APPENDICES

JUNE 1, 2010

Volume II

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APPENDIX VOLUME II

Appendix		Page #
A.	**State Success Factors**	
Appendix A2-5	Letters of Support	1
B.	**Standards and Assessments**	
Appendix B1-1	Common Core State Standards Initiative Consortium Participants	112
Appendix B1-2	Memorandum of Agreement	113
Appendix B1-3	Common Core Standards	117
Appendix B1-4	Outline of International Benchmarking of Common Core Standards	258
Appendix B2-1	PARCC Consortium MOU	260
Appendix B2-2	PARCC Consortium Participants	263

Appendix A2-8
Letters of Support

Name of Organization **Page**

The Honorable Christine Radogno 1
Bill Brady....2
ACT....3
Advance Illinois....5
Alliance for Illinois Manufacturing....7
Alternative Schools Network (ASN)....8
Argonne National Laboratory, Division of Educational Programs (DEP)....9
Associated Colleges of Illinois (ACI)....10
Astellas Pharma US, Inc.....12
AT&T....14
Baxter International, Inc.....15
Bison Gear & Engineering Corp.....17
BNSF Railway....18
Board of Education of the City of Chicago....19
The Chicago Community Trust—Race to the Top Collaborative Fund....21
Chicagoland Chamber of Commerce....22
Commonwealth Edison Company (ComEd)....23
Computing Technology Industry Association (CompTIA)....24
Consortium on Chicago School Research (CCSR) at the University of Chicago, Urban Education Institute....25
Council of Supply Chain Management Professionals (CSCMP)....26
CSC Learning....28
ED-RED....29
Erikson Institute....30
Fermilab....32
The Field Museum....33
IBM....35
Illinois Academy of Physician Assistants (IAPA)....36
Illinois AFL-CIO....37
Illinois Alliance of Administrators for Special Education (IAASE)....38
Illinois Association of Regional Superintendents of Schools (IARSS)....39
Illinois Association of School Administrators (IASA)....40
Illinois Association of School Business Officials (Illinois ASBO)....41
Illinois Board of Higher Education (IBHE)....42
Illinois Biotechnology Industry Organization (iBio)....44
iBio Institute....46
The Illinois Business Roundtable....48
Illinois Leadership Council for Agricultural Education (ILCAE)....50
Illinois Community College Board....52
Illinois Department of Commerce and Economic Opportunity (DCEO)....53
Illinois Department of Transportation (IDOT)....55
Illinois Education Association (IEA)....57

Illinois Education Research Council (IERC) at Southern Illinois University 59
Illinois Federation of Teachers (IFT).....60
Illinois Manufacturers' Association (IMA).....62
Illinois Network of Charter Schools (INCS) 64
Illinois Science and Technology Coalition (ISTC).....65
Illinois Speech-Language-Hearing Association (ISHA) 66
Illinois State Library 67
Center for Renewable Energy, at Illinois State University (ISU).....68
Interactive Illinois Report Card (IIRC).....69
Large Urban District Association (LUDA).....70
Learning Point Associates.....72
Legat Architects.....73
Loyola University Chicago, School of Education 74
Mervis Industries 75
Metropolitan Chicago Healthcare Council (MCHC).....76
Michael A. Johl, LLC 77
Microsoft Corporation 78
Museum of Science and Industry.....79
Northrop Grumman Corp.....80
Ounce of Prevention Fund 81
P-20 Council 84
Parents & Residents Invested in School and Education Reform Coalition (PRISE).....85
Pearson.....86
Peoria Charter School Initiative (PCSI).....87
Promethean 89
Rico Enterprises, Inc.....90
Roosevelt University, College of Education.....92
Scholastic, Inc.....93
Science Olympiad 94
The Security Board 95
Southern Illinois University, Carbondale (SIUC), College of Education and Human Services....96
Southern Illinois University, Carbondale (SIUC).....98
Southern Illinois University, Edwardsville (SIUE), School of Education.....100
Takeda Pharmaceuticals.....102
Tooling & Manufacturing Association (TMA).....103
University of Illinois at Chicago (UIC) 105
National Center for Supercomputing Applications (NCSA) at the University of Illinois Urbana-Champaign 107
Vermillion Advantage.....109
Voices for Illinois Children 110
Illinois Institute for Rural Affairs (IIRA), at Western Illinois University.....111

STATE OF ILLINOIS

JRTC, 100 WEST RANDOLPH, SUITE 16-100
CHICAGO, ILLINOIS 60601

May 17, 2010

Christopher A. Koch, Ed.D.
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Re: Letter of Support for State of Illinois Race to the Top Application

Dear State Superintendent Koch:

We are writing to express our strong support for the comprehensive reforms outlined in the State of Illinois' Race to the Top ("RTTT") application.

We believe that the RTTT competition presents a unique opportunity for Illinois to continue advancing its education agenda, which closely aligns with the RTTT priorities of high standards, data-based decision making, improving human capital, and intensive support for the lowest-performing schools and districts. If awarded a grant in the RTTT competition, Illinois will be able to accelerate and intensify critical work that is already underway.

Illinois has a demonstrated commitment to advancing education reform in RTTT priority areas. Despite the challenges faced by Illinois, strong leadership and collaborative support among key stakeholders have enabled the state to undertake implementation of bold reforms. Within the last eighteen months, the General Assembly has passed and Governor Quinn has signed legislation that:

- Establishes a comprehensive state longitudinal education data system;
- Allows for alternative certification programs to operate independently from higher education;
- Creates new, rigorous teacher and principal evaluation systems that incorporate student growth as a significant factor; and
- Doubles the number of charter schools in Illinois and formally explores the concept of an independent charter school authorizer.

We are confident that the education reform initiatives facilitated by RTTT funding will positively impact Illinois students well beyond the grant period. The Illinois General Assembly has a proven track record of bipartisan support for education reform, and we will provide our continued support to ensure that every child in Illinois is prepared for success in postsecondary education and employment.

Sincerely,

John J. Cullerton
The Honorable John J. Cullerton
Illinois Senate President

Christine Radogno
The Honorable Christine Radogno
Illinois Senate Republican Leader

Michael J. Madigan
The Honorable Michael J. Madigan
Illinois House Speaker

Tom Cross
The Honorable Tom Cross
Illinois House Republican Leader

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BILL BRADY for GOVERNOR

JASON PLUMMER FOR LIEUTENANT GOVERNOR

May 17, 2010

Mr. Arne Duncan
Secretary
U.S. Department of Education
LBJ Education Building
Room 7W311
400 Maryland Avenue, SW
Washington, DC 20202

Dear Mr. Secretary:

Upon careful review of Illinois' Race to the Top application of January 2010, I am pleased to offer this letter of endorsement of the strategies and reforms reflected in it.

A strong education for all of our citizens is essential to rebuilding our economy for the long term. Ensuring that all students have access to world-class schools is the first step toward securing our future. The reforms in this application are a reflection that we are thinking differently about how to improve our schools and bring about a new level of accountability.

As the Republican nominee for Governor of Illinois, it may well fall to my Administration to execute the terms of the state's application. The reforms outlined make sense across the political spectrum and I support the culture of higher expectations, innovation and accountability that are hallmarks of the application. I hope to bring those same elements across all of Illinois state government.

Once again, I am pleased to offer my support for Illinois' application, due to be re-submitted this June. No matter the outcome, Illinoisans will continue to work together, in a bipartisan manner, to support the reforms outlined and oversee their careful implementation to bring success to our schools.

Sincerely,

Bill Brady
State Senator
Bloomington, IL

500 W Monroe
First Floor NE
Springfield, IL 62704

ACT®

Office of the Vice President
Educational Services

May 10, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, IL 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") which you are submitting to the U.S. Department of Education. I, on behalf of ACT, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, ACT, intends to support the implementation of the following components of the State's RTTT plan:

- Developing and Adopting Common Standards
- Establishing new capacities to assist LEAs with the adoption and implementation of Assessments for Learning
- Building off the strengths of the current State high school assessment to promote alignment of middle and high school instruction with college- and work-ready expectation
- Implementing a statewide longitudinal data system
- Supporting research initiatives such as the Index of Teacher Academic Capital
- Conducting workshops and providing resources to support professional development initiatives for teachers and principals
- Implementing the Illinois Partnership Zone initiative, one of the four proposed school intervention models

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jon.erickson@act.org www.act.org

In October 2009, ACT recognized the Illinois State Board of Education with a "Systems of Excellence" award for its commitment to advancing college and career readiness. We are proud to be collaborating with the State on numerous initiatives and look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Jon L. Erickson
Senior Vice President
Educational Services

Advance
ILLINOIS
EVERY STUDENT WORLD READY

May 14, 2010

Governor Pat Quinn
Office of the Governor
James R. Thompson Center
100 W. Randolph Street, Suite 16-100
Chicago, Illinois 60601

Re: Letter of Support for State of Illinois Race to the Top Application, Phase 2

Dear Governor Quinn,

Advance Illinois would like to reinforce its strong support for the comprehensive education reforms outlined in the State of Illinois' Race to the Top ("RTTT") Phase 2 application.

As you know, our advocacy group represents a broad range of Illinoisans, with bipartisan political leadership (co-chaired by former Gov. Jim Edgar and former Secretary of Commerce Bill Daley) and a board of business leaders, community leaders, policy experts and educators. We have recommended Illinois enact many of the reforms called for in RTTT and endorse the state's efforts wholeheartedly.

These reforms will transform the state's schools, replacing an input-driven, compliance-focused system that is failing with an outcome-based, results-oriented system that helps prepare every child in the state to be world-ready.

We offer our continued support in many of the areas of the application. In particular, we offer to continue playing a role in your plan to overhaul the teacher evaluation system in the state. Your plan, passed into law in January, sets Illinois on a path to where teachers are no longer treated like widgets, but given the kind of professional feedback and development they deserve. And, by linking student achievement data to their teachers, we can make the best decisions about instruction and staffing. Advance Illinois has commissioned a study by the National Council on Teacher Quality to assess the caliber of our teacher preparation programs. This process has been in collaboration with the State Board.

Further, we support the State Board's work ahead of this Phase 2 application to redesign principal preparation, creating a performance-driven system that raises and focuses standards and promotes excellence. By tightening the requirements to become a principal and by aligning principal preparation more closely with the precise needs of our schools, the state is taking a strong step toward improving the corps of leaders who are central to the success of our schools.

We continue to support the state's efforts to use data to inform instruction and school improvement. In particular, we hope to keep playing a central role on the working group that is developing the Learning and Performance Management System, founded on a cutting-edge, user-

friendly data system to drive instruction across the state. If RTTT reforms are enacted and successful, our educators will have the support, from quality instructional tools and connections to their colleagues facing the same challenges, to use the data. In addition, improved data quality throughout the state will enable us to track progress and indicators to ensure the state is on track to achieve its education goals from Birth through Career.

Indeed, it's important that the state focus on developing standards for kindergarten readiness and college readiness. Advance Illinois is proud to work together on the team developing the kindergarten readiness standard, along with Illinois-based early education leaders such as Ounce of Prevention and the Erikson Institute. Also, we've called for formative assessments to improve instruction and are heartened to see that captured in the Assessments for Learning section of your RTTT application. In addition, a smart, rigorous model for growth is at the heart of a sound accountability system, allowing us to answer the fundamental question of whether our students are improving over the course of a school year, and from year to year.

We are eager to help you and the State Board with the challenging work of turning around our lowest-achieving schools. We are proud that Illinois was selected by MassInsight as one of three states chosen for the opportunity to focus much-needed outside expertise and resources on this issue. In coordination with the powerful Partnership Zone initiative in the RTTT application, this work promises to dramatically improve the chances for success among our most at-risk populations.

Finally, we congratulate you on the process of the application. By embracing the challenge from the U.S. Department of Education to fully engage our state stakeholders, you have built a robust plan that will endure changes in leadership, be they at the state, district or school level. By working as a team, we believe a new day has dawned, and that Illinois can fulfill its promise to educate all of its children, and prepare them well for the challenges they'll face as adults.

We stand ready to continue working with your office and your strong, progressive team at the State Board. We are eager to keep up the constructive dialogue that has driven this process from the start, and to assist in the implementation of a plan that promises to bring so much good to the citizens of our great state.

Sincerely,

Robin Steans
Executive Director
Advance Illinois

ALLIANCE
FOR ILLINOIS MANUFACTURING

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Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Alliance for Illinois Manufacturing, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Alliance for Illinois Manufacturing recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

Alliance for Illinois Manufacturing is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Pamela McDonough

Pamela McDonough
President/CEO
Alliance for Illinois Manufacturing

Alternative Schools Network
1807 W. Sunnyside Suite 1D
Chicago, IL 60640

Phone: 773-728-4030
Fax : 773-728-3335

Creating Futures Every Day

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

May 3, 2010

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Alternative Schools Network, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Alternative Schools Network intends to support the implementation of the Dropout-Prevention and Re-Enrollment Support component of the Illinois RTTT proposal. With the passage of the Illinois Hope and Opportunities Pathways through Education (IHOPE) and five multi-site high school charters for dropouts in Chicago, Illinois is a strong leader in the country to address the growing crisis of youth who leave school before they earn a high school diploma. The commitment of the Illinois RTTT proposal to allocate $25 million to this component will significantly help thousands of youth who are now on our streets with no hope to return to school and earn a diploma. Also, this will help the graduation rate in the state and many school districts across the state.

Over the last three years, Alternative Schools Network has worked in a close partnership with the Illinois Council on Re-Enrolling Student Who Dropped Out of School and in developing the IHOPE plan and five multi-site charters for high school dropouts. We will continue this partnership to work on implementing these programs through the funding provided in RTTT, particularly for the IHOPE plan.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Jack Wuest
Executive Director

Argonne NATIONAL LABORATORY

Division of Educational Programs
Argonne National Laboratory
9700 S. Cass Avenue, Bldg. 223
Argonne, IL 60439

630-252-4114 Phone
630-252-3193 Fax

May 14, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of *Argonne National Laboratory, Division of Educational Programs,* am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, *Argonne National Laboratory, Division of Educational Programs* recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

Argonne National Laboratory, Division of Educational Programs is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Harold W. Myron

Harold W. Myron, Director
Division of Educational Programs

The Associated
Colleges of Illinois
Established 1952

27 North Wacker Drive
Suite 521
Chicago, Illinois 60606

www.acifund.org

May 12, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

The Associated Colleges of Illinois (ACI) supports the Illinois State Board of Education's goal of turning around low-performing schools through its Race to the Top Application for Initial Funding ("RTTT"), which you are submitting to the U.S. Department of Education. On behalf of the Associated Colleges of Illinois, I am excited about the opportunity to support the work of the Illinois State Board of Education in addressing a key Human Capital Strategy: reform district recruitment and hiring policies -- by providing participating school districts (LEAs) with a *High-Need Schools Internship* (HNSI) program that develops the pipeline of highly qualified teachers prepared specifically for those districts.

Immediate benefits to participating LEA districts include: reducing recruitment costs, relieving teacher shortages, and shrinking attrition rates (and costs) arising from engaging teachers who may not be well prepared or well suited to low performing schools. In addition, *HNSI* advances transformation of teaching to a clinical practice profession, which can result in long-term benefits in the form of a more qualified teacher corps for under performing schools.

ACI will accomplish these goal by partnering its member colleges and universities (IHEs) with host LEAs to operate six-week *High-Need Schools Internships* (HNSIs) -- intensive summer experiences that prepare and position preservice teachers to maintain ongoing relationships with host LEAs, including completing their student teaching and assuming teaching positions in the LEAs in which they have served as interns.

Designed to advance teaching as a professional practice profession, *HNSI*s will 1) actualize the characteristics of clinical practice in the context of Carnegie Corporation's *Teachers for a New Era* (TNE) model for a clinical practice profession (Hinds, 2002); 2) conform to Charlotte Danielson's Framework for Teaching (Danielson, 2007); and 3) combine instruction that addresses content, pedagogy, and socioeconomic and social-emotional factors with hands-on teaching experience -- to build a new pipeline of preservice teachers prepared both for the challenges of

teaching in low performing schools, *and* for the specific cultural, socioeconomic, and intellectual challenges posed by the partner LEAs.

Illinois' RTTT proposal supports the state's education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers, and school leaders by providing educators with access to the data and tools necessary to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that by providing every child with the knowledge, skills, abilities, and attitudes required to succeed in postsecondary education and careers, we can ensure that every student will become a productive citizen in our ever-changing world.

ACI member colleges and universities are committed to the *High-Need Schools Internship* strategy. In addition to the six IHEs with established *HNSI*s, in response to the positive data documenting the success of these internships and the opportunity created by RTTT, many other ACI institutions literally are clamoring for funding to help launch new *HNSI* sites. The institutional commitment of ACI IHEs to *HNSI* represents a significant resource in support of both the internships and of Illinois' anticipated RTTT initiative.

Sincerely,

Jerry Fuller
Executive Director

astellas
Leading Light for Life

January 14, 2010

Governor Pat Quinn
Office of the Governor
James R. Thompson Center
100 W. Randolph Street, Suite 16-100
Chicago, Illinois 60601

Re: Letter of Support for State of Illinois Race to the Top Application

Dear Governor Quinn,

On behalf of Astellas I am writing to express strong support for the comprehensive reforms outlined in the State of Illinois' Race to the Top (RTTT) application. At Astellas science is not only the foundation of our business, it's our passion. We are committed to playing an active role in science education and strongly believe that by doing so we can help drive medical innovation in the future. Through RTTT, Illinois can dramatically improve student performance in science, technology, engineering, and mathematics (STEM) disciplines and prepare them to tackle the challenges of the 21st century.

Our commitment to the Illinois RTTT application expands upon our long standing commitment to foster science educators' needs and help improve science education within Chicago and the surrounding communities. Astellas strongly supports an emphasis on high school reform and the focus on improving transitions into both college and careers—ensuring the development of a well-educated workforce ready for a modern global economy.

We believe the State has identified important and effective high school reform initiatives in its RTTT application including establishing a statewide program for the National Career Readiness Certificate, developing and scaling STEM-related Programs of Study, and building STEM Learning Exchanges. STEM Learning Exchanges, in particular, are important to the success of

Astellas Pharma US, Inc.
Three Parkway North, Deerfield, IL 60015-2537

students because they will bring together the resources and expertise of a wide range of business and industry, education and government partners.

We are committed to partnering with the State to implement the NCRC program and STEM-related Programs of Study throughout the state. Astellas is also willing to serve as a partner with the State in the planning and implementation of STEM Learning Exchanges for health sciences.

We understand that the future of scientific innovation lies in our children and that a child's interest in science is sparked in the classroom. We look forward to working with the State of Illinois and other stakeholders to implement the initiatives outlined in Illinois' Race to the Top application.

Sincerely,

Seigo Kashii
President and CEO
Astellas Pharma US, Inc.

at&t

Paul V. La Schiazza
President
AT&T Illinois

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Governor Pat Quinn
Office of the Governor
James R. Thompson Center
100 W. Randolph Street, Suite 16-100
Chicago, Illinois 60601

Re: Letter of Support for State of Illinois Race to the Top Application

Dear Governor Quinn,

I am writing to express strong support for the comprehensive reforms outlined in the State of Illinois' Race to the Top (RTTT) application. I believe that RTTT presents an unparalleled opportunity to position Illinois to dramatically improve student performance and outcomes and serve as a leader in preparing students in science, technology, engineering, and mathematics (STEM) disciplines.

I support the strong emphasis on high school reform and the focus on improving transitions into both college and careers which will ensure the development of a well-educated workforce ready for a modern global economy. I believe the State has identified important and effective high school reform initiatives in its RTTT application, including: establishing clear college-ready expectations with standardized placement scores, establishing a statewide program for the National Career Readiness Certificate (NCRC), increasing student preparation and rigor in math, and developing and scaling STEM-related Programs of Study.

The NCRC will be an important career readiness credential relevant to a wide range of careers. The STEM-related Programs of Study offer a promising approach for high school reform that will enable students to make real-world connections with their academic and career interests. STEM Learning Exchanges are critical to the success of STEM-related programs of study because they will bring together the resources and expertise of a wide range of business and industry, education and government partners.

I look forward to working with the State of Illinois and other stakeholders to help implement the initiatives outlined in Illinois' Race to the Top application. Please keep me informed of RTTT progress and any opportunities to assist in implementation of the RTTT plan.

Sincerely,

Paul La Schiazza
President – AT&T Illinois

Cc: Eileen Mitchell

USA Proud Sponsor of the U.S. Olympic Team

Baxter

Norbert Riedel
Corporate Vice President / Chief Scientific Officer

January 15, 2010

Governor Pat Quinn
Office of the Governor
James R. Thompson Center
100 W. Randolph Street, Suite 16-100
Chicago, Illinois 60601

Re: Letter of Support for State of Illinois Race to the Top Application

Dear Governor Quinn,

I am writing to express strong support for the comprehensive reforms outlined in the State of Illinois' Race to the Top (RTTT) application. We believe that RTTT presents an unparalleled opportunity for Illinois to dramatically improve student performance and outcomes and serve as a leader in preparing students in science, technology, engineering, and mathematics (STEM) disciplines.

As a global corporation that manufactures and markets products that save and sustain lives, Baxter International is committed to helping students become inspired and excited by science. We believe students deserve every opportunity to experience science first hand. And, in connection with talented Baxter professionals, we hope to enable them to advance medicine, technology and engineering for generations to come.

To that end, in 2008 Baxter launched *Science @ Work: Expanding Minds with Real-World Science* in partnership with Chicago Public Schools (CPS), Renaissance Schools Fund (RSF) and Illinois Institute of Technology, as a five year, three-part program aimed at providing enhanced biotechnology science education opportunities for CPS students and teachers. In its first year, the program has reached hundreds of teachers and thousands of students with biotechnology curricula.

We support the strong emphasis on high school reform and the focus on improving transitions into both college and careers—ensuring the development of a well-educated workforce ready for a modern global economy. We believe the State has identified important and effective high school reform initiatives in its RTTT application including establishing a statewide program for the National Career Readiness Certificate (NCRC) and developing and scaling STEM-related Programs of Study.

The NCRC will be an important career readiness credential relevant to a wide range of careers. The STEM-related Programs of Study offer a promising approach for high school reform that will enable students to make real-world connections with their academic and career interests. STEM Learning Exchanges are critical to the success of STEM-related programs of study because they will bring together the resources and expertise of a wide range of business and industry, education and government partners.

Baxter Healthcare Corporation
One Baxter Parkway / Deerfield, Illinois 60015
T 847 948 2000

Norbert Riedel
Corporate Vice President / Chief Scientific Officer

Through existing partnerships Baxter has with the iBIO Institute, we are committed helping implement the NCRC program and STEM-related Programs of Study.

We are also willing to help plan and implement STEM Learning Exchanges for Health Sciences where applicable. We are committed to supporting STEM Learning Exchange activities including the development of e-learning curriculum resources, professional development programs for teachers. In our first year working with CPS, we have provided biotechnology education support to more than 24,000 Chicago Public School students and 352 teachers in 109 schools. We look forward to furthering involvement in science education initiatives where Baxter's support can play a role in developing young minds.

We have seen the critical role our corporation plays in furthering educational opportunities, and we look forward to working with the State of Illinois and other stakeholders to implement the initiatives outlined in Illinois' Race to the Top application. Please keep me informed of RTTT progress and any opportunities to assist in implementation of the RTTT plan.

Sincerely,

Norbert G. Riedel, Ph.D.
Corporate Vice President
Chief Scientific Officer

Cc: David Miller, iBIO Institute
Valery Gallagher, Baxter Government Affairs and Public Policy

NGR:er

cc: R. Parkinson
D. Scharf

Baxter Healthcare Corporation
One Baxter Parkway / Deerfield, Illinois 60015
T 847.948 2000

May 11th, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. On behalf of ***Bison Gear & Engineering Corporation and as a member of the Illinois P-20 Council***, I'm excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, ***Bison Gear & Engineering*** recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students that will increase both their global competitiveness and ultimately companies like ours that depend on a pipeline of STEM practitioners at both entry and professional levels . The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

In addition, as the Immediate Past Chairman of the ***Illinois Manufacturers Association***, please be assured that the manufacturing community in Illinois is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely

Ronald D Bullock

Ronald D Bullock
Chairman

Paul E. Nowicki
Assistant Vice President
Government & Public Policy

BNSF Railway Company
547 West Jackson Blvd., Ste. 1509
Chicago, IL 60661-5717
tel 312-850-5678
fax 312-850-5677
email paul.nowicki@bnsf.com

May 25, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of BNSF Railway am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, BNSF Railway recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

BNSF Railway is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Paul Nowicki

Paul E. Nowicki

Board of Education

CITY OF CHICAGO

125 SOUTH CLARK STREET • 6TH FLOOR
CHICAGO, ILLINOIS 60603

TELEPHONE (773) 553-1600
FAX (773) 553-1601

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May 26, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Initial Funding ("RTTT") which you are submitting to the U.S. Department of Education. As President of the Board of Education of the City of Chicago, I am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

In particular, I am pleased to see the extent to which the RTTT proposal supports and aligns with current reform initiatives in the Chicago Public Schools. This includes closing or turning around underperforming schools, working with CPS teachers and administrators and private sector partners to open new schools, creating more choice for parents and guardians in neighborhoods that historically have been served by underperforming schools, and using student growth data to measure teacher and principal performance. Much of our work has been done with local funds. We view the Illinois RTTT proposal as an important source of additional funding that will allow us to improve and expand these programs.

At the same time that we look forward to the continued development of these programs in Chicago, we also believe that the knowledge and experience we have gained over the past several years will be of significant value to Illinois as it implements similar strategies at the state level. We look forward to partnering with ISBE in the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Mary B. Richardson-Lowry
President

cc: Jesse Ruiz
Ron Huberman

THE CHICAGO COMMUNITY TRUST
AND AFFILIATES

EXECUTIVE COMMITTEE

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Michael Tang

Terry Mazany
President & CEO

May 13, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

We are writing to applaud you for your efforts to secure funding from the U.S. Department of Education's "Race to the Top" ("RTTT") Fund. We are excited about the opportunity the federal RTTT grant would provide to help the State of Illinois make some needed reforms to improve education. The sorely needed resources will allow Illinois to continue to develop an educational system, from preschool to high school, which will prepare each and every child in Illinois for success in postsecondary education and the workforce and to lead a productive life.

The RTTT proposal supports the Illinois education reform agenda by assuring that we adopt world class standards and assessments for students, teachers and school leaders; by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes; by supporting the development of effective principals and teachers; and, by providing supports to turn around our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes will succeed in postsecondary education and careers and will become a productive citizen.

The 18 members of The Race to the Top Initiative – a short-term collaborative fund of The Chicago Community Foundation—have already demonstrated our financial support to the Illinois State Board of Education (ISBE) for this important endeavor by providing a grant to develop this application. The foundations remain committed to continued conversations with the state to share ideas and strategies for the long-term improvement of education in Illinois.

On behalf of The Race to the Top Initiative collaborative fund, we look forward to continuing this partnership with the Illinois State Board of Education to improve education for all children.

Sincerely,

Nora Moreno Cargie
Director of Global Citizenship
The Boeing Company Charitable Trust
Co-chair, Illinois Race to the Top Initiative

Gudelia López
Senior Program Officer
Chicago Community Trust
Co-chair, Illinois Race to the Top Initiative

111 East Wacker Drive, Suite 1400, Chicago, IL 60601 | 312.616.8000 | Fax 312.616.7955 | www.cct.org

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MAY 17 2010 #6
State Superintendent of Education

CHICAGOLAND
CHAMBER OF COMMERCE

May 12, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. On behalf of the Chicagoland Chamber of Commerce, I am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, the Chicagoland Chamber of Commerce recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

The Chicagoland Chamber of Commerce is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Gerald Roper
President & CEO

200 E. Randolph Street, Suite 2200, Chicago, IL 60601 www.chicagolandchamber.org 312.494.6700 fax: 312.861.0660

Commonwealth Edison Company
Chase Tower
10 S. Dearborn St., 50th Floor
Chicago, IL 60603

www.exeloncorp.com

An Exelon Company

May 14, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of ComEd, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, ComEd recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

ComEd is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Paula Conrad
Corporate Citizenship Manager

CompTIA.

May 18, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express the Computing Technology Industry Association's (CompTIA's) support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. CompTIA is excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will increase Illinois' opportunity to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, CompTIA recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

CompTIA is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Todd Thibodeaux
President and CEO

1815 S. Meyers Road Suite 300 Oakbrook Terrace, IL 60181-5228 Phone: 630.678.8300 Fax: 630.678.8384

www.comptia.org

CONSORTIUM ON
CHICAGO SCHOOL RESEARCH
AT THE UNIVERSITY OF CHICAGO
CROWN CENTER FOR SOCIAL POLICY
CCSR

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Chris:

I am writing to express our enthusiastic support for Illinois's Race to the Top Application for Initial Funding ("RTTT") which you are submitting to the U.S. Department of Education. On behalf of the Consortium on Chicago School Research (CCSR) at the University of Chicago, I am excited about the opportunity the federal RTTT grant provides for the State of Illinois to move forward on a set of ground-breaking education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

CCSR will work to support the implementation of a number of components of the state's plan including its efforts to develop data systems to support instruction, produce and support great teachers and leaders, and turn around the state's lowest achieving schools. Specifically, CCSR will work as an active partner on the proposed Illinois Collaborative for Education Policy Research (ICEPR), an innovative state research and development partnership modeled directly on the experience of CCSR in Chicago. We believe the ICEPR will play a crucial role in shaping the state's learning about the implementation of RTTT priorities, help communicate these findings widely to key stakeholders in the state and assist practitioners in developing their own research capacity for data collection and analysis.

Our work in Chicago teaches us that careful, rigorous research on key policy priorities—research that is grounded in the problems practitioners face—can effectively build the capacity of education systems to improve over time. We are confident such a model can work equally well in a state committed to the kinds of far reaching reforms described in the Illinois plan.

We look forward to enthusiastically partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms.

Sincerely,

Paul Goren
Lewis-Sebring Director

Council of Supply Chain Management Professionals
333 East Butterfield Road, Suite 140 Lombard, IL 60148-5617
phone 630.574.0985 fax 630.574.0989

CSCMP

May 19, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of the Council of Supply Chain Management Professionals (CSCMP), am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

CSCMP intends to support the implementation of the following components of the State's RTTT plan:

- Planning and implementation of supply chain, transportation, distribution and logistics education curriculum
- Development of e-learning curriculum resources (where applicable)
- Professional development programs for teachers, and expanding internships and career development opportunities for students.

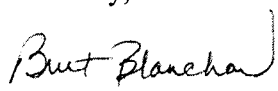
CSCMP will specifically undertake to support the State's RTTT plan through the following actions of support:

- Provide people/resources from industry
- Expand real-time knowledge through assistance to companies (e.g. facility tours, briefings from industry experts, etc.)

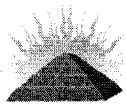
www.cscmp.org

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,



Mr. Burt Blanchard
Director, Business Relations and Solutions
Council of Supply Chain Management Professionals



CSC LEARNING
Research-based, Web-enabled Academic Interventions for RTI

May 5, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of CSC Learning, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

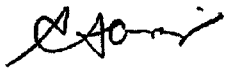
Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, CSC Learning intends to support the implementation of the following components of the State's RTTT plan by providing teachers and principals with:

- Real-time access to data and reduce duplicative reporting requirements
- High quality mentoring, including intensive training in the use of data to improve student growth
- Detailed student growth data to support the development/implementation of frameworks and processes to support teachers and principals in the implementation of new evaluations
- Implementation planning services and research-based, web-delivered academic interventions for RTI into the State's RTTT plan (e.g. Lexia, Reading Plus)
- Site/District/Regional professional development opportunities in the use of online formative assessments to support the State's Proposed Technology Infrastructure
- Develop and deliver training for teachers and principals through our numerous existing partnerships, including ROE's, Special Education Cooperatives and Professional Organizations (e.g. ROE 21, LEASE, WCISEC, TCSEA, TMCSEA, FDSE, Champaign, Infinitec Coalition).

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,



Name: Caroline Sanchez Crozier
Title: President

CSC Learning
1613 S. Michigan Ave. ◆ Chicago, IL 60616
Phone: 877-211-3998 ◆ Fax: 877-211-8623
www.csclearning.com

ED-RED

EDUCATION • RESEARCH • DEVELOPMENT

Erika N. Lindley
Executive Director

"The voice of suburban schools"

1131 South Dee Road
Park Ridge, Illinois 60068
Voice: 847-692-8048
Fax: 847-696-3254
http://www.ed-red.org

May 24, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") which you are submitting to the U.S. Department of Education. ED-RED is excited about the opportunities provided by the federal RTTT grant. These funds will move the State of Illinois forward on ground-breaking, transformative education reforms.

Illinois' financial situation will make it difficult to increase funding and necessary support to our districts over the next few years. The RTTT funding is especially important this year. The Illinois State Board of Education and education stakeholders have created a true reform agenda for the State with the support of the Illinois General Assembly and Governor Pat Quinn. The RTTT funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague chronically low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools. Thanks to the agency's leadership, the Illinois General Assembly passed two related pieces of legislation: strengthening the significance of teacher and principal evaluations and expanding the number of entities that can offer alternative certification programs. Both bills were signed into law by Governor Pat Quinn with his strong support. You and your staff successfully negotiated with education stakeholders and legislators and achieved a rare outcome – a collaborative legislative effort. **I believe this illustrates your interest in working with stakeholders during the implementation process to ensure our districts have the necessary tools to comply with the vision set forth by the U.S. Department of Education and Illinois State Board of Education.** ED-RED strongly supports the legislation and will continue to support the agency's reform efforts.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers will become a productive citizen in our ever-changing world. In addition to RTTT, ED-RED will continue to support the agency's work to develop a statewide longitudinal data system and pursue the Common Core standards. We are excited about the potential of a data system networking local districts, higher education, and the state agency. This system will provide valuable information to our schools and assist our policy makers in determining priorities. As far as standards, there is much that Illinois can share and learn from other states, and this nationwide effort at has tremendous possibilities. Thank you, Dr. Koch, for your leadership in this national effort.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Erika Lindley
Executive Director

Samuel J. Meisels, President
Irving and Neison Harris President's Chair
451 North LaSalle Street
Chicago, Illinois 60654-4510
312-893-7100 | 312-755-0133 |
www.erikson.edu

May 4, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Erikson Institute, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Erikson Institute intends to support the implementation of the following components of the State's RTTT plan: the Kindergarten Readiness assessment program and the training of K – 3 teachers. We have been the lead agency for planning the Kindergarten Readiness assessment development taking place in the state at this time and we look forward to sharing this information on a larger plane. Similarly, we have been working with 11 schools in CPS regarding K – 3 issues. It will be a pleasure to scale this work up to the state as a whole.

Erikson Institute will specifically undertake to support the State's RTTT plan through the following actions of support: Development of a plan for state-wide Kindergarten Readiness assessment and professional development of teachers, K – 3.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Samuel J. Meisels
President

SJM:dm

Fermilab

Marjorie G. Bardeen
Education Office
Workforce Development and Resources Section
630.840.2031
630.840.8248 fax
mbardeen@fnal.gov

May 12, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

On May 12, the first National Lab Day, I am pleased to write in support of the Race to the Top Application for Phase 2 Funding (RTTT) that you are submitting to the U.S. Department of Education. On behalf of Fermilab, I want to express our excitement regarding the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The funds will allow Illinois to continue to develop an educational system that will prepare Illinois children for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world-class standards and assessments for students, teachers and school leaders. The proposal provides teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turn around our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen.

As a national science research institution, Fermilab recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and mathematics.

We look forward to the opportunities that this proposal offers Illinois students.

Sincerely,

Marjorie G. Bardeen

Marjorie G. Bardeen
Manager

The Field Museum exploring the earth and its people

May 17, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of The Field Museum of Natural History, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools. Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, The Field Museum recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The Field Museum serves hundreds of thousands of children each year, throughout the region and the state, through our education programs, exhibitions, outreach programs, and digital programs. Improving the quality of instruction in science is a key focus for us. We focus in particular on early elementary and high school professional development for science educators, seeking to improve educators' content knowledge, inquiry teaching skills, and use of museum resources.

The Field Museum's and The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

1400 S. Lake Shore Drive
Chicago, Illinois 60605-2496
Telephone 312.922.9410

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The Field Museum exploring the earth and its people

The Field Museum is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Elizabeth C. Babcock

Elizabeth C. Babcock, Ph.D.
Vice President of Education and Library Collections

1400 S. Lake Shore Drive
Chicago, Illinois 60605-2496
Telephone 312.922.9410

Printed on recycled paper

May 15, 2010

Governor Pat Quinn
Office of the Governor
James R. Thompson Center
100 W. Randolph Street, Suite 16-100
Chicago, Illinois 60601

Re: Letter of Support for State of Illinois Race to the Top Application

Dear Governor Quinn,

I am writing to express strong support for the comprehensive reforms outlined in the State of Illinois' Race to the Top (RTTT) application. I believe that RTTT presents an unparalleled opportunity for Illinois to dramatically improve student performance and outcomes and serve as a leader in preparing students in science, technology, engineering, and mathematics (STEM) disciplines.

I support the strong emphasis on high school reform and the focus on improving transitions into both college and careers—ensuring the development of a well-educated workforce ready for a modern global economy. I believe the State has identified important and effective high school reform initiatives in its RTTT application including establishing a statewide program for the National Career Readiness Certificate (NCRC) and developing and scaling STEM-related Programs of Study.

The NCRC will be an important career readiness credential relevant to a wide range of careers. The STEM-related Programs of Study offer a promising approach for high school reform that will help enable students to make real-world connections with their academic and career interests. STEM Learning Exchanges are critical to the success of STEM-related programs of study because they will bring together the resources and expertise of a wide range of business and industry, education and government partners.

I am committed to collaborating with the State to foster STEM-related Programs of Study throughout the state. IBM has a long history of fostering STEM education in the State of Illinois. As an IT company, we want to encourage the education community in training a workforce that is capable of using computing effectively. Facilitating STEM careers is the foremost societal concern of the IBM Corporation.

I look forward to working with the State of Illinois and other stakeholders to implement the initiatives outlined in Illinois' Race to the Top application. Please keep me informed of RTTT progress and any opportunities to assist in implementation of the RTTT plan.

Sincerely,

Robert D. Reid, III

IBM Corporate Citizenship and Corporate Affairs
71 South Wacker Drive
20th Floor
Chicago, IL 60606

ILLINOIS ACADEMY OF PHYSICIAN ASSISTANTS

RECEIVED
MAY 19 2010 #1
State Superintendent of Education

May 17, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

On behalf of myself, the Illinois Academy of Physician Assistants' board of directors and the PA profession in Illinois, I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") submission to the U.S. Department of Education.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Illinois Academy of Physician Assistants recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment.

The STEM efforts will provide critical life-long learning skills for students continuing their undergraduate and graduate level courses. The PA profession takes pride in their dedication to healthcare excellence by providing PA students with the knowledge and skills necessary to deliver quality healthcare and increase access to care in the changing healthcare environment. The number of PAs is growing in Illinois as the profession is recognized as one of the top five medical professions. As the PA profession grows, so too will the number of Illinois PA programs. Not only will RTTT provide the basic learning skills of our future PA students, but also the future PA Program staff and faculty.

The Illinois Academy of Physician Assistants is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges. We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Sarah Smalley, MMS, PA-C

Sarah Smalley, MMS, PA-C
President, 2010

225 East Cook Street, Springfield, Il 62704 800-975-9344 217-241-0232 www.IllinoisPA.org info@IllinoisPA.org

534 S. Second Street, Suite 200
Springfield, Illinois 62701-1764
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999 McClintock Drive, Suite 100
Burr Ridge, Illinois 60527-0844
312/251-1414 • Fax: 312/251-1420

OFFICERS
Michael T. Carrigan, President
Timothy E. Drea, Secretary Treasurer

www.ilafl-cio.org

May 18, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Re: Letter of Support for State of Illinois Race to the Top Phase II Application

Dear Dr. Koch:

As the president of the Illinois AFL-CIO, I am writing to express support for the State of Illinois' Race to the Top (RTTT) Phase II application. The Illinois AFL-CIO represents one million union members and is the voice of all working families in the state, and we welcome the opportunity to be a key partner in building a stronger workforce for Illinois.

I believe that the State's RTTT application will position Illinois as a leader in preparing students in science, technology, engineering, and mathematics (STEM) disciplines including careers in the construction industry.

STEM-related Programs of Study offer a promising approach for helping students build strong math and science skills by making real-world connections with their academic and career interests. STEM Learning Exchanges are critical to the success of STEM-related programs of study because they will bring together the resources and expertise of a wide range of industry, government, education and the labor community to be partners in this effort.

The Illinois AFL-CIO is willing to serve as a partner with the State in the planning and implementation of the STEM Learning Exchange for Architecture and Construction. We are committed to supporting STEM Learning Exchange activities including the development of e-learning curriculum resources, professional development programs for teachers, and expanding internships and career development opportunities for students.

Sincerely,

Michael T. Carrigan
President

MTC/br
LIUNA362aflcio

IAASE Illinois Alliance of Administrators of Special Education
A subdivision of the Council of Administrators of Special Education http://www.iaase.org
P.O. Box 357 – Vandalia, Illinois 62471

RECEIVED
MAY 17 2010 #5
State Superintendent of Education

May 6, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Illinois Alliance of Administrators of Special Education am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Illinois Alliance of Administrators of Special Education intends to support the implementation of the following components of the State's RTTT plan: providing effective support to teachers and principals, and intensive support educator support for critical transition points as outlined in MOU support documentation.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Susanne Carrescia

Susanne Carrescia
President
IAASE

Illinois State Superintendent Dr. Chris Koch
Illinois State Board of Education
100 N First St
Springfield, IL 62777-0001

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of the Illinois Association of Regional Superintendents of Schools (IARSS), am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, the IARSS intends to support the implementation of the following component of the State's RTTT plan: IARSS will assist in the regional delivery of services for the system of support for under-performing schools.

The IARSS will specifically undertake to support the State's RTTT plan through the following actions of support: The IARSS will take the lead in regional delivery of services to schools, and serve as a Lead and Supporting Partner for schools in the Turn-Around process.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Gilbert E Morrison, Jr.
President, IARSS

☆ ILLINOIS
IASA
ASSOCIATION OF SCHOOL ADMINISTRATORS

BRENT CLARK, Ph.D.
Executive Director

May 27, 2010

Via Electronic Transmission and First Class Mail

Dr. Christopher A. Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street
Springfield, Illinois 62777

Re: Illinois Association of School Administration/Race to the Top Application

Dear Dr. Koch:

The purpose of this letter is to assist in Illinois' Race to the Top Application for Initial Funding ("RttT") as developed by the Illinois State Board of Education and submitted to the U.S. Department of Education on behalf of all Illinois children.

First, the IASA commends the Board, Administration and Staff of ISBE for all of its time, dedication and tireless effort in the development of Illinois' RttT Application for Initial Funding. The IASA recognizes and appreciates the work product given ever-decreasing funding and resources. It is our honor to work together in our collective quest to better public education in Illinois.

Furthermore, the IASA commits to work collectively and collaboratively with ISBE and all education stakeholders on behalf of Illinois school communities. The IASA will continue to lead and participate in meetings, committees and task forces, such as the Education Stakeholders Meeting, IASA/ISBE Advisory Committee, P-20 Council and Performance Evaluation Advisory Council, once established. It is the intent of the IASA to continue to work together with all education stakeholders to develop the best educational environment for all Illinois administrators, staff and children.

Last, the IASA will strive to facilitate development and implementation of laws, regulations, policies, protocols and procedures for the betterment of public education, given adequate supports, sustainable funding and all committed responsibilities of ISBE and the State and Federal government are provided. However, the IASA will not support legislation, regulations and/or policies which will negatively impact the employment of educational employees without justifiable cause or due process under the law. To this end, the IASA will make every effort to commit its time, talents and resources to ISBE and other education stakeholders for the sustained improvement of education in Illinois.

Yours for better schools,

Brent Clark

Dr. Brent Clark
Executive Director
Illinois Association of School Administrators

2648 Beechler Court ★ Springfield, Illinois 62703-7305 ★ 217/753-2213 ★ FAX 217/753-2240
Email: iasa@iasaedu.org World Wide Web: http://www.iasaedu.org

ILLINOIS
ASSOCIATION OF SCHOOL BUSINESS OFFICIALS

Northern Illinois University (IA-103)
108 Carroll Avenue, DeKalb, IL 60115

May 27, 2010

Via Electronic Transmission

Dr. Christopher A. Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to provide support for the Race to the Top Application for Initial Funding ("RTTT"), which you are submitting to the U.S. Department of Education.

On behalf of the Illinois Association of School Business Officials ("Illinois ASBO") I pledge our continuing commitment to assist you and the Illinois State Board of Education ("ISBE") in the implementation of the RTTT grant. In addition, we will be pleased to collaborate with ISBE and other stakeholders and legislators to provide additional guidance toward the development and communication of related policies. We also pledge to work together with ISBE and other committees or task forces such as the Education Stakeholders, Illinois Education Roundtable, P-20 Council, and the Performance Evaluation Advisory Council as each has a role in recommending legislation, regulations, procedures and practices to support RTTT.

As you know, we share the concerns of all school districts and policy makers regarding the need for sufficient, reliable and sustainable funding to support the current and future system of public schools in Illinois. This includes both the initiation and maintenance of any new or continuing practices. RTTT is surely intended to make a difference for the children of Illinois and the receipt of this grant will assist many districts in taking initial steps toward implementation. That said, we believe it is critical that we also be doubly committed to collectively maintaining the focus of policymakers and legislators on the need for sustainable and reliable funding from the State of Illinois to support these reforms.

Finally, as particular legislation, regulations, procedures and practices emerge, we will be dedicated to support those elements that do not unjustly impact the employment of teachers and school leaders. This is an excellent opportunity in Illinois to encourage sound policy and reform that will positively impact the future of children and we look forward to being an ongoing partner in RTTT.

Sincerely,

Michael Jacoby
Executive Director

ph: 815.753.1276 | fax: 815.753.9367 | online: www.iasbo.org

ILLINOIS BOARD OF HIGHER EDUCATION

431 EAST ADAMS STREET, 2ND FLOOR
SPRINGFIELD, ILLINOIS 62701-1404

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Executive Director
Judy Erwin

May 5, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 North First Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I wish to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") which the Illinois State Board of Education is submitting to the U.S. Department of Education. As Executive Director of the Illinois Board of Higher Education, I am excited about the opportunities the federal RTTT grant will provide to advance ground-breaking, transformative education reforms for the State of Illinois. These funds will enable Illinois to persist in the development of an outstanding educational system that will prepare each and every child in Illinois for success in postsecondary education and the workforce. In addition, RTTT funds will support Illinois' work in addressing the problems continually plaguing persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders. It will support Illinois' goals of providing teachers and school leaders with access to essential data, developing vital tools and resources to improve student outcomes, and turning around our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, the Illinois Board of Higher Education intends to support the implementation of the following components of the State's RTTT plan: Improving Teacher and Principal Effectiveness; Expansion and Adaptation of Statewide Longitudinal Data Systems; and P-20 Coordination, Vertical and Horizontal Alignment.

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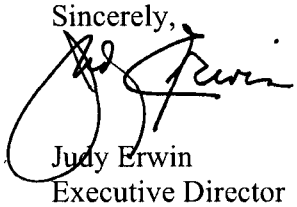
The Illinois Board of Higher Education will specifically undertake to support the State's RTTT plan through the following actions of support: Work in partnership with the ISBE to strengthen teacher and principal qualifications by assisting with preparation work teams; work with institutions of higher education to ensure essential data and information is available for inclusion in and expansion of the statewide longitudinal data system; and work with member postsecondary institutions to implement standardized ACT placement scores for credit-bearing coursework in the State's public universities.

We at the Illinois Board of Higher Education look forward to partnering with, and assisting, the Illinois State Board of Education on the development and the implementation of the Race to the Top proposed reforms and programs.

Sincerely,



Judy Erwin
Executive Director

ILLINOIS BIOTECHNOLOGY
INDUSTRY ORGANIZATION

Kris Lutt
CHAIRMAN, BOARD OF DIRECTORS

January 14, 2010

Governor Pat Quinn
Office of the Governor
James R. Thompson Center
100 W. Randolph Street, Suite 16-100
Chicago, Illinois 60601

Re: Letter of Support for State of Illinois Race to the Top Application

Dear Governor Quinn,

I am writing to express the iBIO Institute's strong support for—and pledge our assistance to—the comprehensive reforms outlined in the State of Illinois' Race to the Top (RTTT) application.

World-class education is necessary for Illinois to develop a workforce able to meet the challenges of the global economy. At iBIO, as at Archer Daniels Midland Company (ADM), we believe that RTTT presents an unparalleled opportunity for Illinois to serve as a leader in preparing students in science, technology, engineering, and mathematics (STEM) disciplines.

I also support the application's strong emphasis on high school reform and the focus on improving transitions into both college and careers. I believe the State has identified important high school initiatives in its RTTT application including establishment of a statewide program for the National Career Readiness Certificate (NCRC) as well as development and scaling of STEM-related Programs.

iBIO Institute and its corporate partners successfully partnered with the State of Illinois' Department of Commerce and Economic Opportunity and State Board of Education on Illinois Innovation Talent, a STEM-focused, industry-led, problem-based learning pilot program. This novel program demonstrated the transformation possible when students connect academic learning with real-world careers and professionals.

65 East Wacker Place
Suite 1600
Chicago IL 60601

Phone 312-422-1111

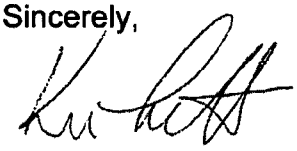
Fax 312-422-1145

Each day, the employees of ADM transform crops such as corn, oilseeds, wheat and cocoa into food ingredients, animal feeds, and agriculturally derived fuels and chemicals that serve vital needs of the global marketplace. The NCRC will be an important career readiness credential relevant to a wide range of careers. And STEM Learning Exchanges are important to the success of STEM-related programs of study, because they bring together the resources and expertise of a wide range of business and industry, education and government partners.

The iBIO Institute is willing to serve as a partner with the State in the planning and implementation of STEM Learning Exchanges for Health Sciences and Agriculture and Natural Resources. Specifically, we are committed to growing and leveraging our existing Institute programs—such as SCI: Science Career Investigation®, and TalentSparks!® teacher professional development in biotechnology to support the RTTT plan. We will continue to assist STEM Learning Exchange activities promoting the development of e-learning curriculum resources, professional development programs for teachers, and expanding internships and career development opportunities for students.

Governor Quinn, I look forward to working with the State of Illinois and other stakeholders to implement the initiatives outlined in Illinois' Race to the Top application. Please keep me informed of RTTT progress and let me know if there is anything further I and the iBIO Institute can do to support this important work.

Sincerely,



Kris Lutt
Advisor-Office of the Chairman
Archer Daniels Midland Company
Chairman, board of directors, iBIO

iBIO INSTITUTE
EDUCATION • TRAINING • RESEARCH

David E. Miller
PRESIDENT & CEO

January 14, 2010

Governor Pat Quinn
Office of the Governor
James R. Thompson Center
100 W. Randolph Street, Suite 16-100
Chicago, Illinois 60601

Re: Letter of Support for State of Illinois Race to the Top Application

Dear Governor Quinn,

I am writing to express the iBIO Institute's strong support for—and pledge our assistance to—the comprehensive reforms outlined in the State of Illinois' Race to the Top (RTTT) application.

World-class education is necessary for Illinois to develop a workforce able to meet the challenges of the global economy. At the Institute, we believe that RTTT presents an unparalleled opportunity for Illinois to serve as a leader in preparing students in science, technology, engineering, and mathematics (STEM) disciplines.

I also support the application's strong emphasis on high school reform and the focus on improving transitions into both college and careers. I believe the State has identified important high school initiatives in its RTTT application including establishment of a statewide program for the National Career Readiness Certificate (NCRC) as well as development and scaling of STEM-related Programs.

iBIO Institute and its corporate partners successfully partnered with the State of Illinois' Department of Commerce and Economic Opportunity and State Board of Education on Illinois Innovation Talent, a STEM-focused, industry-led, problem-based learning pilot program. This novel program demonstrated the transformation possible when students connect academic learning with real-world careers and professionals.

The NCRC will be an important career readiness credential relevant to a wide range of careers. And STEM Learning Exchanges are important to the success

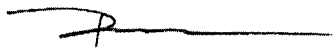
65 EAST WACKER PLACE SUITE 1600 CHICAGO IL 60601 PHONE 312-422-1111 FAX 312-422-1145 www.ibioinstitute.org

of STEM-related programs of study, because they bring together the resources and expertise of a wide range of business and industry, education and government partners.

The iBIO Institute is willing to serve as a partner with the State in the planning and implementation of STEM Learning Exchanges for Health Sciences and Agriculture and Natural Resources. Specifically, we are committed to growing and leveraging our existing Institute programs—such as SCI: Science Career Investigation®, and TalentSparks!® teacher professional development in biotechnology to support the RTTT plan. We will continue to assist STEM Learning Exchange activities promoting the development of e-learning curriculum resources, professional development programs for teachers, and expanding internships and career development opportunities for students.

Governor Quinn, I look forward to working with the State of Illinois and other stakeholders to implement the initiatives outlined in Illinois' Race to the Top application. Please keep me informed of RTTT progress and let me know if there is anything further I and the iBIO Institute can do to support this important work.

Sincerely,



David Miller
President & CEO
iBIO Institute

The Illinois Business RoundTable

200 East Randolph Street
Suite 2200
Chicago, IL 60601
Ph: 312-228-0731 | Fx: 312-228-0732
www.IllinoisBusinessRoundtable.com

May 18, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Re: Letter of Support for State of Illinois Race to the Top Application

Dear Dr. Koch:

On behalf of the members of the Illinois Business Roundtable, I am writing to express our strong support for the comprehensive education reforms outlined in Illinois' Race to the Top ("RTTT") application.

Having been involved in education improvement efforts in Illinois for the last two decades, this application represents both a stretch and a road map for meaningful improvement strategies. This is completely in keeping with the intent of the RTTT challenge. It is my expectation that local districts choosing to participate in the state application will be equally stretched.

Illinois' application builds rationally upon some of the great things we've been able to accomplish recently in Illinois. Just last spring we put in place a longitudinal data system. This application will enhance it and move it forward faster. With better data, a statewide performance management system is proposed that will link student performance to teacher evaluations and program effectiveness. Illinois' newly constituted P-20 Council will guide future state efforts to build the seamless education and workforce development system, using these enhanced tools.

This application will also offer students multiple rigorous and valid pathways to college and careers. Toward this end, it establishes clear college and work-ready expectations with both the ACT standardized assessment and the ACT's National Career Readiness Certificate ("NCRC"), built into our Prairie State Achievement Exam taken by all Juniors in high school. I am committed to partnering with the State to implement the NCRC program, and look forward to participating in NCRC-related career development programs for students and working to promote the NCRC as a tool for verification of workplace skills.

Members of the Illinois Business Roundtable are encouraged by the bold new state and local partnership vision advanced in the application. This application uniquely positions STEM-related Programs of Study with Learning Exchanges in nine targeted industry clusters to offer a useful structural approach for high school reform that will enable students to make real-world

Chairman
RICHARD D. STEPHENS
The Boeing Company

Vice-Chairman
EDWARD B. RUST JR.
State Farm Insurance Co.

Secretary - Treasurer
RUSS M. STROBEL
Nicor, Inc.

President
JEFFREY D. MAYS
Illinois Business Roundtable

Chairman Emeritus
THOMAS M. PATRICK
Peoples Energy Corp.

connections with their academic and career interests. Indeed, our members have pledged significant resources to assist the state in the creation of this STEM learning exchange network statewide.

Our members look forward to working with the State of Illinois and other stakeholders to implement the programs outlined in Illinois' Race to the Top application. Please keep me informed of RTTT progress and any opportunities to assist in implementation of the RTTT plan.

Sincerely,

Jeffrey D. Mays, President
Illinois Business Roundtable

ILCAE *Illinois Leadership Council for Agricultural Education*

ICAE *Illinois Committee for Agricultural Education*

RECEIVED
MAY 12 2010 #4
State Superintendent of Education

May 11, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

We are writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. We, on behalf of Illinois Committee for Agricultural Education (ICAE) and Illinois Leadership Council for Agriculture Education (ILCAE), are excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, ICAE and ILCAE intend to support the implementation of the following components of the State's RTTT plan: Agriculture and Natural Resources Stem Program of Study and Learning Exchange.

ICAE and ILCAE will specifically undertake to support the State's RTTT plan through the following actions of support: E-learning curriculum development and alignment to Common Core standards; internships and work-based learning; career development and outreach K-12; teacher professional development; partnerships with agricultural businesses; sponsored

challenges and project management resources for student team work development; review and research assessment performance.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Dave Mouser
ICAE Chair

Mike Massie
ILCAE Chair

p.c. Dave Mouser
Mike Massie

Illinois Community College Board

Guy H. Alongi
Chairman

Geoffrey S. Obrzut
President/CEO

promoting excellence in the
Illinois Community College System

RECEIVED
MAY 19 2010 #11
State Superintendent of Education

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of the Illinois Community College Board, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, the Illinois Community College Board intends to support the implementation of the following components of the State's RTTT plan: College and Career Readiness Initiative and the STEM Programs of Study.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Geoffrey S Obrzut

Geoffrey Obrzut
President/CEO

401 East Capitol Avenue ● Springfield, IL 62701-1711 ● (217) 785-0123 ● www.iccb.state.il.us
Fax: (217) 524-4981 TDD: (217) 782-5645

dceo Illinois Department of Commerce and Economic Opportunity

Pat Quinn
Governor

Warren Ribley
Director

May 24, 2010

The Honorable Pat Quinn
Governor, State of Illinois
James R. Thompson Center
100 West Randolph Street
Chicago, IL 60601

RE: Letter of Support for State of Illinois Race to the Top Application

Dear Governor Quinn:

I am writing to express support for the Race to the Top Application for Phase 2 Funding (RTTT) that you are submitting to the U.S. Department of Education. I, on behalf of the Illinois Department of Commerce and Economic Opportunity (DCEO), am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms.

I believe the RTTT application will position Illinois as a leader in preparing students in science, technology, engineering, and mathematics (STEM) careers that are critical to growth and development of all major critical sectors in Illinois, including agriculture, construction, information technology, manufacturing, logistics, finance, and healthcare, as well as the emerging energy sector.

DCEO is strongly committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study, as well as the proposed STEM Learning Exchanges. To ensure the success of the education reforms proposed in the State of Illinois' RTTT application, DCEO will commit up to $15 million through the *Illinois Jobs Now!* bill (State of Illinois Public Act 096-0039) upon successful awarding of Department of Education funds. The fund can be used for capital related expenses and will support the following:

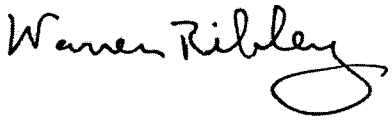
1) Up to $10 million from the Broadband Development Fund (Section 45) to support broadband development in rural communities to assist with connecting school districts to the proposed Learning & Performance Management System; and

2) Up to $5 million from the ARRA Matching Fund (Section 85) to support critical information technology initiatives under the proposed Learning & Performance Management System, in particular the STEM Learning Exchange.

In addition, DCEO is committing up to $300,000 in federal Workforce Investment Act funds to support the development of career pathway applications as part of the core functions of the STEM Learning Exchanges.

Finally, as co-chair of the Illinois Workforce Investment Board (IWIB), I will work with other public and private partners to ensure the STEM initiatives receive the support of our business and labor community.

Sincerely,



Warren Ribley
Director

Illinois Department of Transportation
Office of the Secretary
2300 South Dirksen Parkway / Springfield, Illinois / 62764
Telephone 217/782-5597

May 18, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top (RTTT) application for Phase 2 funding that you are submitting to the U.S. Department of Education.

The Illinois Department of Transportation (IDOT) is excited about the opportunity the federal RTTT grant provides to move the state of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turn around our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, IDOT recognizes science, technology, engineering and math (STEM) education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The state of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

IDOT is committed to supporting the state's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

Thank you for the opportunity to comment on this issue. We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Gary Hannig
Secretary

www.ieanea.org

Illinois Education Association-NEA

Ken Swanson, President
Robert Blade, Vice President
Cinda Klickna, Secretary-Treasurer
Audrey Soglin, Executive Director

100 East Edwards Street
Springfield, IL 62704-1999
(217) 544-0706 Fax 217.544.7383

May 27, 2010

Dr. Christopher Koch, State Superintendent
Illinois State Board of Education
100 North First Street
Springfield, IL 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase Two Funding (RTTT), which you are submitting on the state's behalf to the U.S. Department of Education.

The RTTT grant has the potential to move our state forward through the implementation of ground-breaking, transformative education reforms. This federal funding would allow Illinois to continue to develop an educational system that will prepare every child in Illinois for postsecondary education and the workforce.

On behalf of the more than 133,000 Illinois Education Association (IEA) members, I want to express my appreciation to you and the Illinois State Board of Education (ISBE) for your willingness to work closely with IEA in the development of the RTTT grant proposal. Because you and the board considered the expertise of our classroom educators, Illinois was able to submit a high-quality proposal that gives the students in our state the best opportunity to benefit from this grant program.

Should the Illinois proposal be selected for funding, we will be prepared to continue the collaboration between ISBE and the educators who have agreed to participate in RTTT.

The mission of the IEA is "to effect excellence and equity in public education." The RTTT application, because it was developed collaboratively, aligns very well with the IEA mission.

In addition, IEA believes it is important to recognize that our public schools, the dedicated staff who work in them and the school boards who oversee them, cannot be exclusively held accountable for student achievement. Students themselves, parents, communities and those at the state and federal level who are responsible for providing the resources necessary for EVERY school and EVERY child to succeed, must also be held accountable. Only when every stakeholder fully participates and lives up to his/her obligations will we truly provide an opportunity for every child to attain success.

We are committed to supporting our local associations who have agreed to participate in Illinois' grant application.

The Illinois Education Association, whose executive director and top leadership have considerable experience in the development of new evaluation systems (including systems that incorporate student growth), has pledged to work with the Illinois State Board of Education to help establish fair and effective evaluation systems across the state in response to the plan.

We will encourage all involved in the grant to work collaboratively to develop and implement their local plans. As always, we will wholeheartedly support our members in their efforts to continue to improve Illinois' public schools and the teaching profession.

Sincerely,

Ken Swanson, President

KS/mjb

Illinois Education Research Council

SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE, EDWARDSVILLE, ILLINOIS 62026-1064
Telephone: 866-799-IERC (4372) or 618.650.2840. E-mail: *ierc@siue.edu* Web site: ierc.siue.edu

May 3, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of the Illinois Education Research Council, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, the Illinois Education Research Council intends to support the implementation of the following components of the State's RTTT plan: updating and refining the IERC Index of Teacher Academic Capital (ITAC) to analyze the equitable distribution of highly effective teachers and principals throughout the state.

The IERC will specifically undertake to support the State's RTTT plan through the following actions of support: participate in the Educational Research Collaborative Steering Committee and Board, and will continue to serve on the Technical Advisory Group for the Illinois Longitudinal Data System.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Kathleen S. Brown

Kathleen S. Brown
Executive Director

A Union of Professionals

Illinois Federation of Teachers

500 Oakmont Lane
P.O. Box 390
Westmont, IL 60559
T: 630/468-4080
F: 630/468-4089
www.ift-aft.org

Ed Geppert, Jr.
PRESIDENT

Marilyn Stewart
SECRETARY-TREASURER

An affiliate of the AFT, AFL-CIO

May 13, 2010

Dr. Chris Koch, Superintendent
Illinois State Board of Education
100 North 1st Street
Springfield, IL 62777

Dear Dr. Koch:

On behalf of the 103,000 members of the Illinois Federation of Teachers, I am writing to express support for Illinois' Race to the Top (RttT) Application for Phase II Funding which you are submitting to the U.S. Department of Education. Thanks to the work of the Illinois State Board of Education (ISBE), the Illinois General Assembly and Gov. Pat Quinn's office, Illinois has in place many innovative projects to satisfy the assurance areas of the Race to the Top grant.

The IFT recognizes that ISBE and Illinois' 870-plus diverse school districts are in even more dire need of funding to support the state's ongoing strong education reform initiatives. There is a need for federal funds to fill the gap until an equitable and sustainable source of state funding is achieved. RttT funds can help fill these gaps for ISBE to bolster efforts to provide supports and systems that will benefit all districts in Illinois. These initiatives include:

- a fully-functioning longitudinal data system and learning and performance management system that every classroom teacher can access throughout the school day;
- induction/mentoring programs for all new teachers;
- an effective, research-based Response to Intervention process implemented in every school; and
- continued work to align the Illinois Learning Standards to the Common Core initiative, to revise K-12 standards and to implement updated learning standards in every classroom, as well as develop new state and local assessments aligned to updated standards.

The IFT believes that the conditions placed on states to access these funds are driven by a reform agenda that does not necessarily include a strong foundation in all of the critical supports for educators and school systems.

Sustained, effective initiatives can have a long-term impact on students' education and post-secondary success. That impact will be severely diminished if the following concerns are not addressed:

- Illinois' state education agency itself must have the necessary capacity and staffing levels in place to provide needed supports to school districts and educators as reforms are implemented.
- Sustained funding sources at the state level must be in place for education initiatives to be able to operate beyond RttT.
- Research-based improvement strategies beyond RttT grant guidelines must be included as well, with an emphasis on the necessary supports and collaboration time required for implementation.
- Inclusion of student growth as a significant factor in teacher evaluation without strong, research-based evidence to show positive impacts on student achievement must not be allowed to divert local resources and focus from vital education initiatives.

The IFT supports the state's RttT efforts and appreciates the collaborative manner in which ISBE engaged with stakeholders to develop its application for RttT grant funds. The IFT is committed to supporting the implementation of Illinois' RttT plan by working at both a state and local level. The IFT will participate in state-level work in a collaborative way with ISBE and other education stakeholders to implement the state's proposed initiatives in the four major areas of RttT. Moreover, the IFT commits to working with our local unions to provide information and assistance as they work on RttT initiatives with their school districts. The IFT recognizes that effective state and district leadership in collaboration with union leaders and school staff will bring about real and positive changes that will have a lasting impact on both educator professional growth and student outcomes.

The Illinois Federation of Teachers looks forward to partnering with the Illinois State Board of Education on the implementation of the state's Race to the Top proposal.

Sincerely,

Ed Geppert Jr.
President

Illinois Manufacturers' Association

May 17, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 North 1st Street, S-405
Springfield, IL 62777

Dear Dr. Koch:

On behalf of the Illinois Manufacturers' Association I am writing to express our support for the State of Illinois' application for Phase 2 Funding in the federal Race to the Top program administered by the U.S. Department of Education. As you already know, the Illinois Manufacturers' Association is planning to be designated as STEM Leadership Exchange leader for the manufacturing sector and is committed to participating in developing and implementing the programs of study benefitting manufacturing.

The Race to the Top comes at a critical time for our state's manufacturing sector. Since the beginning of the century just ten short years ago, Illinois has lost more than 320,000 manufacturing jobs; almost a 45 percent decline. Over the next five years, experts tell us that manufacturing will need to replace more than 30,000 workers every month to account for retiring baby-boomers. Clearly our task is unmistakably defined.

Using Race to the Top funding to engage and energize the interest of students to explore rewarding careers in manufacturing will help keep Illinois manufacturing strong. Presently, manufacturing accounts for 13 percent of the state's gross domestic product and is the single largest contributing sector to our economy. It is our understanding the Illinois' Race to the Top application supports the belief that every student who is provided rigorous and relevant curricula and skills training that challenges creativity and innovation develops the abilities and attitudes to succeed in post-secondary education and their chosen career. We wholeheartedly endorse that approach and know its adoption will result in effectively preparing tomorrow's workforce.

220 East Adams, Springfield, IL 62701
217.522.1240 – 217.522.2367 (fax)
www.ima-net.org

Illinois needs to be second to none in developing world class standards for educating and testing of our students, faculty and administrators. The Race to the Top will help assure those goals are achieved everywhere in Illinois by weeding out underachieving teachers and administrators.

Count the Illinois Manufacturers' Association as a strong supporter of the Illinois application.

Yours truly,

Gregory W. Baise
President & CEO

220 East Adams, Springfield, IL 62701
217.522.1240 – 217.522.2367 (fax)
www.ima-net.org

INCS
ILLINOIS NETWORK OF CHARTER SCHOOLS

205 West Randolph Street
Suite 1340
Chicago, Illinois 60606

tel 312 235 0798
fax 312 235 0679
www.incschools.org

May 17, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express our support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of the Illinois Network of Charter Schools ("INCS") am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. We in the charter sector have been engaged in this work for some time and want to see broad reform that impacts the lives of all students. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, INCS intends to support the work on school turnaround and on ensuring an effective teacher in every public school classroom in Illinois. We also hope to work with state leadership to implement a high-quality, independent authorizer so that more transformative charter schools can be approved across our state.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Andrew Broy
President
Illinois Network of Charter Schools

cc: Darren Reisberg, Illinois State Board of Education
Jonathan Furr, Holland & Knight

ILLINOIS SCIENCE &
TECHNOLOGY COALITION

200 East Randolph, Suite 2200
Chicago, IL 60601
T 312 494 6747
F 312 861 0660
ISTCoalition.org

May 19, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Superintendent Koch,

On behalf of the Illinois Science & Technology Coalition, I am writing to re-affirm strong support for the comprehensive reforms outlined in the State of Illinois' Race to the Top (RTTT) Phase 2 Funding application. We believe that RTTT presents an unparalleled opportunity for Illinois to dramatically improve student performance and outcomes and serve as a leader in preparing students in science, technology, engineering, and mathematics (STEM) disciplines.

The Illinois Science & Technology Coalition (ISTC) cultivates economic development in Illinois by advocating for increased resources for Research & Development initiatives at Illinois-based institutions and businesses and is active in the industries of advanced manufacturing, agriculture, energy, information technology, life sciences, and supercomputing.

Improvement in student performance in STEM disciplines will help build a workforce educated to meet the demands to ensure a bright economic future for Illinois. The ISTC also offers our services as a planning and implementation partner for the STEM Learning Exchanges for Research & Development. In particular, the ISTC and our partners are committed to supporting STEM Learning Exchange activities including the development of e-learning curriculum resources, professional development programs for teachers and expanding internships and career development opportunities for students.

The ISTC supports the strong emphasis on high school reform and the focus on improving transitions into both college and careers—ensuring the development of a well-educated workforce ready for a modern global economy. The important and effective high school reform initiatives identified are consistent with the interests of the ISTC, including establishing a statewide program for the National Career Readiness Certificate (NCRC) and developing and scaling STEM-related Programs of Study.

The NCRC promises to be an important career readiness credential relevant to a wide range of careers. The STEM-related Programs of Study offer a promising approach for high school reform that will enable students to make real-world connections with their academic and career interests. STEM Learning Exchanges are critical to the success of STEM-related programs of study because they will bring together the resources and expertise of a range of business and industry, education and government partners.

The ISTC is committed to partnering with the State to implement the NCRC program and STEM-related programs of study throughout Illinois. We look forward to working with the State of Illinois and other stakeholders to implement the initiatives outlined in Illinois' Race to the Top application.

Sincerely,

Matthew Summy
President & CEO

Illinois Speech-Language-Hearing Association

230 E. Ohio Street, Suite 400, Chicago, IL 60611-3265
Phone: 312/644-0828 Fax: 312/644-8557 Web: www.ishail.org
Voice and TT/TDD

May 18, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of the Illinois Speech-Language-Hearing Association (ISHA) am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, ISHA recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

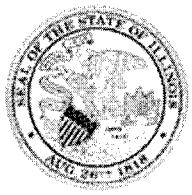
ISHA is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Nancy D. Anderson

Nancy D. Anderson
President



OFFICE OF THE SECRETARY OF STATE

JESSE WHITE • Secretary of State and State Librarian

May 28, 2010

Christopher A. Koch, Ed.D.
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear State Superintendent Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of the Illinois State Library am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms.

In support of the RTTT application, the Illinois State Library will partner with the Illinois State Board of Education (ISBE) to launch the "Know More About Your Schools" campaign. With one-third of United States residents 14 and older using public library computers to connect to the web, the campaign's goal is to ensure universal access to school and district performance data, available through the Illinois Interactive Report Card (IIRC), by utilizing Illinois' 600+ public libraries through our multitype library network. Specifically, the campaign will focus on educating librarians and providing them with the necessary tools, including a librarians' IIRC user guide and web-based video presentations, to be able to effectively assist users in navigating the IIRC. The Illinois State Library will support this campaign by:

1. Partnering with ISBE to serve as an information conduit and promote training opportunities in our weekly e-news;
2. Encouraging public libraries to participate in ISBE web based training opportunities, facilitate public access to this information, and assist users' inquiries regarding this information.

I, on behalf of the Illinois State Library, look forward to partnering with ISBE on the "Know More About Your Schools" campaign as part of Illinois' RTTT plan.

Sincerely,

Jesse White

Jesse White
Secretary of State
and State Librarian

ILLINOIS STATE UNIVERSITY
Illinois' first public university

Center for Renewable Energy

Campus Box 5020
Normal, IL 61790-5020
Phone: (309) 438-7919
Fax: (309) 438-5653

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of the Center for Renewable Energy at Illinois State University, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The Center for Renewable Energy at Illinois State University works to meet the growing needs for education, outreach and research in the area of renewable energy. The Center has three major functional areas: 1) to enhance the renewable energy major at Illinois State University, 2) to serve the Illinois renewable energy community by providing information to the public, and 3) to encourage applied research concerning renewable energy at Illinois State University and through collaborations with other universities.

In particular, the Center for Renewable Energy recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

The Center for Renewable Energy is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

David Loomis

David Loomis, Director
Center for Renewable Energy
Illinois State University

An equal opportunity/affirmative action university encouraging diversity

May 24, 2010
Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express my strong support for the Race to the Top Application for Round 2 Funding ("RTTT") which you are submitting to the U.S. Department of Education. On behalf of the Interactive Illinois Report Card project staff, we are excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

In particular, the Interactive Illinois Report Card (http://iirc.niu.edu) intends to engage fully with ISBE in implementing the following components of the State's RTTT plan:

1. Professional Development: IIRC is committed to assisting with developing and hosting the array of improved school performance benchmarks, assessments for learning, and performance measures in the RTTT plan including interactive access to the Common Core standards and STEM learning exchanges; we will partner with the comprehensive professional development system that will deliver effective training for school leaders and teachers in use of the new standards and data applications.
2. Public Access: IIRC will focus on overcoming the digital divide, insuring wider public access to and understanding of schools and learning resources among all Illinois communities by participating in your agency's innovative state-wide partnership with the Illinois State Library system. Further, we will address the linguistic divide by developing and launching multi-lingual versions of key IIRC resource screens, starting with Spanish and moving forward annually with more languages to assist parents and learners from Illinois' diverse linguistic communities.
3. Data Systems to Support Instruction: IIRC will fulfill its role as the foundation for the State's education data accessibility system, and will work with RTTT stakeholders to expand data resources for Illinois schools. We will launch the state's student-level data dashboards for teachers and principals with the new school year, and will implement the access management system giving local control to LEA's, including appropriate links for parents and students. We look forward in successive years to expanding resources that make formative as well as summative assessments quickly available to teachers in their classrooms through user-friendly web resources and instructional materials, including "intervention ready" guides such as predictive benchmarking measures. We will monitor these initiatives by soliciting user-feed back. Finally, IIRC is ready to assist with providing data for research initiatives that can enhance learning outcomes, including projects initiated by the Illinois Collaborative For Educational Policy Research (ICEPR).

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,
[signed]
Harvey Smith, Ph.D.
Director, Interactive Illinois Report Card

Northern Illinois University is an Equal Opportunity/Affirmative Action Institution.

LUDA
Large Unit District Association

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ludaschools.org

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Yorkville

May 13, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street
Springfield, IL 62777

Dear Dr. Koch:

On behalf of the Large Unit District Association (LUDA), this letter serves as support for the Race to the Top Round Two Application for Funding (RTTT), which you are submitting to the U.S. Department of Education. It is with great sincerity and earnestness that this support is offered.

Our member districts, who educate over half of the children of the state of Illinois, will be the recipients of the broad transformation that will occur due to our state's involvement in Race to the Top. This application reflects the education reform agenda that can become reality with the support of federal resources.

The receipt of this grant will ensure the development and implementation of standards and assessment systems, data systems, recognition systems, and support systems. It will ensure new certification, preparation, and evaluation programs. It will address the needs of our highest priority schools, while providing ongoing induction, mentoring, and professional development for our teachers and leaders. It will serve as the lever for making transformation and continuous improvement a reality in the state of Illinois.

It is with confidence that I believe this enormous undertaking will succeed having watched the collaboration among the education stakeholders of our state grow during the tenure of Dr. Koch as our state superintendent. Additionally, the alignment of our P-20 system is guaranteed through the growing relationship among our Illinois State Board of Education, Illinois Community College Board, and the Illinois Board of Higher Education. The increasingly strong relationship among key legislators, the governor's office, and our state board of education will ensure the authentic implementation of this plan.

LUDA members make up a large percentage of participating districts in Race to the Top. As the largest unit districts in our state, these districts reflect some of the greatest need, while recognizing the need to take the boldest steps for reform. They will be revising their performance evaluations, they will be developing new data systems, implementing new assessment, and finding means to get the most effective educators to their most needy schools, among other reforms.

Diana Rutledge, Ph D., *Executive Director*
drutledge@ludaschools.org

Bert Hendee, *Assistant Director*
rhendee@ludaschools.org

Besides the work of individual districts, LUDA, as an organization, has been an active participant in the state's reform efforts and will continue to support the following specific work: revision and implementation of school leader preparation, university and district partnerships, development of principal performance evaluation system, the dissemination of SAM's (a support for principals' use of time to support student achievement), the dissemination of LPPW (a support instrument for principal mentoring), as well as ongoing professional development for superintendents and senior staff members. Additionally, LUDA will continue in its role to inform and support policy makers and legislators in our combined efforts to improve student achievement.

In closing, I want to stress my personal respect and admiration for those individuals who worked tirelessly in developing this application. Through their leadership and hard work, educators from all over our state have communicated and built stronger relationships that will endure this implementation to make education in Illinois enhanced for all of our students.

Most sincerely,

Diane Rutledge, Ph.D.
Executive Director, LUDA

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Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, IL 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding that you are submitting to the U.S. Department of Education. On behalf of Learning Point Associates, I am excited about the opportunity the federal Race to the Top grant provides to move the state of Illinois forward on groundbreaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in the state for postsecondary education and the workforce. In addition, Race to the Top funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The Race to the Top proposal supports the Illinois education reform agenda by ensuring that we adopt world-class standards and assessments for students, teachers, and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

The Illinois Race to the Top proposal supports our belief that every student—if provided with the knowledge, skills, abilities, and attitudes to succeed in postsecondary education and careers—will become a productive citizen in our ever-changing world.

In particular, Learning Point Associates recognizes STEM education as a critical part of K–12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The STEM efforts of the state of Illinois are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study, we will engage more students, especially those who historically have not done well in science and math.

Learning Point Associates is committed to supporting the state's Race to the Top plan by participating in the planning, development, and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the Race to the Top proposed reforms and programs.

Sincerely,

Gina Burkhardt
CEO

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Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Legat Architects am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Legat Architects recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

Legat Architects is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,
Legat Architects

Patrick Brosnan, AIA, LEED AP
President/CEO

CHICAGO CRYSTAL LAKE OAK BROOK WAUKEGAN
651 West Washington Blvd. - Suite One Chicago, Illinois 60661-2122 Tel 312.258.9595 Fax 312.258.1555 www.legat.com

LOYOLA
UNIVERSITY CHICAGO

David P. Prasse, Ph.D.
Dean, School of Education
820 N. Michigan| Chicago, Illinois 60611
p (312) 915-6992
dprasse@luc.edu

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Loyola University Chicago, School of Education am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

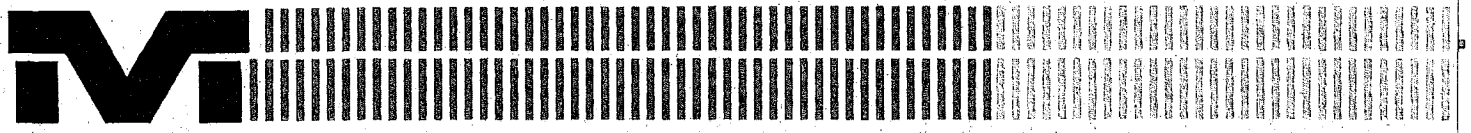
Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, the School of Education at Loyola University Chicago intends to support the implementation of the following components of the State's RTTT plan: Improving the Effectiveness of Teacher and Principal Preparation, Implementing a Statewide Longitudinal Data System, and Supporting Enhanced Standards and High Quality Assessments..

The School of Education at Loyola University Chicago will specifically undertake to support the State's RTTT plan through the following actions of support: Support efforts to link teacher candidate preparation to student learning outcomes; provide technical assistance in areas such as data-based decision making, implementation of response to intervention systems, leadership in reforming principal and teacher candidate professional preparation programs.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

David P. Prasse, Ph.D.
Dean
School of Education
Loyola University Chicago



MERVIS INDUSTRIES

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dr. Koch:
I am writing in support of the Illinois effort for the Race to the Top Application for Phase 2 Funding that you are submitting to the U.S. Department of Education. I, on behalf of Mervis Industries, Inc. am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turn around our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world. Our local economy, high unemployment, and challenging youth population in Danville needs this support more than ever.

In particular, Mervis Industries, Inc. recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

Mervis Industries, Inc. is committed to supporting the State's RTTT plan by our continued participation in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges of which our school district has already engaged.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Lou Mervis

Lou Mervis, Chairman of the Board
Mervis Industries, Inc.

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MCHC
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Health Care Center

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President/Chief Executive Officer
Delnor-Community Hospital

May 17, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Re: Letter of Support for the Race to the Top Application Phase 2

Dear Dr. Koch:

On behalf of the Metropolitan Chicago Healthcare Council (MCHC), I am writing to express our support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. We are excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms.

As a membership association representing 95 hospitals in the Chicago that employ more than 158,720 full-time job equivalent employees, making health care the number one employer in the region, MCHC supports the strong emphasis on high school reform and the focus on improving transitions into both college and careers, ensuring the development of a well-educated workforce ready for a modern global economy. We believe the State has identified important and effective high school reform initiatives in its RTTT application including establishing a statewide program for the National Career Readiness Certificate (NCRC) and developing and scaling STEM-related Programs of Study.

We believe that the RTTT offers an unparalleled opportunity to dramatically improve student performance and outcomes and serve as a leader in preparing students in science, technology engineering, and mathematics (STEM) disciplines and addresses the problems that continue to plague persistently low-achieving schools and districts, within Illinois. We are committed to partnering with the State to implement the NCRC program and STEM-related programs of Study throughout the state.

In particular, MCHC intends to serve as a partner with the State in the planning and implementation of STEM Learning Exchanges for Health Sciences. We commit to coordinating and providing support for STEM Learning Exchange activities including the development of e-learning curriculum resources, professional development programs for teachers, and expanding internships and career development opportunities for Health Sciences students.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Mary Anne Kelly
Vice President, Metropolitan Chicago Healthcare Council

Michael A. Johl, LLC
Consultants

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. On behalf of Michael A. Johl, LLC, I am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, my firm intends to support the implementation of the following components of the State's RTTT plan: creating and maintaining a robust Learning Exchange dedicated to the transportation sector Program of Study (POS).

Michael A. Johl, LLC will specifically undertake to support the State's RTTT plan by bringing together representatives of transportation industry leaders to open the dialogue, create a viable long-term plan and maintain an ongoing, vibrant discussion to assist the Illinois education system in molding the future leaders of the transportation industry so vital to the Illinois economy.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Michael A. Johl

Michael A. Johl
President and CEO

3038 N. 76th Avenue, Elmwood Park, Illinois 60707 Phone: 312-316-6070
Fax: 708-452-7026 E-Mail: mjohl2@comcast.net

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Microsoft®

May 4, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. On behalf of Microsoft Corporation, I am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Microsoft would like to support the implementation of the following components of the State's RTTT plan: development of Longitudinal Data Systems, support in the design and outcomes of Learning Exchanges, sharing of Best Practices for teachers, administrators and students.

Microsoft will specifically undertake to support the State's RTTT plan through the following actions of support:

1. Participation with the State's RTTT planning team on an ongoing basis.
2. Participation of Education specialists and technical specialists
3. Recommendations for technology tools to support the program pillars.
4. Access to extended community based programs to accelerate STEM adoption.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Shelley Stern Grach
Central Region Citizenship Director

Microsoft Corporation is an equal opportunity employer.

museum of
science+industry
chicago

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

May 12, 2010

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. The Museum of Science and Industry has a long tradition of supporting science education in Chicago and throughout Illinois, and the federal RTTT grant provides an opportunity to move Illinois forward on ground-breaking, transformative education reforms.

In particular, the Museum recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The Museum has strengthened its commitment to STEM education by establishing a new vision, *to inspire and motivate our children to achieve their full potential in the fields of science, technology, medicine, and engineering.* In order to meet the institutional vision, the Museum launched the Center for the Advancement of Science Education, initiating a multifaceted approach to target students and science teachers, community organizations, and families at a community-wide level. We are also a proving ground, thoroughly analyzing and evaluating our programs and implementing the best ideas.

I am heartened that RTTT funds would assist Illinois in addressing problems at low-achieving schools. The Museum has engaged high-need students in science learning as part of school field trip experiences, hosting nearly 300,000 this past year—more than any other Chicago cultural institution. But the Museum has evolved beyond simply being a destination, and has established itself as a true science education resource for Illinois students and teachers. Central to its effort to be a science education resource for Illinois, the Museum's Institute for Quality Science Teaching provides professional development for over 1,000 teachers each year. Our goal is to provide quality professional development while working with high-need schools towards placing content-qualified teachers in middle grades science classrooms.

The Museum recognizes that teachers, mentors, parents, other caregivers, and peers all play critical roles in supporting a young person's access to and enthusiasm for science learning. By taking a comprehensive approach to science education, we aim to connect the Museum and the community in a sustainable partnership where learning takes place in many different locations. The State's RTTT proposal shares our objectives and goals by allocating funds that will provide STEM programs that support improved teaching and learning in the schools and extend learning beyond the classroom. To this end, the Museum supports the State's RTTT plan to develop and implement STEM programs, and its proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

David R. Mosena
President and CEO

57th Street and Lake Shore Drive
Chicago, IL 60637-2093

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NORTHROP GRUMMAN

Jeffrey Q. Palombo
Sector Vice President & General Manager

May 19, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Northrop Grumman Corporation, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Northrop Grumman recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

Northrop Grumman is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Jeffrey Q. Palombo
Sector Vice President and General Manager
Land & Self-Protection Systems Division
Electronic Systems

Northrop Grumman Corporation 600 Hicks Road, Rolling Meadows, Illinois 60008
Telephone 224-625-3500 Fax 224-625-5748

the Ounce

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May 14, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I would like to offer my enthusiastic support for Illinois' Race to the Top Application for Phase 2 Funding ("RTTT") that ISBE is submitting to the U.S. Department of Education. As an early childhood education program, policy, and research organization, we at the Ounce of Prevention Fund know that the federal RTTT grant provides a unique opportunity for the State of Illinois. New funds from RTTT will allow Illinois to build on the existing infrastructure that has proved to prepare its children for success in school and in life by continuing to develop an educational system that prepares our state's youngest citizens for success in postsecondary education and the workforce and specifically targets the low-achieving schools and districts that fail to currently meet all of our students' needs.

Illinois is strongly committed to an education reform agenda and has identified the RTTT funds as a mechanism to supplement our efforts to adopt reliable and consistent standards and assessments that will benefit students, teachers, school systems and the community by allowing for transparent and aligned data and tools necessary to improve student outcomes and turnaround even the most challenged schools.

Our specific interest in the state's RTTT application lies in the state's plans to develop and implement a Kindergarten Readiness Measure to promote instructional alignment from Pre-K through third grade. This measure will provide a snapshot of where students are developmentally as they begin kindergarten, allowing parents and educators to address student deficiencies at an early stage in a child's development. Additionally, it will provide statewide comparable data to help us better assess our programs and implement necessary improvements.

The Ounce intends to support the implementation of the state's RTTT plan by actively participating as a partner in planning around Kindergarten Readiness Assessments (KRA) and indeed has begun working with ISBE to staff and

convene statewide KRA stakeholder meetings which have drawn local and national experts in the field. An expanded stakeholders group has had opportunities to question representatives from other states regarding the Kindergarten Readiness processes that they have engaged in and to learn from those efforts. Further conversations are scheduled to determine how to best use a Kindergarten Readiness process to align education systems.

Additionally, we will continue to provide assistance as an active training resource, and through my role as an Ex-Officio member of the P-20 Council.

We look forward to building on our longstanding partnership with the Illinois State Board of Education by assisting in the development and implementation of the RTTT proposed reforms and programs and to continuing our shared work to ensure the success of Illinois' children and schools.

Best Regards,

Diana Mendley Rauner, Ph.D.
Executive Director

OFFICE OF THE GOVERNOR
JRTC, 100 W. RANDOLPH, SUITE 16-100
CHICAGO, ILLINOIS 60601

PAT QUINN
GOVERNOR

May 28, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of the Illinois P-20 Council, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts. RTTT funding will greatly enhance the effectiveness and impact of the work of the Illinois P-20 Council, whose mission is to guide the development of "a seamless and sustainable statewide system of quality education and support (birth through adulthood) that maximizes students' educational attainment and opportunities for success in the workforce and contributions to their local communities."

The RTTT proposal supports the Illinois education reform agenda and the work of the Council by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, the Illinois P-20 Council has aligned its Committee structure to align with and support the State's RTTT plan. The Joint Education Leadership Committee of the P-20 Council, comprised of the heads of the state's educational agencies, including ISBE, ICCB, IBHE, DCEO and ISAC, oversees the overall implementation of Illinois educational reform. The Council's

standing committees: Teacher and Leader Quality, Assessment and Data Systems, Career and College Success, and Community and Youth Engagement will offer support and guidance for the primary goals of the RTTT initiative.

The Illinois P-20 Council will specifically undertake to support the State's RTTT plan through the following actions of support:

--Establishing and monitoring the implementation of a framework for systemic educational improvement and innovation (including RTTT) that will enable every student to meet or exceed state learning standards and be well prepared for education and careers:
--Working with the ICEPR, IERC, CCSR and other research and evaluation entities to develop and sustain a robust and useful empirical foundation for decision-making and monitoring progress; and
--Advising and making recommendations to the Governor, the Illinois General Assembly, and the state agencies on educational issues at all levels, including the fiscal implications of current and proposed initiatives.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Miguel del Valle
Chair, Illinois P-20 Council

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Initial Funding ("RTTT") which you are submitting to the U.S. Department of Education. I, on behalf of the Parents & Residents Invested in School and Education (PRISE) Reform Coalition am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers will become a productive citizen in our ever-changing world.

In particular, PRISE Reform Coalition intends to support the implementation of the following components of the State's RTTT plan: increasing parent and community engagement and social support for the most challenged low-performing schools.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Patricia Watkins
Patricia Watkins, Ph.D.
Convener

PEARSON

RECEIVED
MAY 14 2010 #3
State Superintendent of Education

Darice Keating
President, State Services
Assessment & Information

Pearson

2510 North Dodge Street
Iowa City, Iowa 52245
Telephone: 319 358 4494
Darice.keating@pearson.com

May 13, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

On behalf of Pearson CEO Doug Kubach and me, and as long time supporters of Illinois' efforts to improve the quality of education for all students, Pearson is supportive of the efforts from your team to secure funding through the Race to the Top Application for Phase 2 Funding ("RTTT").

The funding from this proposal will provide Illinois the opportunity to make transformative education reforms that will positively impact schools and districts, particularly those that are persistently low-achieving. Illinois' application demonstrates that in order for students to become productive members of our society and be successful in the global economy, each student must be prepared for postsecondary education or the workplace.

We support the efforts Illinois is making to improve STEM education. Incorporating STEM into the education reforms will provide a more rigorous and relevant education experience that will lead to higher graduation rates, as well as a better transition to postsecondary education and the world of work.

Pearson is committed to supporting your RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

In support of your efforts, you have our commitment that we will support Illinois in the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Darice Keating
President, State Services

May 12, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Peoria Charter School Initiative (PCSI) am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world-class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turn-around our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, PCSI recognizes STEM education as a critical part of K-12 reform and will be a part of our curriculum as we open Quest Charter Academy this coming fall here in Peoria By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

PCSI is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

PEORIA
CHARTER SCHOOL
INITIATIVE

www.peoriacharterschools.org
phone 309 495 5988

100 SW Water Street · Peoria, IL 61602

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Glen Barton
Chairman of the Board

PEORIA
CHARTER SCHOOL
INITIATIVE

www.peoriacharterschools.org
phone 309 495 5988

100 SW Water Street · Peoria, IL 61602

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

May 7, 2010

Dear Dr. Koch:

I am writing to express Promethean's support for the Illinois Race to the Top Application for Phase 2 Funding that you are submitting to the U.S. Department of Education. We at Promethean are very excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The RTTT funds will allow Illinois to continue to develop an educational system that will prepare every child for postsecondary education and today's 21st century workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts. The RTTT proposal supports the Illinois education reform agenda by ensuring the adoption of world class standards and assessments for students, teachers and school leaders by providing access to the necessary data and tools to improve student outcomes and to turnaround the most challenged schools.

In addition, the Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world. Further, we believe that every student should have the benefit of learning in a 21st century classroom. Independent research found that using the Promethean ActivClassroom as a primary tool for instruction resulted in an average 17 percentile increase in student performance. If implemented according to evidence-based best practices, teachers in Illinois should be able to achieve even greater results, to the tune of a 30 percentile increase.

In order to ensure that Illinois receives the maximum educational return on investment, Promethean, Inc. is committed to support all four critical areas of Illinois RTTT plan: Improving the use of Standards and Assessment, Increasing the use of Data, Increasing the Effectiveness of Teachers and Improving Struggling Schools. Promethean, Inc. is committed to support the State's RTTT plan through Project Planning and Development, as well as Implementation Support and Professional Development, all critical components to a successful project.

Promethean has a proven track record of success in 21st Century educational transformation and we are delighted to have the opportunity to partner with the State of Illinois to create a successful, sustainable, effective program. We are also prepared to provide special pricing to extend the reach of this important project. Promethean appreciates the opportunity to partner with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs, and look forward to celebrating transformational success.

Sincerely,

Sharon Holton

Sharon Holton
Vice President of Strategic Initiatives
Promethean, Inc.
770.331.4613

RICO

161 N Clark suite 4700

Chicago, IL. 60610

312-587-7426

5-14-2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, John Rico on behalf of *Rico Computers Enterprises, Inc. I* am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular Rico Computers Enterprises Inc. intends to support the implementation of the following components of the State's RTTT plan: *Rico Computers Enterprises, Inc. is an Information Technology Firm that has worked with educational institutions since 1991. John Rico is a member of the P20 and* is dedicated to assisting school districts and struggling students by developing, promoting and implementing ground-breaking technology and educational solutions that will prepare students to compete in the global economy of the 21st Century.

Rico Computers Enterprises, Inc. will specifically undertake to support the State's RTTT plan through the following actions of support: We will provide the technology tools necessary for students to succeed in the Global Economy of the 21st century. Rico is dedicated to assisting school districts and struggling students by developing, promoting and implement ground-breaking technology solutions that will help support those programs. These solutions will include hardware, software, training, maintenance services and educational support.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

John D. Rico

John D. Rico
President & CEO
Rico Computers Enterprises, Inc.

ROOSEVELT
UNIVERSITY

RECEIVED
MAY 19 2010
#2
State Superintendent of
Education

Holly Stadler
Dean, College of Education
(312) 856-4780
hstadler@roosevelt.edu

May 13, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Initial Funding ("RTTT") which you are submitting to the U.S. Department of Education. On behalf of Roosevelt University's College of Education, I am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. Our work in the college is driven by a mission of transforming schools and communities in the pursuit of social justice. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers will become a productive citizen in our ever-changing world.

In particular, Roosevelt University's College of Education intends to support the implementation of the following components of the State's RTTT plan:

- *Improving the effectiveness of teacher and principal preparation programs;*
- *Providing effective support to beginning teachers and principals; and*
- *Supporting the high school to postsecondary preparation and transition.*

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Holly Stadler
Dean

SCHOLASTIC

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Scholastic Inc. am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Scholastic Inc. intends to support the implementation of the following components of the State's RTTT plan: Scholastic has been at the forefront of an intensive effort to improve literacy and math achievement and reduce the dropout rate for over ten years. As you read this, 345 Scholastic people are at work in 15,000 classrooms across the country serving over one million below proficient students.

Scholastic Inc. will specifically undertake to support the State's RTTT plan through the following actions of support: Over the past 10+ years, Scholastic has developed "best practices" for helping educators turn around the lives of struggling students and their schools. Our best practices are data centric, with a legacy of engaging disenfranchised students, researched-based literacy and math intervention materials, a professional development team of over 225 consultants and proven to work to scale.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Joe Welty

Joe Welty
Vice President
Central Region

SCIENCE OLYMPIAD

Exploring the World of Science

SCIENCE OLYMPIAD
Two TransAm Plaza Drive
Suite 415
Oakbrook Terrace, IL 60181

(630) 792-1251 voice
(630) 792-1287 fax

www.soinc.org

RECEIVED
MAY 06 2010
State Superintendent of Education

Executive Board

Dr. Gerard Putz
President & Co-Director
Illinois

Jack Cairns
Co-Director
Delaware

Mike McKee
Co-State Director
Florida & N. California

Sharon Putz
Executive Administrator
Illinois

James Woodland
State Science Supervisor
Nebraska

Jennifer Kopach
VP Marketing Communications
Illinois

Advisory Committee

Steve Betza
Lockheed Martin
New York

Phyllis Buchanan
DuPont Corporation
Delaware

Philip Dail
Science Consultant
North Carolina State Univ.

Tina Gilliland
Indiana State Director
Indiana University

Azania Heyward-James
Centers for Disease Control
Georgia

Howard Guenther
2010 Tournament Director
University of Illinois at Urbana-Champaign

Dr. Peter Lu
Science Olympiad Alumnus
Harvard University

Harold Miller
State Director
New York

Michael Osborne
Technology Consultant
Texas

Fred Siegel
State Director
The George Washington University

Tim Taylor
Roseville MS Educator
Ohio

Peggy Vavalla
DuPont Corporation
Delaware

Dr. Bill Wellnitz
2009 Tournament Director
Augusta State University

May 4, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top (RTTT) Application for Phase 2 Funding you are submitting to the U.S. Department of Education. On behalf of Science Olympiad, I am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world-class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools. Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Science Olympiad intends to support the implementation of the State's RTTT plan by continuing to provide excellent K-12 after-school STEM opportunities for students across the state of Illinois. Currently, the Illinois Science Olympiad serves 263 middle school and high school teams with a rigorous extracurricular activity, and hosts 10 competitive tournaments for thousands of students in Illinois. In 2007, Science Olympiad piloted the Urban Schools Initiative in the Chicago Public Schools, a model that is rolling out across the US in 2010. Specifically, Science Olympiad raises the bar for student achievement in STEM and motivates the best science and math teachers by providing professional development and an excellent engagement activity aligned to the National Science Education Standards.

Science Olympiad, founded in 1984 and currently serving 6,000 school teams in 49 states with 320 academic tournaments a year, is dedicated to improving the quality of K-12 STEM education, increasing male, female and minority interest in science, creating a technologically literate workforce and providing recognition for outstanding achievement by both students and teachers. We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Dr. Gerard J. Putz
President and Co-Founder
Science Olympiad

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of The Security Board, am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, The Security Board recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

The Security Board is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Richard G. Arms
Executive Director

Southern
Illinois University
Carbondale

College of Education and Human Services
www.ehs.siu.edu
www.siuc.edu

May 14, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Round 2 Funding (RTTT) that you are submitting to the U.S. Department of Education. I, on behalf of the College of Education and Human Services at Southern Illinois University Carbondale (SIUC), am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare all children in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts, e.g., in the southern area of Illinois that is characterized by areas of extreme poverty.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data, tools and resources to improve student outcomes and the educational experiences in our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with a learning environment that appropriately addresses knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

Southern Illinois University Carbondale recognizes Science, Technology, Engineering, and Mathematics (STEM) education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more

Wham Education Building, Room 115 - Mail Code 4624 ▪ Southern Illinois University Carbondale
625 Wham Drive ▪ Carbondale, Illinois 62901 ▪ 618 | 453.2415 ▪ Fax: 618 | 453 1646

STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

The College of Education and Human Services at SIUC is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Kenneth Teitelbaum, PhD
Dean

Cc: Dr. Glenn Poshard, SIU President
Dr. Paul Sarvela, SIU Vice President
Dr. Sam Goldman, SIUC Chancellor
Dr. Don Rice, SIUC Interim Provost

Southern Illinois University Carbondale

Office of the Vice Chancellor for Research and Graduate Dean
www.siu.edu/~ovcr/
www.siuc.edu

May 19, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am pleased to write this letter in support of the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. On behalf of Southern Illinois University Carbondale (SIUC), I am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt high-quality standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

SIUC recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. SIUC has a record of supporting STEM education, as evidenced by the many K-12 outreach programs that we host on our campus, including the Region 8 IJAS Science Fair, the Illinois Junior Science & Humanities Symposium, and Expanding Your Horizons (EYH), a program which has at its goals to increase the interest of young women in math and science through positive, hands-on experiences.

SIUC is proud to have a number of federally funded programs in the STEM area, including a Heartland Ecological/Environmental Academic Research Training (HEART) GK12 program. HEART GK12 is an NSF-funded fellowship targeting primarily underrepresented minorities in science. As a member of the Illinois LSAMP Alliance, SIUC supports STEM education through the NSF-funded ILSAMP program, which has the goal of increasing participation of undergraduates from underrepresented groups in science, technology, engineering and math (STEM) disciplines. In addition, SIUC also offers the McNair Scholars Program, a federally funded Ronald McNair Postbaccalaureate Achievement Program that prepares first-generation-college/low-income and underrepresented minority students for doctoral study.

Anthony Hall - Mail Code 4344 ▪ Southern Illinois University Carbondale
1265 Lincoln Drive ▪ Carbondale, Illinois 62901 ▪ 618 | 453.4526 ▪ Fax: 618 | 453.4573

SIUC has a brand new "Master of Science in Math & Science Education" (MSMSEd) degree program designed specifically with the math and science content & pedagogy needs of K-8 teachers in mind, funded by the Illinois Mathematics and Science Partnerships (IMSP) program. Also, an Illinois Math Science Partnership grant (ISBE-funded, ~$900,000) is currently in force (supporting the creation and implementation of the new MSMSEd program) and known as the "SMART" program (Science, Mathematics and Action Research for Teachers).

The RAMPD (Rural Access to Mathematics Professional Development) program at SIUC is funded as part of the NCLB initiative. The Rural Access to Mathematics through Professional Development (RAMPD) Project is a collaboration involving the SIUC College of Education and Human Services and Department of Mathematics and public elementary schools in Carbondale, Meridian and Murphysboro and two private faith-based schools. It focuses on the improvement of K-8 student achievement in mathematics.

The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

SIUC is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

As a campus already committed to STEM initiatives, as indicated by the programs listed above, we look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

John A. Koropchak
Vice Chancellor for Research and Graduate Dean

Anthony Hall - Mail Code 4344 ▪ Southern Illinois University Carbondale
1265 Lincoln Drive ▪ Carbondale, Illinois 62901 ▪ 618 | 453.4526 ▪ Fax: 618 | 453.4573

SOUTHERN ILLINOIS UNIVERSITY
EDWARDSVILLE
SCHOOL OF EDUCATION

May 10, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top (RTTT) Application for Initial Funding which you are submitting to the U.S. Department of Education. On behalf of Southern Illinois University Edwardsville (SIUE) and the School of Education (SOE), I am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms.

The available funds will allow Illinois to build upon its past initiatives in P-20 education to continue to develop an educational system that will prepare each child in Illinois for postsecondary education and the workforce. Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen who will make profound and positive contributions to the region, state, and global community. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt rigorous standards and assessments for students, teachers and school leaders by providing educators with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools. This will be accomplished through the state's focus on RTTT's four critical reform areas: effective teachers and leaders, data systems to support instruction, strong standards and assessments, and systemic support for struggling schools. SIUE shares the state's commitment to the successful implementation of these critical reforms.

SIUE has demonstrated its commitment to current educational reforms in Illinois through the participation of its faculty and administrators in several critical initiatives that relate to RTTT's reform agenda. For example, the School of Education (SOE) has been actively involved in recent efforts to reform and redesign administrator preparation, has developed successful pathways for certification for non-traditional students in critical needs areas such as Early Childhood Education and Secondary Education that insure that students have access to fully certified teachers, and participates with other public institutions to collect and disseminate data related to graduate satisfaction and success in the classroom through annual surveys of novices and their supervisors. The SOE strongly supports the revisions being proposed of the Illinois Teaching Standards and efforts to strengthen content knowledge for secondary endorsements. In addition, as the SOE's Dean I have served on the state's Leadership to Integrate the Learning Continuum (LINC) Advisory Committee, Illinois New Teacher Collaborative (INTC)

Partnership Board, Associate of Arts in Teaching Steering Committee, and the Charter School Authorizer Task Force, all of which support initiatives being proposed under RTTT. The SOE is firmly committed to excellence in educator preparation, welcomes the opportunity for programmatic review that is transparent and methodologically sound, and anticipates the opportunity to be an active participant in the groundbreaking work proposed through Illinois' RTTT proposal.

SIUE and the School of Education also anticipate supporting the implementation of RTTT's initiatives through the University's newly formed STEM Center, which will coordinate the various STEM-related activities across campus in order to strengthen impact on P-12 outreach and related research. Through its STEM Center, SIUE and the SOE anticipate participating in the state's proposed "STEM Learning Exchange," which will expand access to STEM opportunities and support the development of effective STEM-related programs for P-12 students and teachers. Application areas that are specifically reflective of expertise at SIUE would include Energy, Manufacturing, Information Technology, Research and Development, and the Health Sciences. Through its participation in the STEM Learning Exchange and other related RTTT activities, including the STEM Educator Support Programs and STEM externships, SIUE's STEM Center anticipates working collaboratively with entities across Illinois to strengthen teachers' knowledge and effectiveness in the critical areas of mathematics and science to insure success of Illinois' P-12 students.

In collaboration with the East St. Louis School District, SIUE currently holds a charter for a high school that serves adolescents who are at risk. SIUE and the SOE support the reform initiatives outlined in the state's RTTT proposal to build upon the charter school's successes in graduation rate, post-secondary placement, and attendance to strengthen students' academic achievements. Identified as one of the state's "high priority" schools, this charter school anticipates participation in the proposed Illinois Partnership Zone and systemic reform proposals. This spring, administrators from the charter school, SIUE, the SOE, and the East St. Louis School District began the process of planning for the future, including performing a comprehensive internal evaluation, to insure that students at this school will have access to exemplary teachers, school leaders, and instruction.

As a campus community and regional leader, SIUE and its School of Education are committed to the reform efforts proposed under the state's RTTT proposal and its focus on excellent teachers, assessments, and instruction. We look forward to building upon our record of collaborative work with the state through our continued commitment to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Bette S. Bergeron

Bette S. Bergeron, Ph.D.
Dean
School of Education
Southern Illinois University Edwardsville

Takeda

January 11, 2010

Governor Pat Quinn
Office of the Governor
James R. Thompson Center
100 W. Randolph Street, Suite 16-100
Chicago, Illinois 60601

Re: Letter of Support for State of Illinois Race to the Top Application

Dear Governor Quinn,

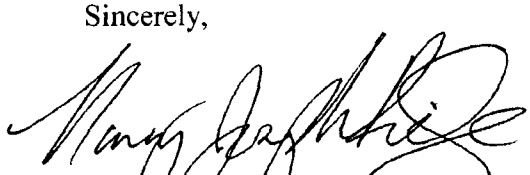
I am writing to express support for the comprehensive reforms outlined in the State of Illinois' Race to the Top (RTTT) application. RTTT presents an unparalleled opportunity for Illinois to dramatically improve student performance and outcomes and serve as a leader in preparing students in science, technology, engineering, and mathematics (STEM) disciplines.

The emphasis on high school reform and focus on improving transitions into both college and careers will ensure the development of a well-educated workforce ready for a modern global economy. The State has identified an important and effective high school reform initiative in its RTTT application, including the establishment of a statewide program for the National Career Readiness Certificate (NCRC) and developing and scaling STEM-related Programs of Study.

As chair of the iBIO Institute, whose mission is to provide education, training and research in biotechnology to the business, educational communities and general public, and through Takeda's backing of the Institute's activities, we look to also support the State's NCRC and STEM-related Programs.

I look forward to working with the State of Illinois and other stakeholders on the initiatives outlined in Illinois' Race to the Top application. Please keep me informed of RTTT progress and any opportunities to assist in implementation of the RTTT plan.

Sincerely,



Nancy Joseph-Ridge, M.D.
General Manager
Pharmaceutical Development Division
Takeda Pharmaceuticals International
Chair, iBIO Institute Board of Directors

TAKEDA GLOBAL RESEARCH & DEVELOPMENT CENTER
One Takeda Parkway Deerfield, Illinois 60015 Phone: 224-554-6500

TOOLING & MANUFACTURING ASSOCIATION
1177 S. Dee Road Park Ridge IL 60068
847.825.1120 847.825.0041 FAX
www.tmanet.com

RECEIVED
MAY 19 2010 #3
State Superintendent of Education

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of The Tooling & Manufacturing Association am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for post-secondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes, as well as turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in post-secondary education and careers, will become a productive citizen in our ever-changing world.

In particular, The Tooling & Manufacturing Association recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students, increasing their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to post-secondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

The Tooling & Manufacturing Association is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

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Carol Ebel
Janler Corporation
(Past Chairperson)

Illinois' Premier Full Service Manufacturing Association

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Brian P. McGuire

UIC UNIVERSITY OF ILLINOIS AT CHICAGO

Office of the Vice Chancellor for Research (MC 672)
310 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612

May 12, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express my support for the Race to the Top Application for Phase 2 Funding (RTTT) that you are submitting to the U.S. Department of Education. I, on behalf of the University of Illinois at Chicago (UIC), am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools. Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

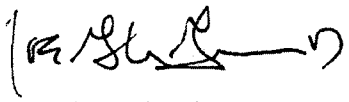
In particular, UIC recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

UIC is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

Phone (312) 996-4995 • Fax (312) 413-0238 • www.research.uic.edu

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,



Joe G.N. Garcia, MD
Vice Chancellor for Research
Professor of Medicine

cc: David Gulley

UNIVERSITY OF ILLINOIS
AT URBANA - CHAMPAIGN

National Center for Supercomputing Applications
1008 NCSA Building
1205 West Clark Street
Urbana, IL 61801

May 18, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education on behalf of the National Center for Supercomputing Applications (NCSA) at the University of Illinois in Urbana-Champaign. As director of NCSA, I am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms, as it also supports our strategic goal for education. We were delighted to work with the team in sharing our knowledge of current technologies applicable to implementing the learning management system, and we look forward to bringing our significant background and expertise to the development and implementation of "programs of study," as part of the STEM Learning Exchanges. The available RTTT funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce.

For over 20 years, NCSA has provided powerful computers and expert support that help thousands of scientists and engineers across the country advance our understanding of natural and engineered systems and improve our world. With the computing power available at NCSA, researchers simulate how galaxies collide and merge, how proteins fold and molecules move through the wall of a cell, how tornadoes and hurricanes form, and other phenomena. A fast national communications network brings the power of NCSA's computers to the desktops of scientists and engineers throughout the country.

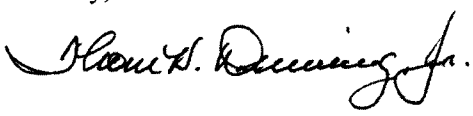
In June 2011, we will deploy Blue Waters, the most powerful supercomputer in the world for open scientific research. It will be the first system of its kind to sustain one petaflop (a million billion arithmetic operations per second) on a broad range of science and engineering applications. The Blue Waters Project also supports a far-reaching educational and workforce development program. *It will impact students from K-12 through postgraduate education and reach out to geographical areas and communities that have been historically underrepresented in supercomputing.*

Through our NSF-funded *Institute for Chemistry Literacy through Computational Science* (ICLCS) program, we are bringing freely available, research-quality computational tools to 127 teachers in high school chemistry classrooms representing 121 individual school districts in Illinois' rural areas. For the past 4 years, we have delivered extraordinary access to computing resources to students in some of the smallest rural districts in Illinois. We have deployed free software to enable teachers to communicate (*i*) via a Virtual Learning Community and (*ii*) via videoconferencing to support ICLCS teachers as they learn new content. This project has shown that the use of computational tools in the classroom is enthusiastically embraced by teachers, results in improved performance of students on standardized tests, and leads to increased student interest in chemistry. With our expertise in deploying leading-edge communication and information technologies to new communities, we can assist other programs that support and develop pathways to the workforce and help facilitate ongoing dialogue and discussion on ways to improve STEM education.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders - providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,



Thom H. Dunning, Jr., Ph.D.
Director, Institute for Advanced Computing Applications & Technologies
Director, National Center for Supercomputing Applications
Distinguished Chair for Research Excellence, Department of Chemistry

VERMILION ADVANTAGE
The Danville Difference

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Judge John O'Rourke	Retired Executive
Jim Ohl	Agriculture Representative
P. B. Patel	Holiday Inn Express
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Judd Peck	Danville Metal Stamping Co., Inc.
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Norman Young	ThyssenKrupp Crankshaft Co.

e-mail: contact@vermilionadvantage.com
http://www.vermilionadvantage.com

May 13, 2010

RECEIVED
MAY 20 2010
State Superintendent of Education

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express support for the Race to the Top Application for Phase 2 Funding ("RTTT") that you are submitting to the U.S. Department of Education. I, on behalf of Vermilion Advantage am excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on ground-breaking, transformative education reforms. The available funds will allow Illinois to continue to develop an educational system that will prepare each and every child in Illinois for postsecondary education and the workforce. In addition, RTTT funds will assist Illinois in addressing the problems that continue to plague persistently low-achieving schools and districts.

The RTTT proposal supports the Illinois education reform agenda by ensuring that we adopt world class standards and assessments for students, teachers and school leaders by providing teachers and school leaders with access to the necessary data and tools to improve student outcomes and to turnaround our most challenged schools.

Illinois' RTTT proposal supports our belief that every student, if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers, will become a productive citizen in our ever-changing world.

In particular, Vermilion Advantage recognizes STEM education as a critical part of K-12 reform that will provide a more rigorous and relevant education experience for our students and will increase their global competitiveness. The State of Illinois' STEM efforts are designed to improve academic achievement, increase high school graduation rates, and improve transition rates to postsecondary education and employment. This approach also promotes choice by providing students with a variety of options in programs of study that are connected to their academic and career interests. By providing more STEM programs of study we will engage more students, especially those that have not historically done well in science and math.

Vermilion Advantage is committed to supporting the State's RTTT plan by participating in the planning, development and implementation of programs of study as well as the proposed STEM Learning Exchanges.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Vicki L. Haugen
President & CEO

Vermilion Advantage, NFP
217-442-6201
28 West North Street, Suite 101
800-373-6201
Danville, Illinois 61832
Fax: 217-442-6228

VOICES
FOR ILLINOIS CHILDREN

BUILDING BETTER LIVES

May 24, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I write to support the Race to the Top Application for Initial Funding you are submitting to the U.S. Department of Education. Voices for Illinois Children is excited about the opportunity this grant provides to move Illinois forward on innovative education reforms. RTTT funding would allow our state to better-develop an educational system that prepares every Illinois child for success in school, the workforce and throughout their lives. In addition, the funds would help our state address many problems that trouble persistently low-achieving schools and districts.

The RTTT proposal supports Illinois' education-reform agenda by ensuring we adopt world-class standards and assessments for students, teachers and school leaders. We can do this by providing teachers and school leaders with access to the data and tools that are necessary to improve student outcomes and to turn around our most challenged schools.

Illinois' RTTT proposal supports our belief that every student – if provided with the knowledge, skills, abilities and attitudes to succeed in postsecondary education and careers – will become a productive citizen in our ever-changing world.

In particular, Voices for Illinois Children intends to support the state's RTTT plan by:

- Service on Illinois' P-20 Council;
- Advocating for the full development and best use of both Kindergarten-readiness measures and longitudinal, P-20 data-sharing processes in Illinois, as well as their proper monitoring;
- Pressing for additional local, state and federal funding to support RTTT priorities; and
- Building public awareness of and support for RTTT, its goals – and what it takes to reach them.

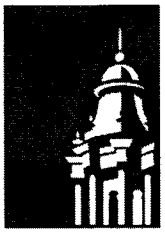
We look forward to working with the Illinois State Board of Education on RTTT-related reforms and efforts to improve children's learning, throughout our state.

Sincerely,

Kathy Ryg

Kathy Ryg, President

208 S. LaSalle Street • Suite 1490 • Chicago, IL 60604-1120 • Tel.312-456-0600 • Fax 312-456-0088 • www.voices4kids.org



WESTERN
ILLINOIS
UNIVERSITY

May 24, 2010

Dr. Christopher Koch
State Superintendent of Education
Illinois State Board of Education
100 N. 1st Street, S-405
Springfield, Illinois 62777

Dear Dr. Koch:

I am writing to express the strong support of the Illinois Institute for Rural Affairs (IIRA) for the Race to the Top Phase 2 application you are submitting to the U.S. Department of Education. We are excited about the opportunity the federal RTTT grant provides to move the State of Illinois forward on transformative education reforms. As the state's academic clearinghouse for rural development data and initiatives, IIRA recognizes the importance of green industry and the technology sector in Illinois' economic development future. In this context we are particularly excited about the State of Illinois' efforts in K-12 STEM education as a way to prepare students to succeed in this new economic environment.

IIRA is committed to supporting the State's RTTT plan by participating in the planning, development, and implementation of programs of study as well as the proposed STEM learning exchanges. We can make particular contributions in the area of renewable energy. For example, in conjunction with Illinois State University, IIRA is leading the establishment of a Wind for Schools program in Illinois, which will infuse wind energy technology into K-12 curricula around the state. We have already been in discussion with State officials on how to incorporate Wind for Schools into an RTTT Energy Learning Exchange.

We look forward to partnering with the Illinois State Board of Education on the development and implementation of the RTTT proposed reforms and programs.

Sincerely,

Christopher D. Merrett

Christopher D. Merrett, PhD
Director and Professor

Illinois Institute for Rural Affairs
Stipes Hall 518, 1 University Circle, Macomb, IL 61455-1390
Tel 309.298.2237 or 800.526.9943 • Fax 309.298.2142 • iira@wiu.edu • www.iira.org

Appendix B1-1

Common Core State Standards Initiative Consortium Participants

1. Alabama
2. Arizona
3. Arkansas
4. California
5. Colorado
6. Connecticut
7. Delaware
8. District of Columbia
9. Florida
10. Georgia
11. Hawaii
12. Idaho
13. Illinois
14. Indiana
15. Iowa
16. Kansas
17. Kentucky
18. Louisiana
19. Maine
20. Maryland
21. Massachusetts
22. Michigan
23. Minnesota
24. Mississippi
25. Missouri
26. Montana
27. Nebraska
28. Nevada
29. New Hampshire
30. New Jersey
31. New Mexico
32. New York
33. North Carolina
34. North Dakota
35. Ohio
36. Oklahoma
37. Oregon
38. Pennsylvania
39. Puerto Rico
40. Rhode Island
41. South Carolina
42. South Dakota
43. Tennessee
44. Utah
45. Vermont
46. Virgin Islands
47. Virginia
48. Washington
49. West Virginia
50. Wisconsin
51. Wyoming

Appendix B1-2

Memorandum of Agreement

The Council of Chief State School Officers and
The National Governors Association Center for Best Practices

Common Core Standards
Memorandum of Agreement

Purpose. This document commits states to a state-led process that will draw on evidence and lead to development and adoption of a common core of state standards (common core) in English language arts and mathematics for grades K-12. These standards will be aligned with college and work expectations, include rigorous content and skills, and be internationally benchmarked. The intent is that these standards will be aligned to state assessment and classroom practice. The second phase of this initiative will be the development of common assessments aligned to the core standards developed through this process.

Background. Our state education leaders are committed to ensuring all students graduate from high school ready for college, work, and success in the global economy and society. State standards provide a key foundation to drive this reform. Today, however, state standards differ significantly in terms of the incremental content and skills expected of students.

Over the last several years, many individual states have made great strides in developing high-quality standards and assessments. These efforts provide a strong foundation for further action. For example, a majority of states (35) have joined the American Diploma Project (ADP) and have worked individually to align their state standards with college and work expectations. Of the 15 states that have completed this work, studies show significant similarities in core standards across the states. States also have made progress through initiatives to upgrade standards and assessments, for example, the New England Common Assessment Program.

Benefits to States. The time is right for a state-led, nation-wide effort to establish a common core of standards that raises the bar for all students. This initiative presents a significant opportunity to accelerate and drive education reform toward the goal of ensuring that all children graduate from high school ready for college, work, and competing in the global economy and society. With the adoption of this common core, participating states will be able to:

- Articulate to parents, teachers, and the general public expectations for students;
- Align textbooks, digital media, and curricula to the internationally benchmarked standards;
- Ensure professional development to educators is based on identified need and best practices;
- Develop and implement an assessment system to measure student performance against the common core; and
- Evaluate policy changes needed to help students and educators meet the common core standards and "end-of-high-school" expectations.

An important tenet of this work will be to increase the rigor and relevance of state standards across all participating states; therefore, no state will see a decrease in the level of student expectations that exist in their current state standards.

Process and Structure

- **Common Core State-Based Leadership.** The Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center) shall assume responsibility for coordinating the process that will lead to state adoption of a common core set of standards. These organizations represent governors and state commissioners of education who are charged with defining K-12 expectations at the state level. As such, these organizations will

facilitate a state-led process to develop a set of common core standards in English language arts and math that are:

- Fewer, clearer, and higher, to best drive effective policy and practice;
- Aligned with college and work expectations, so that all students are prepared for success upon graduating from high school;
- Inclusive of rigorous content and application of knowledge through high-order skills, so that all students are prepared for the 21st century;
- Internationally benchmarked, so that all students are prepared for succeeding in our global economy and society; and
- Research and evidence-based.

- **National Validation Committee.** CCSSO and the NGA Center will create an expert validation group that will serve several purposes, including validating end-of-course expectations, providing leadership for the development of K-12 standards, and certifying state adoption of the common core. The group will be comprised of national and international experts on standards. Participating states will have the opportunity to nominate individuals to the group. The national validation committee shall provide an independent review of the common core. The national validation committee will review the common core as it is developed and offer comments, suggestions, and validation of the process and products developed by the standards development group. The group will use evidence as the driving factor in validating the common core.

- **Develop End-of-High-School Expectations.** CCSSO and the NGA Center will convene Achieve, ACT and the College Board in an open, inclusive, and efficient process to develop a set of end-of–high-school expectations in English language arts and mathematics based on evidence. We will ask all participating states to review and provide input on these expectations. This work will be completed by July 2009.

- **Develop K-12 Standards in English Language Arts and Math.** CCSSO and the NGA Center will convene Achieve, ACT, and the College Board in an open, inclusive, and efficient process to develop K-12 standards that are grounded in empirical research and draw on best practices in standards development. We will ask participating states to provide input into the drafting of the common core and work as partners in the common core standards development process. This work will be completed by December 2009.

- **Adoption.** The goal of this effort is to develop a true common core of state standards that are internationally benchmarked. Each state adopting the common core either directly or by fully aligning its state standards may do so in accordance with current state timelines for standards adoption not to exceed three (3) years.

  This effort is voluntary for states, and it is fully intended that states adopting the common core may choose to include additional state standards beyond the common core. States that choose to align their standards to the common core standards agree to ensure that the common core represents at least 85 percent of the state's standards in English language arts and mathematics.

  Further, the goal is to establish an ongoing development process that can support continuous improvement of this first version of the common core based on research and evidence-based learning and can support the development of assessments that are aligned to the common core across the states, for accountability and other appropriate purposes.

- **National Policy Forum.** CCSSO and the NGA Center will convene a National Policy Forum (Forum) comprised of signatory national organizations (e.g., the Alliance for Excellent Education, Business Roundtable, National School Boards Association, Council of Great City Schools, Hunt Institute, National Association of State Boards of Education, National Education Association, and others) to share ideas, gather input, and inform the common core initiative. The forum is intended as a place for refining our shared understanding of the scope and elements of a common core; sharing and coordinating the various forms of implementation of a common core; providing a means to develop common messaging between and among participating organizations; and building public will and support.

- **Federal Role.** The parties support a state-led effort and not a federal effort to develop a common core of state standards; there is, however, an appropriate federal role in supporting this state-led effort. In particular, the federal government can provide key financial support for this effort in developing a common core of state standards and in moving toward common assessments, such as through the Race to the Top Fund authorized in the American Recovery and Reinvestment Act of 2009. Further, the federal government can incentivize this effort through a range of tiered incentives, such as providing states with greater flexibility in the use of existing federal funds, supporting a revised state accountability structure, and offering financial support for states to effectively implement the standards. Additionally, the federal government can provide additional long-term financial support for the development of common assessments, teacher and principal professional development, other related common core standards supports, and a research agenda that can help continually improve the common core over time. Finally, the federal government can revise and align existing federal education laws with the lessons learned from states' international benchmarking efforts and from federal research.

Agreement. The undersigned state leaders agree to the process and structure as described above and attest accordingly by our signature(s) below.

Signatures	
Governor:	Pat Quinn
Chief State School Officer:	Christopher A. Koch

Appendix B1-3

Common Core Standards

Introduction to the Draft Common Core Standards
March 9, 2010

The Council of Chief State School Officers (CCSSO) and the National Governors Association Center for Best Practices (NGA Center) are pleased to present the draft Kindergarten-12 grade level Common Core State Standards documents that our organizations have produced on behalf of 48 states, two territories, and the District of Columbia. These English language arts and mathematics standards represent a set of expectations for student knowledge and skills that will result in high school graduates who are prepared for success in college and careers.

To develop these standards, CCSSO and the NGA Center worked with representatives from participating states, a wide range of educators, content experts, researchers, national organizations, and community groups. These drafts reflect their input, and we are grateful for the time and insight hundreds of individuals have contributed to the development of these important documents.

Now, we seek public comment on these draft documents and encourage input via our online survey available at www.corestandards.org. The public comment period will end on April 2, 2010.

After our work groups have had an opportunity to review all of the feedback from the general public and state-led reviews, they will produce final documents. It is expected that the final set of standards documents will be available in late spring 2010.

You will notice that the college- and career-readiness standards have been incorporated into this draft. The final English language arts and mathematics standards documents will include college- and career-readiness standards along with the K-12 grade level standards.

The criteria that we used to develop the college- and career-readiness standards, as well as these K-12 grade level standards are:

- Aligned with college and work expectations;
- Include rigorous content *and* application of knowledge through high-order skills;
- Build upon strengths and lessons of current state standards;
- Informed by top-performing countries, so that all students are prepared to succeed in our global economy and society; and,
- Evidence and/or research-based.

The following links provide more information about the criteria and considerations for standards development.

The standards development process has maximized the best practices and research from across the nation and the world. While we have used all available research to shape these documents, we recognize that there is more to be learned about the most essential knowledge for student success. As new research is conducted and we evaluate the

implementation of the common core standards, we plan to revise the standards accordingly on a set review cycle.

Our organizations would also like to thank our advisory group, which provides advice and guidance on this initiative. Members of this group include experts from Achieve, Inc., ACT, the College Board, the National Association of State Boards of Education, and the State Higher Education Executive Officers.

Application of Common Core State Standards for English Language Learners

English language learners (ELLs) must be held to the same level of standards expected of students who are already proficient in English. However, these students are acquiring both English language proficiency and content area knowledge concurrently, so some students will require additional time, and all will require appropriate instructional support and aligned assessments.

ELLs are a heterogeneous group with differences in ethnic background, first language, socioeconomic status, quality of prior schooling, and levels of English language proficiency. Effectively educating these students requires diagnosing each student instructionally, adjusting instruction accordingly, and closely monitoring student progress. For example, ELLs who are literate in a first language that shares cognates with English can apply first-language vocabulary knowledge when reading in English; likewise ELLs with high levels of schooling can bring to bear conceptual knowledge developed in their first language when reading in a second language. However, ELLs with limited or interrupted schooling will need to acquire background knowledge prerequisite to educational tasks at hand. Those ELLs who are newcomers to U.S. schools will need sufficiently scaffolded instruction and assessments to make sense of content delivered in a second language and to display this content knowledge.

English Language Arts

The common core standards for English language arts (ELA) articulate rigorous grade-level expectations in the areas of speaking, listening, reading, and writing to prepare all students to be college and career ready, including English language learners. Second-language learners also will benefit from instruction about how to negotiate situations outside of those settings so they are able to participate on equal footing with native speakers in all aspects of social, economic, and civic endeavors.

ELLs bring with them many resources that enhance their education and can serve as resources for schools and society. Many ELLs have first language and literacy knowledge and skills that boost their acquisition of language and literacy in a second language; additionally, they bring an array of talents and cultural practices and perspectives that enrich our schools and our society. Teachers must build on this enormous reservoir of talent and provide those students who need it with additional time and appropriate instructional support. This includes language proficiency standards that teachers can use in conjunction with the ELA standards to assist ELLs in becoming proficient and literate in English.

To help ELLs meet high academic standards in language arts it is essential that they have access to:

- Teachers and personnel at the school and district levels who are well prepared and qualified to support ELLs while taking advantage of the many strengths and skills they bring to the classroom;

- Literacy-rich school environments where students are immersed in a variety of language experiences;
- Instruction that develops foundational skills in English that enable ELLs to participate fully in grade-level coursework;
- Coursework that prepares ELLs for postsecondary education or the workplace yet is made comprehensible for students learning content in a second language (through specific pedagogical techniques and additional resources);
- Opportunities for classroom discourse and interaction that are well-designed to enable ELLs to develop communicative strengths in language arts;
- Ongoing assessment and feedback to guide learning; and
- Speakers of English who know the language well enough to provide ELLs with models and support.

Mathematics

ELLs can participate in mathematical discussions as they learn English. Mathematics instruction for ELL students should draw on multiple resources and modes available in classrooms—such as objects, drawings, inscriptions, and gestures—as well as home languages and mathematical experiences outside of school. While mathematics instruction for ELLs should address mathematical discourse and academic language, this involves much more than vocabulary instruction.

Language is a resource for learning mathematics; it is not only a tool for communicating, but also a tool for thinking and reasoning mathematically. All languages and language varieties (e.g., different dialects, home or everyday ways of talking, vernacular, slang) provide resources for mathematical thinking, reasoning, and communicating.

Regular and active participation in the classroom—not only reading and listening but also discussing, explaining, writing, representing, and presenting—is critical to the success of ELLs in mathematics. Research has shown that ELLs can produce explanations, presentations, etc. and participate in classroom discussions *as they are learning English*.

ELLs, like English-speaking students, require regular access to teaching practices that are most effective for improving student achievement. Mathematical tasks should be kept at high cognitive demand; teachers and students should attend explicitly to concepts; and students should wrestle with important mathematics.

Overall, research suggests that:

- Language switching can be swift, highly automatic, and facilitate rather than inhibit solving word problems in the second language, as long as the student's language proficiency is sufficient for understanding the text of the word problem.
- Instruction should ensure that students understand the text of word problems before they attempt to solve them.
- Instruction should include a focus on "mathematical discourse" and "academic language" because these are important for ELLs. Although it is critical that

students who are learning English have opportunities to communicate mathematically, this is not primarily a matter of learning vocabulary. Students learn to participate in mathematical reasoning, not by learning vocabulary, but by making conjectures, presenting explanations, and/or constructing arguments.

- While vocabulary instruction is important, it is not sufficient for supporting mathematical communication. Furthermore, vocabulary drill and practice are not the most effective instructional practices for learning vocabulary. Research has demonstrated that vocabulary learning occurs most successfully through instructional environments that are language-rich, actively involve students in using language, require that students both understand spoken or written words and also express that understanding orally and in writing, and require students to use words in multiple ways over extended periods of time. To develop written and oral communication skills, students need to participate in negotiating meaning for mathematical situations and in mathematical practices that require output from students.

Application of Common Core State Standards for Students with Disabilities

The Common Core Standards articulate rigorous, grade-level expectations in the areas of English language arts and mathematics to prepare students to be college and career ready.

All students, including students with disabilities— students eligible under the Individuals with Disabilities Education Act (IDEA) — must be challenged to excel within the general curriculum and prepared for success in their post-school lives, including college and/ or careers. The common core state standards provide a historic opportunity to improve access to academic content standards for students with disabilities. The continued development of understanding about research-based instructional practices and a focus on their effective implementation will also help improve access to the common core state standards.

Students with disabilities are a heterogeneous group with one common characteristic: the presence of disabling conditions that significantly hinder their abilities to benefit from general education (IDEA 34 CFR §300.39, 2004). Therefore, *how* these high standards are taught and assessed is of the utmost importance in reaching this diverse group of students.

For special education students to meet high academic standards and to fully demonstrate their conceptual and procedural knowledge and skills in mathematics and English language arts, their instruction must incorporate supports and often times, accommodations, including:

- Special education supports and related services designed to meet the unique needs of these students and to enable their access to the general education curriculum (IDEA 34 CFR §300.34, 2004).
- An Individualized Education Program, which includes annual goals aligned with and chosen to facilitate their attainment of grade-level academic standards.
- Teachers and specialized instructional support personnel who are prepared and qualified to deliver high-quality, evidence-based, individualized instruction and support services.

Promoting a culture of high expectations for all students is a fundamental goal of the common core state standards. To participate with success in the general curriculum, students with disabilities, as appropriate, may be provided additional supports and services, such as:

- Instructional supports for learning, based on the principles of Universal Design for Learning, which foster student engagement by presenting information in multiple ways and allowing for diverse avenues of action and expression.
- Instructional accommodations —changes in materials or procedures— which do not change the standards but allow students to learn within the framework of the common core state standards.

- Assistive technology devices and services to ensure access to the general education curriculum and the common core state standards.

For some students with significant cognitive disabilities to access certain standards, those standards may need to be extended and/or adjusted. However, standards should be extended and/or adjusted only after students receive access to multiple means of learning and demonstrating knowledge. Any extensions and/ or adjustments must align with and retain the rigor and high expectations of the common core state standards.

COMMON CORE STATE STANDARDS FOR

English Language Arts and Literacy in History/Social Studies & Science

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Table of Contents

Introduction **1**

K–5 Standards for English Language Arts and Literacy in History/Social Studies & Science **6**

College and Career Readiness Standards for Reading 7
Reading Standards for Literature K–5 8
Reading Standards for Informational Text K–5 10
Standards for Reading: Foundational Skills (K–3) 12
Text Complexity 14
College and Career Readiness Standards for Writing 15
Writing Standards K–5 16
College and Career Readiness Standards for Speaking and Listening 19
Speaking and Listening Standards K–5 20
College and Career Readiness Standards for Language 22
Language Standards K–5 23
English Language Arts Conventions Progressive Skills Chart 27
Texts Illustrating the Complexity, Quality, and Range of Student Reading K–5 28
Staying on Topic Within a Grade and Across Grades 29

6–12 Standards for English Language Arts **30**

College and Career Readiness Standards for Reading 31
Reading Standards for Literature 6–12 32
Reading Standards for Informational Text 6–12 34
Text Complexity 36
College and Career Readiness Standards for Writing 37
Writing Standards 6–12 38
College and Career Readiness Standards for Speaking and Listening 44
Speaking and Listening Standards 6–12 45
College and Career Readiness Standards for Language 47
Language Standards 6–12 48
English Language Arts Conventions Progressive Skills Chart 51
Texts Illustrating the Complexity, Quality, and Range of Student Reading 6–12 52

6–12 Standards for Literacy in History/Social Studies & Science **53**

College and Career Readiness Standards for Reading 54
Reading Standards for History/Social Studies 6–12 55
Reading Standards for Science 6–12 56
College and Career Readiness Standards for Writing 57
Writing Standards for History/Social Studies & Science 6–12 58

DRAFT

Introduction

The *Common Core State Standards for English Language Arts and Literacy in History/Social Studies and Science* are the culmination of an extended, broad-based effort to fulfill the charge issued by the states to create the next generation of K–12 standards that help ensure that all students are college and career ready in literacy by no later than the end of high school. The *Standards* set requirements for English language arts (ELA) but also for reading, writing, speaking, listening, and language in the social and natural sciences. Just as students must learn to communicate effectively in a variety of content areas, so too must the *Standards* specify the literacy skills and understandings required for eventual college and career readiness in history, social studies, and science as well as ELA. By their structure, the *Standards* encourage curriculum makers to take a comprehensive approach that coordinates ELA courses with courses in other subject areas in order to help students acquire a wide range of ever more sophisticated knowledge and skills through reading, writing, speaking, and listening.

The present work, led by the Council of Chief State School Officers (CCSSO) and the National Governors Association (NGA), builds on the foundation laid by states in their decades-long work on crafting high-quality education standards, including their work on the American Diploma Project with Achieve. The *Standards* also draw on the most important international models as well as research and input from numerous sources, including scholars, assessment developers, professional organizations, and educators from kindergarten through college. In their design and content, the *Standards* represent a synthesis of the best elements of standards-related work to date and an important advance over that previous work.

As specified by CCSSO and NGA, the *Standards* are (1) research and evidence based, (2) aligned with college and work expectations, (3) rigorous, and (4) internationally benchmarked. A particular standard was included in the document only when the best available evidence indicated that its mastery was essential for students to be college and career ready in a twenty-first-century, globally competitive society. As new and better evidence emerges, the *Standards* will be revised accordingly.

The *Standards* are an extension of a prior initiative led by CCSSO and NGA to develop College and Career Readiness (CCR) standards in reading, writing, speaking, listening, and language as well as in mathematics. The CCR Reading, Writing, and Speaking and Listening Standards, released in draft form in September 2009, serve, in revised form, as the backbone of the present document. Consistent across grades and disciplines, the CCR Standards create an essential unity within the document and a consistent point of reference for educators. Whether guiding third graders through a science unit or high school sophomores through a classic work of literature, teachers can look to the same CCR Standards—included in each section of this document—to help judge whether students are on course for being college and career ready. Grade-specific K–12 standards in reading, writing, speaking, listening, and language translate the broad (and, for the earliest grades, seemingly distant) aims of the CCR Standards into age- and attainment-appropriate terms.

While college and career readiness is the end point of the *Standards*—an ambitious goal in its own right—some students will reach that point before the end of high school. For those students who do complete the *Standards*' requirements before graduation, advanced work in such areas as literature, composition, language, and journalism should be available. It is beyond the scope of the *Standards* to describe what such advanced work should consist of, but it should provide the next logical step up from the college and career readiness baseline established here.

As a natural outgrowth of meeting the charge to define college and career readiness, the *Standards* also lay out a vision of what it means to be a literate person in the twenty-first century. Indeed, the skills and understandings students are expected to demonstrate have wide applicability outside the classroom or workplace. Students who meet the *Standards* readily undertake the close, attentive reading that is at the heart of understanding and enjoying complex works of literature. They habitually perform the critical reading necessary to pick carefully through the staggering amount of information available today in print and online. They actively seek the wide, deep, and thoughtful engagement with high-quality literary and informational texts that builds knowledge, enlarges experience, and broadens worldviews. They reflexively demonstrate the cogent reasoning and use of evidence that is essential to both private deliberation and responsible citizenship in a democratic republic. In short, students who master the *Standards* develop the skills in reading, writing, speaking, and listening that are the foundation for any creative and purposeful expression in language.

March 2010

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Key Design Considerations

A focus on results rather than means

By focusing on required achievements, the *Standards* leave room for teachers, curriculum developers, and states to determine how those goals should be reached and what additional topics should be addressed. Thus, the *Standards* do not mandate such things as a particular writing process or specify the full range of metacognitive strategies that students may need to use to monitor and direct their thinking and learning. Teachers are thus free to provide students with whatever tools and knowledge their professional judgment and experience identify as most helpful for meeting the goals set out in the *Standards*.

An integrated model of literacy

Although the *Standards* are divided into Reading, Writing, Speaking and Listening, and Language strands for conceptual clarity, the processes of communication are closely connected, as reflected throughout this document. For example, Writing Standard #9 requires that students be able to write about what they read. Likewise, Speaking and Listening Standard #4 sets the expectation that students will share findings from their research.

Language conventions and vocabulary are treated in detail in a separate strand not because those skills should be taught in isolation from other communication activities but because their importance extends beyond writing and reading, where standards documents often place such skills. Many of the conventions must be observed in standard spoken as well as written English, and students, particularly the youngest ones, encounter and acquire new words through conversations as well as through texts. To signal the link between the Language skills and the rest of the standards even more strongly, some skills associated with language use are also found in other strands when appropriate. Reading Standard #4, for example, concerns determining word meanings, and Writing Standard #5 includes editing among the skills students must be able to use to strengthen writing.

Research and media skills integrated into the Standards *as a whole*

To be ready for college, workforce training, and life in a technological society, students need the ability to gather, comprehend, evaluate, synthesize, report on, and create a high volume and extensive range of print and nonprint texts in media forms old and new. The need to research and to consume and produce media is embedded into every element of today's curriculum; in like fashion, the associated skills and understandings are embedded throughout the *Standards* rather than treated in a separate section.

Shared responsibility for students' literacy development

The *Standards* establish that instruction in reading, writing, speaking, listening, and language is a shared responsibility. The *Standards* present reading instruction in K–5 as fully integrative, including a rich blend of stories, drama, and poetry as well as informational texts from a range of content areas. ELA-specific standards for grade 6 and above include fiction, poetry, and drama but also literary nonfiction (e.g., speeches, essays, and historical documents with significant cultural importance and literary merit). Literacy standards specific to history/social studies and science for grade 6 and above are predicated on teachers in these areas using their unique disciplinary expertise to help students meet the particular challenges of reading, writing, speaking, listening, and language in their respective fields.

Part of the motivation behind the interdisciplinary approach to literacy promulgated by the *Standards* is extensive research establishing the need for college- and career-ready students to be proficient in reading complex informational text independently in a variety of content areas. Most of the required reading in college and workforce training programs is informational in structure and challenging in content; postsecondary education programs typically provide students with both a higher volume of such reading than is generally required in K–12 schools and comparatively little scaffolding.

The *Standards* are not alone in calling for a special emphasis on informational text. The 2009 reading framework of the National Assessment of Educational Progress (NAEP) requires a high and increasing proportion of informational text on its assessment as students advance through the grades.

Distribution of Literary and Informational Passages by Grade in the 2009 NAEP Reading Framework

Grade	Literary	Informational
4	50%	50%
8	45%	55%
12	30%	70%

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The *Standards* aim to align instruction with this framework so that many more students can meet the demands of college and career readiness. In K–5, the *Standards* balance the teaching of literature with informational text, including texts in history/social studies and science. Fulfilling the standards for 6–12 ELA requires much greater attention to literary nonfiction than has been traditional. The NAEP framework also makes clear that significant reading of informational texts should take place outside of the ELA classroom in order for students to be ready for college and careers. The NAEP framework applies the sum of all the reading students do in a grade, not just their reading in the ELA context. The percentages do not imply, for example, that high school ELA teachers must teach 70 percent informational text; they demand instead that a great deal of reading should occur in other disciplines. To measure students' growth toward college and career readiness, assessments aligned with the *Standards* should adhere to the distribution of texts across grades cited in the NAEP framework.

A progression of writing toward college and career readiness

NAEP likewise outlines a distribution across the grades of the core purposes and types of student writing. Similar to the *Standards,* the NAEP framework cultivates the development of three mutually reinforcing writing capacities: writing to persuade, to explain, and to convey real or imagined experience. Evidence concerning the demands of college and career readiness gathered during development of the *Standards* concurs with NAEP's shifting emphases: in grades 9–12 in the *Standards*, students continue writing in all three forms but focus overwhelmingly on writing to argue and to inform or explain.

Distribution of Communicative Purposes by Grade in the 2011 NAEP Writing Framework

Grade	To Persuade	To Explain	To Convey Experience
4	30%	35%	35%
8	35%	35%	30%
12	40%	40%	20%

It follows that writing assessments aligned with the *Standards* should adhere to the distribution of writing purposes across grades outlined by NAEP.

Grade levels for K–8; grade bands for 9–10 and 11–12

The *Standards* use individual grade levels in kindergarten through grade 8 to provide useful specificity; the *Standards* use two-year bands in grades 9–12 to allow schools, districts, and states flexibility in high school course design.

What is not *covered by the* Standards

The *Standards* should be recognized for what they are *not* as well as what they are. Three of the most important intentional design limitations are as follows:

1) The *Standards* define what all students are expected to know and be able to do but not *how* teachers should teach. The *Standards* must be complemented by a well-developed, content-rich curriculum consistent with the expectations laid out in this document.

2) While the *Standards* do attempt to focus on what is most essential, they do not describe all that *can* or *should* be taught. A great deal is left to the discretion of teachers and curiculum developers. The aim of the *Standards* is to articulate the fundamentals, not to set out an exhaustive list nor a set of restrictions that limits what can be taught beyond what is specified herein.

3) The *Standards* set grade-level standards but do not define the intervention methods or materials necessary to support students who are well below or well above grade-level expectations. No set of grade-level standards can fully reflect the great variety in achievement levels of students in any given classroom. However, the *Standards* do provide clear signposts along the way to the goal of college and career readiness for all students.

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The Student Who is College and Career Ready in Reading, Writing, Speaking, Listening, and Language

The descriptions that follow are not standards themselves, but instead offer a portrait of students who meet the standards set out in this document. As students advance through the grades and master the standards in reading, writing, speaking, listening, and language, they are able to exhibit with increasing fullness and regularity these capacities of the literate individual.

- **They demonstrate independence.**

Students can, without significant scaffolding or support, comprehend and evaluate complex texts across a range of types and disciplines, and they can construct effective arguments and clearly convey intricate or multifaceted information. Likewise, students are independently able to discern a speaker's key points and request clarification if something is not understood. They ask relevant questions, build on others' ideas, articulate their own ideas, and ask for confirmation that they have been understood. Without prompting, they observe language conventions, determine word meanings, attend to the connotations of words, and acquire new vocabulary.

- **They build strong content knowledge.**

Students establish a base of knowledge across a wide range of subject matter by engaging with works of quality and substance. They become proficient in new areas through research and study. They read purposefully and listen attentively to gain both general knowledge and discipline-specific expertise. They refine and share their knowledge through writing and speaking.

- **They respond to the varying demands of audience, task, purpose, and discipline.**

Students consider their communication in relation to audience, task, purpose, and discipline. They appreciate nuances, such as how the composition of an audience should affect tone when speaking and how the connotations of words affect meaning. They also know that different disciplines call for different types of evidence (e.g., documentary evidence in history, experimental evidence in the sciences).

- **They comprehend as well as critique.**

Students are engaged and open-minded—but discerning—readers and listeners. They work diligently to understand precisely what an author or speaker is saying, but they also question an author's or speaker's assumptions and assess the veracity of claims.

- **They value evidence.**

Students cite specific evidence when offering an oral or written interpretation of a text. They use relevant evidence when supporting their own points in writing and speaking, making their reasoning clear to the reader or listener, and they constructively evaluate others' use of evidence.

- **They use technology and digital media strategically and capably.**

Students employ technology thoughtfully to enhance their reading, writing, speaking, listening, and language use. They tailor their searches online to acquire useful information efficiently, and they integrate what they learn using technology with what they learn offline. They are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals.

- **They come to understand other perspectives and cultures.**

Students appreciate that the twenty-first-century classroom and workplace are settings in which people from often widely divergent cultures and who represent diverse experiences and perspectives must learn and work together. Students actively seek to understand other perspectives and cultures through reading and listening, and they are able to communicate effectively with people of varied backgrounds. They evaluate other points of view critically and constructively. Through reading great classic and contemporary works of literature representative of a variety of periods, cultures, and worldviews, students can vicariously inhabit worlds and have experiences much different than their own.

How to Read This Document

Overall Document Organization and Main Features

The *Standards* comprise three main sections: a comprehensive K–5 section and two content area–specific sections for grades 6–12, one in English language arts and one in history/social studies and science.

Each section is divided into Reading, Writing, Speaking and Listening, and Language *strands*. Each strand is headed by a set of *College and Career Readiness (CCR) Standards* that is identical across all grades and content areas. The uniformity of the CCR Standards provides a consistent point of reference for educators, facilitating schoolwide goal setting and professional development.

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CCR Standards: The basis for the K–12 Standards

Standards for each grade within K–8 and for grades 9–10 and 11–12 follow the College and Career Readiness (CCR) Standards in each strand. Each *grade-specific standard* (as these standards will be collectively referred to) corresponds to a particular CCR Standard. Put another way, each CCR Standard has an accompanying grade-specific standard translating the broader CCR statement into grade-appropriate terms.

Who is responsible for which portion of the Standards

A single K–5 section sets CCR and grade-specific standards for reading, writing, speaking, listening, and language across the curriculum, reflecting the fact that most or all of the instruction students receive in these grades comes from one elementary school teacher. Grades 6–12 are covered in two content area–specific sections, the first for the English language arts teacher and the second for the history/social studies and the science teacher. Each of these sections uses the same CCR Standards but also includes discipline-specific standards tuned to the literacy requirements of these disciplines. It is important to note that the literacy standards in history/social studies and science are meant to complement rather than supplant content standards in those disciplines.

Key Features of the Strands

Reading: Text complexity and the growth of comprehension

To foster students' ability to comprehend literary and informational texts of steadily increasing complexity, the *Standards* (starting formally in grade 2) define what proportion of the texts students read each year should come from a particular text complexity grade band (2–3, 4–5, 6–8, 9–10, or 11–12). Whatever they are reading, students must also show a steadily increasing ability to discern more from and make fuller use of text, including making an increasing number of connections among ideas and between texts, considering a wider range of textual evidence, and becoming more sensitive to inconsistencies, ambiguities, and poor reasoning in texts.

Writing: Text types, responding to sources, and research

The *Standards* acknowledge the fact that whereas some writing skills, such as the ability to reflect purpose, task, and audience, are important for many types of writing, others are more properly part of writing narratives, informative and explanatory texts, or arguments. Beginning at grade 4, the *Standards* specify the sorts of writing over extended and shorter time frames that students in each grade are to produce in response to sources. Because of the centrality of writing to most forms of inquiry, research standards are primarily included in this strand.

Speaking and Listening: Flexible communication and interpersonal skills

Including but not limited to skills necessary for formal presentations, the Speaking and Listening standards require students to develop a range of broadly useful oral communication and interpersonal skills. Students must learn to sift through and evaluate multiple points of view, listen thoughtfully in order to build on and constructively question the ideas of others while contributing their own ideas, and, where appropriate, reach agreement and common goals through teamwork.

Language: Conventions and vocabulary

The Conventions standards in the Language strand include the essential "rules" of formal written and spoken English, but they also approach language as a matter of craft and informed choice among alternatives. The Vocabulary standards focus on both understanding words and their nuances and acquiring new words through conversation, reading, and being taught them directly.

Appendices

Appendix A contains supplementary material on reading text complexity, writing, speaking and listening, language conventions, and vocabulary. Appendix B consists of text exemplars illustrating the complexity, quality, and range of reading appropriate for various grade levels. Appendix C includes annotated writing samples demonstrating at least adequate performance at various grade levels.

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Standards for English Language Arts and Literacy in History/Social Studies & Science

K–5

DRAFT

College and Career Readiness Standards for Reading

The K–5 standards on the following pages define what students should understand and be able to do in each grade and build toward the ten College and Career Readiness Standards.

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze in detail where, when, why, and how events, ideas, and characters develop and interact over the course of a text.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and explain how specific word choices shape meaning or tone.
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section or chapter) relate to each other and the whole.
6. Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge and Ideas

7. Synthesize and apply information presented in diverse ways (e.g., through words, images, graphs, and video) in print and digital sources in order to answer questions, solve problems, or compare modes of presentation.[1]
8. Delineate and evaluate the reasoning and rhetoric within a text, including assessing whether the evidence provided is relevant and sufficient to support the text's claims.
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Range and Level of Text Complexity

10. Read complex texts independently, proficiently, and fluently, sustaining concentration, monitoring comprehension, and, when useful, rereading.[2]

[1]Please see "Research to Build Knowledge" in Writing and "Comprehension and Collaboration" in Speaking and Listening for additional standards relevant to gathering, assessing, and applying information from print and digital sources.
[2]Proficiency in this standard is measured by students' ability to read a range of appropriately complex texts in each grade as defined on page 14.

Note on range and content of student reading

To build a foundation for college and career readiness, students must read widely and deeply from among a broad range of high-quality, increasingly challenging literary and informational texts. Through extensive reading of stories, dramas, poems, and myths from diverse cultures and different time periods, students gain literary and cultural knowledge as well as familiarity with various text structures and elements. By reading texts in history/social studies, science, and other disciplines, students build a foundation of knowledge in these fields that will also give them the background to be better readers in all content areas. Students can only gain this foundation when the curriculum is intentionally and coherently structured to develop rich content knowledge within and across grades. Students also acquire the habits of reading independently and closely, which are essential to their future success.

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Reading Standards for Literature K–5

Following are the standards for K–5, which relate to their College and Career Readiness counterparts by number. They offer a focus for instruction each year and help ensure that students gain adequate exposure to a range of texts and tasks. Rigor is also infused through the requirement that students read increasingly complex texts through the grades.

Kindergartners:	Grade 1 students:	Grade 2 students:
Key Ideas and Details		
1. With prompting and support, ask and answer questions about details and events in a text.	**1.** Ask and answer questions about key details and events in a text.	**1.** Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details and events in a text.
2. Retell familiar stories.	**2.** Retell stories, demonstrating understanding of the central message or lesson.	**2.** Paraphrase stories, fables, folktales, or myths from diverse cultures and determine their lessons or morals.
3. Identify characters, settings, and key events in a story.	**3.** Describe characters, settings, and key events in a story.	**3.** Describe how characters in a story respond to key events and conflicts.
Craft and Structure		
4. Ask questions about unknown words in a text.	**4.** Identify words and phrases in stories or poems that suggest feelings or appeal to the senses.	**4.** Identify words and phrases (e.g., regular beats, rhymes, and repeated lines) that supply rhythm and meaning in a story, poem, or song.
5. Recognize common types of texts (e.g., storybooks, poems).	**5.** Distinguish major categories of writing from each other (e.g., stories and poems), drawing on a wide reading of a range of text types.	**5.** Refer to core elements of stories, plays, and myths, including characters, settings, and plots, when writing or speaking about a specific text.
6. Name the author and illustrator of a text and define the role of each.	**6.** Identify who is speaking at various points in a story, myth, fable, or narrative poem.	**6.** Distinguish between characters by speaking in a different voice for each character when reading aloud.
Integration of Knowledge and Ideas		
7. Relate pictures and illustrations to the overall story in which they appear.	**7.** Use pictures, illustrations, and details in a story to describe characters, events, or settings.	**7.** Explain how images and illustrations contribute to and clarify a story.
8. (Not applicable to literature)	**8.** (Not applicable to literature)	**8.** (Not applicable to literature)
9. Compare and contrast the adventures of characters in familiar stories.	**9.** Compare and contrast two or more versions of the same story (e.g., Cinderella stories) by different authors or from different cultures.	**9.** Compare and contrast characters or events from different stories addressing similar themes.
Range and Level of Text Complexity		
10. Read emergent-reader literature texts with purpose and understanding.	**10.** Read independently, proficiently, and fluently literature texts appropriately complex for grade 1.	**10.** Read literature independently, proficiently, and fluently within the grades 2–3 text complexity band; read texts at the high end of the range with scaffolding as needed.

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Reading Standards for Literature K–5

Grade 3 students:	Grade 4 students:	Grade 5 students:
Key Ideas and Details		
1. Ask and answer questions to demonstrate understanding of a text, explicitly using the text as the basis for the answers.	**1.** Draw on details and examples from a text to support statements about the text.	**1.** Quote from a text to support statements about the text.
2. Use key supporting details in stories, fables, folktales, or myths from diverse cultures to determine the lessons or morals.	**2.** Summarize a text and derive a theme of a story, drama, or poem from details in the text.	**2.** Determine a theme of a text, drawing on how characters in a story respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.
3. Describe the main characters in a story (e.g., their traits, motivations, or feelings) and explain how they contribute to the sequence of events.	**3.** Describe in detail a character, event, or setting, drawing on specific details in the text (e.g., from a character's thoughts, words, deeds, or interactions with others).	**3.** Compare and contrast two or more characters, events, or settings in a text, drawing on specific details.
Craft and Structure		
4. Interpret key words and phrases in a text, distinguishing literal from figurative language.	**4.** Understand words and phrases in a text that allude to significant characters found in mythology (e.g., *Herculean*), drawing on a wide reading of classic myths from a variety of cultures and periods.	**4.** Identify how metaphors and similes as well as rhymes and other repetitions of sounds (e.g., alliteration) supply meaning and rhythm in a specific verse or stanza of a poem.
5. Demonstrate understanding of common features of legends, myths, and folk- and fairytales (e.g., heroes and villains; quests or challenges) when writing or speaking about classic stories from around the world.	**5.** Explain major differences between poems and prose, and refer to the structural elements of poems (e.g., stanza, verse, rhythm, meter) when writing or speaking about specific poems.	**5.** Explain major differences between drama and prose stories, and refer to the structural elements of drama (e.g., casts of characters, setting descriptions, dialogue, stage directions, acts, scenes) when writing or speaking about specific works of dramatic literature.
6. Distinguish their own point of view from those of characters in a story.	**6.** Compare the point of view from which different stories are narrated, including the difference between first- and third-person narrations.	**6.** Identify how a narrator's perspective or point of view influences how events are described.
Integration of Knowledge and Ideas		
7. Use information from illustrations and other visual elements in a text with the words to develop an understanding of the setting, characters, and plot.	**7.** Integrate information from several illustrations and other visual elements in a text with the words to develop an understanding of how the setting and characters change and the plot develops.	**7.** Explain how images, sounds, and movements contribute to an animated or live-action adaptation of a story, comparing that version to what they "see" or "hear" from reading the text.
8. (Not applicable to literature)	**8.** (Not applicable to literature)	**8.** (Not applicable to literature)
9. Compare and contrast the plots, settings, and themes of stories written by the same author about the same or similar characters (e.g., in books from a series).	**9.** Compare and contrast thematically similar tales, myths, and accounts of events from various cultures.	**9.** Compare the treatment of similar ideas and themes (e.g., opposition of good and evil) as well as character types and patterns of events in myths and other traditional literature from different cultures.
Range and Level of Text Complexity		
10. Read literature independently, proficiently, and fluently within the grades 2–3 text complexity band; read "stretch" texts in the grades 4–5 text complexity band with scaffolding as needed.	**10.** Read literature independently, proficiently, and fluently in the grades 4–5 text complexity band; read texts at the high end of the range with scaffolding as needed.	**10.** Read literature independently, proficiently, and fluently within the grades 4–5 text complexity band; read "stretch" texts in the grades 6–8 text complexity band with scaffolding as needed.

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Reading Standards for Informational Text K–5

Kindergartners:	Grade 1 students:	Grade 2 students:
Key Ideas and Details		
1. With prompting and support, ask and answer questions about information and events a text.	**1.** Ask and answer questions about key information and events in a text.	**1.** Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key information and events in a text.
2. Identify the main topic and main ideas of a text.	**2.** Identify the main topic, main ideas, and key details of a text.	**2.** Identify the main focus of a multiparagraph text as well as that of specific paragraphs within the text.
3. With prompting and support, describe the connection between two events or ideas in a text.	**3.** Describe the connection between two key events or ideas in a text.	**3.** Describe the connection between two or more historical events or scientific concepts in a text.
Craft and Structure		
4. Ask questions about unknown words in a text.	**4.** Learn and determine the meanings of words and phrases encountered in text relevant to a *grade 1 topic or subject area*.	**4.** Learn and determine the meanings of words and phrases encountered in text relevant to a *grade 2 topic or subject area*.
5. Locate basic information in a text.	**5.** Describe how a text groups information into general categories (e.g., cows, pigs, and horses are *farm animals*).	**5.** Know and use various text features (e.g., captions, headings, tables of contents, glossaries, indexes, electronic menus, icons) to locate key facts or information.
6. Name the author and illustrator of a text and define the role of each.	**6.** Distinguish between information provided by pictures or illustrations and that provided by the words in a text.	**6.** Identify the main purpose of a text, including what question the author aims to answer or what the author aims to explain or describe.
Integration of Knowledge and Ideas		
7. Relate pictures or illustrations to the overall text in which they appear.	**7.** Use pictures, illustrations, and details in a text to describe the key ideas.	**7.** Explain how images and illustrations contribute to and clarify a text.
8. With prompting and support, recognize cause-and-effect relationships in a text.	**8.** Identify cause-and-effect relationships in a text.	**8.** Describe how specific causes link key events or ideas together in a text.
9. With prompting and support, recognize basic similarities in and differences between two texts on the same topic (e.g., in illustrations or descriptions).	**9.** Identify similarities in and differences between two texts on the same topic (e.g., in illustrations or descriptions).	**9.** Describe similarities in and differences between two texts on the same topic.
Range and Level of Text Complexity		
10. Read emergent-reader informational texts with purpose and understanding.	**10.** Read independently, proficiently, and fluently informational texts appropriately complex for grade 1.	**10.** Read informational texts independently, proficiently, and fluently within the grades 2–3 text complexity band; read texts at the high end of the range with scaffolding as needed.

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Reading Standards for Informational Text K–5

Grade 3 students:	Grade 4 students:	Grade 5 students:
Key Ideas and Details		
1. Ask and answer questions to demonstrate understanding of a text, explicitly using the text as the basis for the answers.	**1.** Draw on details and examples from a text to support statements about the text.	**1.** Quote from a text to support statements about the text.
2. Determine the main idea of a text and explain how it is supported by the key details.	**2.** Determine the main idea and supporting details of a text; summarize the text.	**2.** Determine two or more main ideas and how they are supported by details; summarize the text.
3. Describe the relationship between historical or scientific events or ideas in a text, using knowledge of connective devices that pertain to time, sequence, and cause and effect.	**3.** Describe the sequence of events in an historical or scientific account, including what happened and why, based on specific information in a text.	**3.** Explain the relationships between two or more historical events or scientific concepts by drawing on specific information from one or more texts.
Craft and Structure		
4. Learn and determine the meanings of general academic language and domain-specific words and phrases encountered in a text relevant to a *grade 3 topic or subject area*.	**4.** Learn and determine the meanings of general academic language and domain-specific words or phrases encountered in a text relevant to a *grade 4 topic or subject area*.	**4.** Learn and determine the meanings of general academic language and domain-specific words and phrases encountered in a text relevant to a *grade 5 topic or subject area*.
5. Use text features (e.g., bold print, key words, topic sentences, hyperlinks, electronic menus, icons) to locate information quickly and efficiently.	**5.** Use text features and search tools to locate and process information relevant to a given topic.	**5.** Describe how events, ideas, or information are organized (e.g., chronology, comparison, cause and effect) in a whole text or in part of a text.
6. Compare what is presented in a text with relevant prior knowledge and beliefs, making explicit what is new or surprising.	**6.** Compare an eyewitness account to a secondhand account of the same event or topic.	**6.** Analyze two accounts of the same event or topic and describe important similarities and differences in the details they provide.
Integration of Knowledge and Ideas		
7. Integrate information from illustrations and other visual elements (e.g., maps, photographs) in print and digital texts as an aid to understanding where, when, why, and how key events occur.	**7.** Interpret factual information presented graphically or visually (e.g., in charts, diagrams, time lines, animations, and interactive elements) and explain how the information contributes to understanding a print or digital text.	**7.** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
8. Describe the logical connection between paragraphs and between sentences in a text (e.g., comparison, sequence, example).	**8.** Explain how an author uses evidence to support his or her claims in a text.	**8.** Explain how an author uses evidence to support his or her claims in a text, identifying what evidence supports which claim(s).
9. Compare and contrast information drawn from two texts on the same subject.	**9.** Describe how two or more texts on the same subject build on one another; provide a coherent picture of the information they convey.	**9.** Integrate information from several texts on the same subject in order to write or speak about the subject knowledgeably.
Range and Level of Text Complexity		
10. Read informational texts independently, proficiently, and fluently within the grades 2–3 text complexity band; read "stretch" texts in the grades 4–5 text complexity band with scaffolding as needed.	**10.** Read informational texts independently, proficiently, and fluently within the grades 4–5 text complexity band; read texts at the high end of the range with scaffolding as needed.	**10.** Read informational texts independently, proficiently, and fluently within the grades 4–5 text complexity band; read "stretch" texts in the grades 6–8 text complexity band with scaffolding as needed.

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Reading Standards: Foundational Skills (K–3)

These standards are directed toward fostering students' understanding and working knowledge of concepts of print, the alphabetic principle, and other basic conventions of the English writing system. These Foundational Skills are not an end in and of themselves; rather, they are necessary and important components of an effective, comprehensive reading program designed to develop proficient readers with the capacity to comprehend texts across a range of types and disciplines.

Kindergartners:	Grade 1 students:
Print Concepts	
1. Demonstrate understanding of the organization and basic features of print. a. Identify the front cover, back cover, and title page of a book. b. Follow words from left to right, top to bottom, and page by page. c. Understand that words are separated by spaces in print. d. Recognize and name all upper- and lowercase letters of the alphabet.	**1.** (Not applicable)
Phonological Awareness	
2. Demonstrate understanding of spoken words, syllables, and phonemes. a. Recite and produce rhyming words. b. Count, pronounce, blend, and segment syllables in spoken words. c. Count individual words in spoken phrases or simple sentences. d. Blend and segment consonants and rimes of spoken words (*/q/ - /oat/*, */bl/ - /ack/*). e. Demonstrate phonemic awareness by isolating and pronouncing the initial, medial vowel, and final phonemes (sounds) in three-phoneme (CVC) words (e.g., */save/*, */ham/*).[1] (This does not include CVCs ending with */l/*, */r/*, or */x/*.) f. Add or substitute individual phonemes in simple, one-syllable words to make new words (e.g., */at/* → */sat/* → */mat/* → */map/*).	**2.** Demonstrate understanding of spoken words, syllables, and phonemes. a. Aurally distinguish long from short vowel sounds in spoken single-syllable words (e.g., */tap/* vs. */tape/*, */sock/* vs. */soak/*, */sit/* vs. */sight/*). b. Orally produce single-syllable words by blending phonemes, including consonant blends (e.g., */cats/*, */black/*, */blast/*). c. Isolate and pronounce initial, medial vowel, and final phonemes (sounds) in spoken single-syllable words (e.g., *f**a**st*, *fa**s**t*, *fas**t***). d. Segment spoken single-syllable words into their complete sequence of individual phonemes (e.g., lap: /l/-/a/-/p/→ /f/-/l/-/a/-/p/).

[1]Words, syllables, or phonemes written in /slashes/refer to their pronunciation or phonology. Thus, /CVC/ is a word with three phonemes regardless of the number of letters in the spelling of the word.

Reading Standards: Foundational Skills (K–3)

Kindergartners:	Grade 1 students:	Grade 2 students:	Grade 3 students:
Phonics and Word Recognition			
3. Know and apply grade-level phonics and word analysis skills in decoding words. a. Demonstrate basic knowledge of letter-sound correspondences by producing the primary or most frequent sound for each consonant. b. Associate the long and short sounds with the graphemes for the five major vowels. c. Read at least twenty-five very-high-frequency words by sight (e.g., *the*, *of*, *to*, *you*, *she*, *my*, *is*, *are*, *do*, *does*). d. Distinguish between similarly spelled words by identifying the sounds of the letters that differ (e.g., ***b**at* vs. *s**a**t*, *ca**t*** vs. *ca**n***, *h**i**t* vs. *h**o**t*).	**3.** Know and apply grade-level phonics and word analysis skills in decoding words. a. Know the spelling-sound correspondences for common consonant digraphs (e.g., *-ll*, *-ck*, *wr-*, *sh*). b. Decode regularly spelled one-syllable words (e.g., *lock*, *much*, *see*, *rain*, *slide*, *bake*, *bring*). c. Know final *-e* (e.g., *take*, *side*) and common vowel team conventions (e.g., *rain*, *day*, *week*, *seat*, *road*, *show*) for representing long vowel sounds. d. Use knowledge that every syllable must have a vowel sound to determine the number of syllables in a printed word. e. Decode two-syllable words following basic patterns (e.g., *rabbit*) by breaking the words into syllables. f. Read words with inflectional endings (e.g., *-s*, *-es*, *-ed*, *-ing*, *-er*, *-est*). g. Recognize and read grade-appropriate irregularly spelled words (e.g., *said*, *were*, *could*, *would*, *their*, *there*, *through*, *none*, *both*).	**3.** Know and apply grade-level phonics and word analysis skills in decoding words. a. Distinguish long and short vowels when reading regularly spelled one-syllable words (e.g., *hop* vs. *hope*, *men* vs. *mean*, *fell* vs. *feel*, *bend* vs. *bead*). b. Know spelling-sound correspondences for additional common vowel teams (e.g., *loud*, *cow*, *look*, *loop*, *boy*, *boil*). c. Decode regularly spelled two-syllable words with long vowels (e.g., *surprise*, *remain*, *needle*, *baby*, *paper*). d. Decode words with common prefixes and suffixes (e.g., *unhappy*, *carefully*, *goodness*, *unbutton*). e. Identify words with inconsistent but common spelling-sound correspondences (e.g., *heat* vs. *head*, *roll* vs. *doll*, *hint* vs. *hind*). f. Recognize and read grade-appropriate irregularly spelled words (e.g., *through*, *eyes*, *busy*, *ocean*, *island*, *people*).	**3.** Know and apply grade-level phonics and word analysis skills in decoding words. a. Identify and know the meaning of the most common prefixes and derivational suffixes (e.g., *un-*, *re-*, *mis-*, *-ful*, *-less*, *-able*). b. Decode words with common Latin suffixes (e.g., *-tion/-sion*, *-ture*, *-tive/-sive*, *-ify*, *-ity*, *-ment*). c. Decode multisyllable words (e.g., *supper*, *chimpanzee*, *refrigerator*, *terrible*, *frightening*). d. Read grade-appropriate irregularly spelled words (e.g., *although*, *science*, *stomach*, *machine*).
Fluency			
4. Read with sufficient accuracy and fluency to support comprehension. a. Read emergent-reader texts with purpose and understanding.	**4.** Read with sufficient accuracy and fluency to support comprehension. a. Read on-level text with purpose and understanding. b. Read on-level text orally with accuracy, appropriate rate, and expression on successive readings. c. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.	**4.** Read with sufficient accuracy and fluency to support comprehension. a. Read on-level text with purpose and understanding. b. Read on-level text orally with accuracy, appropriate rate, and expression on successive readings. c. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.	**4.** Read with sufficient accuracy and fluency to support comprehension. a. Read on-level text with purpose and understanding. b. Read on-level text orally with accuracy, appropriate rate, and expression on successive readings c. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.

Range and Level of Text Complexity for Student Reading by Grade (Standard 10)

Students demonstrate proficiency in reading texts at the following ranges of text complexity to progress on a path to college and career readiness.

K	(See specific exemplars.)	
1		
2		**In grade 2**, students focus on reading texts independently in the grades 2–3 text complexity band, with scaffolding likely required for texts at the high end of the range.
3		**In grade 3**, students focus on reading texts independently in the grades 2–3 text complexity band (70 percent) and are introduced to texts in the grades 4–5 text complexity band as "stretch" texts (30 percent), which will likely require scaffolding.
4		**In grade 4**, students focus on reading texts independently in the grades 4–5 text complexity band, with scaffolding likely required for texts at the high end of the range.
5		**In grade 5**, students focus on reading independently in the grades 4–5 text complexity band (70 percent) and are introduced to texts in the grades 6–8 text complexity band as "stretch" texts (30 percent), which will likely require scaffolding.

Note: In any given classroom, the actual range of students' reading ability could be greater than the proposed range. Some students will require extra time and intense support and scaffolding to enable them to read grade-level material, whereas other students will be ready for—and should be encouraged to read—more advanced texts.

Measuring Text Complexity: Three Factors

Qualitative evaluation of the text: Levels of meaning, structure, language conventionality and clarity, and knowledge demands

Quantitative evaluation of the text: Readability measures and other scores of text complexity

Matching reader to text and task: Reader knowledge, motivation, and interests as well as the complexity generated by the tasks to be assigned and the questions to be posed

Note: More detailed information on text complexity and how it is measured is contained in Appendix A.

Range of Text Types for K–5

Students in K–5 apply the Reading standards to the following range of text types, with texts selected from a broad range of cultures and periods.

Literature			Informational Text
Stories	**Drama**	**Poetry**	**Literary Nonfiction, History/Social Studies, and Science and Technical Texts**
Includes children's adventure stories, folktales, legends, fables, fantasy, realistic fiction, and myth	Includes staged dialogue and brief familiar scenes	Includes nursery rhymes and the subgenres of the narrative poem, limerick, and free verse poem	Includes biographies and autobiographies; books about history, social studies, science, and the arts; and digital media sources on a range of topics

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College and Career Readiness Standards for Writing

The K–5 standards on the following pages define what students should understand and be able to do in each grade and build toward the ten College and Career Readiness Standards.

Text Types and Purposes[1]

1. Write arguments to support a substantive claim with clear reasons and relevant and sufficient evidence.
2. Write informative/explanatory texts to convey complex information clearly and accurately through purposeful selection and organization of content.
3. Write narratives to convey real or imagined experiences, individuals, or events and how they develop over time.

Production and Distribution of Writing

4. Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience.
5. Strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.[2]
6. Use technology, including the Internet, to produce, publish, and interact with others about writing.

Research to Build Knowledge

7. Perform short, focused research projects as well as more sustained research in response to a focused research question, demonstrating understanding of the material under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate and cite the information while avoiding plagiarism.
9. Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned.

Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.[3]

[1]These broad categories of writing include many subgenres. See Appendix A for definitions of key writing types.
[2]See "Conventions" in Language, pages 22–26, for specific editing expectations.
[3]This standard is measured by the proficiency of student writing products.

Note on range and content of student writing

To build a foundation for college and career readiness, students need to learn to use writing as a way of offering and supporting opinions, demonstrating understanding of the subjects they are studying, and conveying thoughts, feelings, and real and imaginary experiences. They learn to appreciate that a key purpose of writing is to communicate clearly to an external, sometimes unfamiliar audience, and they begin to adapt the form, content, and style of their writing to accomplish a particular purpose and task. They develop the capacity to build knowledge on a subject through research projects and to respond analytically to literary and informational sources. To meet these goals, students must devote significant time and effort to writing, producing numerous pieces over short and long time frames throughout the year.

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Writing Standards K–5

Following are the standards for K–5, which relate to their College and Career Readiness counterparts by number. They offer a focus for instruction in each year to help ensure that students gain adequate exposure to a range of skills and applications. Growth in writing ability is characterized by an increasing sophistication in all aspects of language use, from vocabulary and syntax to the development and organization of ideas. At the same time, the content and sources that students address in their writing grow in demand every year.

Kindergartners:	Grade 1 students:	Grade 2 students:
Text Types and Purposes		
1. Use a combination of drawing, dictating, and writing to compose opinions in which they tell a reader the name of a book or the topic they are "writing" about and give an opinion about the topic (e.g., *My favorite book is . . .*).	**1.** Write opinions in which they introduce the topic or the name of the book they are writing about, state an opinion, and provide a reason for their opinion.	**1.** Write opinions in which they introduce the topic or book(s) directly, state an opinion, provide reasons and details to support opinions, use words to link opinions and reason(s) (e.g., *because*, *and*, *also*), and provide a sense of closure.
2. Use a combination of drawing, dictating, and writing to compose informative and explanatory texts in which they name what they are "writing" about and share some information about it.	**2.** Write informative and explanatory texts in which they name a topic, supply some facts relevant to the topic, and provide some sense of closure.	**2.** Write informative and explanatory texts in which they introduce a topic, use facts and definitions to develop points, present similar information together using headers to signal groupings when appropriate, and provide a concluding sentence or section.
3. Use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order that they occurred, and provide a reaction to what happened.	**3.** Write narratives in which they include at least two or more appropriately sequenced events, use time cue words to signal event order, and provide some details and a sense of closure.	**3.** Write narratives in which they recount a well-elaborated event or series of events, use temporal words and phrases to signal event order, include details to tell what the narrator did, thought, and felt, and provide closure.
Production and Distribution of Writing		
4. (Begins in grade 3)	**4.** (Begins in grade 3)	**4.** (Begins in grade 3)
5. With guidance and support from adults, add details to strengthen writing as needed through revision.	**5.** With guidance and support from adults, add details to strengthen writing as needed through revision.	**5.** With guidance from adults, strengthen writing as needed by revising and editing.
6. (Begins in grade 2)	**6.** (Begins in grade 2)	**6.** With guidance from adults, use technology to produce writing.
Research to Build Knowledge		
7. (Begins in grade 1)	**7.** Participate in shared research and writing projects (e.g., exploring a number of books on a given topic).	**7.** Participate in shared research and writing projects (e.g., exploring a number of books on a given topic).
8. Gather information from experiences or provided text sources to answer a specific question.	**8.** Gather information from experiences or provided text sources to answer a specific question.	**8.** Gather information from experiences or provided text sources to answer a specific question.
9. (Begins in grade 4)	**9.** (Begins in grade 4)	**9.** (Begins in grade 4)
Range of Writing		
10. (Begins in grade 4)	**10.** (Begins in grade 4)	**10.** (Begins in grade 4)

DRAFT

Writing Standards K–5

Grade 3 students:	Grade 4 students:	Grade 5 students:
Text Types and Purposes		
1. Write opinions in which they: a. Introduce the topic or book(s) directly, state an opinion relative to the topic, and create an organizing structure that lists reasons. b. Provide reasons that support the opinion. c. Use appropriate words to link opinions and reason(s) (e.g., *because*, *therefore*, *in order to*, *since*, *for example*). d. Provide a sense of closure.	**1.** Write opinions in which they: a. Introduce an opinion about a concrete issue or topic and create an organizing structure where related ideas are grouped to support the writer's purpose. b. Provide reasons that are supported by facts and details. c. Link reasons and details together using words and phrases (e.g., *so*, *then*, *for instance*, *in addition*). d. Adopt an appropriate style for sharing and defending an opinion. e. Provide a concluding statement or section.	**1.** Write opinions in which they: a. Introduce an opinion about a concrete issue or topic and create an organizing structure where ideas are logically grouped to support the writer's purpose. b. Provide logically ordered reasons that are supported by facts and details. c. Link reasons and details together using words, phrases, and clauses (e.g., *consequently*, *generally*, *specifically*). d. Adopt an appropriate style for sharing and defending an opinion. e. Provide a concluding statement or section.
2. Write informative/explanatory pieces in which they: a. Introduce a topic and create an organizational structure that presents similar information together. b. Provide some details to develop points. c. Use linking words (e.g., *also*, *another*, *and*, *more*) to connect ideas within categories of information. d. Include a concluding sentence or section.	**2.** Write informative/explanatory pieces in which they: a. State the topic clearly and group related information in paragraphs and sections. b. Develop the topic using facts, concrete details, quotations, or other information and examples. c. Use appropriate links to join ideas within categories of information. d. Employ domain-specific vocabulary when appropriate. e. Provide a conclusion related to the information or explanation offered.	**2.** Write informative/explanatory pieces in which they: a. State the topic clearly, provide a general observation and focus, and group related information logically. b. Develop the topic using relevant facts, concrete details, quotations, or other information and examples. c. Use appropriate links to join ideas within and across categories of information. d. Employ domain-specific vocabulary and some technical terms when appropriate. e. Provide a conclusion related to the information or explanation offered.
3. Write narratives in which they: a. Establish a situation, introduce a narrator and/or characters, and organize an event sequence that unfolds naturally. b. Employ dialogue and descriptions of characters' actions, thoughts, and feelings. c. Use temporal words and phrases to signal event sequence. d. Provide a sense of closure.	**3.** Write narratives in which they: a. Orient the reader by establishing a situation, introduce a narrator and/or characters, and organize an event sequence that unfolds naturally. b. Use narrative techniques such as dialogue and description to develop events and show the characters' external behaviors and internal responses to events. c. Use a variety of temporal words and phrases to manage the sequence of events. d. Use concrete and sensory words and phrases to convey events and experiences precisely. e. Provide a satisfying conclusion that follows from the narrative's events.	**3.** Write narratives in which they: a. Engage and orient the reader by establishing a situation, introduce a narrator and/or characters, and create an organization that sequences events naturally and logically. b. Use narrative techniques such as dialogue, pacing, and description to develop events and show characters' external behaviors and internal responses. c. Use a variety of temporal words, phrases, and clauses to manage the sequence of events. d. Use well-chosen words and phrases to convey events and experiences precisely. e. Provide a satisfying conclusion that follows from the narrative's events.

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Writing Standards K–5

Grade 3 students:	Grade 4 students:	Grade 5 students:
Production and Distribution of Writing		
4. (Begins in grade 4).	**4.** Produce coherent and clear writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in Standards 1–3 above.)	**4.** Produce coherent and clear writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in Standards 1–3 above.)
5. With guidance and support from peers and adults, strengthen writing as needed by revising and editing.	**5.** With guidance and support from peers and adults, strengthen writing as needed by planning, revising, and editing.	**5.** With guidance and support from peers and adults, strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
6. With guidance and support from adults, use technology to produce and publish writing.	**6.** With guidance and support from adults, use technology to produce, publish, and interact with others about writing.	**6.** With guidance and support from adults, use technology, including the Internet, to produce, publish, and interact with others about writing.
Research to Build Knowledge		
7. Perform short, focused research tasks that build knowledge about a topic.	**7.** Perform short, focused research tasks that build knowledge through investigation of different aspects of a single topic.	**7.** Perform short, focused research tasks that build knowledge through investigation of different aspects of a topic using several sources.
8. Gather information from experience as well as print and digital resources, take simple notes on sources, and sort evidence into provided categories.	**8.** Gather relevant information from experience as well as print and digital sources, take notes and categorize evidence, restate information in written text, and provide basic bibliographic information.	**8.** Gather relevant information from experience as well as print and digital sources; summarize or paraphrase information in notes and finished work, and provide basic bibliographic information.
9. (Begins in grade 4)	**9.** Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned: a. Apply *grade 4 reading standards* to informational texts (e.g., "Explain how an author uses evidence to support his or her claims in a text"). b. Apply *grade 4 reading standards* to literature (e.g., "Describe in detail a character, event, or setting, drawing on specific details in the text (e.g., from a character's thoughts, words, deeds, and interactions with others").	**9.** Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned: a. Apply *grade 5 reading standards* to informational texts (e.g., "Explain how an author uses evidence to support his or her claims in a text, identifying what evidence supports which claim(s)"). b. Apply *grade 5 reading standards* to literature (e.g., "Compare and contrast two or more characters, events, or settings in a text, drawing on specific details").
Range of Writing		
10. (Begins in grade 4)	**10.** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.	**10.** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

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College and Career Readiness Standards for Speaking and Listening

The K–5 standards on the following pages define what students should understand and be able to do in each grade and build toward the six College and Career Readiness Standards.

Comprehension and Collaboration

1. Participate effectively in a range of interactions (one-on-one and in groups), exchanging information to advance a discussion and to build on the input of others.
2. Integrate and evaluate information from multiple oral, visual, or multimodal sources in order to answer questions, solve problems, or build knowledge.
3. Evaluate the speaker's point of view, reasoning, and use of evidence and rhetoric.

Presentation of Knowledge and Ideas

4. Present information, evidence, and reasoning in a clear and well-structured way appropriate to purpose and audience.
5. Make strategic use of digital media and visual displays of data to express information and enhance understanding.
6. Adapt speech to a variety of contexts and communicative tasks, demonstrating a command of formal English when indicated or appropriate.

Note on range and content of student speaking and listening

To build a foundation for college and career readiness, students must have ample opportunities to take part in a variety of rich, structured conversations—whole class, small group, and with a partner. Being productive members of these conversations requires that students contribute accurate, relevant information; respond to and develop what others have said; make comparisons and contrasts; and analyze and synthesize a multitude of ideas in various domains.

New technologies have broadened and expanded the role that speaking and listening play in acquiring and sharing knowledge and have tightened their link to other forms of communication. Digital texts confront students with the potential for continually updated content and dynamically changing combinations of words, graphics, images, hyperlinks, and embedded video and audio.

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Speaking and Listening Standards K–5

Following are the standards for K–5, which relate to their College and Career Readiness counterparts by number. They offer a focus for instruction in each year to help ensure that students gain adequate exposure to a range of skills and applications.

Kindergartners:	Grade 1 students:	Grade 2 students:
Comprehension and Collaboration		
1. Participate in conversations with peers and adults about *kindergarten topics and texts* being studied in class. a. Listen to others and take turns speaking. b. Continue a conversation through several exchanges.	**1.** Initiate and participate in conversations with peers and adults about *grade 1 topics and texts* being studied in class. a. Follow agreed-upon rules for discussions, such as listening to others, speaking one at a time, and gaining the floor in respectful ways. b. Respond to the comments of others through multiple exchanges. c. Ask questions to clear up confusion about a topic.	**1.** Engage in group discussions on *grade 2 topics and texts* being studied in class. a. Follow agreed-upon rules for discussions, such as listening to others, speaking one at a time, and gaining the floor in respectful ways. b. Stay on topic by linking their own additions to the conversation to the previous remarks of others. c. Ask for clarification and further explanation as needed. d. Extend their ideas and understanding in light of the discussions.
2. Confirm understanding of information presented orally or through media by asking and answering questions about key details.	**2.** Confirm understanding of information presented orally or through media by restating key elements and asking and answering questions about key details.	**2.** Retell key details or ideas presented orally or through media.
3. Ask questions to get information, seek help, or clarify something that is not understood.	**3.** Ask questions to get information, clarify something that is not understood, or gather additional information.	**3.** Ask and answer questions about information presented orally or visually in order to deepen their understanding or clarify comprehension.
Presentation of Knowledge and Ideas		
4. Describe familiar people, places, things, and events and, with prompting and support, provide additional detail.	**4.** Describe familiar people, places, things, and events with relevant details, expressing ideas and feelings clearly.	**4.** Recount stories or experiences with appropriate facts and descriptive details.
5. (Begins in grade 4)	**5.** (Begins in grade 4)	**5.** (Begins in grade 4)
6. (Begins in grade 1)	**6.** Produce complete sentences when appropriate to task and situation, using correct verb tenses to convey a sense of past, present, and future. (See "Conventions" in Language, pages 22–26, for specific demands.)	**6.** Produce complete sentences when appropriate to task and situation to provide requested detail or clarification, ensuring subject-verb agreement and correct use of irregular plural nouns. (See "Conventions" in Language, pages 22–26, for specific demands.)

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Speaking and Listening Standards K–5

Grade 3 students:	Grade 4 students:	Grade 5 students:
Comprehension and Collaboration		
1. Initiate and engage in group discussions on *grade 3 topics and texts* being studied in class. a. Follow agreed-upon rules for discussions and carry out assigned roles in small-group discussions. b. Pose relevant questions and link their own additions to the conversation to the previous remarks of others. c. Extend their ideas and understanding in light of the discussions.	**1.** Initiate and engage in group discussions on *grade 4 topics and texts* being studied in class. a. Come to discussions prepared, having read required material; in discussions, explicitly draw on that material and other information known about the topic. b. Pose and respond to questions as well as build on the ideas of previous speakers. c. Acknowledge new information provided by others and incorporate it into their own thinking as appropriate.	**1.** Initiate and engage in group discussions on *grade 5 topics and texts* being studied in class. a. Come to discussions prepared, having read the required material; in discussions, explicitly draw on that material and other information known about the topic. b. Respond to questions with elaboration, make comments that contribute to the topic, and build on the ideas of previous speakers. c. Ask questions to clarify or follow up on ideas or information presented orally or through media. d. Draw conclusions based on the ideas of others and incorporate them into their own thinking as appropriate.
2. Identify the main ideas and supporting details of information presented graphically, visually, orally, or multimodally.	**2.** Paraphrase the key information or ideas presented graphically, visually, orally, or multimodally.	**2.** Summarize the key ideas and supporting details presented graphically, visually, orally, or multimodally.
3. Ask and answer questions about presentations, offering appropriate elaboration and detail.	**3.** Identify the claims and supporting evidence used by a speaker or a presenter.	**3.** Summarize the claims made by a speaker or presenter and explain how each claim is supported with evidence.
Presentation of Knowledge and Ideas		
4. Report on a topic or recount stories or experiences with appropriate facts and descriptive details.	**4.** Report on events, topics, or texts in an organized manner, using appropriate, specific facts and descriptive details to support main ideas.	**4.** Report on events, topics, or texts in a focused, organized manner, sequencing ideas logically and using appropriate, specific facts, details, examples, or other information to develop main ideas.
5. (Begins in grade 4)	**5.** Incorporate visual displays and digital media into presentations when appropriate.	**5.** Incorporate visual displays and digital media into presentations when appropriate.
6. Speak coherently, employing a variety of tenses and ensuring subject-verb and pronoun-antecedent agreement. (See "Conventions" in Language, pages 22–26, for specific demands.)	**6.** Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation. (See "Conventions" in Language, pages 22–26, for specific demands.)	**6.** Adapt speech to a variety of contexts and communicative tasks, using formal English when appropriate to task and situation. (See "Conventions" in Language, pages 22–26, for specific demands.)

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College and Career Readiness Standards for Language

The K–5 standards on the following pages define what students should understand and be able to do in each grade and build toward the six College and Career Readiness Standards.

Conventions in Writing and Speaking

1. Demonstrate a command of the conventions of standard English grammar and usage.
2. Demonstrate a command of the conventions of capitalization, punctuation, and spelling.
3. Make effective choices about language, punctuation, and sentence structure for meaning and style.

Vocabulary Acquisition and Use

4. Determine the meaning of words and phrases encountered through conversations, reading, and media use.
5. Understand the nuances of and relationships among words.
6. Use grade-appropriate general academic vocabulary and domain-specific words and phrases purposefully acquired as well as gained through conversation and reading and responding to texts.

Note on range and content of student language use

To build a foundation for college and career readiness in language, students must gain control over many conventions of writing and speaking as well as acquire new words and understand those that they encounter through listening, reading, and media use. They must be able to determine the meaning of grade-appropriate words, come to appreciate that words have shadings of meaning and relationships to other words, and expand their vocabulary through conversation and (especially in later grades) through reading and by being taught words directly in the course of studying subject matter. The inclusion of Language standards in their own strand should not be taken as an indication that skills related to conventions and vocabulary are unimportant to reading, writing, speaking, and listening; indeed, they are

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Language Standards K–5

Following are the standards for K–5, which relate to their College and Career Readiness counterparts by number. They offer a focus for instruction in each year to help ensure that students gain adequate exposure to a range of skills and applications.

Kindergartners:	Grade 1 students:	Grade 2 students:
Conventions in Writing and Speaking		
1. Observe conventions of grammar and usage. a. Print most upper- and lowercase letters. b. Write a letter or letters for most consonant and short-vowel sounds (phonemes). c. Form regular plural nouns orally by adding /s/ or /es/ (e.g., *dog*, *dogs*; *wish*, *wishes*) when speaking. d. Understand and use the most frequently occurring prepositions in English (e.g., *to/from*, *in/out*, *on/off*, *for, of*, *by*, *with*) when speaking. e. Produce and expand complete sentences in shared language and writing activities. f. Understand and use question words (e.g., *who*, *what*, *where*, *when*, *why*, *how*) in discussions.	**1.** Observe conventions of grammar and usage. a. Print all upper- and lowercase letters. b. Use singular and plural nouns with matching verbs in simple sentences (e.g., *He hops*; *We hop*). c. Use subject, object, and possessive pronouns in speaking and writing (e.g., *I*, *me*, *my*; *they*, *them*, *their*). d. Use verbs to convey a sense of past, present, and future in writing and speaking (e.g., *Yesterday I walked home*; *Today I walk home*; *Tomorrow I will walk home*). e. Understand and use frequently occurring prepositions in English (e.g., *during*, *beyond*, *toward*). f. Produce and expand complete declarative, interrogative, imperative, and exclamatory sentences in response to questions and prompts. g. Understand that, minimally, every sentence must be about something (the subject) and tell something (the predicate) about its subject.	**1.** Observe conventions of grammar and usage. a. Form common irregular plural nouns (e.g., *feet*, *children*, *teeth*, *mice*, *fish*). b. Form the past tense of common irregular verbs (e.g., *sat*, *hid*, *told*). c. Produce and expand complete declarative, interrogative, imperative, and exclamatory sentences. d. Produce and expand complete sentences to provide requested detail or clarification.
2. Observe conventions of capitalization, punctuation, and spelling. a. Capitalize the first word in a sentence and the pronoun *I*. b. Name and identify end punctuation, including periods, question marks, and exclamation points. c. Spell simple words phonetically using knowledge of sound-letter relationships.	**2.** Observe conventions of capitalization, punctuation, and spelling. a. Capitalize names, places, and dates. b. Use end punctuation for sentences, including periods, question marks, and exclamation points. c. Use commas in dates and to separate single words in a series. d. Use conventional spelling for words with common spelling patterns and for common irregular words. e. Use phonetic spellings for untaught words, drawing on phonemic awareness and spelling conventions. f. Form new words through addition, deletion, and substitution of sound and letters (e.g., *an* → *man* → *mat* → *mast* → *must* → *rust* → *crust*).	**2.** Observe conventions of capitalization, punctuation, and spelling. a. Capitalize holidays, product names, geographic names, and important words in titles. b. Use commas in greetings and closings of letters. c. Use apostrophes to form contractions and common possessives. d. Generalize learned spelling patterns when writing words (e.g., *cage* → *badge*; *boy* → *boil*; *paper* → *copper*). e. Consult reference materials, including beginning dictionaries, as needed to check and correct spellings.
3. (Begins in grade 3)	**3.** (Begins in grade 3)	**3.** (Begins in grade 3)

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Kindergartners:	Grade 1 students:	Grade 2 students:
Vocabulary Acquisition and Use		
4. Determine word meanings (*based on kindergarten reading*). a. Sort common objects into categories (e.g., shapes, foods) to gain a sense of the concepts the categories represent. b. Identify new meanings for familiar words and apply them accurately (e.g., knowing *duck* as a bird and learning the verb *to duck*). c. Use the most common affixes in English (e.g., *-ed*, *-s*, *re-*, *un-*, *pre-*, *-ful*, *-less*) as a clue to the meaning of an unknown word.	**4.** Determine word meanings (*based on grade 1 reading*). a. Sort words into categories (e.g., colors, clothing) to gain a sense of the concepts the categories represent. b. Use sentence-level context as a clue to the meaning of an unknown word. c. Use common affixes in English as a clue to the meaning of an unknown word. d. Define words by category and by one or more key attributes (e.g., a *duck* is a bird that swims; a *tiger* is a large cat with stripes). e. Demonstrate understanding of the concept of multiple-meaning words (e.g., *match*, *kind*, *play*) by identifying meanings of some grade-appropriate examples of such words.	**4.** Determine word meanings (*based on grade 2 reading*). a. Determine or clarify the meaning of unknown or multiple-meaning words through the use of one or more strategies, such as understanding how the word is used in a sentence; analyzing the word's sounds, spelling, and meaningful parts; and consulting glossaries or beginning dictionaries, both print and digital. b. Explain the meaning of grade-appropriate compound words (e.g., *birdhouse*, *lighthouse*, *housefly*; *bookshelf*, *notebook*, *bookmark*). c. Use a known root word as a clue to the meaning of an unknown word with the same root (e.g., *addition*, *additional*). d. Determine the meaning of the new word formed when a known prefix is added to a known word (e.g., *happy/unhappy*, *tell/retell*).
5. Understand word relationships. a. Build real-life connections between words and their use (e.g., note places at school that are *colorful*). b. Distinguish shades of meaning among verbs describing the same general action (e.g., *walk*, *march*, *strut*, *prance*) by acting out the meanings. c. Use common adjectives to distinguish objects (e.g., the *small blue* square; the *shy white* rabbit). d. Demonstrate understanding of common verbs and adjectives by relating them to their opposites (antonyms).	**5.** Understand word relationships. a. Build real-life connections between words and their use (e.g., note places at home that are *cozy*). b. Distinguish shades of meaning among verbs differing in manner (e.g., *look*, *peek*, *glance*, *stare*, *glare*, *scowl*) and adjectives differing in intensity (e.g., *large*, *gigantic*) by defining, choosing, or acting out the meanings.	**5.** Understand word relationships. a. Build real-life connections between words and their use (e.g., describe foods that are *spicy* or *juicy*). b. Distinguish shades of meaning among related verbs (e.g., *toss*, *throw*, *hurl*) and related adjectives (e.g., *thin*, *slender*, *skinny*, *scrawny*).
6. Use newly learned words acquired through conversations, reading, and responding to texts.	**6.** Use newly learned words acquired through conversations, reading, and responding to texts.	**6.** Use newly learned words acquired through conversations, reading, and responding to texts.

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Language Standards K–5

Grade 3 students:	Grade 4 students:	Grade 5 students:
Conventions in Writing and Speaking		
1. Observe conventions of grammar and usage. a. Explain the function of nouns, pronouns, verbs, adjectives, and adverbs in general and their functions in specific sentences. b. Form and use the simple (e.g., *I walked*, *I walk*, *I will walk*) verb tenses. c. Ensure subject-verb and pronoun-antecedent agreement.* d. Produce simple, compound, and complex sentences.	**1.** Observe conventions of grammar and usage. a. Form and use the progressive (e.g., *I was walking*, *I am walking*, *I will be walking*) verb aspects. b. Form and use adjectives and adverbs (including comparative and superlative forms), placing them appropriately within sentences.* c. Produce complete sentences, avoiding rhetorically poor fragments and run-ons.* d. Correctly use frequently confused words (e.g., *to*, *too*, *two*; *there*, *their*).*	**1.** Observe conventions of grammar and usage. a. Form and use the perfect (e.g., *I had walked*, *I have walked*, *I will have walked*) verb aspects. b. Recognize and correct inappropriate shifts in verb tense and aspect.*
2. Observe conventions of capitalization, punctuation, and spelling. a. Use correct capitalization. b. Use quotation marks in dialogue. c. Use conventional spelling for high-frequency and other studied words and for adding suffixes to base words (e.g., *sitting*, *smiled*, *cries*, *happiness*). d. Use spelling patterns and generalizations (e.g., word families, position-based spellings, syllable patterns, ending rules, meaningful word parts) in writing words. e. Consult reference materials, including dictionaries, as needed to check and correct spellings.	**2.** Observe conventions of capitalization, punctuation, and spelling. a. Use quotation marks to mark direct speech and quotations from a text. b. Spell grade-appropriate words correctly, consulting references as needed.	**2.** Observe conventions of capitalization, punctuation, and spelling. a. Use punctuation to separate items in a series.* b. Use a comma to separate an introductory element from the rest of the sentence. c. Use underlining, quotation marks, or italics to indicate titles of works. d. Spell grade-appropriate words correctly, consulting references as needed.
3. Make effective language choices. a. Use words for effect.*	**3.** Make effective language choices. a. Use punctuation for effect.* b. Maintain consistency in style and tone.* c. Choose words and phrases to convey ideas precisely.*	**3.** Make effective language choices. a. Expand, combine, and reduce sentences for meaning, reader/listener interest, and style.*

* Conventions standards noted with an asterisk (*) need to be revisited by students in subsequent grades as their writing and speaking grows in sophistication. See chart on page 27 for a complete listing.

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Grade 3 students:	Grade 4 students:	Grade 5 students:
Vocabulary Acquisition and Use		
4. Determine word meanings (*based on grade 3 reading*). a. Determine or clarify the meaning of unknown or multiple-meaning words through the use of one or more strategies, such as understanding how the word is used in a sentence; analyzing the word's sounds, spelling, and meaningful parts; and consulting glossaries or beginning dictionaries, both print and digital. b. Use a known root word as a clue to the meaning of an unknown word with the same root (e.g., *company*, *companion*). c. Determine the meaning of the new word formed when a known affix is added to a known word (e.g., *agreeable/disagreeable*, *comfortable/uncomfortable*, *care/careless*, *heat/preheat*). d. Distinguish the literal and nonliteral meanings of words and phrases in context (e.g., *take steps*).	**4.** Determine word meanings (*based on grade 4 reading*). a. Determine or clarify the meaning of unknown or multiple-meaning words through the use of one or more strategies, such as using semantic clues (e.g., definitions, examples, or restatements in text); using syntactic clues (e.g., the word's position or function in the sentence); analyzing the word's sounds, spelling, and meaningful parts; and consulting reference materials, both print and digital. b. Use a known root word as a clue to the meaning of an unknown word with the same root (e.g., *telegraph*, *photograph*, *autograph*). c. Explain the meaning of simple similes and metaphors (e.g., *as pretty as a picture*). d. Paraphrase common idioms, adages, and proverbs.	**4.** Determine word meanings (*based on grade 5 reading*). a. Determine or clarify the meaning of unknown or multiple-meaning words through the use of one or more strategies, such as using semantic clues (e.g., definitions, examples, or restatements in text); using syntactic clues (e.g., the word's position or function in the sentence); analyzing the word's sounds, spelling, and meaningful parts; and consulting reference materials, both print and digital. b. Use a known root word as a clue to the meaning of an unknown word with the same root (e.g., *photograph*, *photosynthesis*). c. Interpret figurative language, including similes and metaphors. d. Explain the meaning of common idioms, adages, and proverbs.
5. Understand word relationships. a. Build real-life connections between words and their use (e.g., describe people who are *friendly* or *helpful*). b. Distinguish among related words that describe states of mind or degrees of certainty (e.g., *knew*, *believed*, *suspected*, *heard*, *wondered*).	**5.** Understand word relationships. a. Build real-life connections between words and their various uses and meanings. b. Define relationships between words (e.g., how *ask* is like and unlike *demand*; what items are likely to be *enormous*). c. Distinguish a word from other words with similar but not identical meanings (synonyms).	**5.** Understand word relationships. a. Build real-life connections between words and their various uses and meanings. b. Define relationships between words (e.g., how *smirk* is like and unlike *smile*; what items are likely to be *vast*). c. Distinguish a word from other words with similar but not identical meanings (synonyms).
6. Use words that are in common, conversational vocabulary as well as grade-appropriate academic vocabulary and domain-specific words (in English language arts, history/social studies, and science) taught directly and acquired through reading and responding to texts.	**6.** Use grade-appropriate general academic vocabulary and domain-specific words and phrases (in English language arts, history/social studies, and science) taught directly and acquired through reading and responding to texts.	**6.** Use grade-appropriate general academic vocabulary and domain-specific words and phrases (in English language arts, history/social studies, and science) taught directly and acquired through reading and responding to texts.

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English Language Arts Conventions Progressive Skills, By Standard

The following, marked with an asterisk (*) in the Conventions standards, are skills and understandings that require continued attention in higher grades (after their introduction in the grade listed below) as they are applied to increasingly sophisticated writing and speaking.

Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grades 9–10
1c. Ensure subject-verb and pronoun-antecedent agreement. **3a.** Choose words for effect.						
	1b. Form and use adjectives and adverbs (including comparative and superlative forms), placing them appropriately within sentences. **1c.** Produce complete sentences, avoiding rhetorically poor fragments and run-ons. **1d.** Correctly use frequently confused words (e.g., *effect/affect*, *to/too/two*). **3a.** Use punctuation for effect. **3b.** Maintain consistency in style and tone. **3c.** Choose words and phrases to convey ideas precisely.					
		1b. Recognize and correct inappropriate shifts in verb tense and aspect. **2a.** Use punctuation to separate items in a series. **3a.** Expand, combine, and reduce sentences for meaning, reader/listener interest, and style.				
			1b. Recognize and correct inappropriate shifts in pronoun number and person. **1c.** Recognize and correct vague pronouns (i.e., ones with unclear or ambiguous antecedents). **2a.** Use commas, parentheses, or dashes to set off nonrestrictive/parenthetical elements. **3a.** Vary sentence patterns for meaning, reader/listener interest, and style.			
				1c. Place phrases and clauses within a sentence, avoiding misplaced and dangling modifiers. **3b.** Choose words and phrases that express ideas concisely, eliminating wordiness and redundancy.		
					1c. Recognize and correct inappropriate shifts in verb voice and mood.	
						1a. Use parallel structure in writing.

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* Read-aloud
** Read-along

Texts Illustrating the Complexity, Quality, and Range of Student Reading K–5

	Literature: Stories, Drama, Poetry	Informational Texts: Literary Nonfiction, History/Social Studies, Science/Technical Texts
K[1]	▪ *Over in the Meadow* by John Langstaff (traditional) (c1800)* ▪ *A Boy, a Dog, and a Frog* by Mercer Mayer (1967) ▪ *Pancakes for Breakfast* by Tomie DePaola (1978) ▪ *A Story A Story* by Gail E. Haley (1970)* ▪ *Kitten's First Full Moon* by Kevin Henkes (2004)*	▪ *My Five Senses* by Aliki (1962)* ▪ *Truck* by Donald Crews (1980) ▪ *I Read Signs* by Tana Hoban (1987) ▪ *What Do You Do With a Tail Like This?* by Steve Jenkins & Robin Page (2003)* ▪ *Amazing Whales!* by Sarah L. Thomson (2005)*
1[1]	▪ "Mix a Pancake" by Christina G. Rossetti (1893)** ▪ *Mr. Popper's Penguins* by Richard Atwater (1938)* ▪ *Little Bear* by Else Holmelund Minarik, illustrated by Maurice Sendak (1957)** ▪ *Frog and Toad Together* by Arnold Lobel (1971)** ▪ *Hi! Fly Guy* by Tedd Arnold (2006)	▪ *A Tree Is a Plant* by Clyde Robert Bulla, illustrated by Stacey Schuett (1960)** ▪ *My Five Senses* by Aliki (1962)** ▪ *Follow the Water from Brook to Ocean* by Arthur Dorros (1991)** ▪ *From Seed to Pumpkin* by Wendy Pfeffer, illustrated by James Graham Hale (2004)* ▪ *How People Learned to Fly* by Fran Hodgkins and True Kelley (2007)*
2–3	▪ "Who Has Seen the Wind?" by Christina G. Rossetti (1893) ▪ *Charlotte's Web* by E. B. White (1952)* ▪ *Sarah, Plain and Tall* by Patricia MacLachlan (1985) ▪ *Tops and Bottoms* by Janet Stevens (1995) ▪ *Poppleton in Winter* by Cynthia Rylant, illustrated by Mark Teague (2001)	▪ *A Medieval Feast* by Aliki (1983) ▪ *From Seed to Plant* by Gail Gibbons (1991) ▪ *The Story of Ruby Bridges* by Robert Coles (1995)* ▪ *A Drop of Water: A Book of Science and Wonder* by Walter Wick (1997) ▪ *Moonshot: The Flight of Apollo 11* by Brian Floca (2009)
4–5	• *Alice's Adventures in Wonderland* by Lewis Carroll (1865) • "Casey at the Bat" by Ernest Lawrence Thayer (1888) • *The Black Stallion* by Walter Farley (1941) • "Zlateh the Goat" by Isaac Bashevis Singer (1984) ▪ *Bud, Not Buddy* by Christopher Paul Curtis (1999) ▪ *The Birchbark House* by Louise Erdrich (1999) ▪ *Where the Mountain Meets the Moon* by Grace Lin (2009)	▪ *Discovering Mars* by Melvin Berger (1992) ▪ *Hurricanes: Earth's Mightiest Storms* by Patricia Lauber (1996) ▪ *A History of US* by Joy Hakim (2005) ▪ *Horses* by Seymour Simon (2006) ▪ *Quest for the Tree Kangaroo: An Expedition to the Cloud Forest of New Guinea* by Sy Montgomery (2006)

Note: Given space limitations, the illustrative texts listed above are meant only to show individual titles that are representative of a wide range of topics and genres. (See Appendix B for excerpts of these and other texts illustrative of K–5 text complexity.) At a curricular or instructional level, within and across grade levels, texts need to be selected around topics or themes that generate knowledge and allow students to study that topic in depth. On the next page is an example of progressions of texts building knowledge across grade levels.

[1]Children at the kindergarten and grade 1 levels should be expected to read texts independently that have been specifically written to correlate to their reading level and their word knowledge. Many of the titles listed above are meant to supplement carefully structured independent reading with books to read along with a teacher or that are read aloud to students to build knowledge and cultivate a joy in reading.

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Staying on Topic Within a Grade and Across Grades: How to Build Knowledge Systematically in English Language Arts K–5

Building knowledge systematically in English language arts is like giving children various pieces of a puzzle in each grade that, over time, will form one big picture. At a curricular or instructional level, texts—within and across grade levels—need to be selected around topics or themes that systematically develop the knowledge base of students. Within a grade level, there should be an adequate number of titles on a single topic that would allow children to study that topic for a sustained period. The knowledge children have learned about particular topics in early grade levels should then be expanded and developed in subsequent grade levels to ensure an increasingly deeper understanding of these topics. Children in the upper elementary grades will generally be expected to read these texts independently and reflect on them in writing. However, children in the early grades (particularly K–2) should participate in rich, structured conversations with an adult in response to the written texts that are read aloud, *orally* comparing and contrasting as well as analyzing and synthesizing, in the manner called for by the *Standards*.

Preparation for reading complex informational texts should begin at the very earliest elementary school grades. What follows is one example that uses domain-specific nonfiction titles across grade levels to illustrate how curriculum designers and classroom teachers can infuse the English language arts block with rich, age-appropriate content knowledge and vocabulary in history/social studies, science, and the arts. Having students listen to informational read-alouds in the early grades helps lay the necessary foundation for students' reading and understanding of increasingly complex texts on their own in subsequent grades.

Exemplar Texts on a Topic Across Grades	K	1	2–3	4–5
The Human Body Students can begin learning about the human body starting in kindergarten and then review and extend their learning during each subsequent grade.	The five senses and associated body parts ▪ *My Five Senses* by Aliki (1989) ▪ *Hearing* by Maria Rius (1985) ▪ *Sight* by Maria Rius (1985) ▪ *Smell* by Maria Rius (1985) ▪ *Taste* by Maria Rius (1985) ▪ *Touch* by Maria Rius (1985) Taking care of your body: Overview (hygiene, diet, exercise, rest) ▪ *My Amazing Body: A First Look at Health & Fitness* by Pat Thomas (2001) ▪ *Get Up and Go!* by Nancy Carlson (2008) ▪ *Go Wash Up* by Doering Tourville (2008) ▪ *Sleep* by Paul Showers (1997) ▪ *Fuel the Body* by Doering Tourville (2008)	Introduction to the systems of the human body and associated body parts ▪ *Under Your Skin: Your Amazing Body* by Mick Manning (2007) ▪ *Me and My Amazing Body* by Joan Sweeney (1999) ▪ *The Human Body* by Gallimard Jeunesse (2007) ▪ *The Busy Body Book* by Lizzy Rockwell (2008) ▪ *First Encyclopedia of the Human Body* by Fiona Chandler (2004) Taking care of your body: Germs, diseases, and preventing illness ▪ *Germs Make Me Sick* by Marilyn Berger (1995) ▪ *Tiny Life on Your Body* by Christine Taylor-Butler (2005) ▪ *Germ Stories* by Arthur Kornberg (2007) ▪ *All About Scabs* by GenichiroYagu (1998)	Digestive and excretory systems ▪ *What Happens to a Hamburger* by Paul Showers (1985) ▪ *The Digestive System* by Christine Taylor-Butler (2008) ▪ *The Digestive System* by Rebecca L. Johnson (2006) ▪ *The Digestive System* by Kristin Petrie (2007) Taking care of your body: healthy eating and nutrition ▪ *Good Enough to Eat* by Lizzy Rockwell (1999) ▪ *Showdown at the Food Pyramid* by Rex Barron (2004) Muscular, skeletal, and nervous systems ▪ *The Mighty Muscular and Skeletal Systems* Crabtree Publishing (2009) ▪ *Muscles* by Seymour Simon (1998) ▪ *Bones* by Seymour Simon (1998) ▪ *The Astounding Nervous System* Crabtree Publishing (2009) ▪ *The Nervous System* by Joelle Riley (2004)	Circulatory system ▪ *The Heart* by Seymour Simon (2006) ▪ *The Heart and Circulation* by Carol Ballard (2005) ▪ *The Circulatory System* by Kristin Petrie (2007) ▪ *The Amazing Circulatory System* by John Burstein (2009) Respiratory system ▪ *The Lungs* by Seymour Simon (2007) ▪ *The Respiratory System* by Susan Glass (2004) ▪ *The Respiratory System* by Kristin Petrie (2007) ▪ *The Remarkable Respiratory System* by John Burstein (2009) Endocrine system ▪ *The Endocrine System* by Rebecca Olien (2006) ▪ *The Exciting Endocrine System* by John Burstein (2009)

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Standards for English Language Arts

6–12

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College and Career Readiness Standards for Reading

The grades 6–12 standards on the following pages define what students should understand and be able to do in each grade and build toward the ten College and Career Readiness Standards.

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze in detail where, when, why, and how events, ideas, and characters develop and interact over the course of a text.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and explain how specific word choices shape meaning or tone.
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section or chapter) relate to each other and the whole.
6. Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge and Ideas

7. Synthesize and apply information presented in diverse ways (e.g., through words, images, graphs, and video) in print and digital sources in order to answer questions, solve problems, or compare modes of presentation.[1]
8. Delineate and evaluate the reasoning and rhetoric within a text, including assessing whether the evidence provided is relevant and sufficient to support the text's claims.
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Range and Level of Text Complexity

10. Read complex texts independently, proficiently, and fluently, sustaining concentration, monitoring comprehension, and, when useful, rereading.[2]

[1]Please see "Research to Build Knowledge" in Writing and "Comprehension and Collaboration" in Speaking and Listening for additional standards relevant to gathering, assessing, and applying information from print and digital sources.
[2]Proficiency in this standard is measured by students' ability to read a range of appropriately complex text in each grade as defined on page 36.

Note on range and content of student reading

To become college and career ready, students must grapple with works of exceptional craft and thought whose range extends across genres, cultures, and centuries. Such works offer profound insights into the human condition and serve as models for students' own thinking and writing. Along with high-quality contemporary works, these texts should be chosen from among the founding U.S. documents, the classics of American literature, and the timeless dramas of Shakespeare. Through wide and deep reading of literature and literary nonfiction of steadily increasing sophistication, students gain a reservoir of literary and cultural knowledge, references, and images; the ability to evaluate intricate arguments; and the capacity to surmount the challenges posed by complex texts.

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Reading Standards for Literature 6–12

Following are the standards for grades 6–12, which relate to their College and Career Readiness counterparts by number. They offer a focus for instruction each year and help ensure that students gain adequate exposure to a range of texts and tasks. Rigor is also infused through the requirement that students read increasingly complex texts through the grades.

Grade 6 students:	Grade 7 students:	Grade 8 students:
Key Ideas and Details		
1. Cite specific textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	**1.** Cite several sources of textual evidence when useful to support analysis of what the text says explicitly as well as inferences drawn from the text.	**1.** Cite a wide range of evidence throughout the text when useful to support analysis of what the text says explicitly as well as inferences drawn from the text.
2. Analyze how a theme or central idea develops over the course of a text, drawing on key details.	**2.** Analyze how two or more themes or central ideas in a text relate to one another, drawing on key details.	**2.** Analyze how recurring images or events contribute to the development of a theme or central idea in a text.
3. Describe how a story's plot unfolds (in a series of episodes or as a problem to be solved) as well as how characters adapt or change as they move toward a resolution.	**3.** Analyze how particular lines of dialogue or specific incidents in a story or drama propel the action, reveal aspects of a character, or provoke a decision.	**3.** Analyze how elements of a story or drama interact (e.g., how plot and setting are integral to one another; how the setting affects characters).
Craft and Structure		
4. Interpret the figurative and connotative meanings of words and phrases as they are used in a text.	**4.** Interpret the figurative and connotative meanings of words and phrases as they are used in a text and describe in detail a specific word choice and its impact on meaning and tone.	**4.** Explain the comparisons an author makes through metaphors, allusions, or analogies in a text and analyze how those comparisons contribute to meaning.
5. Explain the effect of such devices as flashbacks and foreshadowing on the development of the plot and meaning of a text.	**5.** Describe how any given sentence, chapter, scene, or stanza fits into the overall structure of a text and contributes to the development of the plot or themes.	**5.** Compare a poem with a conventional structure, such as a sonnet, to a poem without a proscribed structure, such as a free verse poem.
6. Describe how an author establishes the point of view of the speaker or a character in a poem, drama, or story.	**6.** Analyze how an author presents the points of view of different characters in a story or drama, including their different reactions to the same person or event(s).	**6.** Explain how a difference in the perspective or knowledge of characters and the audience (e.g., created through the device of dramatic irony) produces suspense or humor.
Integration of Knowledge and Ideas		
7. Analyze how illustrations, diagrams, multimedia elements, and words contribute to the meaning and tone of a print or digital text (e.g., graphic novel, multimedia presentation of fiction).	**7.** Compare and contrast a text to its filmed, staged, or multimedia version, including examining some techniques unique to each medium (e.g., lighting, sound, color, camera focus and angles).	**7.** Analyze to what degree a filmed or live production of a drama or story stays faithful to or departs from the script or text.
8. (Not applicable to literature)	**8.** (Not applicable to literature)	**8.** (Not applicable to literature)
9. Analyze stories in the same genre (e.g., mysteries, adventure stories), comparing and contrasting their approaches to similar themes and topics.	**9.** Analyze a specific case in which a modern work of fiction draws on patterns of events or character types found in traditional literature (e.g., the hero, the quest).	**9.** Compare a fictional portrayal of a time, place, or character to historical sources from the same period as a means of understanding how authors use or alter history.
Range and Level of Text Complexity		
10. Read literature independently, proficiently, and fluently in the grades 6–8 text complexity band; read texts at the high end of the range with scaffolding as needed.	**10.** Read literature independently, proficiently, and fluently in the grades 6–8 text complexity band; read "stretch" texts in the grades 9–10 text complexity band with scaffolding as needed.	**10.** Read literature independently, proficiently, and fluently in the grades 6–8 text complexity band; engage in sustained practice with "stretch" texts in the grades 9–10 text complexity band with scaffolding as needed.

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Reading Standards for Literature 6–12

Grades 9–10 students:	Grades 11–12 students:
Key Ideas and Details	
1. Cite the evidence in the text that most strongly supports a specific analysis of what the text says explicitly as well as inferences drawn from the text.	**1.** Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves things uncertain.
2. Analyze in detail the development and refinement of a theme or central idea in a text, including how it emerges and how it is shaped and refined by specific details.	**2.** Analyze how multiple themes or central ideas in a text interact, build on, and, in some cases, conflict with one another.
3. Analyze how complex characters, including those with conflicting motivations or divided loyalties, develop over the course of a text, interact with other characters, and advance the plot or develop the theme.	**3.** Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama (e.g., where a story is set, how the action is ordered, how the characters are introduced and developed).
Craft and Structure	
4. Evaluate how an author's use of language, including formality of diction, shapes meaning and tone in a text (e.g., how the language evokes a sense of time and place, how it sets a formal or informal tone).	**4.** Analyze in detail the condensed language of poems (or particularly rich language use in a narrative or drama), determining how specific word choices and multiple meanings shape the impact and tone.
5. Analyze how an author structures a text, orders events within it (e.g., parallel plots), and manipulates time (e.g., pacing) to create mystery, tension, or surprise.	**5.** Analyze how an author's choices concerning how to structure a text (e.g., electing at what point to begin or end a story) shape the meaning of the text.
6. Analyze a case in which the author's work takes a position or stance on a social issue or other topic and describe how the author carries out that purpose.	**6.** Analyze an author's use of satire, sarcasm, irony, understatement, or other means that requires a reader to understand various layers of meaning in a text.
Integration of Knowledge and Ideas	
7. Compare and contrast the representation of a subject or a key scene in two different artistic mediums (e.g., Auden's "Musée de Beaux Arts" and Breughel's *Landscape with the Fall of Icarus*).	**7.** Compare and contrast multiple interpretations of a drama or story (e.g., recorded or live productions), distinguishing how each version interprets the source text. (This includes at least one play by Shakespeare as well as one play by an American dramatist.)
8. (Not applicable to literature)	**8.** (Not applicable to literature)
9. Analyze a wide range of nineteenth- and early-twentieth-century foundational works of American literature, comparing and contrasting approaches to similar ideas or themes in two or more texts from the same period.	**9.** Analyze how an author draws on and transforms fictional source material in a specific work (e.g., how Shakespeare draws on a story from Ovid or how a later author draws on a play by Shakespeare).
Range and Level of Text Complexity	
10. **In grade 9**, read literature independently, proficiently, and fluently in the grades 9–10 text complexity band; read texts at the high end of the range with scaffolding as needed. **In grade 10**, read literature independently, proficiently, and fluently in the grades 9–10 text complexity band; read "stretch" texts in the grades 11–CCR text complexity band with scaffolding as needed.	**10.** **In grade 11**, read literature independently, proficiently, and fluently in the grades 11–CCR text complexity band; read texts at the high end of the range with scaffolding as needed. **In grade 12**, read literature independently, proficiently, and fluently in the grades 11–CCR text complexity band; read "stretch" texts in the Beyond CCR text complexity band with scaffolding as needed.

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Reading Standards for Informational Text 6–12

Grade 6 students:	Grade 7 students:	Grade 8 students:
Key Ideas and Details		
1. Cite specific textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	**1.** Cite several sources of textual evidence when useful to support analysis of what the text says explicitly as well as inferences drawn from the text.	**1.** Cite a wide range of evidence throughout the text when useful to support analysis of what the text says explicitly as well as inferences drawn from the text.
2. Analyze how a central idea develops over the course of a text, drawing on key details.	**2.** Analyze how two or more central ideas in a text relate to one another, drawing on key details.	**2.** Provide an objective summary of a text, accurately conveying an author's view and specific points.
3. Determine the causes or reasons that link different events, ideas, or information in a text, drawing on key details.	**3.** Describe in detail how an author introduces, illustrates, and elaborates a key idea in a text (e.g., through examples or anecdotes).	**3.** Analyze how an author introduces, illustrates, and elaborates two or more significant ideas in a text, including how the relationship between the ideas is expressed.
Craft and Structure		
4. Interpret words and phrases as they are used in a text, including technical, figurative, and connotative meanings, and analyze how an author's choice of specific words in a text contributes to understanding the ideas or concepts.	**4.** Interpret words and phrases as they are used in a text, including technical, figurative, and connotative meanings, and describe in detail how an author's choice of specific words affects meaning and tone.	**4.** Explain the comparisons an author makes through metaphors, allusions, and analogies in a text and analyze how those comparisons contribute to meaning.
5. Describe the structure an author uses to organize a specific text, including how the major sections contribute to the whole.	**5.** Describe how any given sentence, paragraph, chapter, or section fits into the overall structure of a text and contributes to the development of the ideas.	**5.** Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.
6. Compare and contrast one author's point of view on events with that of another (e.g., a memoir written by and a biography on the same person).	**6.** Describe an author's point of view or purpose in a text and analyze how the author distinguishes his or her point of view from that of others.	**6.** Compare and contrast the points of view and purposes of two authors writing about the same topic.
Integration of Knowledge and Ideas		
7. Compare and contrast the accounts of a subject in different mediums (e.g., a person's life story told in print, video, or multimedia), analyzing which details are emphasized and how the account unfolds in each version.	**7.** Compare and contrast the impression conveyed by a printed text to that conveyed when listening to or viewing a video or multimedia presentation of it (e.g., analyzing how the delivery of a speech affects its impact).	**7.** Evaluate the advantages and disadvantages of using different mediums (e.g., text, video, multimedia) to present a particular topic or idea.
8. Distinguish among fact, opinion, and reasoned judgment presented in a text.	**8.** Identify the stated and unstated premises of an argument and explain how they contribute to the conclusions reached.	**8.** Evaluate an argument's claims and reasoning as well as the degree to which evidence supports each claim.
9. Assess the similarities and differences between two or more texts on the same subject and apply the knowledge gained to inform reading of additional texts.	**9.** Analyze where two or more texts provide conflicting information on the same subject and determine whether the texts disagree on matters of fact or on matters of interpretation.	**9.** Compare and contrast how two or more authors writing about the same topic shape their presentations of key information by emphasizing different evidence or advancing different interpretations of facts.
Range and Level of Text Complexity		
10. Read informational text independently, proficiently, and fluently in the grades 6–8 text complexity band; read texts at the high end of the range with scaffolding as needed.	**10.** Read informational text independently, proficiently, and fluently in the grades 6–8 text complexity band; read "stretch" texts in the grades 9–10 text complexity band with scaffolding as needed.	**10.** Read informational text independently, proficiently, and fluently in the grades 6–8 text complexity band; engage in sustained practice with "stretch" texts in the grades 9–10 text complexity band with scaffolding as needed.

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Reading Standards for Informational Text 6–12

Grades 9–10 students:	Grades 11–12 students:
Key Ideas and Details	
1. Cite evidence in the text that most strongly supports a specific analysis of what the text says explicitly as well as inferences drawn from the text.	**1.** Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves things uncertain.
2. Analyze in detail the development and refinement of a central idea in a text, including how it emerges and is shaped and refined by specific details.	**2.** Analyze how multiple ideas in a text interact, build on, and, in some cases, conflict with one another.
3. Analyze the interactions between and among ideas and events, including how ideas and events influence one another.	**3.** Analyze in detail an author's ideas by describing how the ideas are developed and refined by specific sentences, paragraphs, and larger portions of a text.
Craft and Structure	
4. Evaluate how an author's use of language, including formality and type of diction, shapes meaning and tone in a text (e.g., the formality of a court opinion or a newspaper).	**4.** Interpret how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines *faction* in Federalist No. 10 and No. 51).
5. Evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.	**5.** Analyze how an author's choices concerning how to structure a text (e.g., how reasons, evidence, and information are organized and emphasized) shape the meaning of the text.
6. Analyze documents of historical and literary significance, including foundational U.S. documents (e.g., the Declaration of Independence, the Preamble to the Constitution, the Bill of Rights) for their premises, purposes, and structure.	**6.** Analyze how various authors express different points of view on similar events or issues, assessing the authors' assumptions, use of evidence, and reasoning, including analyzing seminal U.S. documents (e.g., *The Federalist*, landmark U.S. Supreme Court majority opinions and dissents).
Integration of Knowledge and Ideas	
7. Synthesize information presented in different formats (e.g., text, video, mutimedia) to generate a coherent understanding of an issue.	**7.** Synthesize and apply multiple sources of information presented in different formats in order to address a question or solve a problem, including resolving conflicting information.
8. Assess the truth of an argument's explicit and implicit premises by determining whether the evidence presented in the text justifies the conclusions.	**8.** Evaluate the reasoning and rhetoric that support an argument or explanation, including assessing the relevance and sufficiency of evidence and identifying false statements or fallacious reasoning.
9. Analyze how authors argue with or otherwise respond to one another's ideas or accounts of key events, evaluating the strength of each author's interpretation.	**9.** Synthesize explanations and arguments from diverse sources to provide a coherent account of events or ideas, including resolving conflicting information.
Range and Level of Text Complexity	
10. **In grade 9**, read informational text independently, proficiently, and fluently in the grades 9–10 text complexity band; read texts at the high end of the range with scaffolding as needed. **In grade 10**, read informational text independently, proficiently, and fluently in the grades 9–10 text complexity band; read "stretch" texts in the grades 11–CCR text complexity band with scaffolding as needed.	**10.** **In grade 11**, read informational text independently, proficiently, and fluently in the grades 11–CCR text complexity band; read texts at the high end of the range with scaffolding as needed. **In grade 12**, read informational text independently, proficiently, and fluently in the grades 11–CCR text complexity band; read "stretch" texts in the Beyond CCR text complexity band with scaffolding as needed.

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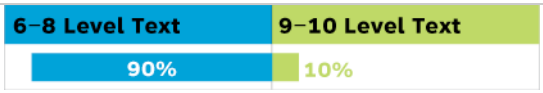
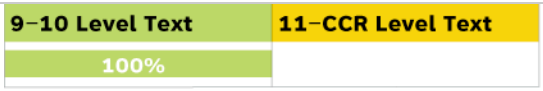
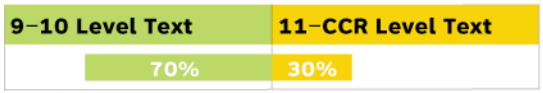
Range and Level of Text Complexity for Student Reading by Grade (Standard 10)

Students demonstrate proficiency in reading texts at the following ranges of text complexity to progress on a path to college and career readiness.

6		**In grade 6**, students focus on reading texts independently in the grades 6–8 text complexity band, with scaffolding likely required for texts at the high end of the range.
7		**In grade 7**, students focus on reading texts independently in the grades 6–8 text complexity band (90 percent) and are introduced to texts in the grades 9–10 text complexity band as "stretch" texts (10 percent), which will likely require scaffolding.
8		**In grade 8**, students focus on reading texts independently in the grades 6–8 text complexity band (70 percent) as well as sustained practice with texts in the grades 9–10 text complexity band as "stretch" texts (30 percent), which will likely require scaffolding.
9		**In grade 9**, students focus on reading texts independently in the grades 9–10 text complexity band, with scaffolding likely required for texts at the high end of the range.
10		**In grade 10**, students focus on reading texts independently in the grades 9–10 text complexity band (70 percent) and are introduced to texts in the grades 11–CCR text complexity band as "stretch" texts (30 percent), which will likely require scaffolding.
11		**In grade 11**, students focus on reading texts independently in the grades 11–CCR text complexity band, with scaffolding likely required for texts at the high end of the range.
12		**In grade 12**, students focus on reading texts independently in the grades 11–CCR text complexity band (70 percent) and are introduced to texts in the Beyond CCR text complexity band as "stretch" texts (30 percent), which will likely require scaffolding.

Note: In any given classroom, the actual range of students' reading ability could be greater than the proposed range. Some students will require extra time and intense support and scaffolding to enable them to read grade-level material, whereas other students will be ready for—and should be encouraged to read—more advanced texts.

Measuring Text Complexity: Three Factors

Qualitative evaluation of the text: Levels of meaning, structure, language conventionality and clarity, and knowledge demands

Quantitative evaluation of the text: Readability measures and other scores of text complexity

Matching reader to text and task: Reader knowledge, motivation, and interests as well as the complexity generated by the tasks to be assigned and the questions to be posed

Note: More detailed information on text complexity and how it is measured is contained in Appendix A.

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College and Career Readiness Standards for Writing

The grades 6–12 standards on the following pages define what students should understand and be able to do in each grade and build toward the ten College and Career Readiness Standards.

Text Types and Purposes[1]

1. Write arguments to support a substantive claim with clear reasons and relevant and sufficient evidence.
2. Write informative/explanatory texts to convey complex information clearly and accurately through purposeful selection and organization of content.
3. Write narratives to convey real or imagined experiences, individuals, or events and how they develop over time.

Production and Distribution of Writing

4. Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience.
5. Strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.[2]
6. Use technology, including the Internet, to produce, publish, and interact with others about writing.

Research to Build Knowledge

7. Perform short, focused research projects as well as more sustained research in response to a focused research question, demonstrating understanding of the material under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate and cite the information while avoiding plagiarism.
9. Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned.

Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.[3]

[1]These broad categories of writing include many subgenres. See Appendix A for definitions of key writing types.
[2]See "Conventions" in Language, pages 47–50, for specific editing expectations.
[3]This standard is measured by the proficiency of student writing products.

Note on range and content of student writing

For students, writing is a key means of asserting and defending claims, showing what they know about a subject, and conveying what they have experienced, imagined, thought, and felt. To be college- and career-ready writers, students must take task, purpose, and audience into careful consideration, choosing words, information, structures, and formats deliberately. They need to be able to use technology strategically when creating, refining, and collaborating on writing. They have to become adept at gathering information, evaluating sources, and citing material accurately, reporting findings from their research and analysis of sources in a clear and cogent manner. They must have the flexibility, concentration, and fluency to produce high-quality first-draft text under a tight deadline as well as the capacity to revisit and make improvements to a piece of writing over multiple drafts when circumstances encourage or require it. To meet these goals, students must devote significant time and effort to writing, producing numerous pieces over short and long time frames throughout the year.

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Writing Standards 6–12

Following are the standards for grades 6–12, which relate to their College and Career Readiness counterparts by number. They offer a focus for instruction in each year to help ensure that students gain adequate exposure to a range of skills and applications. Growth in writing ability is characterized by an increasing sophistication in all aspects of language use, from vocabulary and syntax to the development and organization of ideas. At the same time, the content and sources that students address in their writing grow in demand every year.

Grade 6 students:	Grade 7 students:	Grade 8 students:
Text Types and Purposes		
1. Write arguments in which they: a. Introduce a claim about a topic or issue and organize the reasons and evidence to support the claim. b. Support the claim with clear reasons and relevant evidence. c. Use words, phrases, and clauses to convey the relationships among claims and reasons. d. Sustain an objective style and tone. e. Provide a concluding statement or section that follows from the argument.	**1.** Write arguments in which they: a. Introduce a claim about a topic or issue, acknowledge alternate or opposing claims, and organize the reasons and evidence logically to support the claim. b. Support the claim with logical reasoning and detailed, relevant evidence that demonstrate a comprehensive understanding of the topic. c. Use words, phrases, and clauses to convey the relationships among the claims, reasons, and evidence. d. Sustain an objective style and tone. e. Provide a concluding statement or section that follows logically from the argument.	**1.** Write arguments in which they: a. Introduce a claim about a topic or issue, distinguish it from alternate or opposing claims, and organize the reasons and evidence logically to support the claim. b. Support the claim with logical reasoning and detailed and relevant evidence from credible sources to demonstrate a comprehensive understanding of the topic. c. Use words, phrases, and clauses to make clear the relationships among claims, reasons, counterclaims, and evidence. d. Sustain an objective style and tone. e. Provide a concluding statement or section that follows logically from the argument.
2. Write informative/explanatory texts in which they: a. Introduce a topic and organize information appropriate to the purpose, using strategies such as definition, classification, comparison/contrast, and cause/effect. b. Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate links and varied sentence structures to join and clarify ideas. d. Use straightforward language to create an objective style appropriate for a reader seeking information. e. Provide a conclusion that follows logically from the information or explanation presented.	**2.** Write informative/explanatory texts in which they: a. Introduce and establish a topic that provides a sense of what is to follow and organize information appropriate to the purpose, using strategies such as definition, classification, comparison/contrast, and cause/effect. b. Develop the topic with relevant and accurate facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate links and varied sentence structures to create cohesion and clarify ideas. d. Use precise language and sustain an objective style appropriate for a reader seeking information. e. Provide a conclusion that follows logically from the information or explanation presented.	**2.** Write informative/explanatory texts in which they: a. Introduce and establish a topic and organize information under broader concepts or categories. b. Develop the topic with well-chosen, relevant, and accurate facts, concrete details, quotations, or other information and examples. c. Use varied links and sentence structures to create cohesion and clarify information and ideas. d. Use precise language and domain-specific and technical wording (when appropriate) and sustain a formal, objective style appropriate for a reader seeking information. e. Provide a conclusion that follows logically from the information or explanation presented.

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Grade 6 students:	Grade 7 students:	Grade 8 students:
Text Types and Purposes (continued)		
3. Write narratives in which they: a. Engage and orient the reader by establishing a context and point of view, and organize a sequence of events or experiences. b. Develop narrative elements (e.g., setting, event sequence, characters) using relevant sensory details. c. Use a variety of transition words, phrases, and clauses to convey sequence, shift from one time frame or setting to another, and/or show the relationships among events and experiences. d. Choose words and phrases to develop the events, experiences, and ideas precisely. e. Provide a satisfying conclusion that follows from the events, experiences, or ideas.	**3.** Write narratives in which they: a. Engage and orient the reader by establishing a context and point of view, and purposefully organize a sequence of events or experiences. b. Develop narrative elements (e.g., setting, conflict, complex characters) with relevant and specific sensory details. c. Use a variety of techniques to convey sequence, shift from one time frame or setting to another, and/or show the relationships among events or experiences. d. Choose words and phrases to develop the events, experiences, and ideas precisely and to create mood. e. Provide a satisfying conclusion that follows from the events, experiences, or ideas.	**3.** Write narratives in which they: a. Engage and orient the reader by establishing a context and point of view, and purposefully organize a progression of events or experiences. b. Develop narrative elements (e.g., setting, plot, event sequence, complex characters) with well-chosen, relevant, and specific sensory details. c. Use a variety of techniques to convey sequence in multiple storylines, shift from one time frame or setting to another, and/or show the relationships among events or experiences. d. Choose words and phrases to effectively develop the events, experiences, and ideas precisely and to create mood. e. Provide a satisfying conclusion that follows from the events, experiences, or ideas.
Production and Distribution of Writing		
4. Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in Standards 1–3 above.)	**4.** Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in Standards 1–3 above.)	**4.** Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in Standards 1–3 above.)
5. With some guidance and support from peers and adults, strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.	**5.** With some guidance and support from peers and adults, strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach after rethinking how well questions of purpose have been addressed.	**5.** With some guidance and support from peers and adults, strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach after rethinking how well questions of purpose and context have been addressed.
6. Use technology, including the Internet, to produce, publish, and interact with others about writing, including linking to and citing online sources.	**6.** Use technology, including the Internet, to produce, publish, and interact with others about writing, including presenting and citing information in a digital format.	**6.** Use technology, including the Internet, to present and cite information effectively in a digital format, including when publishing and responding to writing.

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Writing Standards 6–12

Grade 6 students:	Grade 7 students:	Grade 8 students:
Research to Build Knowledge		
7. Perform short, focused research projects in response to a question and refocus the inquiry in response to further research and investigation.	**7.** Perform short, focused research projects in response to a question and generate additional related and focused questions for further research and investigation.	**7.** Perform short, focused research projects in response to a question and generate additional related questions that allow for multiple avenues of exploration.
8. Gather relevant information from multiple print and digital sources, assess the credibility of each source, and quote or paraphrase the data and conclusions of others while avoiding plagiarism and documenting sources.	**8.** Gather relevant information from multiple print and digital sources using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others, avoiding plagiarism and following a standard format for citation.	**8.** Gather relevant information from multiple print and digital sources using advanced search features; assess the credibility and accuracy of each source; and quote or paraphrase the evidence, avoiding plagiarism and following a standard format for citation.
9. Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned. a. Apply *grade 6 reading standards* to literature (e.g., "Analyze stories in the same genre (e.g., mysteries, adventure stories), comparing and contrasting their approaches to similar themes and topics."). b. Apply *grade 6 reading standards* to literary nonfiction (e.g., "Distinguish among fact, opinion, and reasoned judgment presented in a text").	**9.** Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned. a. Apply *grade 7 reading standards* to literature (e.g., "Analyze a specific case in which a modern work of fiction draws on patterns of events or character types found in traditional literature (e.g., the hero, the quest). b. Apply *grade 7 reading standards* to literary nonfiction (e.g., "Identify the stated and unstated premises of an argument and explain how they contribute to the conclusions reached").	**9.** Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned: a. Apply *grade 8 reading standards* to literature (e.g., "Compare a fictional portrayal of a time, place, or character to historical sources from the same period as a means of understanding how authors use or alter history"). b. Apply *grade 8 reading standards* to literary nonfiction (e.g., "Evaluate an argument's claims and reasoning as well as the degree to which evidence supports each claim").
Range of Writing		
10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.	**10.** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.	**10.** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

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Writing Standards 6–12

Grades 9–10 students:	Grades 11–12 students:
Text Types and Purposes	
1. Write arguments which they: a. Introduce a precise claim, distinguish it from alternate or opposing claims, and provide an organization that establishes clear relationships among the claim, reasons, and evidence. b. Develop a claim and counterclaim fairly, supplying evidence for each, while pointing out the strengths of their own claim and the weaknesses of the counterclaim. c. Use precise words, phrases, and clauses to make clear the relationships between claims and reasons, between reasons and evidence, and between claims and counterclaims. d. Sustain an objective style and tone while attending to the norms and conventions of the specific discipline as well as to the audience's knowledge of the issue. e. Provide a concluding statement or section that follows logically from the argument and offers a reflection or recommendation.	**1.** Write arguments in which they: a. Introduce a substantive claim, establish its significance, distinguish it from alternate or opposing claims, and create an organization so that claims, reasons, and evidence are purposefully and logically sequenced. b. Develop a claim and counterclaim thoroughly and fairly, supplying the most relevant evidence, while pointing out the strengths of their own claim and the weaknesses of the counterclaim. c. Use precise words, phrases, and complex syntax to make explicit the relationships between claims and reasons, between reasons and evidence, and between claims and counterclaims. d. Sustain an objective style and tone while attending to the norms and conventions of the specific discipline as well as to the audience's knowledge, values, and possible biases. e. Provide a concluding statement or section that follows logically from the argument and offers a reflection or recommendation.
2. Write informative/explanatory texts in which they: a. Introduce a topic and organize information under broader concepts and categories to make clear the connections and distinctions between key ideas appropriate to the purpose; include formatting (e.g., headings) and graphics (e.g., figures, tables) when useful to clarify ideas. b. Develop a complex topic through well-chosen, relevant, and sufficient facts, concrete details, quotations, extended definitions, or other information and examples. c. Use varied transitions and sentence structures to create cohesion, clarify information and ideas, and link major sections in the text. d. Use precise language and domain-specific and technical wording (when appropriate) to manage the complexity of the topic in a style that responds to the specific discipline and context as well as to the expertise of likely readers. e. Provide a conclusion that follows logically from the information or explanation provided and articulates the implications or significance of the topic.	**2.** Write informative/explanatory texts in which they: a. Introduce a complex topic and organize the information at multiple levels of the text so that each new piece of information builds on that which precedes it to create a unified whole; include formatting (e.g., headings) and graphics (e.g., figures, tables) when useful to clarify ideas. b. Thoroughly develop aspects of a complex topic through the purposeful selection of the most significant and relevant facts, concrete details, quotations, extended definitions, or other information and examples. c. Use varied transitional devices and sentence structures to create cohesion, clarify complex ideas, and link the major sections of the text. d. Use precise language, domain-specific and technical wording (when appropriate), and techniques such as metaphor, simile, and analogy to manage the complexity of the topic in a style that responds to the specific discipline and context as well as to the expertise of likely readers. e. Provide a well-developed conclusion that follows logically from the information or explanation provided and articulates the implications or significance of the topic.

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Grades 9–10 students:	Grades 11–12 students:
Text Types and Purposes (continued)	
3. Write narratives in which they: a. Engage the reader by establishing a problem, situation, or observation and purposefully organize a progression of events or experiences. b. Develop narrative elements (e.g., setting, event sequence, complex characters) with well-chosen, revealing details. c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole. d. Use precise language to develop a picture of how the events, experiences, and ideas emerge and unfold. e. Provide a satisfying conclusion that follows from what is experienced, observed, or resolved over the course of the narrative.	**3.** Write narratives in which they: a. Engage the reader by establishing the significance of a problem, situation, or observation and purposefully organize events or experiences. b. Develop narrative elements (e.g., setting, stance, event sequence, complex characters) with purposefully selected details that call readers' attention to what is most distinctive or worth noticing. c. Use a variety of techniques to build toward a particular impact (e.g., a sense of mystery, suspense, growth, or resolution). d. Use precise language to develop the events, experiences, and ideas clearly and to reinforce the style. e. Provide a satisfying conclusion that follows from what is experienced, observed, or resolved over the course of the narrative.
Production and Distribution of Writing	
4. Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for this standard are defined in Standards 1–3 above.)	**4.** Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for this standard are defined in Standards 1–3 above.)
5. Strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific task and context.	**5.** Strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
6. Use technology, including the Internet, to produce, publish, and collaborate on a shared writing product, incorporating diverse and sometimes conflicting feedback.	**6.** Demonstrate command of technology, including the Internet, to produce, publish, and update work in response to ongoing feedback, including fresh arguments or new information.
Research to Build Knowledge	
7. Perform short, focused research projects and more sustained research; synthesize multiple sources on a subject to answer a question or solve a problem.	**7.** Perform short, focused research projects and more sustained research; synthesize multiple authoritative sources on a subject to answer a question or solve a problem.
8. Assemble evidence gathered from authoritative print and digital sources; assess the credibility and accuracy of the information and its strengths and limitations in terms of answering the research question; and integrate selected information into the text, avoiding overreliance on any one source and following a standard format for citation.	**8.** Analyze evidence gathered from multiple authoritative print and digital sources; assess the credibility and accuracy of the information and its usefulness and relevance for the specific task, purpose, and audience; and integrate selected information into the text, following a standard format for citation.

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Grades 9–10 students:	Grades 11–12 students:
Research to Build Knowledge (continued)	
9. Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned. a. Apply *grades 9–10 reading standards* to literature (e.g., "Analyze a wide range of nineteenth- and early-twentieth-century foundational works of American literature, comparing and contrasting approaches to similar ideas or themes in two or more texts from the same period."). b. Apply *grades 9–10 reading standards* to literary nonfiction (e.g., "Assess the truth of an argument's explicit and implicit premises by determining whether the evidence presented in the text justifies the conclusions").	**9.** Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned. a. Apply *grades 11–12 reading standards* to literature (e.g., "Analyze how an author draws on and transforms fictional source material, such as how Shakespeare draws on a story from Ovid, or a later author draws on Shakespeare"). b. Apply *grades 11–12 reading standards* to literary nonfiction (e.g., "Evaluate the reasoning and rhetoric that support an argument or explanation, including assessing the relevance and sufficiency of evidence and identifying false statements or fallacious reasoning").
Range of Writing	
10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.	**10.** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

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College and Career Readiness Standards for Speaking and Listening

The grades 6–12 standards on the following pages define what students should understand and be able to do in each grade and build toward the six College and Career Readiness Standards.

Comprehension and Collaboration

1. Participate effectively in a range of interactions (one-on-one and in groups), exchanging information to advance a discussion and to build on the input of others.
2. Integrate and evaluate information from multiple oral, visual, or multimodal sources in order to answer questions, solve problems, or build knowledge.
3. Evaluate the speaker's point of view, reasoning, and use of evidence and rhetoric.

Presentation of Knowledge and Ideas

4. Present information, evidence, and reasoning in a clear and well-structured way appropriate to purpose and audience.
5. Make strategic use of digital media and visual displays of data to express information and enhance understanding.
6. Adapt speech to a variety of contexts and communicative tasks, demonstrating a command of formal English when indicated or appropriate.

Note on range and content of student speaking and listening

To become college and career ready, students must have ample opportunities to take part in a variety of rich, structured conversations—whole class, small group, and with a partner—built around important content in various domains. They must be able to contribute appropriately to these conversations, to make comparisons and contrasts, and to analyze and synthesize a multitude of ideas in accordance with the standards of evidence appropriate to a particular discipline. Whatever their intended major or profession, high school graduates will depend heavily on their ability to listen attentively to others so that they are able to build on others' meritorious ideas while expressing their own clearly and persuasively.

New technologies have broadened and expanded the role that speaking and listening play in acquiring and sharing knowledge and have tightened their link to other forms of communication. The Internet has accelerated the speed at which connections between speaking, listening, reading, and writing can be made, requiring that students be ready to use these modalities nearly simultaneously. Technology itself is changing quickly, creating a new urgency for students to be adaptable in response to change.

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Speaking and Listening Standards 6–12

Following are the standards for grades 6–12, which relate to their College and Career Readiness counterparts by number. They offer a focus for instruction in each year to help ensure that students gain adequate exposure to a range of skills and applications.

Grade 6 students:	Grade 7 students:	Grade 8 students:
Comprehension and Collaboration		
1. Initiate and engage actively in group discussions on *grade 6 topics, texts, and issues* being studied in class. a. Prepare for discussions by completing reading or conducting research and explicitly draw on that material in discussions. b. Cooperate with peers to set clear goals and deadlines. c. Build on the ideas of others by asking relevant questions and contributing appropriate and essential information. d. Review the key ideas expressed and extend their own thinking in light of new information learned.	**1.** Initiate and engage actively in group discussions on *grade 7 topics, texts, and issues* being studied in class. a. Prepare for discussions by completing reading or conducting research and explicitly draw on that material in discussions. b. Cooperate with peers to set clear goals and deadlines. c. Advance a discussion by asking questions, responding precisely, and sharing factual knowledge and observations. d. Ensure a hearing for the range of positions on an issue. e. Take the views of others into account and, when warranted, modify their own views in light of the evidence presented.	**1.** Initiate and engage actively in group discussions on *grade 8 topics, texts, and issues* being studied in class. a. Prepare for discussions by completing reading or conducting research and explicitly draw on that material in discussions. b. Cooperate with peers to set clear goals and deadlines. c. Advance a discussion by asking questions, responding precisely, and sharing factual knowledge and observations supported by credible evidence. d. Ensure a hearing for the range of positions on an issue. e. Qualify or justify, when warranted, their own thinking after listening to others' questions or accounts of the evidence.
2. Interpret information presented in visual or multimodal formats and explain how the information clarifies and contributes to a topic or issue under study.	**2.** Determine the main ideas and supporting elements presented in oral, visual, or multimodal formats and explain how the information clarifies and contributes to an understanding of a topic or issue under study.	**2.** Determine the purpose of and perspectives represented in oral, visual, or multimodal formats and evaluate whether the information is laden with social, commercial, or political motives.
3. Delineate the claims made by a speaker or presenter and detail what evidence supports which claims.	**3.** Evaluate a speaker's or presenter's reasoning and claims as well as the degree to which each claim is logically supported by the evidence provided.	**3.** Assess the truth of a speaker's or presenter's premises and the validity of his or her conclusions.
Presentation of Knowledge and Ideas		
4. Present information, emphasizing salient points with pertinent descriptions and details and using appropriate eye contact, adequate volume, and clear pronunciation.	**4.** Present claims and findings with relevant and specific descriptions, facts, and examples, and use appropriate eye contact, adequate volume, and clear pronunciation.	**4.** Present claims and findings with relevant evidence that is accessible and verifiable to listeners, and use appropriate eye contact, adequate volume, and clear pronunciation.
5. Incorporate digital media and visual displays of data when helpful and in a manner that strengthens the presentation.	**5.** Incorporate digital media and visual displays of data when helpful and in a manner that strengthens the presentation.	**5.** Incorporate digital media and visual displays of data when helpful and in a manner that strengthens the presentation.
6. Adapt speech to a variety of contexts and communicative tasks, demonstrating a command of formal English when indicated or appropriate. (See "Conventions" in Language, on pages 47–50, for specific demands.)	**6.** Adapt speech to a variety of contexts and communicative tasks, demonstrating a command of formal English when indicated or appropriate. (See "Conventions" in Language, pages 47–50, for specific demands.)	**6.** Adapt speech to a variety of contexts and communicative tasks, demonstrating a command of formal English when indicated or appropriate. (See "Conventions" in Language, pages 47–50, for specific demands.)

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Speaking and Listening Standards 6–12

Grades 9–10 students:	Grades 11–12 students:
Comprehension and Collaboration	
1. Initiate and participate effectively in group discussions on *grades 9–10 topics, texts, and issues* being studied in class. a. Prepare for discussions by reading and researching material under study and explicitly draw on that preparation in discussions. b. Cooperate with peers to set clear goals and deadlines and to establish roles. c. Build on essential information from others' input by asking questions and sharing comments that enrich discussions. d. Acknowledge the ideas and contributions of others in the group, reach decisions about the information and ideas under discussion, and complete the task. e. Evaluate whether the team has met its goals.	**1.** Initiate and participate effectively in group discussions on *grades 11–12 topics, texts, and issues* being studied in class. a. Prepare for discussions by distilling the evidence or information about the material under study and explicitly draw on that preparation in discussions. b. Cooperate with peers to set clear goals and deadlines, establish roles, and determine ground rules for decision making (e.g., informal consensus, taking votes on key issues, presentation of alternate views). c. Propel conversations forward by asking questions that test the evidence and by sharing findings that clarify, verify, or challenge ideas and conclusions. d. Summarize accurately the comments and claims made on all sides of an issue and determine what additional information, research, and tasks are required for the team to complete the task. e. Evaluate whether the team has met its goals.
2. Synthesize information presented visually or multimodally with other information presented orally, noting any discrepancies between the data that emerge as a result.	**2.** Integrate multiple streams of data presented through various mediums, evaluating the reliability and credibility of each source of information in order to answer questions, solve problems, or build knowledge.
3. Determine a speaker's or presenter's position or point of view by assessing the evidence, word choice, points of emphasis, and tone used.	**3.** Evaluate the information conveyed and rhetoric used by a speaker or presenter, identifying logical errors in reasoning and exaggerated or distorted evidence.
Presentation of Knowledge and Ideas	
4. Plan and deliver relevant and sufficient evidence in support of findings and claims such that listeners can follow the reasoning, adjusting presentation to particular audiences and purposes.	**4.** Plan and deliver focused and coherent presentations that convey clear and distinct perspectives such that the line of reasoning and sources of support are clear and alternative perspectives are addressed, adjusting presentation to particular audiences and purposes.
5. Make strategic use of digital media elements and visual displays of data to enhance understanding.	**5.** Make strategic use of digital media elements and visual displays of data to enhance understanding.
6. Adapt speech to a variety of contexts and communicative tasks, demonstrating a command of formal English when indicated or appropriate. (See "Conventions" in Language, pages 47–50, for specific demands.)	**6.** Adapt speech to a variety of contexts and communicative tasks, demonstrating a command of formal English when indicated or appropriate. (See "Conventions" in Language, pages 47–50, for specific demands.)

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College and Career Readiness Standards for Language

The grades 6–12 standards on the following pages define what students should understand and be able to do in each grade and build toward the six College and Career Readiness Standards.

Conventions in Writing and Speaking

1. Demonstrate a command of the conventions of standard English grammar and usage.
2. Demonstrate a command of the conventions of capitalization, punctuation, and spelling.
3. Make effective choices about language, punctuation, and sentence structure for meaning and style.

Vocabulary Acquisition and Use

4. Determine the meaning of words and phrases encountered through conversations, reading, and media use.
5. Understand the nuances of and relationships among words.
6. Use grade-appropriate general academic vocabulary and domain-specific words and phrases purposefully acquired as well as gained through conversation and reading and responding to texts.

Note on range and content of student language use

To be college and career ready in language, students must have firm control over the conventions of writing and speaking and have extensive vocabularies built through reading and study. They must have a well-developed understanding of standard written and spoken English, demonstrating command of the conventions of grammar, usage, and mechanics. They also must come to appreciate that language is as much a matter of craft as of rules and be able to use punctuation, words, phrases, clauses, and sentences to achieve particular rhetorical effects and to convey ideas precisely and concisely. They need to become highly skilled in determining the meanings of words they encounter, choosing flexibly from an array of strategies to aid them. They must learn to see an individual word as part of a network of other words—words, for example, that have similar denotations but different connotations. The inclusion of Language standards in their own strand should not be taken as an indication that skills related to conventions and vocabulary are unimportant to reading, writing, speaking, and listening; indeed, they are inseparable from such contexts.

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Language Standards 6–12

Following are the standards for grades 6–12, which relate to their College and Career Readiness counterparts by number. They offer a focus for instruction in each year to help ensure that students gain adequate exposure to a range of skills and applications.

Grade 6 students:	Grade 7 students:	Grade 8 students:
Conventions in Writing and Speaking		
1. Observe conventions of grammar and usage. a. Ensure that pronouns are in the proper case (subjective, objective, possessive). b. Recognize and correct inappropriate shifts in pronoun number and person.* c. Recognize and correct vague pronouns (i.e., ones with unclear or ambiguous antecedents).*	**1.** Observe conventions of grammar and usage. a. Explain the function of phrases and clauses in general and their functions in specific sentences. b. Chose among simple, compound, complex, and compound-complex sentences to signal differing relationships among ideas. c. Place phrases and clauses within a sentence, avoiding misplaced and dangling modifiers.*	**1.** Observe conventions of grammar and usage. a. Form and use verbs in the active and passive voice. b. Form and use verbs in the indicative, imperative, interrogative, conditional, and subjunctive moods. c. Recognize and correct inappropriate shifts in verb voice and mood.*
2. Observe conventions of capitalization, punctuation, and spelling. a. Use commas, parentheses, or dashes to set off nonrestrictive/parenthetical elements.* b. Spell correctly.	**2.** Observe conventions of capitalization, punctuation, and spelling. a. Use a comma before a coordinating conjunction in a compound sentence. b. Spell correctly.	**2.** Observe conventions of capitalization, punctuation, and spelling. a. Use a comma to separate coordinate adjectives (e.g., *It was a fascinating, enjoyable movie* but not *He wore an old[,] green shirt*). b. Use a comma, ellipses, or dash to indicate a pause or break. c. Spell correctly.
3. Make effective language choices. a. Vary sentence patterns for meaning, reader/listener interest, and style.*	**3.** Make effective language choices. a. Choose words and phrases that express ideas concisely, eliminating wordiness and redundancy.*	**3.** Make effective language choices. a. Use verbs in the active and passive voice and in the conditional and subjunctive moods to achieve particular effects (e.g., emphasizing the actor or the action; expressing uncertainty or describing a state contrary to fact).

* Conventions standards noted with an asterisk need to be revisited by students in subsequent grades. See page 51 for a complete listing.

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Grade 6 students:	Grade 7 students:	Grade 8 students:
Vocabulary Acquisition and Use		
4. Determine word meanings (*based on grade 6 reading*). a. Determine or clarify the meaning of unknown or multiple-meaning words through the use of one or more strategies, such as using semantic clues (e.g., sentence and paragraph context, the organizational pattern of the text); using syntactic clues (e.g., the word's position or function in the sentence); analyzing the word's sounds, spelling, and meaningful parts; and consulting reference materials, both print and digital. b. Use a known root as a clue to the meaning of an unknown word (e.g., *audience*, *auditory*, *audible*). c. Verify the preliminary determination of a word's meaning (e.g., by checking the inferred meaning in context or looking up the word in a dictionary). d. Interpret various figures of speech (e.g., personification) relevant to particular texts.	**4.** Determine word meanings (*based on grade 7 reading*). a. Determine or clarify the meaning of unknown or multiple-meaning words through the use of one or more strategies, such as using semantic clues (e.g., sentence and paragraph context, the organizational pattern of the text); using syntactic clues (e.g., the word's position or function in the sentence); analyzing the word's sounds, spelling, and meaningful parts; and consulting reference materials, both print and digital. b. Use a known root as a clue to the meaning of an unknown word (e.g., *belligerent*, *bellicose*, *rebel*). c. Verify the preliminary determination of a word's meaning (e.g., by checking the inferred meaning in context or looking up the word in a dictionary). d. Interpret various figures of speech (e.g., allegory) relevant to particular texts.	**4.** Determine word meanings (*based on grade 8 reading*). a. Determine or clarify the meaning of unknown or multiple-meaning words through the use of one or more strategies, such as using semantic clues (e.g., sentence and paragraph context, the organizational pattern of the text); using syntactic clues (e.g., the word's position or function in the sentence); analyzing the word's sounds, spelling, and meaningful parts; and consulting reference materials, both print and digital. b. Use a known root as a clue to the meaning of an unknown word (e.g., *precede*, *recede*, *secede*). c. Verify the preliminary determination of a word's meaning (e.g., by checking the inferred meaning in context or looking up the word in a dictionary). d. Interpret various figures of speech (e.g. verbal irony, puns) relevant to particular texts.
5. Understand word relationships. a. Trace the network of uses and meanings that different words have and the interrelationships among those meanings and uses. b. Distinguish a word from other words with similar denotations but different connotations.	**5.** Understand word relationships. a. Trace the network of uses and meanings different words have and the interrelationships among those meanings and uses. b. Distinguish a word from other words with similar denotations but different connotations.	**5.** Understand word relationships. a. Trace the network of uses and meanings different words have and the interrelationships among those meanings and uses. b. Distinguish a word from other words with similar denotations but different connotations.
6. Use grade-appropriate general academic vocabulary and English language arts–specific words and phrases taught directly and gained through reading and responding to texts.	**6.** Use grade-appropriate general academic vocabulary and English language arts–specific words and phrases taught directly and gained through reading and responding to texts.	**6.** Use grade-appropriate general academic vocabulary and English language arts–specific words and phrases taught directly and gained through reading and responding to texts.

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Grades 9–10 students:	Grades 11–12 students:
Conventions in Writing and Speaking	
1. Observe conventions of grammar and usage. a. Use parallel structure in writing.* b. Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to add variety and interest to writing or presentations.	**1.** Observe conventions of grammar and usage. a. Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested. b. Resolve complex usage issues, particularly when the issue involves contested or changing usage; consult references (e.g., *Merriam-Webster's Dictionary of English Usage*) as needed for guidance.
2. Observe conventions of capitalization, punctuation, and spelling. a. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses. b. Use a colon to introduce a list or quotation. c. Spell correctly.	**2.** Observe conventions of capitalization, punctuation, and spelling. a. Observe the conventions concerning using hyphens to join words. b. Spell correctly.
3. Make effective language choices. a. Write and edit work so that it conforms to the guidelines in a style manual.	**3.** Make effective language choices. a. Write and edit work so that it conforms to the guidelines in a style manual.
Vocabulary Acquisition and Use	
4. Determine word meanings (*based on grades 9–10 reading*). a. Determine or clarify the meaning of unknown or multiple-meaning words through the use of one or more strategies, such as using semantic clues (e.g., sentence, paragraph, and whole-text context; the organizational pattern of the text); using syntactic clues (e.g., the word's position or function in the sentence); analyzing the word's sounds, spelling, and meaningful parts; understanding the word's etymology; and consulting reference materials, both print and digital. b. Verify the preliminary determination of a word's meaning (e.g., by checking the inferred meaning in context or looking up the word in a dictionary). c. Interpret various figures of speech (e.g., hyperbole, paradox) and analyze their role in a text.	**4.** Determine word meanings (*based on grades 11–12 reading*). a. Determine or clarify the meaning of unknown or multiple-meaning words through the use of one or more strategies, such as using semantic clues (e.g., sentence, paragraph, and whole-text context; the organizational pattern of the text); using syntactic clues (e.g., the word's position or function in the sentence); analyzing the word's sounds, spelling, and meaningful parts; understanding the word's etymology; and consulting reference materials, both print and digital. b. Verify the preliminary determination of a word's meaning (e.g., by checking the inferred meaning in context or looking up the word in a dictionary). c. Interpret various figures of speech (e.g., satire, sarcasm) and analyze their role in a text.
5. Understand word relationships. a. Trace the network of uses and meanings different words have and the interrelationships among those meanings and uses. b. Distinguish a word from other words with similar denotations but different connotations.	**5.** Understand word relationships. a. Trace the network of uses and meanings different words have and the interrelationships among those meanings and uses. b. Distinguish a word from other words with similar denotations but different connotations.
6. Use grade-appropriate general academic vocabulary and English language arts–specific words and phrases taught directly and gained through reading and responding to texts.	**6.** Use grade-appropriate general academic vocabulary and English language arts–specific words and phrases taught directly and gained through reading and responding to texts.

* Conventions standards noted with an asterisk need to be revisited by students in subsequent grades as their writing and speak grow in sophistication. See page 51 for a complete listing.

DRAFT

English Language Arts Conventions Progressive Skills, By Standard

The following, marked with an asterisk (*) in the Conventions standards, are skills and understandings that require continued attention in higher grades (after their introduction in the grade listed below) as they are applied to increasingly sophisticated writing and speaking.

Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grades 9–10
1c. Ensure subject-verb and pronoun-antecedent agreement. **3a.** Choose words for effect.						
	1b. Form and use adjectives and adverbs (including comparative and superlative forms), placing them appropriately within sentences. **1c.** Produce complete sentences, avoiding rhetorically poor fragments and run-ons. **1d.** Correctly use frequently confused words (e.g., *effect*/*affect*, *to*/*too*/*two*). **3a.** Use punctuation for effect. **3b.** Maintain consistency in style and tone. **3c.** Choose words and phrases to convey ideas precisely.					
		1b. Recognize and correct inappropriate shifts in verb tense and aspect. **2a.** Use punctuation to separate items in a series. **3a.** Expand, combine, and reduce sentences for meaning, reader/listener interest, and style.				
			1b. Recognize and correct inappropriate shifts in pronoun number and person. **1c.** Recognize and correct vague pronouns (i.e., ones with unclear or ambiguous antecedents). **2a.** Use commas, parentheses, or dashes to set off nonrestrictive/parenthetical elements. **3a.** Vary sentence patterns for meaning, reader/listener interest, and style.			
				1c. Place phrases and clauses within a sentence, avoiding misplaced and dangling modifiers. **3b.** Choose words and phrases that express ideas concisely, eliminating wordiness and redundancy.		
					1c. Recognize and correct inappropriate shifts in verb voice and mood.	
						1a. Use parallel structure in writing.

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Range of Text Types for 6–12

Students in grades 6–12 apply the Reading standards to the following range of text types, with texts selected from a broad range of cultures and periods.

Literature			Informational Text
Stories	**Drama**	**Poetry**	**Literary Nonfiction**
Includes the subgenres of adventure stories, historical fiction, mysteries, myths, science fiction, realistic fiction, allegories, parodies, satire, and graphic novels	Includes one-act and multiact plays, both in written form and on film	Includes the subgenres of narrative poems, lyrical poems, free verse poems, sonnets, odes, ballads, and epics	Includes the subgenres of exposition and argument in the form of personal essays, speeches, opinion pieces, essays about art or literature, biographies, memoirs, journalism, and historical, scientific, or economic accounts (including digital media sources) written for a broad audience

Texts Illustrating the Complexity, Quality, and Range of Student Reading 6–12

	Literature: Stories, Drama, Poetry	Informational Texts: Literary Nonfiction
6–8	▪ *Little Women* by Louisa May Alcott (1869) ▪ *The Adventures of Tom Sawyer* by Mark Twain (1876) ▪ "The Road Not Taken" by Robert Frost (1915) ▪ *The Dark Is Rising* by Susan Cooper (1973) ▪ *Dragonwings* by Laurence Yep (1975) ▪ *Roll of Thunder, Hear My Cry* by Mildred Taylor (1976)	▪ "Letter on Thomas Jefferson" by John Adams (1776) ▪ *Narrative of the Life of Frederick Douglass, an American Slave* by Frederick Douglass (1845) ▪ *Harriet Tubman: Conductor on the Underground Railroad* by Ann Petry (1955) ▪ *Travels with Charley: In Search of America* by John Steinbeck (1962) ▪ *The Great Fire* by Jim Murphy (1995) ▪ *This Land Was Made for You and Me: The Life and Songs of Woody Guthrie* by Elizabeth Partridge (2002)
9–10	▪ *The Tragedy of Romeo and Juliet* by William Shakespeare (1592) ▪ "Ozymandias" by Percy Bysshe Shelley (1817) ▪ "The Raven" by Edgar Allen Poe (1845) ▪ "The Gift of the Magi" by O. Henry (1906) ▪ *The Grapes of Wrath* by John Steinbeck (1939) ▪ *Fahrenheit 451* by Ray Bradbury (1953) ▪ *The Killer Angels* by Michael Shaara (1975)	▪ "Speech to the Second Virginia Convention" by Patrick Henry (1775) ▪ The Declaration of Independence by Thomas Jefferson (1776) ▪ "Second Inaugural Address" by Abraham Lincoln (1865) ▪ "State of the Union Address" by Franklin Delano Roosevelt (1941) ▪ *Cod: A Biography of the Fish That Changed the World* by Mark Kurlansky (1997) ▪ *The Race to Save Lord God Bird* by Phillip Hoose (2004)
11–CCR	▪ "Ode on a Grecian Urn" by John Keats (1820) ▪ *Jane Eyre* by Charlotte Brontë (1848) ▪ "Because I Could Not Stop for Death" by Emily Dickinson (1890) ▪ *The Great Gatsby* by F. Scott Fitzgerald (1925) ▪ *Their Eyes Were Watching God* by Zora Neale Hurston (1937) ▪ *A Raisin in the Sun* by Lorraine Hansberry (1959) ▪ *The Namesake* by Jhumpa Lahiri (2003)	▪ *The Crisis* by Thomas Paine (1776) ▪ *Walden* by Henry David Thoreau (1854) ▪ "Society and Solitude" by Ralph Waldo Emerson (1857) ▪ "Gettysburg Address" by Abraham Lincoln (1863) ▪ "Letter from Birmingham Jail" by Martin Luther King, Jr. (1964) ▪ *Google Hacks: Tips & Tools for Smarter Searching* by Tara Calishain and Rael Dornfest (2004) ▪ *America's Constitution: A Biography* by Akhil Reed Amar (2005)

Note: Given space limitations, the illustrative texts listed above are meant only to show individual titles that are representative of a range of topics and genres. (See Appendix B for excerpts of these and other texts illustrative of grades 6–12 text complexity.) At a curricular or instructional level, within and across grade levels, texts need to be selected around topics or themes that generate knowledge and allow students to study topics in depth.

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Standards for Literacy in History/Social Studies & Science

6–12

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College and Career Readiness Standards for Reading

The grades 6–12 standards on the following pages define what students need to know and be able to do and build toward the ten College and Career Readiness Standards.

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

3. Analyze in detail where, when, why, and how events, ideas, and characters develop and interact over the course of a text.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and explain how specific word choices shape meaning or tone.

5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section or chapter) relate to each other and the whole.

6. Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge and Ideas

7. Synthesize and apply information presented in diverse ways (e.g., through words, images, graphs, and video) in print and digital sources in order to answer questions, solve problems, or compare modes of presentation.[1]

8. Delineate and evaluate the reasoning and rhetoric within a text, including assessing whether the evidence provided is relevant and sufficient to support the text's claims.

9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Range and Level of Text Complexity

10. Read complex texts independently, proficiently, and fluently, sustaining concentration, monitoring comprehension, and, when useful, rereading.[2]

[1]Please see "Research to Build Knowledge" in Writing for additional standards relevant to gathering, assessing, and applying information from print and digital sources.

[2]Proficiency in this standard is measured by students' ability to read a range of appropriately complex text in each grade as defined in Appendix A.

Note on range and content of student reading

Reading is critical to building knowledge in history/social studies as well as in science and other technical fields. College- and career-ready reading in these fields requires an appreciation of the norms and conventions of each discipline, such as the kinds of evidence used in history and science; an understanding of domain-specific words and phrases; an attention to precise details; and the capacity to evaluate intricate arguments, synthesize complex information, and follow detailed descriptions of events and concepts. In history/social studies, for example, students need to be able to analyze, evaluate, and differentiate primary and secondary sources. When reading scientific and technical texts, students need to be able to gain knowledge from challenging texts that often make extensive use of elaborate diagrams and data to convey information and illustrate concepts. Students must be able to read complex informational text in these fields with independence and confidence because the vast majority of reading in college and workforce training programs will be sophisticated nonfiction. It is important to note that these Reading standards are meant to complement the specific content demands of the disciplines, not replace them.

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Reading Standards for History/Social Studies 6–12

Following are the standards for grades 6–12, which relate to their College and Career Readiness counterparts by number. The standards below begin at grade 6; standards for K–5 reading in history/social studies are integrated into the K–5 standards for reading informational text.

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
Key Ideas and Details		
1. Cite specific textual evidence to support analysis of primary and secondary sources. **2.** Determine the main ideas or information of a primary or secondary source; summarize the source, basing the summary on information in the text rather than on prior knowledge or opinions. **3.** Identify key steps in a text's description of a process related to history/social studies (e.g., how a bill becomes law, how interest rates are raised or lowered).	**1.** Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information. **2.** Determine the main ideas or information of a primary or secondary source; summarize how key events or ideas develop over the course of the text. **3.** Analyze in detail a series of events described in a text and the causes that link the events; distinguish whether earlier events caused later ones or simply preceded them.	**1.** Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole. **2.** Determine the main ideas or information of a primary or secondary source; provide a summary that makes clear the relationships between the key details and ideas. **3.** Analyze how ideas and beliefs emerge, develop, and influence events, based on evidence in the text .
Craft and Structure		
4. Determine the meaning of words and phrases in a text, including vocabulary specific to domains related to history/social studies. **5.** Identify how a history/social studies text presents information (e.g., sequentially, comparatively, causally). **6.** Identify aspects of a text that reveal an author's point of view or purpose (e.g., loaded language, inclusion or avoidance of particular facts).	**4.** Determine the meaning of words and phrases in a text, including the vocabulary describing political, economic, or social aspects of history. **5.** Explain how an author chooses to structure information or an explanation in a text to emphasize key points or advance a point of view. **6.** Compare the point of view of two or more authors by comparing how they treat the same or similar historical topics, including which details they include and emphasize in their respective accounts.	**4.** Interpret the meaning of words and phrases in a text, including how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines *faction* in Federalist No. 10 and No. 51). **5.** Analyze in detail how a complex primary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole. **6.** Evaluate authors' differing points of view on the same historical event or issue by assessing the authors' claims, evidence, and reasoning.
Integration of Knowledge and Ideas		
7. Integrate graphical information (e.g., pictures, videos, maps, time lines) with other information in a print or digital text. **8.** Distinguish among fact, opinion, and reasoned judgment in a historical account. **9.** Analyze the relationship between a primary and secondary source on the same topic.	**7.** Integrate quantitative or technical information presented in maps, time lines, and videos with other information in a print or digital text. **8.** Assess the extent to which the evidence n a text supports the author's claims. **9.** Compare and contrast treatments of the same topic in several primary and secondary sources.	**7.** Synthesize ideas and data presented graphically and determine their relationship to the rest of a print or digital text, noting discrepancies between the graphics and other information in the text. **8.** Evaluate an author's premises, claims, and evidence by corroborating or challenging them with other sources of information. **9.** Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.
Range and Level of Text Complexity		
10. Read informational text independently, proficiently, and fluently in the grades 6–8 text complexity band; read "stretch" texts with scaffolding as needed.	**10.** Read informational text independently, proficiently, and fluently in the grades 9–10 text complexity band; read "stretch" texts with scaffolding as needed.	**10.** Read informational text independently, proficiently, and fluently in the grades 11–12 text complexity band; read "stretch" texts with scaffolding as needed.

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Reading Standards for Science 6–12

Following are the standards for grades 6–12, which relate to their College and Career Readiness counterparts by number. The standards below begin at grade 6; standards for K–5 reading in science are integrated into the K–5 standards for reading informational text.

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
Key Ideas and Details		
1. Cite specific textual evidence to support analysis of scientific and technical texts. **2.** Summarize the broad ideas and specific conclusions made in a text, basing the summary on textual information rather than on prior knowledge or opinions. **3.** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	**1.** Cite specific textual evidence to support analysis of scientific and technical text, including analysis of the precise details of explanations or descriptions. **2.** Analyze the development of a text's explanation of a process or phenomenon, summarizing the central ideas and supporting details. **3.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	**1.** Cite specific textual evidence to support analysis of scientific and technical texts, including analysis of important distinctions the author makes between ideas or pieces of information. **2.** Summarize complex information or ideas presented in a text, paraphrasing it in simpler but still accurate terms. **3.** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the causes of the specific results based on information from the text.
Craft and Structure		
4. Determine the meaning of key terms, symbols, and domain-specific vocabulary used in a text. **5.** Analyze how each major part of a text contributes to an understanding of the topic discussed in the text. **6.** Analyze the purpose of an experiment or explanation in a text, including defining the problem or question to be resolved.	**4.** Determine the meaning of key terms, symbols, and domain-specific vocabulary used in a text, noting relationships among terms pertaining to important ideas or processes (e.g., *force*, *friction*, *reaction force*, *energy*). **5.** Analyze the relationships among concepts in a text, including developing propositional concept maps to organize and illustrate the ideas. **6.** Analyze the purpose of an experiment, including defining the possibilities ruled out by the experimental results.	**4.** Determine the meaning of key terms, symbols, and domain-specific vocabulary used in a text, attending to the precise meaning of terms as they are used in particular scientific or technical contexts. **5.** Analyze the hierarchical or categorical relationships of concepts or information presented in a text. **6.** Analyze the scope and purpose of an experiment or explanation and determine which related issues remain unresolved or uncertain.
Integration of Knowledge and Ideas		
7. Integrate information provided by the words in a text with a version of that information expressed graphically (e.g., in a flowchart, diagram, model, graph, or table). **8.** Distinguish facts or reasoned judgments based on research findings from opinions. **9.** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	**7.** Integrate quantitative or technical information presented graphically (e.g., in a flowchart, diagram, model, graph, or table) with other information in a text. **8.** Assess the extent to which the evidence in a text supports a scientific claim or a recommendation for solving a technical problem. **9.** Compare experimental findings presented in a text to information from other sources, noting when the findings support or contradict previous explanations or accounts.	**7.** Synthesize information in different formats by representing complex information in a text in graphical form (e.g., a table or chart) or translating a graphic or equation into words. **8.** Evaluate the hypotheses, data, and conclusions in a scientific text, corroborating or undercutting them with other sources of information. **9.** Integrate information from diverse sources (e.g., video, multimedia sources, experiments, simulations) into a coherent understanding of a concept, process, or phenomenon, noting discrepancies among sources.
Range and Level of Text Complexity		
10. Read informational text independently, proficiently, and fluently in the grades 6–8 text complexity band; read "stretch" texts with scaffolding as needed.	**10.** Read informational text independently, proficiently, and fluently in the grades 9–10 text complexity band; read "stretch" texts with scaffolding as needed.	**10.** Read informational text independently, proficiently, and fluently in the grades 11–CCR text complexity band; read "stretch" texts with scaffolding as needed.

College and Career Readiness Standards for Writing

The grades 6–12 standards on the following pages define what students need to know and be able to do and build toward these ten College and Career Readiness Standards.

Text Types and Purposes[1]

1. Write arguments to support a substantive claim with clear reasons and relevant and sufficient evidence.
2. Write informative/explanatory texts to convey complex information clearly and accurately through purposeful selection and organization of content.
3. Write narratives to convey real or imagined experiences, individuals, or events and how they develop over time.

Production and Distribution of Writing

4. Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience.
5. Strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
6. Use technology, including the Internet, to produce, publish, and interact with others about writing.

Research to Build Knowledge

7. Perform short, focused research projects as well as more sustained research in response to a focused research question, demonstrating understanding of the material under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate and cite the information while avoiding plagiarism.
9. Write in response to literary or informational sources, drawing evidence from the text to support analysis and reflection as well as to describe what they have learned.

Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.[2]

[1]These broad categories of writing include many subgenres. See Appendix A for definitions of key writing types.
[2]This standard is measured by the proficiency of student writing products.

Note on range and content of student writing

For students, writing is a key means of asserting and defending claims, showing what they know about a subject, and conveying what they have experienced, imagined, thought, and felt. To be college- and career-ready writers, students must take task, purpose, and audience into careful consideration, choosing words, information, structures, and formats deliberately. They need to be able to use technology strategically when creating, refining, and collaborating on writing. They have to become adept at gathering information, evaluating sources, and citing material accurately, reporting findings from their research and analysis of sources in a clear and cogent manner. They must have the flexibility, concentration, and fluency to produce high-quality first-draft text under a tight deadline and the capacity to revisit and make improvements to a piece of writing over multiple drafts when circumstances encourage or require it. To meet these goals, students must devote significant time and effort to writing, producing numerous pieces over short and long time frames throughout the year.

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Writing Standards for History/Social Studies and Science 6–12

Following are the standards for grades 6–12, which relate to their College and Career Readiness counterparts by number. The standards below begin at grade 6; standards for K–5 writing in history/social studies and science are integrated into the K–5 standards for writing.

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
Text Types and Purposes		
1. Write arguments focused on *discipline-specific content* in which they: a. Introduce a claim about a topic or issue, distinguish it from alternate or opposing claims, and organize the reasons, data, and evidence logically to support the claim. b. Support the claim with logical reasoning and detailed, accurate data and evidence (science) or information from credible primary, secondary, and tertiary sources (history). c. Use words and phrases as well as domain-specific vocabulary to make clear the relationships among claims, reasons, data, and evidence. d. Sustain an objective style and tone. e. Provide a concluding statement or section that follows logically from the argument.	**1.** Write arguments focused on *discipline-specific content* in which they: a. Introduce a precise claim, distinguish it from alternate or opposing claims, and provide an organization that establishes clear relationships among the claim, reasons, data, and evidence. b. Develop a claim fairly with logical reasoning, supplying detailed, accurate data and evidence acquired in a scientifically acceptable form (science) or gathered from credible primary, secondary, and tertiary sources (history). c. Use precise words and phrases as well as domain-specific vocabulary to make clear the relationships between claims and reasons and between reasons and the data and evidence. d. Sustain an objective style and tone while attending to the norms and conventions of the specific discipline. e. Provide a concluding statement or section that follows logically from the argument.	**1.** Write arguments focused on *discipline-specific content* in which they: a. Introduce a substantive claim, establish its significance, distinguish it from alternate or opposing claims, and create an organization so that claims, reasons, data, and evidence are purposefully and logically sequenced. b. Develop a claim thoroughly and fairly with logical reasoning, supplying the most relevant data and evidence acquired in a scientifically acceptable form (science) or gathered from credible primary, secondary, and tertiary sources (history). c. Use precise words and phrases as well as domain-specific vocabulary to make clear the relationships between claims and reasons and between reasons and the data and evidence. d. Sustain an objective style and tone while attending to the norms and conventions of the specific discipline. e. Provide a concluding statement or section that follows logically from the argument.

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Writing Standards for History/Social Studies and Science 6–12

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
Text Types and Purposes (continued)		
2. Write informative/explanatory texts, including the narration of historical events or scientific procedures/experiments, in which they: a. Introduce and establish a topic and organize information under concepts or into categories. b. Develop a topic that has historical or scientific significance using well-chosen, relevant facts, data, details, quotations, examples, or other information. c. Use varied links and sentence structures to create cohesion and clarify information and ideas. d. Use precise language and domain-specific vocabulary and sustain a formal, objective style appropriate for a reader seeking information. e. Provide a conclusion that follows logically from the information or explanation presented.	**2.** Write informative/explanatory texts, including the narration of historical events or scientific procedures/experiments, in which they: a. Introduce a topic and organize information under concepts and into categories, making clear the connections and distinctions between key ideas; use formatting and graphics (e.g., headings, figures, tables, graphs, illustrations) as useful to clarify ideas. b. Develop a topic that has historical or scientific significance using well-chosen, relevant, and sufficient facts, data, details, quotations, examples, extended definitions, or other information. c. Use varied transitions and sentence structures to create cohesion, clarify information and ideas, and link major sections in the text. d. Use precise language and domain-specific vocabulary to convey a style appropriate to the specific discipline and context as well as to the expertise of likely readers. e. Provide a conclusion that follows logically from the information or explanation provided and that articulates the implications or significance of the topic.	**2.** Write informative/explanatory texts, including the narration of historical events or scientific procedures/experiments, in which they: a. Introduce a complex topic and organize the information so that each new piece of information builds on that which precedes it to create a unified whole; use formatting and graphics (e.g., headings, figures, tables, graphs, illustrations) as useful to clarify ideas. b. Develop a complex topic that has historical and scientific significance using the most significant and relevant facts, data, details, quotations, examples, extended definitions, or other information. c. Use varied transitional devices and sentence structures to create cohesion, clarify complex information and ideas, and link the major sections of the text. d. Use precise language, domain-specific and technical wording, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the specific discipline and context as well as to the expertise of likely readers. e. Provide a well-developed conclusion that follows logically from the information or explanation provided and that articulates the implications or significance of the topic.
3. Students' narrative skills continue to grow in these grades. The *Standards* require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In history, students must be able to write narrative accounts about individuals or events of historical import. In science, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations that others can replicate them and (possibly) reach the same results.	**3.** Students' narrative skills continue to grow in these grades. The *Standards* require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In history, students must be able to write narrative accounts about individuals or events of historical import. In science, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations that others can replicate them and (possibly) reach the same results.	**3.** Students' narrative skills continue to grow in these grades. The *Standards* require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In history, students must be able to write narrative accounts about individuals or events of historical import. In science, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations that others can replicate them and (possibly) reach the same results.

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Writing Standards for History/Social Studies and Science 6–12

Grades 6–8 students:	Grades 9–10 students:	Grades 11–12 students:
Production and Distribution of Writing		
4. Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience.	**4.** Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience.	**4.** Produce writing in which the organization, development, substance, and style are appropriate to task, purpose, and audience.
5. With some guidance and support from peers and adults, strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach after rethinking how well questions of purpose and context have been addressed.	**5.** Strengthen writing as needed by planning, revising, editing, or trying a new approach, focusing on addressing what is most significant for a specific task and context.	**5.** Strengthen writing as needed by planning, revising, editing, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
6. Use technology, including the Internet, to present and cite information effectively in a digital format, including when publishing and responding to writing.	**6.** Use technology, including the Internet, to produce, publish, and collaborate on a shared writing product, incorporating diverse and sometimes conflicting feedback.	**6.** Demonstrate command of technology, including the Internet, to produce, publish, and update work in response to ongoing feedback, including fresh arguments or new information.
Research to Build Knowledge		
7. Perform short, focused research projects in response to a question or problem and generate additional related questions that allow for multiple avenues of exploration.	**7.** Perform short, focused research projects and more sustained research; synthesize multiple sources on a subject to answer a question or solve a problem.	**7.** Perform short, focused research projects and more sustained research; synthesize multiple authoritative sources on a subject to answer a question or solve a problem.
8. Gather relevant information from multiple print and digital sources using effectively tailored searches; assess the credibility and accuracy of each source; and quote or paraphrase the evidence, avoiding plagiarism and following a standard format for citation.	**8.** Gather relevant information from multiple print and digital sources; assess the credibility, accuracy, and strengths and limitations of each source; and integrate selected information into the text, avoiding overreliance on any one source, avoiding plagiarism, and following a standard format for citation.	**8.** Gather relevant information from multiple print and digital sources; assess its credibility and accuracy and its usefulness in terms of purpose, task, and audience; and integrate selected information into the text, avoiding overreliance on any one source, avoiding plagiarism, and following a standard format for citation.
9. Write in response to informational sources, drawing on textual evidence to support analysis and reflection as well as to describe what they have learned.	**9.** Write in response to informational sources, drawing on textual evidence to support analysis and reflection as well as to describe what they have learned.	**9.** Write in response to informational sources, drawing on textual evidence to support analysis and reflection as well as to describe what they have learned.
Range of Writing		
10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.	**10.** Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.	**10.** Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

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COMMON CORE STATE STANDARDS

FOR Mathematics

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Contents

Introduction 2
Standards for Mathematical Practice 4
How to Read the Grade Level Standards 6
Overview of the Mathematics Standards, Grades K–5 7
Overview of the Mathematics Standards, Grades 6–8 8
Kindergarten 9
Grade 1 12
Grade 2 15
Grade 3 18
Grade 4 22
Grade 5 26
Grade 6 30
Grade 7 34
Grade 8 38
Introduction to the High School Standards 42
High School—Number and Quantity 43
High School—Algebra 46
High School—Functions 49
High School—Modeling 53
High School—Statistics and Probability 55
High School—Geometry 59
Glossary 63
Appendix: Designing High School Mathematics Courses Based on the Common Core Standards
online at www.corestandards.org

DRAFT

Introduction
Toward greater focus and coherence

> *The composite standards [of Hong Kong, Korea and Singapore] have a number of features that can inform an international benchmarking process for the development of K–6 mathematics standards in the US. First, the composite standards concentrate the early learning of mathematics on the number, measurement, and geometry strands with less emphasis on data analysis and little exposure to algebra. The Hong Kong standards for grades 1–3 devote approximately half the targeted time to numbers and almost all the time remaining to geometry and measurement.*
>
> Ginsburg, Leinwand and Decker, 2009

> *Mathematics experiences in early childhood settings should concentrate on (1) number (which includes whole number, operations, and relations) and (2) geometry, spatial relations, and measurement, with more mathematics learning time devoted to number than to other topics. The mathematical process goals should be integrated in these content areas. Children should understand the concepts and learn the skills exemplified in the teaching-learning paths described in this report.*
>
> National Research Council, 2009

> *In general, the US textbooks do a much worse job than the Singapore textbooks in clarifying the mathematical concepts that students must learn. Because the mathematics concepts in these textbooks are often weak, the presentation becomes more mechanical than is ideal. We looked at both traditional and non-traditional textbooks used in the US and found this conceptual weakness in both.*
>
> Ginsburg et al., 2005

Notable in the research base for these standards are conclusions from TIMSS and other studies of high-performing countries that the traditional US mathematics curriculum must become substantially more coherent and more focused in order to improve student achievement in mathematics. To deliver on the promise of common standards, the standards must address the problem of a curriculum that is 'a mile wide and an inch deep.' The draft Common Core State Standards for Mathematics are a substantial answer to this challenge.

It is important to recognize that "fewer standards" are no substitute for *focused* standards. Achieving "fewer standards" would be easy to do by simply resorting to broad, general statements. Instead, the draft Common Core State Standards for Mathematics aim for clarity and specificity.

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Assessing the coherence of a set of standards is more difficult than assessing their focus. William Schmidt and Richard Houang (2002) have said that content standards and curricula are coherent if they are:

> *articulated over time as a sequence of topics and performances that are logical and reflect, where appropriate, the sequential or hierarchical nature of the disciplinary content from which the subject matter derives. That is, what and how students are taught should reflect* not only the topics *that fall within a certain academic discipline,* but also the key ideas *that determine how knowledge is organized and generated within that discipline. This implies that "to be coherent," a set of content standards must evolve from particulars (e.g., the meaning and operations of whole numbers, including simple math facts and routine computational procedures associated with whole numbers and fractions) to deeper structures inherent in the discipline. This deeper structure then serves as a means for connecting the particulars (such as an understanding of the rational number system and its properties).* (emphasis added)

The draft Common Core State Standards for Mathematics endeavor to follow such a design, not only by stressing conceptual understanding of the key ideas, but also by continually returning to organizing principles such as place value or the laws of arithmetic to structure those ideas.

The standards in this draft document define what students should understand and be able to do. Asking a student to understand something means asking a teacher to assess whether the student has understood it. But what does mathematical understanding look like? One hallmark of mathematical understanding is the ability to justify, in a way appropriate to the student's mathematical maturity, *why* a particular mathematical statement is true or where a mathematical rule comes from. There is a world of difference between the student who can summon a mnemonic device such as "FOIL" to expand a product such as $(a + b)(x + y)$ and a student who can explain where that mnemonic comes from. Teachers often observe this difference firsthand, even if large-scale assessments in the year 2010 often do not. The student who can explain the rule understands the mathematics, and may have a better chance to succeed at a less familiar task such as expanding $(a + b + c)(x + y)$. Mathematical understanding and procedural skill are equally important, and both are assessable using mathematical tasks of sufficient richness.

The draft Common Core State Standards for Mathematics begin on the next page with eight Standards for Mathematical Practice. These are not a list of individual math topics, but rather a list of ways in which developing student-practitioners of mathematics increasingly ought to engage with those topics as they grow in mathematical maturity and expertise throughout the elementary, middle and high school years.

Grateful acknowledgment is here made to Dr. Cathy Kessel for editing the draft standards.

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Mathematics | Standards for Mathematical Practice

Proficient students of all ages expect mathematics to make sense. They take an active stance in solving mathematical problems. When faced with a non-routine problem, they have the courage to plunge in and try something, and they have the procedural and conceptual tools to continue. They are experimenters and inventors, and can adapt known strategies to new problems. They think strategically.

The practices described below are encouraged in apprentices by expert mathematical thinkers. Students who engage in these practices, individually and with their classmates, discover ideas and gain insights that spur them to pursue mathematics beyond the classroom walls. They learn that effort counts in mathematical achievement. Encouraging these practices in students of all ages should be as much a goal of the mathematics curriculum as the learning of specific content.

1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2 Reason abstractly and quantitatively.

Mathematically proficient students make sense of the quantities and their relationships in problem situations. Students bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

3 Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

4 Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a

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student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, 2-by-2 tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students interpret graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

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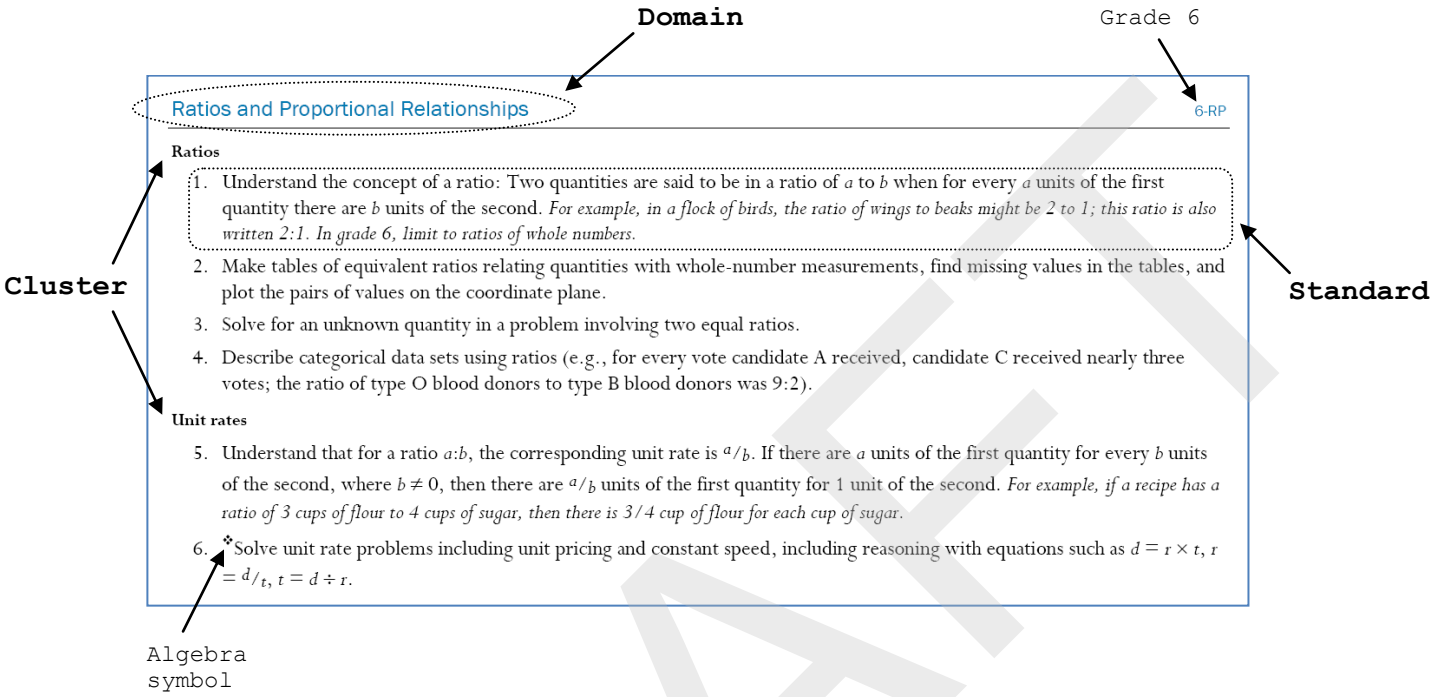
How to read the grade level standards



Standards define what students should understand and be able to do. **Clusters** are groups of related standards. Note that standards from different clusters may sometimes be closely related, because mathematics is a connected subject. **Domains** are larger groups of related standards. For each grade level in Grades K–8, the standards are organized into four or five domains. Standards from different domains may sometimes be closely related.

Algebra Symbol: Key standards for the development of algebraic thinking in Grades K–5 are indicated by ❖.

Dotted Underlines: Dotted underlines, for example, decade words, indicate terms that are explained in the Glossary. In each grade, underlining is used for the first occurrence of a defined term, but not in subsequent occurrences.

Note on Grade Placement of Topics. What students can learn at any particular grade level depends upon what they have learned before. Ideally then, each standard in this document might have been phrased in the form, "Students who already know A should next come to learn B." But in the year 2010 this approach is unrealistic—not least because existing education research cannot specify all such learning pathways. Of necessity therefore, grade placements for specific topics have been made on the basis of state and international comparisons and the collective experience and collective professional judgment of educators, researchers and mathematicians. One promise of common state standards is that over time they will allow research on learning progressions to inform and improve the design of standards to a much greater extent than is possible today. Learning opportunities will continue to vary across schools and school systems, and educators should make every effort to meet the needs of individual students based on their current understanding.

Note on Ordering of Topics within a Grade. These standards do not dictate curriculum. In particular, just because topic A appears before topic B in the standards for a given grade, it does not necessarily mean that topic A must be taught before topic B. A teacher might prefer to teach topic B before topic A, or might choose to highlight connections by teaching topic A and topic B at the same time. Or, a teacher might prefer to teach a topic of his or her own choosing that leads, as a byproduct, to students reaching the standards for topics A and B.

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Overview of the Mathematics Standards
Grades K–5

This table shows the domains and clusters in each grade K–5

	K	*1*	*2*	*3*	*4*	*5*
Number—Counting and Cardinality	• Number names • Counting to tell the number of objects • Comparing and ordering numbers					
Number—Operations and the Problems They Solve	• Composing and decomposing numbers; addition and subtraction	• Addition and subtraction • Describing situations and solving problems with addition and subtraction	• Addition and subtraction • Describing situations and solving problems with addition and subtraction	• Multiplication and division • Describing situations and solving problems with multiplication and division	• Multiplication and Division • Problem solving with the four operations	
Number—Base Ten	• Two-digit numbers • Composing and decomposing ten	• Numbers up to 100 • Adding and subtracting in base ten	• Numbers up to 1000 • Adding and subtracting in base ten	• Numbers up to 10,000 • Adding and subtracting in base ten • Multiplying and dividing in base ten	• Numbers up to 100,000 • Multiplying and dividing in base ten	• Whole numbers in base ten • Decimal concepts • Operations on decimals
Number—Fractions				• Fractions as representations of numbers • Fractional quantities	• Operations on fractions • Decimal concepts	• Fraction equivalence • Operations on fractions
Measurement and Data	• Direct measurement • Representing and interpreting data	• Length measurement • Time measurement • Representing and interpreting data	• Length measurement • Time and money • Representing and interpreting data	• The number line and units of measure • Perimeter and area • Representing and interpreting data	• The number line and units of measure • Perimeter and area • Angle measurement • Representing and interpreting data	• Units of measure • Volume • Representing and interpreting data
Geometry	• Shapes, their attributes, and spatial reasoning	• Shapes, their attributes, and spatial reasoning	• Shapes, their attributes, and spatial reasoning	• Properties of 2-dimensional shapes • Structuring rectangular shapes	• Lines and angles • Line symmetry	• Coordinates • Plane figures

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Overview of the Mathematics Standards
Grades 6–8

This table shows the domains and clusters in each grade 6–8.

	Grade		
	6	*7*	*8*
Ratios and Proportional Relationships	• Ratios • Unit rates	• Analyzing proportional relationships • Percent	
The Number System	• Operations • The system of rational numbers	• The system of rational numbers • The system of real numbers	• The system of real numbers
Expressions and Equations	• Expressions • Quantitative relationships and the algebraic approach to problems	• Expressions • Quantitative relationships and the algebraic approach to solving problems	• Slopes of lines in the coordinate plane • Linear equations and systems
Functions			• Function concepts • Functional relationships between quantities
Geometry	• Properties of area, surface area, and volume	• Congruence and similarity • Angles	• Congruence and similarity • The Pythagorean Theorem • Plane and solid geometry
Statistics and Probability	• Variability and measures of center • Summarizing and describing distributions	• Situations involving randomness • Random sampling to draw inferences about a population • Comparative inferences about two populations	• Patterns of association in bivariate data

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Mathematics | Kindergarten

In Kindergarten, instructional time should focus on two critical areas: (1) representing, comparing and ordering whole numbers and joining and separating sets; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.

(1) Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; creating a set with a given number of objects; comparing and ordering sets or numerals; and modeling simple joining and separating situations with objects. They choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.

(2) Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic shapes, such as squares, triangles, circles, rectangles, (regular) hexagons, and (isosceles) trapezoids, presented in a variety of ways (e.g., with different sizes or orientations), as well as three-dimensional shapes such as spheres, cubes, and cylinders. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

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Number—Counting and Cardinality K-NCC

Number names

1. Say the number name sequence to 100.
2. Know the decade words to ninety and recite them in order ("ten, twenty, thirty, …").
3. Say the number name sequence forward or backward beginning from a given number within the known sequence (instead of always beginning at 1).
4. Write numbers from 1 to 20 in base-ten notation.

Counting to tell the number of objects

5. Count to answer "how many?" questions about as many as 20 things. *Objects may be arranged in a line, a rectangular array, a circle, or a scattered configuration.*
6. Understand that when counting objects,
   a. The number names are said in the standard order.
   b. Each object is paired with one and only one number name.
   c. The last number name said tells the number of objects counted.
7. Understand that when counting forward, each successive number name refers to a quantity that is 1 larger.

Comparing and ordering numbers

8. Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. *Include groups with up to ten objects.*
9. Compare and put in order numbers between 1 and 10 presented in written symbols: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

Number—Operations and the Problems They Solve K-NOP

Composing and decomposing numbers; addition and subtraction

1. Understand addition as putting together—e.g., finding the number of objects in a group formed by putting two groups together. Understand subtraction as taking apart—e.g., finding the number of objects left when a one group is taken from another.
2. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. *Note that drawings need not show details, but should show the mathematics in the problem. (This note also applies wherever drawings are mentioned in subsequent standards.)*
3. ❖Decompose numbers less than or equal to 10 into pairs in various ways, e.g., using objects or drawings, and record each decomposition by a drawing or equation (e.g., $5 = 2 + 3$). Compose numbers whose sum is less than or equal to 10, e.g., using objects or drawings, and record each composition by a drawing or equation (e.g., $3 + 1 = 4$).❖
4. Compose and decompose numbers less than or equal to 10 in two different ways, and record compositions and decompositions by drawings or equations. *For example, 7 might be composed or decomposed in two different ways by a drawing showing how a group of 2 and a group of 5 together make the same number as do a group of 3 and a group of 4.*
5. ❖Understand that addition and subtraction are related. *For example, when a group of 9 is decomposed into a group of 6 and a group of 3, this means not only $9 = 6 + 3$ but also $9 - 3 = 6$ and $9 - 6 = 3$.*
6. ❖Solve addition and subtraction word problems, and calculate additions and subtractions within 10, e.g., using objects or drawings to represent the problem.
7. Fluently add and subtract, for sums and minuends of 5 or less.

Number—Base Ten K-NBT

Two-digit numbers

1. Understand that 10 can be thought of as a bundle of ones—a unit called a "ten."
2. Understand that a teen number is composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
3. Compose and decompose teen numbers into a ten and some ones, e.g., by using objects or drawings, and record the compositions and decompositions in base-ten notation. *For example, $10 + 8 = 18$ and $14 = 10 + 4$.*
4. Put in order numbers presented in base-ten notation from 1 to 20 (inclusive), and be able to explain the reasoning.
5. Understand that a decade word refers to one, two, three, four, five, six, seven, eight, or nine tens.
6. Understand that the two digits of a two-digit number represent amounts of tens and ones. *In 29, for example, the 2 represents two tens and the 9 represents nine ones.*

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Composing and decomposing ten

7. Decompose 10 into pairs of numbers, e.g., by using objects or drawings, and record each decomposition with a drawing or equation.
8. Compose numbers to make 10, e.g., by using objects or drawings, and record each composition with a drawing or equation.
9. ❖For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.

Measurement and Data K-MD

Direct measurement

1. Understand that objects have measurable attributes, such as length or weight. A single object might have several measurable attributes of interest.
2. Directly compare two objects with a measurable attribute in common, to see which object has "more of" the attribute. *For example, directly compare the heights of two books and identify which book is taller.*

Representing and interpreting data

3. Classify objects or people into given categories; count the numbers in each category and sort the categories by count. *Limit category counts to be less than or equal to 10.*

Geometry K-G

Shapes, their attributes, and spatial reasoning

1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.
2. Understand that names of shapes apply regardless of the orientation or overall size of the shape. *For example, a square in any orientation is still a square. Students may initially need to physically rotate a shape until it is "level" before they can correctly name it.*
3. Understand that shapes can be two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
4. Understand that shapes can be seen as having parts, such as sides and vertices ("corners"), and that shapes can be put together to compose other shapes.
5. Analyze and compare a variety of two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, component parts (e.g., number of sides and vertices) and other attributes (e.g., having sides of equal length).
6. Combine two- or three-dimensional shapes to solve problems such as deciding which puzzle piece will fit into a place in a puzzle.

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In Grade 1, instructional time should focus on four critical areas: (1) developing understanding of addition, subtraction, and strategies for additions and subtractions within 20; (2) developing understanding of whole number relationships, including grouping in tens and ones, (3) developing understanding of linear measurement and measuring lengths, and (4) composing and decomposing geometric shapes.

(1) Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model "put together/take apart," "add to," "take from," and "compare" situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (i.e., adding two is the same as counting on two). They use properties of addition (commutativity and associativity) to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the inverse relationship between addition and subtraction.

(2) Students compare and order whole numbers (at least to 100), to develop understanding of and solve problems involving their relative sizes. They think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones). They understand the sequential order of the counting numbers and their relative magnitudes through activities such as representing numbers on paths of numbered things.

(3) Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as partitioning (the mental activity of decomposing the length of an object into equal-sized units) and transitivity (e.g., in terms of length, if object A is longer than object B and object B is longer than object C, then object A is longer than object C). They understand linear measure as an iteration of units, and use rulers and other measurement tools with that understanding.

(4) Students compose and decompose plane and solid figures (e.g., put two congruent isosceles triangles together to make a rhombus), building understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine solid and plane figures, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

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Addition and subtraction

1. ❖Understand the properties of addition.
   a. Addition is commutative. *For example, if 3 cups are added to a stack of 8 cups, then the total number of cups is the same as when 8 cups are added to a stack of 3 cups; that is, 8 + 3 = 3 + 8.*
   b. Addition is associative. *For example, 4 + 3 + 2 can be found by first adding 4 + 3 = 7 then adding 7 + 2 = 9, or by first adding 3 + 2 = 5 then adding 4 + 5 = 9.*
   c. 0 is the additive identity.
2. ❖Explain and justify properties of addition and subtraction, e.g., by using representations such as objects, drawings, and story contexts. Explain what happens when:
   a. The order of addends in a sum is changed in a sum with two addends.
   b. 0 is added to a number.
   c. A number is subtracted from itself.
   d. One addend in a sum is increased by 1 and the other addend is decreased by 1. *Limit to two addends.*
3. ❖Understand that addition and subtraction have an inverse relationship. *For example, if 8 + 2 = 10 is known, then 10 – 2 = 8 and 10 – 8 = 2 are also known.*
4. ❖Understand that when all but one of three numbers in an addition or subtraction equation are known, the unknown number can be found. *Limit to cases where the unknown number is a whole number.*
5. Understand that addition can be recorded by an expression (e.g., 6 + 3), or by an equation that shows the sum (e.g., 6 + 3 = 9). Likewise, subtraction can be recorded by an expression (e.g., 9 – 5), or by an equation that shows the difference (e.g., 9 – 5 = 4).

Describing situations and solving problems with addition and subtraction

6. Understand that addition and subtraction apply to situations of adding-to, taking-from, putting together, taking apart, and comparing. *See Glossary, Table 1.*
7. ❖Solve word problems involving addition and subtraction within 20, e.g., by using objects, drawings and equations to represent the problem. *Students should work with all of the addition and subtraction situations shown in the Glossary, Table 1, solving problems with unknowns in all positions, and representing these situations with equations that use a symbol for the unknown (e.g., a question mark or a small square). Grade 1 students need not master the more difficult problem types.*
8. Solve word problems involving addition of three whole numbers whose sum is less than or equal to 20.

Number—Base Ten 1-NBT

Numbers up to 100

1. Read and write numbers to 100.
2. Starting at any number, count to 100 or beyond.
3. Understand that when comparing two-digit numbers, if one number has more tens, it is greater; if the amount of tens is the same in each number, then the number with more ones is greater.
4. Compare and order two-digit numbers based on meanings of the tens and ones digits, using > and < symbols to record the results of comparisons.

Adding and subtracting in base ten

5. Calculate mentally, additions and subtractions within 20.
   a. Use strategies that include counting on; making ten (for example, 7 + 6 = 7 + 3 + 3 = 10 + 3 = 13); and decomposing a number (for example, 17 – 9 = 17 – 7 – 2 = 10 – 2 = 8).
6. Demonstrate fluency in addition and subtraction within 10.
7. Understand that in adding or subtracting two-digit numbers, one adds or subtracts like units (tens and tens, ones and ones) and sometimes it is necessary to compose or decompose a higher value unit.
8. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count.
9. Add one-digit numbers to two-digit numbers, and add multiples of 10 to one-digit and two-digit numbers.
10. Explain addition of two-digit numbers using concrete models or drawings to show composition of a ten or a hundred.
11. ❖Add two-digit numbers to two-digit numbers using strategies based on place value, properties of operations, and/or the inverse relationship between addition and subtraction; explain the reasoning used.

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Measurement and Data 1-MD

Length measurement

1. Order three objects by length; compare the length of two objects indirectly by using a third object.
2. Understand that the length of an object can be expressed numerically by using another object as a length unit (such as a paper-clip, yardstick, or inch length on a ruler). The object to be measured is partitioned into as many equal parts as possible with the same length as the length unit. The length measurement of the object is the number of length units that span it with no gaps or overlaps. *For example, "I can put four paperclips end to end along the pencil, so the pencil is four paperclips long."*
3. Measure the length of an object by using another object as a length unit.

Time measurement

4. Tell time from analog clocks in hours and half- or quarter-hours.

Representing and interpreting data

5. Organize, represent, and interpret data with several categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

Geometry 1-G

Shapes, their attributes, and spatial reasoning

1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size) for a wide variety of shapes.
2. Understand that shapes can be joined together (composed) to form a larger shape or taken apart (decomposed) into a collection of smaller shapes. Composing multiple copies of some shapes creates tilings. *In this grade, "circles," "rectangles," and other shapes include their interiors as well as their boundaries.*
3. Compose two-dimensional shapes to create a unit, using cutouts of rectangles, squares, triangles, half-circles, and quarter-circles. Form new shapes by repeating the unit.
4. Compose three-dimensional shapes to create a unit, using concrete models of cubes, right rectangular prisms, right circular cones, and right circular cylinders. Form new shapes by repeating the unit. *Students do not need to learn formal names such as "right rectangular prism."*
5. Decompose circles and rectangles into two and four equal parts. Describe the parts using the words *halves*, *fourths*, and *quarters*, and using the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the parts. Understand that decomposing into more equal shares creates smaller shares.
6. Decompose two-dimensional shapes into rectangles, squares, triangles, half-circles, and quarter-circles, including decompositions into equal shares.

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Mathematics | Grade 2

In Grade 2, instructional time should focus on three critical areas: (1) developing understanding of base-ten notation; (2) developing fluency with additions and subtractions within 20 and fluency with multi-digit addition and subtraction; and (3) describing and analyzing shapes.

(1) Students develop an understanding of the base-ten system (at least to 1000). Their understanding of the base-ten system includes ideas of counting in units (twos, fives, and tens) and multiples of hundreds, tens, and ones, as well as number relationships, including comparing and ordering. They understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

(2) Students use their understanding of addition to develop fluency with additions and subtractions within 20. They solve arithmetic problems by applying their understanding of models for addition and subtraction (such as combining or separating sets or using number lines that begin with zero), relationships and properties of numbers, and properties of addition. They develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of two-digit whole numbers. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences. They develop fluency with efficient procedures, including standard algorithms, for adding and subtracting whole numbers; understand and explain why the procedures work based on their understanding of base-ten notation and properties of operations; and use them to solve problems.

(3) Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding attributes of two- and three-dimensional space such as area and volume, and properties such as congruence and symmetry that they will learn about in later grades.

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Addition and subtraction

1. ❖Explain and justify properties of addition and subtraction, e.g., by using representations such as objects, drawings, and story contexts. Include properties such as:
   a. Changing the order of addends does not change their sum.
   b. Subtracting one addend from a sum of two numbers results in the other addend.
   c. If more is subtracted from a number, the difference is decreased, and if less is subtracted the difference is increased.
   d. In an addition equation, each addend can be decomposed and the parts can be recombined in any order without changing the sum. *For example, 5 + 3 = 8. Because 5 decomposes as 4 + 1, the first addend can be replaced by 4 + 1, yielding (4 + 1) + 3 = 8. Recombining in two different orders: 4 + 4 = 8, also 7 + 1 = 8.*

Describing situations and solving problems with addition and subtraction

2. ❖Solve word problems involving addition and subtraction within 100, e.g., by using drawings or equations to represent the problem. *Students should work with all of the addition and subtraction situations shown in the Glossary, Table 1, solving problems with unknown sums, addends, differences, minuends, and subtrahends, and representing these situations with equations that use a symbol for the unknown (e.g., a question mark or a small square). Focus on the more difficult problem types.*
3. Solve two-step word problems involving addition and subtraction within 100, e.g., by using drawings or equations to represent the problem.

Number—Base Ten 2-NBT

Numbers up to 1000

1. Understand that 100 can be thought of as a bundle of tens—a unit called a "hundred."
2. Read and write numbers to 1000 using base-ten notation, number names, and expanded form.
3. Count within 1000; skip count by 2s, 5s, 10s, and 100s.
4. Understand that when comparing three-digit numbers, if one number has more hundreds, it is greater; if the amount of hundreds is the same in each number, then the number with more tens is greater. If the amount of tens and hundreds is the same in each number, then the number with more ones is greater.
5. Compare and order three-digit numbers based on meanings of the hundreds, tens, and ones digits.

Adding and subtracting in base ten

6. Fluently add and subtract within 20. By end of Grade 2, know from memory sums of one-digit numbers.
7. Mentally compute sums and differences of multiples of 10. *For example, mentally calculate 130 – 80.*
8. Understand that in adding or subtracting three-digit numbers, one adds or subtracts like units (hundreds and hundreds, tens and tens, ones and ones) and sometimes it is necessary to compose or decompose a higher value unit.
9. Given a number from 100 to 900, mentally find 10 more or 10 less than the number, and mentally find 100 more or 100 less than the number, without counting.
10. Understand that algorithms are predefined steps that give the correct result in every case, while strategies are purposeful manipulations that may be chosen for specific problems, may not have a fixed order, and may be aimed at converting one problem into another. *For example, one might mentally compute 503 – 398 as follows: 398 + 2 = 400, 400 + 100 = 500, 500 + 3 = 503, so the answer is 2 + 100 + 3, or 105.*
11. ❖ Compute sums and differences of one-, two-, and three-digit numbers using strategies based on place value, properties of operations, and/or the inverse relationship between addition and subtraction; explain the reasoning used.
12. ❖Explain why addition and subtraction strategies and algorithms work, using place value and the properties of operations. *Include explanations supported by drawings or objects. A range of reasonably efficient algorithms may be covered, not only the standard algorithm.*
13. Compute sums of two three-digit numbers, and compute sums of three or four two-digit numbers, using the standard algorithm; compute differences of two three-digit numbers using the standard algorithm.

Measurement and Data 2-MD

Length measurement

1. Understand that 1 inch, 1 foot, 1 centimeter, and 1 meter are conventionally defined lengths used as standard units.
2. Measure lengths using measurement tools such as rulers, yardsticks and measuring tapes; understand that these tools are used to find out how many standard length units span an object with no gaps or overlaps, when the 0 mark of the tool is aligned with an end of the object.

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3. Understand that when measuring a length, if a smaller unit is used, more copies of that unit are needed to measure the length than would be necessary if a larger unit were used.
4. Understand that units can be decomposed into smaller units, e.g., 1 foot can be decomposed into 12 inches and 1 meter can be decomposed into 100 centimeters. A small number of long units might compose a greater length than a large number of small units.
5. Understand that lengths can be compared by placing objects side by side, with one end lined up. The difference in lengths is how far the longer extends beyond the end of the shorter.
6. Understand that a sum of two whole numbers can represent a combination of two lengths; a difference of two whole numbers can represent a difference in length; find total lengths and differences in lengths using addition and subtraction.

Time and money

7. Find time intervals between hours in one day.
8. Solve word problems involving dollar bills, quarters, dimes, nickels and pennies. *Do not include dollars and cents in the same problem.*

Representing and interpreting data

9. Generate measurement data by measuring whole-unit lengths of several objects, or by making repeated measurements of the same object. Show the measurements by making a dot plot, where the horizontal scale is marked off in whole-number units.
10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with several categories. Connect representations on bar graph scales, rulers, and number lines that begin with zero. Solve simple Put Together/Take Apart and Compare problems using information presented in a bar graph. *See Glossary, Table 1.*

Geometry 2-G

Shapes, their attributes, and spatial reasoning

1. Understand that different categories of shapes (e.g., rhombuses, trapezoids, rectangles, and others) can be united into a larger category (e.g., quadrilaterals) on the basis of shared attributes (e.g., having four straight sides).
2. Identify and name polygons of up to six sides by the number of their sides or angles.
3. Recognize rectangles, rhombuses, squares and trapezoids as examples of quadrilaterals; draw examples of quadrilaterals that do not belong to any of these subcategories.
4. Draw and identify shapes that have specific attributes, such as number of equal sides or number of equal angles. *Sizes of lengths and angles are compared directly or visually, not compared by measuring.*
5. Recognize objects as resembling spheres, right circular cylinders, and right rectangular prisms. *Students do not need to learn formal names such as "right rectangular prism."*
6. Decompose circular and rectangular objects into two, three, or four equal parts. Describe the parts using the words *halves*, *thirds*, *half of*, *a third of*, etc.; describe the wholes as two halves, three thirds, four fourths. Recognize that a half, a third, or a fourth of a circular or rectangular object—a graham cracker, for example—is the same size regardless of its shape.

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Mathematics | Grade 3

In Grade 3, instructional time should focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) developing understanding of fractions, starting with unit fractions; (3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing two-dimensional shapes. Multiplication, division, and fractions are the most important developments in Grade 3.

(1) Students develop an understanding of the meanings of multiplication and division of whole numbers through the use of representations such as equal-sized groups, arrays, area models, and equal jumps on number lines for multiplication; and successive subtraction, partitioning, and sharing for division. Through this process, numbers themselves take on new meaning and are no longer only counters for single objects. They represent groups, a number of groups (for example, 3 teams of 6 people), or a comparative factor (3 times as long).

Students use properties of operations to calculate products of whole numbers. They use increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the inverse relationship between multiplication and division.

(2) Students develop an understanding of a definition of a fraction, beginning with unit fractions. They use fractions to represent parts of a whole or distances on a number line that begins with zero. Students understand that the size of a fractional part is relative to the size of the whole (for example, ¼ of a mile is longer than ¾ of a foot, even though ¼ < ¾), and they are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing and ordering fractions using by models or strategies based on noticing common numerators or denominators.

(3) Students recognize area as an attribute of two-dimensional regions. They understand that area can be quantified by finding the total number of same-size units of area required to cover the shape without gaps or overlaps. They understand that a 1-unit by 1-unit square is the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area measure to the area model used to represent multiplication, and they use this connection to justify using multiplication to determine the area of a rectangle. Students contrast area with perimeter.

(4) Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify the shapes by their sides and angles, and connect these with definitions of shapes. Students investigate, describe, and reason about decomposing and combining polygons to make other polygons. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of attributes and properties of two-dimensional objects.

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Multiplication and division

1. Understand that multiplication of whole numbers is repeated addition. *For example, 5 × 7 means 7 added to itself 5 times. Products can be represented by rectangular arrays, with one factor the number of rows and the other the number of columns.*
2. ❖Understand the properties of multiplication.
   a. Multiplication is commutative. *For example, the total number in 3 groups with 6 things each is the same as the total number in 6 groups with 3 things each, that is, 3 × 6 = 6 × 3.*
   b. Multiplication is associative. *For example, 4 × 3 × 2 can be calculated by first calculating 4 × 3 = 12 then calculating 12 × 2 = 24, or by first calculating 3 × 2 = 6 then calculating 4 × 6 = 24.*
   c. 1 is the multiplicative identity.
   d. Multiplication distributes over addition (the distributive property). *For example, 5 × (3 + 4) = (5 × 3) + (5 × 4).*
3. ❖Explain and justify properties of multiplication and division, e.g., by using representations such as objects, drawings, and story contexts. Include properties such as:
   a. Changing the order of two factors does not change their product.
   b. The product of a number and 1 is the number.
   c. Dividing a nonzero number by itself yields 1.
   d. Multiplying a quantity by a nonzero number, then dividing by the same number, yields the original quantity.
   e. When one factor in a product is multiplied by a number and another factor divided by the same number, the product is unchanged. *Limit to multiplying and dividing by numbers that result in whole-number quotients.*
   f. Products where one factor is a one-digit number can be computed by decomposing one factor as the sum of two numbers, multiplying each number by the other factor, and adding the two products.
4. ❖Understand that multiplication and division have an inverse relationship. *For example, if 5 × 7 = 35 is known, then 35 ÷ 5 = 7 and 35 ÷ 7 = 5 are also known. The division 35 ÷ 5 means the number which yields 35 when multiplied by 5; because 5 × 7 = 35, then 35 ÷ 5 = 7.*
5. ❖Understand that when all but one of three numbers in a multiplication or division equation are known, the unknown number can be found. *Limit to cases where the unknown number is a whole number.*

Describing situations and solving problems with multiplication and division

6. Understand that multiplication and division apply to situations with equal groups, arrays or area, and comparing. *See Glossary, Table 2.*
7. ❖Solve word problems involving multiplication and division within 100, using an equation with a symbol for the unknown to represent the problem. *This standard is limited to problems with whole-number quantities and whole-number quotients. Focus on situations described in the Glossary, Table 2.*
8. ❖Solve one- or two-step word problems involving the four operations. *This standard is limited to problems with whole-number quantities and whole-number quotients.*
9. Understand that multiplication and division can be used to compare quantities (see Glossary, Table 2); solve multiplicative comparison problems with whole numbers (problems involving the notion of "times as much").

Number—Base Ten 3-NBT

Numbers up to 10,000

1. Understand that 1000 can be thought of as a bundle of hundreds—a unit called a "thousand."
2. Read and write numbers to 10,000 using base-ten notation, number names, and expanded form.
3. Count within 10,000; skip count by 10s, 100s and 1000s.
4. Understand that when comparing four-digit numbers, if one number has more thousands, it is greater; if the amount of thousands is the same in each number, then the number with more hundreds is greater; and so on. Compare and order four-digit numbers based on meanings of the digits.

Adding and subtracting in base ten

5. Mentally calculate sums and differences of multiples of 10, 100, and 1000. *For example, mentally calculate 1300 – 800*
6. Given a number from 1000 to 9000, mentally find 100 more or 100 less than the number, and mentally find 1000 more or 1000 less than the number, without counting.

Multiplying and dividing in base ten

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7. ❖Understand that the distributive property is at the heart of strategies and algorithms for multiplication and division computations with numbers in base-ten notation; use the distributive property and other properties of operations to explain patterns in the multiplication table and to derive new multiplication and division equations from known ones. *For example, the distributive property makes it possible to multiply 4 × 7 by decomposing 7 as 5 + 2 and using 4 × 7 = 4 × (5 + 2) = (4 × 5) + (4 × 2) = 20 + 8 = 28.*
8. Fluently multiply one-digit numbers by 10.
9. Use a variety of strategies for multiplication and division within 100. By end of Grade 3, know from memory products of one-digit numbers where one of the factors is 2, 3, 4, or 5.

Number—Fractions 3-NF

Fractions as representations of numbers

1. Understand that a unit fraction corresponds to a point on a number line. *For example, 1/3 represents the point obtained by decomposing the interval from 0 to 1 into three equal parts and taking the right-hand endpoint of the first part. In Grade 3, all number lines begin with zero.*
2. Understand that fractions are built from unit fractions. *For example, 5/4 represents the point on a number line obtained by marking off five lengths of ¼ to the right of 0.*
3. Understand that two fractions are equivalent (represent the same number) when both fractions correspond to the same point on a number line. Recognize and generate equivalent fractions with denominators 2, 3, 4, and 6 (e.g., $^1/_2 = {}^2/_4$, $^4/_6 = {}^2/_3$), and explain the reasoning.
4. Understand that whole numbers can be expressed as fractions. *Three important cases are illustrated by the examples 1 = 4/4, 6 = 6/1, and 7 = (4 × 7)/4. Expressing whole numbers as fractions can be useful for solving problems or making calculations.*

Fractional quantities

5. Understand that fractions apply to situations where a whole is decomposed into equal parts; use fractions to describe parts of wholes. *For example, to show 1/3 of a length, decompose the length into 3 equal parts and show one of the parts.*
6. Compare and order fractional quantities with equal numerators or equal denominators, using the fractions themselves, tape diagrams, number line representations, and area models. Use > and < symbols to record the results of comparisons.

Measurement and Data 3-MD

The number line and units of measure

1. Understand that a number line has an origin (0) and a unit (1), with whole numbers one unit distance apart. Use number lines to represent problems involving distances, elapsed time, amounts of money and other quantities. *In such problems, the interval from 0 to 1 may represent a unit of distance, time, money, etc.*
2. Understand that a unit of measure can be decomposed into equal-sized parts, whose sizes can be represented as fractions of the unit. Convert measurements in one unit to measurements in a smaller or a larger unit, and solve problems involving such mixed units (e.g., feet and inches, weeks and days).

Perimeter and area

3. Understand and use concepts of area measurement.
   a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
   b. A plane figure which can be covered without gaps or overlaps by *n* unit squares has an area of *n* square units. Areas of some other figures can be measured by using fractions of unit squares or using figures whose areas have been found by decomposing other figures.
   c. When measuring an area, if a smaller unit of measurement is used, more units must be iterated to measure the area in those units.
   d. Determine and compare areas by counting square units. *Use cm^2, m^2, in^2, ft^2, and improvised units.*
4. Understand that multiplication of whole numbers can be represented by area models; a rectangular region that is *a* length units by *b* length units (where *a* and *b* are whole numbers) and tiled with unit squares illustrates why the rectangle encloses an area of *a* × *b* square units.
5. Solve problems involving perimeters of polygons.
   a. Add given side lengths, and multiply for the case of equal side lengths.
   b. ❖Find an unknown length of a side in a polygon given the perimeter and all other side lengths; represent these problems with equations involving a letter for the unknown quantity.
   c. Exhibit rectangles with the same perimeter and different area, and with the same area and different perimeter.

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Representing and interpreting data

6. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *Include single-unit scales and multiple-unit scales; for example, each square in the bar graph might represent 1 pet, 5 pets, or 10 pets.*
7. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a dot plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.

Geometry 3-G

Properties of 2-dimensional shapes

1. Understand that a given category of plane figures (e.g., triangles) has subcategories (e.g., isosceles triangles) defined by special properties.
2. Describe, analyze, compare and classify two-dimensional shapes by their properties and connect these properties to the classification of shapes into categories and subcategories (e.g., squares are "special rectangles" as well as "special rhombuses"). *Focus on triangles and quadrilaterals.*

Structuring rectangular shapes

3. Understand that rectangular regions can be tiled with squares in rows and columns, or decomposed into such arrays.
4. Structure a rectangular region spatially by decomposing it into rows and columns of squares. Determine the number of squares in the region using that spatial structure (e.g., by multiplication or skip counting).
5. Understand that shapes can be decomposed into parts with equal areas; the area of each part is a unit fraction of the whole. *For example, when a shape is partitioned into 4 parts with equal area, the area of each part is ¼ of the area of the shape.*

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Mathematics | Grade 4

In Grade 4, instructional time should focus on four critical areas: (1) continuing to develop understanding and fluency with whole number multiplication, and developing understanding of multi-digit whole number division; (2) developing an understanding of addition and subtraction of fractions with like denominators, multiplication of fractions by whole numbers, and division of whole numbers with fractional answers; (3) developing an understanding of area; and (4) understanding that geometric figures can be analyzed and classified using properties such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

(1) Students use understandings of multiplication to develop fluency with multiplication and division within 100. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models, equal intervals on a number line), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate products or mentally calculate products. They develop fluency with efficient procedures, including the standard algorithm, for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate quotients and mentally calculate quotients, depending upon the context and the numbers involved.

(2) Students develop understanding of operations with fractions. They apply their understandings of fractions as built from unit fractions, and use fraction models to represent the addition and subtraction of fractions with like denominators. Students use the meaning of fractions and the meaning of multiplication to understand and explain why the procedure for multiplying a fraction by a whole number makes sense. They understand and explain the connection between division and fractions.

(3) Students develop their understanding of area. They understand and apply the area formula for rectangles and also find areas of shapes that can be decomposed into rectangles. They select appropriate units, strategies (e.g., decomposing shapes), and tools for solving problems that involve estimating and measuring area.

(4) Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

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Multiplication and division

1. Find the factor pairs for a given whole number less than or equal to 100; recognize prime numbers as numbers greater than 1 with exactly one factor pair. *Example: The factor pairs of 42 are {42, 1}, {21, 2}, {14, 3}, {7, 6}.*

Problem solving with the four operations

2. ❖Solve multistep word problems involving the four operations with whole numbers.
3. ❖Solve problems posed with both whole numbers and fractions. Understand that while quantities in a problem might be described with whole numbers, fractions, or decimals, the operations used to solve the problem depend on the relationships between the quantities regardless of which number representations are involved.
4. Assess the reasonableness of answers using mental computation and estimation strategies including rounding to the nearest 10 or 100.

Number—Base Ten 4-NBT

Numbers up to 100,000

1. Understand that a digit in one place represents ten times what it represents in the place to its right. *For example, 7 in the thousands place represents 10 times as many as than 7 in the hundreds place.*
2. Read, write and compare numbers to 100,000 using base-ten notation, number names, and expanded form.

Multiplying and dividing in base ten

3. Understand how the distributive property and the expanded form of a multi-digit number can be used to calculate products of multi-digit numbers.
   a. ❖The product of a one-digit number times a multi-digit number is the sum of the products of the one-digit number with the summands in the expanded form of the multi-digit number. Illustrate this numerically and visually using equations, rectangular arrays, area models, and tape diagrams.
   b. Algorithms for multi-digit multiplication can be derived and explained by writing multi-digit numbers in expanded form and applying the distributive property.
4. Fluently multiply and divide within 100. By end of Grade 4, know from memory products of one-digit numbers where one of the factors is 6, 7, 8, or 9.
5. Mentally calculate products of one-digit numbers and one-digit multiples of 10, 100, and 1000 (e.g., 7×6000). Mentally calculate whole number quotients with divisors of 10 and 100.
6. Compute products and whole number quotients of two-, three- or four-digit numbers and one-digit numbers, and compute products of two two-digit numbers, using strategies based on place value, the properties of operations, and/or the inverse relationship between multiplication and division; explain the reasoning used.
7. Explain why multiplication and division strategies and algorithms work, using place value and the properties of operations. *Include explanations supported by drawings, equations, or both. A range of reasonably efficient algorithms may be covered, not only the standard algorithms.*
8. Compute products of two-digit numbers using the standard algorithm, and check the result using estimation.
9. Given two whole numbers, find an equation displaying the largest multiple of one which is less than or equal to the other. *For example, given 325 and 7, the equation $325 = 46 \times 7 + 3$ shows the largest multiple of 7 less than or equal to 325.*

Number—Fractions 4-NF

Operations on fractions

1. Understand addition of fractions:
   a. Adding or subtracting fractions with the same denominator means adding or subtracting copies of unit fractions. *For example, $2/3 + 4/3$ is 2 copies of $1/3$ plus 4 copies of $1/3$, or 6 copies of $1/3$ in all, that is $6/3$.*
   b. Sums of related fractions can be computed by replacing one with an equivalent fraction that has the same denominator as the other. *For example, the sum of the related fractions $2/3$ and $1/6$ can be computed by rewriting $2/3$ as $4/6$ and computing $4/6 + 1/6 = 5/6$.*
2. Compute sums and differences of fractions with like denominators, add and subtract related fractions within 1 (e.g., $1/2 + 1/4$, $3/10 + 4/100$, $7/8 - 1/4$), and solve word problems involving these operations.
3. ❖ Understand that the meaning of multiplying a fraction by a whole number comes from interpreting multiplication by a whole number as repeated addition. *For example, $3 \times 2/5 = 6/5$ because $3 \times 2/5 = 2/5 + 2/5 + 2/5 = 6/5$.*

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4. Solve word problems that involve multiplication of fractions by whole numbers; represent multiplication of fractions by whole numbers using tape diagrams and area models that explain numerical results.
5. ❖Understand that fractions give meaning to the quotient of any whole number by any non-zero whole number. *For example, 3 ÷ 4 = 3/4, because 3/4 multiplied by 4 equals 3. (The division 3 ÷ 4 means the number which yields 3 when multiplied by 4.)*
6. Solve word problems that involve non-whole number quotients of whole numbers; represent quotients of whole numbers using tape diagrams and area models that explain numerical results.

Decimal concepts

7. Understand that a two-digit decimal is a sum of fractions with denominators 10 and 100. *For example, 0.34 is 3/10 + 4/100.*
8. Use decimals to hundredths to describe parts of wholes; compare and order decimals to hundredths based on meanings of the digits; and write fractions of the form *a*/10 or *a*/100 in decimal notation. *Use > and < symbols to record the results of comparisons.*

Measurement and Data 4-MD

The number line and units of measure

1. Understand that the unit length on a number line (interval from 0 to 1) can be divided into parts of equal fractional length. Draw number line representations of problem situations involving length, height, and distance including fractional or decimal units. *For example, show distances along a race course to tenths of a mile on a number line, by dividing the unit length into 10 equal parts to get parts of length 1/10; the endpoint of the segment of 1/10 length from 0 represents 1/10 of a mile from the starting point of the race. In Grade 4, all numbers lines begin with zero.*

Perimeter and area

2. Understand that if a region is decomposed into several disjoint pieces, then the area of the region can be found by adding the areas of the pieces (when these areas are expressed in the same units).
3. ❖Apply the formulas for area of squares and rectangles. Measure and compute whole-square-unit areas of objects and regions enclosed by geometric figures which can be decomposed into rectangles. *Limit to situations requiring products of one-or two-digit numbers.*
4. ❖Find one dimension of a rectangle, given the other dimension and the area or perimeter; find the length of one side of a square, given the area or perimeter. Represent these problems using equations involving a letter for the unknown quantity.

Angle measurement

5. Understand what an angle is and how it is measured:
   a. An angle is formed by two rays with a common endpoint.
   b. An angle is measured by reference to a circle with its center at the common endpoint of the rays. The measure of an angle is based on the fraction of the circle between the points where the two rays intersect the circle.
   c. A one-degree angle turns through 1/360 of a circle, where the circle is centered at the common endpoint of its rays; the measure of a given angle is the number of one-degree angles turned with no gaps or overlaps.
6. Measure angles in whole-number degrees using a protractor; sketch angles of specified measure; ❖find the measure of a missing part of an angle, given the measure of the angle and the measure of a part of it, representing these problems with equations involving a letter for the unknown quantity.

Representing and interpreting data

7. Make a dot plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in dot plots. *For example, from a dot plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

Geometry 4-G

Lines and angles

1. Draw points, lines, line segments, rays, angles, and perpendicular and parallel lines; identify these in plane figures.
2. Identify right angles, and angles smaller than or greater than a right angle in geometric figures; recognize right triangles.
3. Classify shapes based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of specified size.

Line symmetry

4. Understand that a line of symmetry for a geometric figure is a line across the figure such that the figure can be folded along the line into matching parts

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5. Identify line-symmetric figures; given a horizontal or vertical line and a drawing that is not a closed figure, complete the drawing to create a figure that is symmetric with respect to the given line.

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Mathematics | Grade 5

In Grade 5, instructional time should focus on four critical areas: (1) developing fluency with addition and subtraction of fractions, developing understanding of the multiplication of fractions and of division of fractions in limited cases (fractions divided by whole numbers and whole numbers divided by unit fractions); (2) developing understanding of and fluency with division of multi-digit whole numbers; (3) developing understanding of and fluency with addition, subtraction, multiplication, and division of decimals; and (4) developing understanding of volume.

(1) Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the inverse relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing fractions by whole numbers and whole numbers by unit fractions.)

(2) Students develop fluency with division of whole numbers; understand why procedures work based on the meaning of base-ten notation and properties of operations; and use these procedures to solve problems. Based on the context of a problem situation, they select the most useful form of the quotient for the answer and interpret it appropriately.

(3) Students apply their understandings of models for decimals, decimal notation, and properties of operations to compute sums and differences of finite decimals. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of finite decimals efficiently and accurately.

(4) Students recognize volume as an attribute of three-dimensional space. They understand that volume can be quantified by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve problems.

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Whole numbers in base ten

1. Compute quotients of two-, three-, and four-digit whole numbers and two-digit whole numbers using strategies based on place value, the properties of operations, and/or the inverse relationship between multiplication and division; explain the reasoning used.
2. Explain why division strategies and algorithms work, using place value and the properties of operations. *Include explanations supported by drawings, equations, or both. A range of reasonably efficient algorithms may be covered, not only the standard algorithm.*
3. Use the standard algorithm to compute quotients of two-, three- and four-digit whole numbers and two-digit whole numbers, expressing the results as an equation (e.g., 145 = 11 × 13 + 2 or 120 ÷ 7 = 17 1/7).
4. Fluently add, subtract and multiply whole numbers using the standard algorithm for each operation.

Decimal concepts

5. Read, write, and compare numbers expressed as decimals. Understand that a digit in one place represents ten times what it represents in the place to its right. *For example, 7 in the hundredths place represents 10 times as many as 7 in the thousandths place.*
6. Round decimals (to hundredths) to the nearest whole number.
7. Write fractions in decimal notation for fractions with denominators 2, 4, 5, 8, 10, and 100.

Operations on decimals

8. Understand that in adding or subtracting finite decimals, one adds or subtracts like units (tenths and tenths, hundredths and hundredths, etc.) and sometimes it is necessary to compose or decompose a higher value unit.
9. Fluently find 0.1 more than a number and less than a number; 0.01 more than a number and less than a number; and 0.001 more than a number and less than a number, for numbers expressed as finite decimals.
10. Compute sums and differences of finite decimals by expressing the decimals as fractions and adding the fractions. *For example, 0.05 + 0.91 = 5/100 + 91/100 = 96/100 or 0.96.*
11. Compute sums, differences, products, and quotients of finite decimals using strategies based on place value, the properties of operations, and/or the inverse relationships between addition and subtraction and between multiplication and division; explain the reasoning used. *For example, transform 1.5 ÷ 0.3 into 15 ÷ 3 = 5.*
12. Explain why strategies and algorithms for computations with finite decimals work. *Include explanations supported by drawings, equations, or both. A range of reasonably efficient algorithms may be covered, not only the standard algorithm.*
13. Use the standard algorithm for each of the four operations on decimals (to hundredths).
14. Solve word problems involving operations on decimals.

Number—Fractions 5-NF

Fraction equivalence

1. ❖Understand fraction equivalence:
   a. Multiplying the numerator and denominator of a fraction by the same nonzero whole number produces an equivalent fraction. *For example, 2/3 = (2 × 4)/(3 × 4) = 8/12. (1/3 is 4 copies of 1/12, so 2/3 is 8 copies of 1/12.)*
   b. Equivalent fractions correspond to the same point on a number line. *In Grade 5, all numbers lines begin with zero.*
   c. When the numerators of equivalent fractions are divided by their denominators, the resulting quotients are the same.
2. Identify pairs of equivalent fractions; given two fractions with unlike denominators, find two fractions with the same denominator and equivalent to each.
3. Compare and order fractions with like or unlike denominators, e.g., by finding equivalent fractions with the same denominator, and describe the sizes of fractional quantities from a context with reference to the context. *Compare using the fractions themselves, tape diagrams or number line representations, and area models.*

Operations on fractions

4. Understand that sums and differences of fractions with unlike denominators can be computed by replacing each with an equivalent fraction so that the resulting fractions have the same denominator. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12.*
5. Compute sums and differences of fractions with like or unlike denominators, and solve word problems involving addition and subtraction of fractions. Estimate fraction sums and differences to assess the reasonableness of results.
6. ❖ Understand that multiplying a fraction by *a/b* means taking *a* parts of a decomposition of the fraction into *b* equal parts. *For example, to multiply 2/3 × 4/5 = 8/15, one may decompose a whole of size 4/5 into 3 equal parts; each part has size 4/15. Two*

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of these parts then make 8/15, so 2/3 × 4/5 = 8/15. (In general, a/b × p/q = ap/bq.) This standard includes multiplication of a whole number by a fraction, by writing the whole number as fraction with denominator 1.

7. Understand that the area of a rectangle with side lengths *a/b* and *c/d* is the product *a/b* × *p/q*. This extends the area formula for rectangles to fractional side lengths, and also allows products of fractions to be represented visually as areas of rectangles.
8. ❖Explain and justify the properties of operations with fractions, e.g., by using equations, number line representations, area models, and story contexts.
9. Understand division of unit fractions by whole numbers and division of whole numbers by unit fractions:
   a. Dividing a unit fraction 1/b by a whole number a results in a smaller unit fraction 1/a × b. *For example, 1/3 ÷ 2 = 1/6 because when 1/3 is divided into 2 equal parts, the size of each part is 1/6; a third of a pound of cheese shared between two people will give each person a sixth of a pound. (Using the inverse relationship between multiplication and division: 1/3 ÷ 2 = 1/6 because 1/6 × 2 = 1/3.)*
   b. Dividing a whole number a by a unit fraction 1/b results in a greater whole number a × b. *For example, 2 ÷ 1/3 = 6 because 6 is the number of 1/3s in 2; two pounds of cheese will make six portions of a third of a pound each. (Using the inverse relationship between multiplication and division: 2 ÷ 1/3 = 6 because 6 × 1/3 = 2.)*
10. Calculate products of fractions, and quotients of unit fractions and nonzero whole numbers (with either as divisor), and solve word problems involving these operations. Represent these operations using equations, area models and length models.
11. Understand that a mixed number such as 3 2/5 represents the sum of a whole number and a fraction less than one. Because a whole number can be represented as a fraction (3 = 3/1), and the sum of two fractions is also a fraction, a mixed number also represents a fraction (3 2/5 = 3 + 2/5 = 15/5 + 2/5 = 17/5). Write fractions as equivalent mixed numbers and vice versa.

Measurement and Data 5-MD

Units of measure

1. Understand that quantities expressed in like units can be added or subtracted giving a sum or difference with the same unit; different quantities may be multiplied to obtain a new kind of quantity (e.g., as when two lengths are multiplied to compute an area, or when an area and a length are multiplied to compute a volume).
2. Understand that when measuring a quantity, if a smaller unit is used, more units must be iterated to measure the quantity in those units.
3. Convert among different-sized standard measurement units within a given measurement system (e.g., feet to yards, centimeters to meters) and use conversion in solving multi-step word problems.

Volume

4. Understand concepts of volume measurement:
   a. A cube with side length 1 unit (a unit cube) is said to have "one cubic unit" of volume, and can be used to measure volume.
   b. The volume of a right rectangular prism with whole-unit side lengths can be found by packing it with unit cubes and using multiplication to count their number. *For example, decomposing a right rectangular prism 3 length units wide by 5 units deep by 2 units tall shows that its volume is 3 × 5 × 2 cubic units. The base of the prism has area 3 × 5 square units, so the volume can also be expressed as the height times the area of the base.*
   c. When measuring a volume, if a smaller unit is used, more units must be iterated to measure the volume in those units.
   d. If a solid figure is decomposed into several disjoint pieces, then the volume enclosed by the figure can be found by adding the volumes of the pieces (when these volumes are expressed in the same units).
5. Decompose right rectangular prisms into layers of arrays of cubes; determine and compare volumes of right rectangular prisms, and objects well described as right rectangular prisms, by counting cubic units (using cm^3, m^3, in^3, ft^3, and improvised units).

Representing and interpreting data

6. Make a dot plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in dot plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

Geometry 5-G

Coordinates

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1. Understand that a pair of perpendicular number lines, called axes, defines a coordinate system.
    a. Their intersection is called the origin, usually arranged to coincide with the 0 on each line.
    b. A given point in the plane can be located by using an ordered pair of numbers, called its coordinates. The first number indicates how far to travel from the origin in the direction of one axis, the second number indicates how far to travel in the direction of the second axis.
    c. To avoid ambiguity, conventions dictate that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).
2. Graph points in the first quadrant of the coordinate plane, and identify the coordinates of graphed points. Where ordered pairs arise in a problem situation, interpret the coordinate values in the context of the situation.

Plane figures

3. Understand that properties belonging to a category of plane figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*
4. Classify plane figures in a hierarchy based on properties.

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Mathematics | Grade 6

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division; (2) developing understanding of and fluency with division of fractions and developing fluency with multiplication of fractions; (3) developing understanding of and using formulas to determine areas of two-dimensional shapes and distinguishing between volume and surface area of three-dimensional shapes; and (4) writing, interpreting, and using expressions and equations.

(1) Students use reasoning about multiplication and division with quantities to solve ratio and rate problems. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students extend whole number multiplication and division to ratios and rates. Thus students expand their repertoires of problems in which multiplication and division can be used to solve problems, and they build on their understanding of fractions to understand ratios. Students solve a wide variety of problems involving ratios and rates.

(2) Students use the meaning of fractions, the meanings of multiplication and division, and the inverse relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students are able to add, subtract, multiply, and divide fractions fluently, and use these operations to solve problems, including multi-step problems and problems involving measurement.

(3) Students reason about relationships among shapes to determine area and surface area. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposition into pieces whose area they can determine.

(4) Students write mathematical expressions and equations that correspond to given situations, they evaluate expressions, and they use expressions and formulas to solve problems. Students understand that a variable is a letter standing for a number, where the number is unknown, or where, for the purpose at hand, it can be any number in the domain of interest. Students understand that expressions in different forms can be equivalent, and they use the laws of arithmetic to rewrite expressions to represent a total quantity in a different way (such as to represent it more compactly or to feature different information). Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as $3x = y$) to describe relationships in a table.

Having represented and analyzed data in Grades K–5, students in Grade 6 begin a serious engagement with statistics. The study of variability in data distinguishes statistics from mathematics. Students beginning their study of variability must first recognize statistical questions as those that anticipate variability in the answers. From this conceptual beginning, they learn to describe and summarize distributions of data—an activity that goes beyond merely computing summary statistics to include assessing the shape of a distribution and considering other issues as described in the standards.

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Ratios and Proportional Relationships 6-RP

Ratios

1. Understand the concept of a ratio: Two quantities are said to be in a ratio of a to b when for every a units of the first quantity there are b units of the second. *For example, in a flock of birds, the ratio of wings to beaks might be 2 to 1; this ratio is also written 2:1. In Grade 6, limit to ratios of whole numbers.*
2. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane.
3. Solve for an unknown quantity in a problem involving two equal ratios.
4. Describe categorical data sets using ratios (e.g., for every vote candidate A received, candidate C received nearly three votes; the ratio of type O blood donors to type B blood donors was 9:2).

Unit rates

5. Understand that for a ratio a:b, the corresponding unit rate is a/b. If there are a units of the first quantity for every b units of the second, where $b \neq 0$, then there are a/b units of the first quantity for 1 unit of the second. *For example, if a recipe has a ratio of 3 cups of flour to 4 cups of sugar, then there is 3/4 cup of flour for each cup of sugar.*
6. ❖Solve unit rate problems including unit pricing and constant speed, including reasoning with equations such as $d = r \times t$, $r = d/t$, $t = d \div r$.

The Number System 6-NS

Operations

1. Understand that the properties of operations apply to, and can be used with, addition and multiplication of fractions.
2. Understand that division of fractions is defined by viewing a quotient as the solution for an unknown-factor multiplication problem. *For example, (2/3) ÷ (5/7) = 14/15 because (5/7) × (14/15) = (2/3).*
3. Solve word problems requiring arithmetic with fractions, using the properties of operations and converting between forms as appropriate; estimate to check reasonableness of answers.
4. Fluently divide whole numbers using the standard algorithm.

The system of rational numbers

5. Understand that a number is a point on the number line.
6. Understand that some quantities have opposite directions, such as elevation above and below sea level or money received and spent. These quantities can be described using positive and negative numbers.
7. Understand that number lines familiar from previous grades can be extended to represent negative numbers to the left of zero. *Number lines can also be vertically oriented, as when a coordinate system is formed. Then the conventional terms "to the right of 0" and "to the left of 0" conventionally become "above 0" and "below 0."*
   a. Two different numbers, such as 7 and –7, that are equidistant from zero on a number line are said to be opposites of one another. The opposite of the opposite of a number is the number itself, e.g., –(–3) = 3. The opposite of 0 is 0.
   b. The absolute value of a number q, written $|q|$, is its distance from zero, and is always positive or zero.
   c. Fractions and their opposites form a system of numbers called the rational numbers, represented by points on a number line. Whole numbers and their opposites form the integers, which are contained in the rational numbers.
   d. Previous ways of comparing positive numbers can be extended to the rational numbers. The statement $p > q$ means that p is located to the right of q on a number line, while $p < q$ means that p is located to the left of q on a number line. Comparisons can also be made by reasoning appropriately about signed quantities (e.g, –3 > –7 makes sense because –3°C is a higher temperature than –7°C). The way two numbers compare does not always agree with the way their absolute values compare; for example, –3 > –7, but $|-3| < |-7|$.
8. Find and position rational numbers, including integers, on a number line.
9. Use rational numbers to describe quantities such as elevation, temperature, account balance and so on. Compare these quantities, recording the results of comparisons using > and < symbols.
10. Graph points and identify coordinates of points on the coordinate plane in all four quadrants. Where ordered pairs arise in a problem situation, interpret the coordinate values in the context of the situation.

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Expressions

1. Understand that an expression records operations with numbers or with letters standing for numbers. *For example, the expression 2 · (8 + 7) records adding 8 and 7 then multiplying by 2; the expression 5 – y records subtracting y from 5. Focus on the operations of addition, subtraction, multiplication and division, with some attention to square or cube roots.*
2. Understand the use of variables in expressions and algebraic conventions:
   a. A letter is used to stand for a number in an expression in cases where the number is unknown, or where, for the purpose at hand, it can be any number in a domain of interest. Such a letter is called a variable.
   b. If a variable appears in an expression more than once (e.g., as in $t + 3t$), that variable is understood to refer to the same number in each instance.
   c. The multiplication symbol can be omitted when writing products of two or more variables or of a number and a variable. *For example, the expressions xy and 2a indicate $x \times y$ and $2 \times a$, respectively.*
3. Describe the structure and elements of simple expressions using correct terminology (sum, term, product, factor, quotient, coefficient); describe an expression by viewing one or more of its parts as a single entity. *For example, describe the expression 2 · (8 + 7) as a product of two factors, by viewing (8 + 7) as a single entity. The second factor is itself a sum of two terms.*
4. Understand and generate equivalent expressions:
   a. Understand that two expressions are equivalent if they name the same number regardless of which numbers the variables in them stand for. *For example, the expressions $x + 3$ and $4x$ are not equivalent, even though they happen to name the same number in the case when x stands for 1.*
   b. Understand that applying the laws of arithmetic to an expression results in an equivalent expression. *For example, applying the distributive law to the expression 3 · (2 + x) leads to the equivalent expression 6 + 3x. Applying the distributive law to y + y + y leads to the equivalent expression $y \times (1 + 1 + 1)$, i.e., $y \times 3$ and then the commutative law of multiplication leads to the equivalent expression 3y.*
   c. Generate equivalent expressions to reinterpret the meaning of an expression. *For example, 2t + 3t records the addition of twice a quantity to three times itself; applying the distributive law leads to the equivalent expression 5t, so that the original expression can be reinterpreted as recording five times the quantity.*

Quantitative relationships and the algebraic approach to problems

5. Understand that an equation is a statement that two expressions are equal, and a solution to an equation is a replacement value of the variable (or replacement values for all the variables if there is more than one) that makes the equation true.
6. Using the idea of maintaining equality between both sides of the equation, solve equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.
7. Choose variables to represent quantities in a word problem, and construct simple expressions or equations to solve the problem by reasoning about the quantities.
8. Understand that a variable can be used to represent a quantity that can change, often in relationship to another changing quantity, and an equation can express one quantity, thought of as the dependent variable, in terms of other quantities, thought of as the independent variables; represent a relationship between two quantities using equations, graphs, and tables; translate between any two of these representations. *For example, describe the terms in a sequence $t = 3, 6, 9, 12, \ldots$ of multiples of 3 by writing the equation $t = 3n$ for $n = 1, 2, 3, 4, \ldots$.*

Geometry 6-G

Properties of area, surface area, and volume

1. Understand that plane figures can be decomposed, reassembled, and completed into new figures; use this technique to derive area formulas.
2. Find the areas enclosed by right triangles, other triangles, special quadrilaterals, and polygons (by composing into rectangles or decomposing into triangles and other shapes).
3. Understand that three-dimensional figures can be formed by joining rectangles and triangles along their edges to enclose a solid region with no gaps or overlaps. The surface area is the sum of the areas of the enclosing rectangles and triangles.
4. Find the surface area of cubes, prisms and pyramids (include the use of nets to represent these figures).
5. Solve problems involving area, volume and surface area of objects.
6. Give examples of right rectangular prisms with the same surface area and different volumes, and with the same volume and different surface areas.

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7. ❖Use exponents and symbols for square roots and cube roots to express the area of a square and volume of a cube in terms of their side lengths, and to express their side lengths in terms of their area or volume.

Statistics and Probability 6-SP

Variability and measures of center

1. Understand that a statistical question is one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question , but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*
2. Understand that a set of data generated by answers to a statistical question typically shows variability—not all of the values are the same—and yet often the values show an overall pattern, often with a tendency to cluster.
   a. A measure of center for a numerical data set summarizes all of its values using a single number. The median is a measure of center in the sense that approximately half the data values are less than the median, while approximately half are greater. The mean is a measure of center in the sense that it is the value that each data point would take on if the total of the data values were redistributed fairly, and in the sense that it is the balance point of a data distribution shown on a dot plot.
   b. A measure of variation for a numerical data set describes how its values vary using a single number. The interquartile range and the mean absolute deviation are both measures of variation.

Summarizing and describing distributions

3. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
4. Summarize numerical data sets, such as by:
   a. Reporting the number of observations.
   b. Describing the nature of the variable, including how it was measured and its units of measurement. *Data sets can include fractional values at this grade but not negative values.*
   c. Describing center and variation, as well as describing any overall pattern and any striking deviations from the overall pattern.
5. Relate the choice of the median or mean as a measure of center to the shape of the data distribution being described and the context in which it is being used. Do the same for the choice of interquartile range or mean average deviation as a measure of variation. *For example, why are housing prices often summarized by reporting the median selling price, while students' assigned grades are often based on mean homework scores?*

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Mathematics | Grade 7

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and solving linear equations; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence; and (4) drawing inferences about populations based on samples.

(1) Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about similar objects (including geometric figures) by using scale factors that relate corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.

(2) Students develop a unified understanding of number, recognizing fractions, decimals, and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division and their properties to all rational numbers, including integers and numbers represented by complex fractions and negative fractions. By applying the laws of arithmetic, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain why the rules for adding, subtracting, multiplying, and dividing with negative numbers make sense. They use the arithmetic of rational numbers as they formulate and solve linear equations in one variable and use these equations to solve problems.

(3) Students use ideas about distance and angles, how they behave under dilations, translations, rotations and reflections, and ideas about congruence and similarity to describe and analyze figures and situations in two- and three-dimensional space and to solve problems, including multi-step problems. Students prove that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students apply this reasoning about similar triangles to solve problems, such as finding heights and distances. Students see the plausibility of the formulas for the circumference and area of a circle. For example, in the case of area, they may do so by reasoning about how lengths and areas scale in similar figures or by decomposing a circle or circular region and rearranging the pieces.

(4) Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

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Ratios and Proportional Relationships 7-RP

Analyzing proportional relationships

1. Form ratios of nonnegative rational numbers and compute corresponding unit rates. *For example, a person might walk ½ mile in each ¼ hour; the unit rate for this ratio is (1/2)/(1/4) miles per hour, equivalently 2 miles per hour. Include ratios of lengths, areas and other quantities, including when quantities being compared are measured in different units.*
2. Recognize situations in which two quantities covary and have a constant ratio. (The quantities are then said to be in a proportional relationship and the unit rate is called the constant of proportionality.) Decide whether two quantities that covary are in a proportional relationship, e.g., by testing for equivalent ratios or graphing on a coordinate plane.
3. Compute unit rates and solve proportional relationship problems in everyday contexts, such as shopping, cooking, carpentry, party planning, etc. Represent proportional relationships by equations that express how the quantities are related via the constant of proportionality or unit rate. *For example, total cost, t, is proportional to the number, n, purchased at a constant price, p; this relationship can be expressed as $t = pn$.*
4. Plot proportional relationships on a coordinate plane where each axis represents one of the two quantities involved, observe that the graph is a straight line through the origin, and find unit rates from a graph. Explain what a point (x, y) means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.
5. Compare tables, graphs, formulas, diagrams, and verbal descriptions that represent or partially represent proportional relationships; explain correspondences among the representations including how the unit rate is shown in each.

Percent

6. Understand that percentages are rates per 100. For example, 30% of a quantity means $30/100$ times the quantity. A percentage can be a complex fraction, as in $3.75\% = 3.75/100$.
7. Find a percentage of a quantity; solve problems involving finding the whole given a part and the percentage.
8. Solve multistep percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error, expressing monthly rent as a percentage of take-home pay.*

The Number System 7-NS

The system of rational numbers

1. Understand that the rules for manipulating fractions extend to complex fractions.
2. Understand and perform addition and subtraction with rational numbers:
   a. Understand that on a number line, the sum $p + q$ is the number located a distance $|q|$ from p, to the right of p if q is positive and to the left of p if q is negative. A number and its opposite are additive inverses (i.e., their sum is zero).
   b. Compute sums of signed numbers using the laws of arithmetic. *For example, $7 + (-3) = 4$ because $7 + (-3) = (4 + 3) + (-3) = 4 + [3 + (-3)] = 4 + [0] = 4$.*
   c. Understand that subtraction of rational numbers is defined by viewing a difference as the solution of an unknown-addend addition problem. Subtraction of a rational number gives the same answer as adding its additive inverse.
   d. Explain and justify rules for adding and subtracting rational numbers, using a number line and practical contexts. *For example, relate $r + (-s) = r - s$ to a bank transaction; explain why $p - (q + r) = p - q - r$.*
   e. Understand that the additive inverse of a sum is the sum of the additive inverses, that is $-(p + q) = -p + -q$. *For example, $-(6 + -2) = (-6) + 2$ because $[6 + (-2)] + [(-6) + 2] = [6 + (-6)] + [(-2) + 2] = [0] + [0] = 0$.*
3. Understand and perform multiplication and division with rational numbers:
   a. Understand that the extension of multiplication from fractions to rational numbers is determined by the requirement that multiplication and addition satisfy the laws of arithmetic, particularly the distributive law, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers.
   b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p/q is a rational number, then $-(p/q) = (-p)/q = p/(-q)$.
   c. Calculate products and quotients of rational numbers, and use multiplication and division to solve word problems. *Include signed quantities.*

The system of real numbers

4. Understand that there are numbers that are not rational numbers, called irrational numbers, e.g., π and $\sqrt{2}$. Together the rational and irrational numbers form the real number system. In school mathematics, the real numbers are assumed to satisfy the laws of arithmetic.

Expressions and Equations 7-EE

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Expressions

1. Interpret numerical expressions at a level necessary to calculate their value using a calculator or spreadsheet. For expressions with variables, use and interpret conventions of algebraic notation, such as $y/2$ is $y \div 2$ or $1/2 \times y$; $(3 \pm y)/5$ is $(3 \pm y) \div 5$ or $1/5 \times (3 \pm y)$; a^2 is $a \times a$, a^3 is $a \times a \times a$, a^2b is $a \times a \times b$.
2. Generate equivalent expressions from a given expression using the laws of arithmetic and conventions of algebraic notation. Include:
   a. Adding and subtracting linear expressions, as in $(2x + 3) + x + (2 - x) = 2x + 5$.
   b. Factoring, as in $4x + 4y = 4(x + y)$ or $5x + 7x + 10y + 14y = 12x + 24y = 12(x + 2y)$.
   c. Simplifying, as in $-2(3x - 5) + 4x = 10 - 2x$ or $x/3 + (x - 2)/4 = 7x/12 - 1/2$.

Quantitative relationships and the algebraic approach to problems

3. Choose variables to represent quantities in a word problem, and construct simple equations to solve the problem by reasoning about the quantities.
   a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are nonnegative rational numbers and the solution is a nonnegative rational number. Fluently solve equations of these forms, e.g., by undoing the operations involved in producing the expression on the left.
   b. Solve the same word problem arithmetically and algebraically. *For example, "J. has 4 packages of balloons and 5 single balloons. In all, he has 21 balloons. How many balloons are in a package?" Solve this problem arithmetically (using a sequence of operations on the given numbers), and also solve it by using a variable to stand for the number of balloons in a package, constructing an equation such as $4b + 5 = 21$ to describe the situation then solving the equation.*
   c. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, $P + 0.05P = 1.05P$ means that "increase by 5%" is the same as "multiply by 1.05."*

Geometry 7-G

Congruence and similarity

1. Verify experimentally the fact that a rigid motion (a sequence of rotations, reflections, and translations) preserves distance and angle, e.g., by using physical models, transparencies, or dynamic geometry software:
   a. Lines are taken to lines, and line segments to line segments of the same length.
   b. Angles are taken to angles of the same measure.
   c. Parallel lines are taken to parallel lines.
2. Understand the meaning of congruence: a plane figure is congruent to another if the second can be obtained from the first by a rigid motion.
3. Verify experimentally that a dilation with scale factor k preserves lines and angle measure, but takes a line segment of length L to a line segment of length kL.
4. Understand the meaning of similarity: a plane figure is similar to another if the second can be obtained from the first by a similarity transformation (a rigid motion followed by a dilation).
5. Solve problems involving similar figures and scale drawings. *Include computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.*
6. Use informal arguments involving approximation by lines, squares, and cubes to see that a similarity transformation with a scale factor of k leaves angle measures unchanged, changes lengths by a factor of k, changes areas by a factor of k^2, and changes volumes by a factor of k^3.
7. Know the formulas relating the area, radius and circumference of a circle and solve problems requiring the use of these formulas; give an informal derivation of the relationship between the circumference and area of a circle.

Angles

8. Justify facts about the angle sum of triangles, exterior angles, and alternate interior angles created when parallel lines are cut by a transversal, e.g., by using physical models, transparencies, or dynamic geometry software to make rigid motions and give informal arguments. *For example, arrange three copies of the same triangle so that the three angles appear to form a line, and give an argument in terms of transversals why this is so.*
9. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

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Situations involving randomness

1. Simulate situations involving randomness using random numbers generated by a calculator or a spreadsheet or taken from a table. *For example, if you guess at all ten true/false questions on a quiz, how likely are you to get at least seven answers correct?*
2. Use proportional reasoning to predict relative frequencies of outcomes for situations involving randomness, but for which a theoretical answer can be determined. For *example, when rolling a number cube 600 times, one would predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times. How far off might your prediction be? Use technology to generate multiple samples to approximate a distribution of sample proportions. Repeat the process for smaller sample sizes.*

Random sampling to draw inferences about a population

3. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
4. Understand the importance of measures of variation in sample quantities (like means or proportions) in reasoning about how well a sample quantity estimates or predicts the corresponding population quantity.
5. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*

Comparative inferences about two populations

6. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean average deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*
7. Use measures of center and measures of variability for numerical data from uniform random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade book are generally longer than the words in a chapter of a sixth-grade book.*

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Mathematics | Grade 8

In Grade 8, instructional time should focus on three critical areas: (1) solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) understanding and applying the Pythagorean Theorem.

(1) Students use linear equations, and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize proportions ($y/x = m$ or $y = mx$) as a special case of linear equations, $y = mx + b$, understanding that the constant of proportionality (m) is the slope and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount mA. Students also formulate and solve linear equations in one variable and use these equations to solve problems. Students also use a linear equation to describe the association between two quantities in a data set (such as arm span vs. height for students in a classroom). At this grade, fitting the model, and assessing its fit to the data are done informally. Interpreting the model in the context of the data requires students to express a relationship between the two quantities in question.

Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation. Students solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line. Students use linear equations, systems of linear equations, linear functions, and their understanding of slope of a line to analyze situations and solve problems.

(2) Students grasp the concept of a function as a rule that assigns to each element of its domain exactly one element of its range. They use function notation and understand that functions describe situations where one quantity determines another. They can translate among verbal, tabular, graphical, and algebraic representations of functions (noting that tabular and graphical representations are usually only partial representations), and they describe how aspects of the function are reflected in the different representations.

(3) Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem is valid, for example, by decomposing a square in two different ways. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons.

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The Number System 8-NS

The system of real numbers

1. Understand informally that every number on a number line has a decimal expansion, which can be found for rational numbers using long division. Rational numbers are those with repeating decimal expansions (this includes finite decimals which have an expansion that ends in a sequence of zeros).
2. Informally explain why $\sqrt{2}$ is irrational.
3. Use rational approximations (including those obtained from truncating decimal expansions) to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions (e.g., π^2). *For example, show that the square root of 2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

Expressions and Equations 8-EE

Linear equations in one variable

1. Understand that a linear equation in one variable might have one solution, infinitely many solutions, or no solutions. Which of these possibilities is the case can be determined by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
2. Solve linear equations with rational number coefficients, including equations that require expanding expressions using the distributive law and collecting like terms.

Linear equations in two variables

3. Understand that the slope of a non-vertical line in the coordinate plane has the same value for any two distinct points used to compute it. This can be seen using similar triangles.
4. Understand that two lines with well-defined slopes are parallel if and only if their slopes are equal.
5. Understand that the graph of a linear equation in two variables is a line, the set of pairs of numbers satisfying the equation. If the equation is in the form $y = mx + b$, the graph can be obtained by shifting the graph of $y = mx$ by b units (upwards if b is positive, downwards if b is negative). The slope of the line is m.
6. Understand that a proportional relationship between two variable quantities y and x can be represented by the equation $y = mx$. The constant m is the unit rate, and tells how much of y per unit of x.
7. Graph proportional relationships and relationships defined by a linear equation; find the slope and interpret the slope in context.
8. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*

Systems of linear equations

9. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
10. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because the quantity $3x + 2y$ cannot simultaneously be 5 and 6.*
11. Solve and explain word problems leading to two linear equations in two variables.
12. Solve problems involving lines and their equations. *For example, decide whether a point with given coordinates lies on the line with a given equation; construct an equation for a line given two points on the line or one point and the slope; given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

Functions 8-F

Function concepts

1. Understand that a function from one set (called the domain) to another set (called the range) is a rule that assigns to each element of the domain (an input) exactly one element of the range (the corresponding output). The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. *Function notation is not required in Grade 8.*
2. Evaluate expressions that define functions, and solve equations to find the input(s) that correspond to a given output.
3. Compare properties of two functions represented in different ways (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*

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4. Understand that a function is linear if it can be expressed in the form $y = mx + b$ or if its graph is a straight line. *For example, the function $y = x^2$ is not a linear function because its graph contains the points (1,1), (–1,1) and (0,0), which are not on a straight line.*

Functional relationships between quantities

5. Understand that functions can describe situations where one quantity determines another.
6. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship; from two (x, y) values, including reading these from a table; or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
7. Describe qualitatively the functional relationship between two quantities by reading a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Geometry 8-G

Congruence and similarity

1. Use coordinate grids to transform figures and to predict the effect of dilations, translations, rotations and reflections.
2. Explain using rigid motions the meaning of congruence for triangles as the equality of all pair of sides and all pairs of angles.
3. Give an informal explanation using rigid motions of the SAS and ASA criteria for triangle congruence, and use them to prove simple theorems.
4. Explain using similarity transformations the meaning of similarity for triangles as the equality of all pairs of angles and the proportionality of all pairs of sides.
5. Give an informal explanation using similarity transformations of the AA and SAS criteria for triangle similarity, and use them to prove simple theorems.

The Pythagorean Theorem

6. The side lengths of a right triangle are related by the Pythagorean Theorem. Conversely, if the side lengths of a triangle satisfy the Pythagorean Theorem, it is a right triangle.
7. Explain a proof of the Pythagorean Theorem and its converse.
8. Use the Pythagorean Theorem to determine unknown side lengths in right triangles and to solve problems in two and three dimensions.
9. Use the Pythagorean Theorem to find the distance between two points in a coordinate system.

Plane and solid geometry

10. Draw (freehand, with ruler and protractor, and with technology) geometric shapes from given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the triangle is uniquely defined, ambiguously defined or nonexistent.
11. Understand that slicing a three-dimensional figure with a plane produces a two-dimensional figure. Describe plane sections of right rectangular prisms and right rectangular pyramids.
12. Use hands-on activities to demonstrate and describe properties of: parallel lines in space, the line perpendicular to a given line through a given point, lines perpendicular to a given plane, lines parallel to a given plane, the plane or planes passing through three given points, and the plane perpendicular to a given line at a given point.

Statistics and Probability 8-SP

Patterns of association in bivariate data

1. Understand that scatter plots for bivariate measurement data may reveal patterns of association between two quantities.
2. Construct and interpret scatter plots for bivariate measurement data. Describe patterns such as clustering, outliers, positive or negative association, linear association, nonlinear association.
3. Understand that a straight line is a widely used model for exploring relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
4. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*
5. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables

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collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*

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Where is the College-and-Career-Readiness line drawn?

The high school standards specify the mathematics that all students should learn in order to be college and career ready. The high school standards also describe additional mathematics that students should learn to pursue careers and majors in science, technology, engineering and mathematics (STEM) fields. Other forms of advanced work are possible (for example in discrete mathematics or advanced statistics) and can be eventually added to the standards.

Standards beyond the college and career readiness level that are necessary for STEM careers are prefixed with a symbol STEM, as in this example:

> STEM Graph complex numbers in polar form and interpret arithmetic operations on complex numbers geometrically.

Any standard without this tag is understood to be in the common core mathematics curriculum for all students.

How are the high school standards organized?

The high school standards are listed in conceptual categories, as shown in the Table below. **Appendix A (online) contains drafts of model course descriptions based on these standards**. Conceptual categories portray a coherent view of core high school mathematics; a student's work with Functions, for example, crosses a number of traditional course boundaries, potentially up through and including Calculus.

Conceptual Organization of the High School Standards

CCRS Draft September 17th	High School Standards Draft March 10
Number	Number and Quantity
Quantity	
Expressions	Algebra
Equations	
Coordinates	
Functions	Functions
Geometry	Geometry
Statistics	Statistics and Probability
Probability	
Modeling	Modeling**

* Standards formerly appearing under Coordinates now appear under other headings.

** Making mathematical models is now a Standard for Mathematical Practice. Standards formerly appearing under Modeling are now distributed under other major headings. High school standards with relevance to modeling are flagged with a (★) symbol. A narrative description of modeling remains in the high school standards, but there are no specific standard statements in that narrative description.

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Mathematics | High School—Number and Quantity

Numbers and Number Systems. During the years from kindergarten to eighth grade, students must repeatedly extend their conception of number. At first, "number" means "counting number": 1, 2, 3, … Soon after that, 0 is used to represent "none" and the whole numbers are formed by the counting numbers together with zero. The next extension is fractions. At first, fractions are barely numbers and tied strongly to pictorial representations. Yet by the time students understand division of fractions, they have a strong concept of fractions as numbers and have connected them, via their decimal representations, with the base-ten system used to represent the whole numbers. During middle school, fractions are augmented by negative fractions to form the rational numbers. In Grade 7, students extend this system once more, augmenting the rational numbers with the irrational numbers to form the real numbers. In high school, students will be exposed to yet another extension of number, when the real numbers are augmented by the imaginary numbers to form the complex numbers.

Students sometimes have difficulty accepting new kinds of numbers when these differ in appearance and properties from those of a familiar system. For example, students might decide that complex numbers are not numbers because they are not written with numerical digits, or because they do not describe positive or negative quantities. Indeed, this ascent through number systems makes it fair to ask: what does the word *number* mean that it can mean all of these things? One possible answer is that a number is something that can be used to do mathematics: calculate, solve equations, or represent measurements. Historically, number systems have been extended when there is an intellectual or practical benefit in using the new numbers to solve previously insoluble problems.[1]

Although the referent of "number" changes, the four operations stay the same in important ways. The commutative, associative, and distributive laws extend the properties of operations to the integers, rational numbers, real numbers, and complex numbers. The inverse relationships between addition and subtraction, and multiplication and division are maintained in these larger systems.

Calculators are useful in this strand to generate data for numerical experiments, to help understand the workings of matrix, vector, and complex number algebra, and to experiment with non-integer exponents.

Quantities. In their work in measurement up through Grade 8, students primarily measure commonly used attributes such as length, area, volume, and so forth. In high school, students encounter novel situations in which they themselves must conceive the attributes of interest. Such a conceptual process might be called quantification. Quantification is important for science, as when surface area suddenly "stands out" as an important variable in evaporation. Quantification is also important for companies, who must conceptualize relevant attributes and create or choose suitable metrics by which to measure them.

Content Outline

The Real Number System

Quantities

The Complex Number System

Vector Quantities and Matrices

[1] See Harel, G., "A Standpoint of Research on Middle/Higher Number and Quantity," a research review provided for the Common Core State Standards Initiative.

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The Real Number System N-RN

1. Understand that the laws of exponents for positive integer exponents follow from an understanding of exponents as indicating repeated multiplication, and from the associative law for multiplication.
2. Understand that the definition of the meaning of zero, positive rational, and negative exponents follows from extending the laws of exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, since* $(5^{1/3})^3 = 5^{(1/3)\cdot 3} = 5^1 = 5$, $5^{1/3}$ *is a cube root of 5.*
3. Understand that sums and products of rational numbers are rational.
4. Understand that the sum of a rational number and an irrational number is irrational, and that the product of a nonzero rational number and an irrational number is irrational.
5. Rewrite expressions using the laws of exponents. *For example,* $(5^{1/2})^3 = 5^{3/2}$ *and* $1/5 = 5^{-1}$.

Quantities★ N-Q

1. Understand that the magnitude of a quantity is independent of the unit used to measure it. *For example, the density of a liquid does not change when it is measured in another unit. Rather, its measure changes. The chosen unit "measures" the quantity by giving it a numerical value ("the density of lead is 11.3 times that of water").*
2. Use units as a way to understand problems and to guide the solution of multi-step problems, involving, e.g., acceleration, currency conversions, derived quantities such as person-hours and heating degree days, social science rates such as per-capita income, and rates in everyday life such as points scored per game.
3. Define metrics for the purpose of descriptive modeling. *For example, find a good measure of overall highway safety; propose and debate measures such as fatalities per year, fatalities per year per driver, or fatalities per vehicle-mile traveled.*
4. Add, subtract, multiply, and divide numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
5. Use and interpret quantities and units correctly in algebraic formulas.
6. Use and interpret quantities and units correctly in graphs and data displays (function graphs, data tables, scatter plots, and other visual displays of quantitative information). Generate graphs and data displays using technology.

The Complex Number System N-CN

1. Understand that the relation $i^2 = -1$ and the commutative, associative, and distributive laws can be used to calculate with complex numbers.
2. STEM Understand that polynomials can be factored over the complex numbers, e.g., as in $x^2 + 4 = (x + 2i)(x - 2i)$.
3. STEM Understand that complex numbers can be visualized on the complex plane. Real numbers correspond to points on the horizontal (real) axis, and imaginary numbers to points on the vertical axis.
4. STEM Understand that on the complex plane, arithmetic of complex numbers can be interpreted geometrically: addition is analogous to vector addition, and multiplication can be understood as rotation and dilation about the origin. Complex conjugation is reflection across the real axis.
5. STEM Understand that on the complex plane, as on the real line, the distance between numbers is the absolute value of the difference, and the midpoint of a segment is the average of the numbers at its endpoints.
6. Add, subtract, and multiply complex numbers.
7. STEM Find the conjugate of a complex number; use conjugates to find absolute values and quotients of complex numbers.
8. STEM Solve quadratic equations with real coefficients that have complex solutions using a variety of methods.
9. STEM Graph complex numbers in rectangular form.
10. STEM Graph complex numbers in polar form and interpret arithmetic operations on complex numbers geometrically.
11. STEM Explain why the rectangular and polar forms of a complex number represent the same number.

★ Standard with close connection to modeling.

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1. STEM Understand that vector quantities have both magnitude and direction. Vector quantities are typically represented by directed line segments. The magnitude of a vector **v** is commonly denoted $|\mathbf{v}|$ or $||\mathbf{v}||$.
2. STEM Understand that vectors are determined by the coordinates of their initial and terminal points, or by their components.
3. STEM Understand that vectors can be added end-to-end, component-wise, or by the parallelogram rule. The magnitude of a sum of two vectors is typically not the sum of the magnitudes.
4. STEM Understand that a vector **v** can be multiplied by a real number c (called a scalar in this context) to form a new vector $c\mathbf{v}$ with magnitude $|c|v$. When $|c|v \neq 0$, the direction of $c\mathbf{v}$ is either along **v** (for $c > 0$) or against **v** (for $c < 0$). Scalar multiplication can be shown graphically by scaling vectors and possibly reflecting them in the origin; scalar multiplication can also be performed component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$.
5. STEM Understand that vector subtraction $\mathbf{v} - \mathbf{w}$ is defined as $\mathbf{v} + (-\mathbf{w})$. Two vectors can be subtracted graphically by connecting the tips in the appropriate order.
6. STEM Understand that matrices can be multiplied by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled. Matrices of the same dimensions can be added or subtracted. Matrices with compatible dimensions can be multiplied. Unlike multiplication of numbers, matrix multiplication is not a commutative operation, but still satisfies the associative and distributive laws.
7. STEM Understand that a vector, when regarded as a matrix with one column, can be multiplied by a matrix of suitable dimensions to produce another vector. A 2×2 matrix can be viewed as a transformation of the plane.
8. STEM Understand that a system of linear equations can be represented as a single matrix equation in a vector variable.
9. STEM Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.
10. STEM Perform basic vector operations (addition, subtraction, scalar multiplication) both graphically and algebraically.
11. STEM Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.
12. STEM Solve problems involving velocity and quantities that can be represented by vectors.★
13. STEM Add, subtract, and multiply matrices of appropriate dimensions.
14. STEM Use matrices to store and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
15. STEM Represent systems of linear equations as matrix equations.
16. STEM Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension greater than 3×3).

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★ Standard with close connection to modeling.

Expressions. An expression is a description of a computation on numbers and symbols that represent numbers, using arithmetic operations and the operation of raising a number to rational exponents. Conventions about the use of parentheses and the order of operations assure that each expression is unambiguous. Creating an expression that describes a computation involving a general quantity requires the ability to express the computation in general terms, abstracting from specific instances.

Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning. For example, $p + 0.05p$ can be interpreted as the addition of a 5% tax to a price p. Rewriting $p + 0.05p$ as $1.05p$ shows that adding a tax is the same as multiplying the price by a constant factor.

Algebraic manipulations are governed by deductions from the commutative, associative, and distributive laws and the inverse relationships between the four operations, and the conventions of algebraic notation. These extend what students have learned about arithmetic expressions in K–8 to expressions that involve exponents, radicals, and representations of real numbers, and, for STEM-intending students, complex numbers.

At times, an expression is the result of applying operations to simpler expressions. Viewing such an expression by singling out these simpler expressions can sometimes clarify its underlying structure.

A spreadsheet or a CAS environment can be used to experiment with algebraic expressions, perform complex algebraic manipulations,and understand how algebraic manipulations behave.

Equations and inequalities. An equation is a statement that two expressions are equal. Solutions to an equation are numbers that make the equation true when assigned to the variables in it. If the equation is true for all numbers, then it is called an identity; identities are often discovered by using the laws of arithmetic or the laws of exponents to transform one expression into another.

The solutions of an equation in one variable form a set of numbers; the solutions of an equation in two variables form a set of ordered pairs of numbers, which can be graphed in the coordinate plane. Two or more equations and/or inequalities form a system. A solution for such a system must satisfy every equation and inequality in the system.

An equation can often be solved by successively transforming it into one or more simpler equations. The process is governed by deductions based on the properties of equality. For example, one can add the same constant to both sides without changing the solutions, but squaring both sides might lead to extraneous solutions. Strategic competence in solving includes looking ahead for productive manipulations and anticipating the nature and number of solutions.

Some equations have no solutions in a given number system, stimulating the extension of that system. For example, the solution of $x + 1 = 0$ is an integer, not a whole number; the solution of $2x + 1 = 0$ is a rational number, not an integer; the solutions of $x^2 - 2 = 0$ are real numbers, not rational numbers; and the solutions of $x^2 + 2 = 0$ are complex numbers, not real numbers.

The same solution techniques used to solve equations can be used to rearrange formulas. For example, the formula for the area of a trapezoid, $A = ((b_1+b_2)/2)h$, can be solved for h using the same deductive process.

Inequalities can be solved by reasoning about the properties of inequality. Many, but not all, of the properties of equality continue to hold for inequalities and can be useful in solving them.

Connections to Functions and Modeling. Expressions can define functions, and equivalent expressions define the same function. Equations in two variables may also define functions. Asking when two functions have the same value leads to an equation; graphing the two functions allows for the approximate solution of the equation. Converting a verbal description to an equation, inequality, or system of these is an essential skill in modeling.

Content Outline

Seeing Structure in Expressions

Arithmetic with Polynomials and Rational Expressions

Creating Equations that Describe Numbers or Relationships

Reasoning with Equations and Inequalities

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Seeing Structure in Expressions A-SSE

1. Understand that different forms of an expression may reveal different properties of the quantity in question; a purpose in transforming expressions is to find those properties. *Examples: factoring a quadratic expression reveals the zeros of the function it defines, and putting the expression in vertex form reveals its maximum or minimum value; the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
2. Understand that complicated expressions can be interpreted by viewing one or more of their parts as single entities.
3. Interpret an expression that represents a quantity in terms of the context. *Include interpreting parts of an expression, such as terms, factors and coefficients.*★
4. Factor, expand, and complete the square in quadratic expressions.
5. See expressions in different ways that suggest ways of transforming them. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$.
6. Rewrite expressions using the laws of exponents. *For example,* $(x^{1/2})^3 = x^{3/2}$ *and* $1/x = x^{-1}$.
7. Use the laws of exponents to interpret expressions for exponential functions, recognizing positive rational exponents as indicating roots of the base and negative exponents as indicating the reciprocal of a power. *For example, identify the per unit percentage change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$*, and conclude whether it represents exponential growth or decay. Recognize that any nonzero number raised to the zero power is 1, for example,* $12(1.05)^0 = 12$*. Avoid common errors such as confusing* $6(1.05)^t$ *with* $(6 \cdot 1.05)^t$ *and* $5(0.03)^t$ *with* $5(1.03)^t$.
8. STEM Prove the formula for the sum of a geometric series, and use the formula to solve problems.

Arithmetic with Polynomials and Rational Expressions A-APR

1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication.
2. Understand that polynomial identities become true statements no matter which real numbers are substituted. *For example, the polynomial identity* $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ *can be used to generate Pythagorean triples.*
3. Understand the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.
4. STEM Understand that the Binomial Theorem gives the expansion of $(x + a)^n$ in powers of x for a positive integer n and a real number a, with coefficients determined for example by Pascal's Triangle. The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.
5. STEM Understand that rational expressions are quotients of polynomials. They form a system analogous to the rational numbers, closed under division by a nonzero rational function.
6. Add, subtract and multiply polynomials.
7. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the polynomial.
8. Transform simple rational expressions using the commutative, associative, and distributive laws, and the inverse relationship between multiplication and division.
9. Divide a polynomial $p(x)$ by a divisor of the form $x - a$ using long division.
10. STEM Identify zeros and asymptotes of rational functions, when suitable factorizations are available, and use the zeros and asymptotes to construct a rough graph of the function.
11. STEM Divide polynomials, using long division for linear divisors and long division or a computer algebra system for higher degree divisors.

Creating Equations That Describe Numbers or Relationships A-CED★

1. Understand that equations in one variable are often created to describe properties of a specific but unknown number.
2. Understand that equations in two or more variables that represent a relationship between quantities can be built by experimenting with specific numbers in the relationship.
3. Write equations and inequalities that specify an unknown quantity or to express a relationship between two or more quantities. Use the equations and inequalities to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*

★ Standard with close connection to modeling.

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4. Rearrange formulas to highlight a quantity of interest. *For example, transform Ohm's law $V = IR$ to highlight resistance R; in motion with constant acceleration, transform $v_{f,x}^2 - v_{i,x}^2 = 2a_x(x_f - x_i)$ to highlight the change in position along the x-axis, $x_f - x_i$.*

Reasoning with Equations and Inequalities A-REI

1. Understand that to solve an equation algebraically, one makes logical deductions from the equality asserted by the equation, often in steps that replace it with a simpler equation whose solutions include the solutions of the original one.
2. Understand that the method of completing the square can transform any quadratic equation in x into an equivalent equation of the form $(x - p)^2 = q$. This leads to the quadratic formula.
3. Understand that given a system of two linear equations in two variables, adding a multiple of one equation to another produces a system with the same solutions. This principle, combined with principles already encountered with equations in one variable, allows for the simplification of systems.
4. Understand that the graph of an equation in two variables is the set of its solutions plotted in the coordinate plane, often forming a curve or a line.
5. Understand that solutions to two equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
6. Understand that the solutions to a linear inequality in two variables can be graphed as a half-plane (excluding the boundary in the case of a strict inequality).
7. Understand that solutions to several linear inequalities in two variables correspond to points in the intersection of the regions in the plane defined by the solutions to the inequalities.
8. Understand that equations and inequalities can be viewed as constraints in a problem situation, e.g., inequalities describing nutritional and cost constraints on combinations of different foods.★
9. STEM Understand that the relationship between an invertible function f and its inverse function can be used to solve equations of the form $f(x) = c$.
10. Solve simple rational and radical equations in one variable, noting and explaining extraneous solutions.
11. Solve linear equations in one variable, including equations with coefficients represented by letters.
12. Solve quadratic equations in one variable. *Include methods such as inspection (e.g. for $x^2 = 49$), square roots, completing the square, the quadratic formula and factoring. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.*
13. Solve equations $f(x) = g(x)$ approximately by finding the intersections of the graphs of $f(x)$ and $g(x)$, e.g. using technology to graph the functions. *Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, exponential, and logarithmic functions.*
14. Solve linear inequalities in one variable and graph the solution set on a number line.
15. Solve systems of linear equations algebraically and graphically, focusing on pairs of linear equations in two variables.
16. Solve algebraically a simple system consisting of one linear equation and one quadratic equation in two variables; for example, find points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.
17. Graph the solution set of a system of linear inequalities in two variables.
18. In modeling situations, represent constraints by systems of equations and/or inequalities, and interpret solutions of these systems as viable or non-viable options in the modeling context.★
19. In the context of exponential models, solve equations of the form $a\,b^{ct} = d$ where a, c, and d are specific numbers and the base b is 2, 10, or e.★
20. STEM Relate the properties of logarithms to the laws of exponents and solve equations involving exponential functions.
21. STEM Use inverse functions to solve equations of the form $a\sin(bx + c) = d$, $a\cos(bx + c) = d$, and $a\tan(bx + c) = d$.

★ Standard with close connection to modeling.

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Mathematics | High School—Functions

Functions describe situations where one quantity determines another. For example, the return on $10,000 invested at an annualized percentage rate of 4.25% is a function of the length of time the money is invested. Because nature and society are full of dependencies between quantities, functions are important tools in the construction of mathematical models.

In school mathematics, functions usually have numerical inputs and outputs and are often defined by an algebraic expression. For example, the time in hours it takes for a car to drive 100 miles is a function of the car's speed in miles per hour, v; the rule $T(v) = 100/v$ expresses this relationship algebraically and defines a function whose name is T.

The set of inputs to a function is called its domain. We often infer the domain to be all inputs for which the expression defining a function has a value, or for which the function makes sense in a given context.

A function can be described in various ways, such as by a graph (e.g., the trace of a seismograph); by a verbal rule, as in, "I'll give you a state, you give me the capital city"; or by an algebraic expression like $f(x) = a + bx$. The graph of a function is often a useful way of visualizing the relationship the function models, and manipulating a mathematical expression for a function can throw light on the function's properties. Graphing technology and spreadsheets are also useful tools in the study of functions.

Functions presented as expressions can model many important phenomena. Two important families of functions characterized by laws of growth are linear functions, which grow at a constant rate, and exponential functions, which grow at a constant percent rate. Linear functions with a constant term of zero describe proportional relationships.

A graphing utility or a CAS can be used to experiment with properties of the functions and their graphs and to build computational models of functions, including recursively defined functions.

Connections to Expressions, Equations, Modeling and Coordinates. Determining an output value for a particular input involves evaluating an expression; finding inputs that yield a given output involves solving an equation. Questions about when two functions have the same value lead to equations, whose solutions can be visualized from the intersection of their graphs. Because functions describe relationships between quantities, they are frequently used in modeling. Sometimes functions are defined by a recursive process, which can be displayed effectively using a spreadsheet or other technology.

Content Outline

Interpreting Functions

Building Functions

Linear, Quadratic, and Exponential Models

Trigonometric Functions

Limits and Continuity†

Differential Calculus†

Applications of Derivatives†

Integral Calculus†

Applications of Integration†

Infinite Series†

† Specific standards for calculus domains are not listed.

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Interpreting Functions A-IF

1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x.
2. Understand that functions of a single variable have key characteristics, including: zeros; extreme values; average rates of change (over intervals); intervals of increasing, decreasing and/or constant behavior; and end behavior.
3. Understand that a function defined by an expression may be written in different but equivalent forms, which can reveal different properties of the function.
4. Use function notation and evaluate functions for inputs in their domains.
5. Describe qualitatively the functional relationship between two quantities by reading a graph (e.g., where the function is increasing or decreasing, what its long-run behavior appears to be, and whether it appears to be periodic).★
6. Sketch a graph that exhibits the qualitative features of a function that models a relationship between two quantities.★
7. Compare properties of two functions represented in different ways (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, draw conclusions about the graph of a quadratic function from its algebraic expression.*
8. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*★
9. Describe the qualitative behavior of functions presented in graphs and tables. *Identify: intercepts; intervals where the function is increasing, decreasing, positive or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*★
10. Use technology to exhibit the effects of parameter changes on the graphs of linear, power, quadratic, square root, cube root, and polynomial functions, and simple rational, exponential, logarithmic, sine, cosine, absolute value, and step functions.★
11. Transform quadratic polynomials algebraically to reveal different features of the function they define, such as zeros, extreme values, and symmetry of the graph.

Building Functions A-BF

1. Understand that functions can be described by specifying an explicit expression, a recursive process or steps for calculation.
2. Understand that sequences are functions whose domain is a subset of the nonnegative integers.
3. STEM Understand that composing a function f with a function g creates a new function called the composite function—for an input number x, the output of the composite function is $f(g(x))$.
4. STEM Understand that the inverse of an invertible function "undoes" what the function does; that is, composing the function with its inverse in either order returns the original input. One can sometimes produce an invertible function from a non-invertible function by restricting the domain (e.g., squaring is not an invertible function on the real numbers, but squaring is invertible on the nonnegative real numbers).
5. Write a function that describes a relationship between two quantities, for example by varying parameters in and combining standard function types (such as linear, quadratic or exponential functions). Use technology to experiment with parameters and to illustrate an explanation of the behavior of the function when parameters vary.★
6. Solve problems involving linear, quadratic, and exponential functions.★
7. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.
8. Generate an arithmetic or geometric sequence given a recursive rule for the sequence.★
9. As a way to describe routine modeling situations, write arithmetic and geometric sequences both recursively and in closed form, and translate between the two forms.★
10. STEM Evaluate composite functions and compose functions symbolically.
11. STEM Read values of an inverse function from a graph or a table, given that the function has an inverse.
12. STEM For linear or simple exponential functions, find a formula for an inverse function by solving an equation.
13. STEM Verify symbolically by composition that one function is the inverse of another.

Linear, Quadratic, and Exponential Models A-LQE

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1. Understand that a linear function, defined by $f(x) = mx + b$ for some constants m and b, models a situation in which a quantity changes at a constant rate, m, relative to another.★
2. Understand that quadratic functions have maximum or minimum values and can be used to model problems with optimum solutions.★
3. Understand that an exponential function, defined by $f(x) = ab^x$ or by $f(x) = a(1 + r)^x$ for some constants a, $b > 0$ and $r > -1$, models a situation where a quantity grows or decays by a constant factor or a constant percentage change over each unit interval.★
4. Understand that linear functions grow by equal differences over equal intervals; exponential functions grow by equal factors over equal intervals.★
5. Understand that in an arithmetic sequence, differences between consecutive terms form a constant sequence, and second differences are zero. Conversely, if the second differences are zero, the sequence is arithmetic. Arithmetic sequences can be seen as linear functions.★
6. Understand that in a sequence that increases quadratically (e.g., $a_n = 3n^2 + 2n + 1$), differences between consecutive terms form an arithmetic sequence, and second differences form a constant sequence. Conversely, if the second differences form a constant sequence with nonzero value, the sequence increases quadratically.★
7. Understand that in a geometric sequence, ratios of consecutive terms are all the same.★
8. Understand that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.★
9. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★
10. Construct a function to describe a linear relationship between two quantities. Determine the rate of change and constant term of a linear function from a graph, a description of a relationship, or from two (x, y) values (include reading these from a table).★
11. Use quadratic functions to model problems, e.g., in situations with optimum solutions.★
12. Construct an exponential function in the form $f(x) = a(1 + r)^x$ or $f(x) = ab^x$ to describe a relationship in which one quantity grows with respect to another at a constant percent growth rate or a with a constant growth factor.★
13. Interpret the rate of change and constant term of a linear function or sequence in terms of the situation it models, and in terms of its graph or a table of values.★
14. Calculate and interpret the growth factor for an exponential function (presented symbolically or as a table) given a fixed interval. Estimate the growth factor from a graph.★
15. Recognize a quantitative relationship as linear, exponential, or neither from description of a situation.★
16. Compare quantities increasing exponentially to quantities increasing linearly or as a polynomial function.★

Trigonometric Functions F-TF

1. STEM Understand that the unit circle in the coordinate plane enables one to define the sine, cosine, and tangent functions for real numbers.
2. STEM Understand that trigonometric functions are periodic by definition, and sums and products of functions with the same period are periodic.
3. STEM Understand that restricting trigonometric functions to a domain on which they are always increasing or always decreasing allows for the construction of an inverse function.
4. STEM Revisit trigonometric functions and their graphs in terms of radians.
5. STEM Use the unit circle to determine geometrically the values of sine, cosine, tangent for integer multiples of $\pi/4$ and $\pi/6$.
6. STEM Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
7. STEM Solve simple trigonometric equations formally using inverse trigonometric functions and evaluate the solutions numerically using technology. *Solving trigonometric equations by means of the quadratic formula is optional.*

Limits and Continuity† F-LC

★ Standard with close connection to modeling.

† Specific standards for calculus domains are not listed.

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Differential Calculus† F-DC

Applications of Derivatives† F-AD

Integral Calculus† F-IC

Applications of Integration† F-AI

Infinite Series† F-IS

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† Specific standards for calculus domains are not listed.

Mathematics | High School—Modeling

Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data.

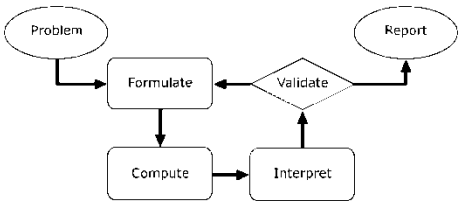
A model can be very simple, such as writing total cost as a product of unit price and number bought, or using a geometric shape to describe a physical object like a coin. Even such simple models involve making choices. It is up to us whether to model a coin as a three-dimensional cylinder, or whether a two-dimensional disk works well enough for our purposes. Other situations—modeling a delivery route, a production schedule, or a comparison of loan amortizations—need more elaborate models that use other tools from the mathematical sciences. Real-world situations are not organized and labeled for analysis; formulating tractable models, representing such models, and analyzing them is appropriately a creative process. Like every such process, this depends on acquired expertise as well as creativity.

Some examples of such situations might include:

- Estimating how much water and food is needed for emergency relief in a devastated city of 3 million people, and how it might be distributed.
- Planning a table tennis tournament for 7 players at a club with 4 tables, where each player plays against each other player.
- Designing the layout of the stalls in a school fair so as to raise as much money as possible.
- Analyzing stopping distance for a car.
- Modeling savings account balance, bacterial colony growth, or investment growth.
- Critical path analysis, e.g., applied to turnaround of an aircraft at an airport.
- Risk situations, like extreme sports, pandemics and terrorism.
- Relating population statistics to individual predictions.

In situations like these, the models devised depend on a number of factors: How precise an answer do we want or need? What aspects of the situation do we most need to understand, control, or optimize? What resources of time and tools do we have? The range of models that we can create and analyze is also constrained by the limitations of our mathematical, statistical, and technical skills, and our ability to recognize significant variables and relationships among them. Diagrams of various kinds, spreadsheets and other technology, and algebra are powerful tools for understanding and solving problems drawn from different types of real-world situations.

One of the insights provided by mathematical modeling is that essentially the same mathematical or statistical structure can model seemingly different situations. Models can also shed light on the mathematical structures themselves, for example as when a model of bacterial growth makes more vivid the explosive growth of the exponential function.



The basic modeling cycle is summarized in the diagram. It involves (1) identifying variables in the situation and selecting those than represent essential features, (2) formulating a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables, (3) analyzing and performing operations on these relationships to draw conclusions, (4) interpreting the results of the mathematics in terms of the original situation, (5) validating the conclusions by comparing them with the situation, and then, either improving the model or, if it is acceptable, (6) reporting on the conclusions and the reasoning behind them. Choices, assumptions and approximations are present throughout this cycle.

In descriptive modeling, a model simply describes the phenomena or summarizes them in a compact form. Graphs of observations are a familiar descriptive model—for example, graphs of global temperature and atmospheric CO_2 over time.

Analytic modeling seeks to explain data on the basis of deeper theoretical ideas, albeit with parameters that are empirically based; for example, exponential growth of bacterial colonies (until cut-off mechanisms such as pollution or starvation intervene) follows from a constant reproduction rate. Functions are an important tool for analyzing such

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problems.

Graphing utilities, spreadsheets, CAS environments, and dynamic geometry software are powerful tools that can be used to model purely mathematical phenomena (e.g., the behavior of polynomials) as well as physical phenomena.

Modeling Standards

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

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Mathematics | High School—Statistics and Probability*

Decisions or predictions are often based on data—numbers in context. These decisions or predictions would be easy if the data always sent a clear message, but the message is often obscured by variability. Statistics provides tools for describing variability in data and for making informed decisions that take it into account.

Data are gathered, displayed, summarized, examined, and interpreted to discover patterns and deviations from patterns. Quantitative data can be described in terms of key characteristics: measures of shape, center, and spread. The shape of a data distribution might be described as symmetric, skewed, flat, or bell shaped, and it might be summarized by a statistic measuring center (such as mean or median) and a statistic measuring spread (such as standard deviation or interquartile range). Different distributions can be compared numerically using these statistics or compared visually using plots. Knowledge of center and spread are not enough to describe a distribution. Which statistics to compare, which plots to use, and what the results of a comparison might mean, depend on the question to be investigated and the real-life actions to be taken.

Randomization has two important uses in drawing statistical conclusions. First, collecting data from a random sample of a population makes it possible to draw valid conclusions about the whole population, taking variability into account. Second, randomly assigning individuals to different treatments allows a fair comparison of the effectiveness of those treatments. A statistically significant outcome is one that is unlikely to be due to chance alone, and this can be evaluated only under the condition of randomness. The conditions under which data are collected are important in drawing conclusions from the data; in critically reviewing uses of statistics in public media and other reports it is important to consider the study design, how the data were gathered, and the analyses employed as well as the data summaries and the conclusions drawn.

Random processes can be described mathematically by using a probability model. One begins to make a probability model by listing or describing the possible outcomes (the sample space) and assigning probabilities. In situations such as flipping a coin, rolling a number cube, or drawing a card, it might be reasonable to assume various outcomes are equally likely. In a probability model, sample points represent outcomes and combine to make up events; probabilities of events can be computed by applying the additive and multiplicative laws of probability. Interpreting these probabilities relies on an understanding of independence and conditional probability, which can be approached through the analysis of two-way tables.

Technology plays an important role in statistics and probability by making it possible to generate plots, functional models, and correlation coefficients, and to simulate many possible outcomes in a short amount of time.

Connections to Functions and Modeling. Functional models may be used to approximate data; if the data are approximately linear, the relationship may be modeled with a regression line and the strength and direction of such a relationship may be expressed through a correlation coefficient.

Content Outline

Summarizing Categorical and Measurement Data

Probability Models

Independently Combined Probability Models

Making Inferences and Justifying Conclusions Drawn from Data

Conditional Probability and the Laws of Probability

Experimenting and Simulating to Model Probabilities

Using Probability to Make Decisions

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* Most or all of the standards in Statistics and Probability have a close connection to modeling.

Summarizing Categorical and Quantitative Data S-SI

1. Understand that statistical methods take variability into account to support making informed decisions based on data collected to answer specific questions.
2. Understand that visual displays and summary statistics condense the information in data sets into usable knowledge.
3. Understand that patterns of association or relationships between variables may emerge through careful analysis of multi-variable data.
4. Summarize comparative or bivariate categorical data in two-way frequency tables. Interpret joint, marginal and conditional relative frequencies in the context of the data, recognizing possible associations and trends in bivariate categorical data.
5. Compare data on two or more count or measurement variables by using plots on the real number line (dot plots, histograms, and box plots). Use statistics appropriate to the shape of the data distribution to summarize center (median, mean) and spread (interquartile range, standard deviation) of the data sets. Interpret changes in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
6. Represent bivariate quantitative data on a scatter plot and describe how the variables are related.
7. Fit a linear function for scatter plots that suggest a linear association. Informally assess the fit of the model function by plotting and analyzing residuals.
8. Use a model function fitted to the data to solve problems in the context of the data, interpreting the slope (rate of change) and the intercept (constant term).
9. Compute (using technology) and interpret the correlation coefficient for a linear relationship between variables.
10. Distinguish between correlation and causation.

Probability Models S-PM

1. Understand that in a probability model, individual outcomes have probabilities that sum to 1. When outcomes are categorized, the probability of a given type of outcome is the sum of the probabilities of all the individual outcomes of that type.
2. Understand that uniform probability models are useful models for processes such as (i) the selection of a person from a population; (ii) the selection of a number in a lottery; (iii) any physical situation in which symmetry suggests that different individual outcomes are equally likely.
3. Understand that two different empirical probability models for the same process will rarely assign exactly the same probability to a given type of outcome. But if the data sets are large and the methods used to collect the data for the two data sets are consistent, the agreement between the models is likely to be reasonably good.
4. Understand that a (theoretical) uniform probability model may be judged by comparing it to an empirical probability model for the same process. If the theoretical assumptions are appropriate and the data set is large, then the two models should agree approximately. If the agreement is not good, then it may be necessary to modify the assumptions underlying the theoretical model or look for factors that might have affected the data used to create the empirical model.
5. Use a uniform probability model to compute probabilities for a process involving uncertainty, including the random selection of a person from a population and physical situations where symmetry suggests that different individual outcomes are equally likely.
    a. List the individual outcomes to create a sample space.
    b. Label the individual outcomes in the sample space to reflect important characteristics or quantities associated with them.
    c. Determine probabilities of individual outcomes, and determine the probability of a type or category of outcome as the fraction of individual outcomes it includes.
6. Generate data by sampling, repeated experimental trials, and simulations. Record and appropriately label such data, and use them to construct an empirical probability model. Compute probabilities in such models.
7. Compare probabilities from a theoretical model to probabilities from a corresponding empirical model for the same situation. If the agreement is not good, explain possible sources of the discrepancies.

Independently Combined Probability Models S-IPM

1. Understand that to describe a pair of random processes (such as tossing a coin and rolling a number cube), or one random process repeated twice (such as randomly selecting a student in the class on two different days), two probability models can be combined into a single model.

DRAFT

a. The sample space for the combined model is formed by listing all possible ordered pairs that combine an individual outcome from the first model with an individual outcome from the second. Each ordered pair is an individual outcome in the combined model.

b. The total number of individual outcomes (ordered pairs) in the combined model is the product of the number of individual outcomes in each of the two original models.

2. Understand that when two probability models are combined independently, the probability that one type of outcome in the first model occurs together with another type of outcome in the second model is the product of the two corresponding probabilities in the original models (the Multiplication Rule).
3. Combine two uniform models independently to compute probabilities for a pair of random processes (e.g., flipping a coin twice, selecting one person from each of two classes).
   a. Use organized lists, tables and tree diagrams to represent the combined sample space.
   b. Determine probabilities of ordered pairs in the combined model, and determine the probability of a particular type or category of outcomes in the combined model, as the fraction of ordered pairs corresponding to it.
4. For two independently combined uniform models, use the Multiplication Rule to determine probabilities.

Making Inferences and Justifying Conclusions S-IC

1. Understand that statistics is a process for making inferences about population parameters based on a sample from that population; randomness is the foundation for statistical inference.
2. Understand that the design of an experiment or sample survey is of critical importance to analyzing the data and drawing conclusions.
3. Understand that simulation-based techniques are powerful tools for making inferences and justifying conclusions from data.
4. Use probabilistic reasoning to decide if a specified model is consistent with results from a given data-generating process. (For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?)
5. Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization relates to each.
6. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
7. Use data from a randomized experiment to compare two treatments; justify significant differences between parameters through the use of simulation models for random assignment.
8. Evaluate reports based on data.

Conditional Probability and the Laws of Probability S-CP

1. Understand that events are subsets of a sample space; often, events of interest are defined by using characteristics (or categories) of the sample points, or as unions, intersections, or complements thereof ("and," "or," "not"). A sample point may belong to several events (categories).
2. Understand that if A and B are two events, then in a uniform model the conditional probability of A given B, denoted by $P(A \mid B)$, is the fraction of B's sample points that also lie in A.
3. Understand that the laws of probability allow one to use known probabilities to determine other probabilities of interest.
4. Compute probabilities by constructing and analyzing sample spaces, representing them by tree diagrams, systematic lists, and Venn diagrams.
5. Use the laws of probability to compute probabilities.
6. Apply concepts such as intersections, unions and complements of events, and conditional probability and independence to define or analyze events, calculate probabilities and solve problems.
7. Construct and interpret two-way tables to show probabilities when two characteristics (or categories) are associated with each sample point. Use a two-way table to determine conditional probabilities.★
8. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.★
9. Use permutations and combinations to compute probabilities of compound events and solve problems.

★ Standard with close connection to modeling.

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Experimenting and Simulating to Model Probabilities S-ES

1. Understand that sets of data obtained from surveys, simulations or other means can be used as probability models, by treating the data set itself as a sample space, in which the sample points are the individual pieces of data.
2. Understand that the probability of an outcome can be interpreted as an assertion about the long-run proportion of the outcome's occurrence if the random experiment is repeated a large number of times.
3. Calculate experimental probabilities by performing simulations or experiments involving a probability model and using relative frequencies of outcomes.
4. Compare the results of simulations with predicted probabilities. When there are substantial discrepancies between predicted and observed probabilities, explain them.
5. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets and tables to estimate areas under the normal curve.

Using Probability to Make Decisions S-MD

1. Understand that the expected value of a random variable is the weighted average of its possible values, with weights given by their respective probabilities.
2. Understand that when the possible outcomes of a decision can be assigned probabilities and payoff values, the decision can be analyzed as a random variable with an expected value, e.g., of an investment.
3. Calculate expected value, e.g. to determine the fair price of an investment.
4. Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
5. Evaluate and compare two investments or strategies with the same expected value, where one investment or strategy is safer than the other.
6. Evaluate and compare two investments or strategies, where one investment or strategy is safer but has lower expected value. Include large and small investments, and situations with serious consequences.
7. Analyze decisions and strategies using probability concepts (e.g. product testing, medical testing, pulling a hockey goalie at the end of a game).

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Mathematics | High School—Geometry

An understanding of the attributes and relationships of geometric objects can be applied in diverse contexts—interpreting a schematic drawing, estimating the amount of wood needed to frame a sloping roof, rendering computer graphics, or designing a sewing pattern for the most efficient use of material.

Understanding the attributes of geometric objects often relies on measurement: a circle is a set of points in a plane at a fixed distance from a point; a cube is bounded by six squares of equal area; when two parallel lines are crossed by a transversal, pairs of corresponding angles are congruent.

The concepts of congruence, similarity and symmetry can be united under the concept of geometric transformation. Reflections and rotations each explain a particular type of symmetry, and the symmetries of an object offer insight into its attributes—as when the reflective symmetry of an isosceles triangle assures that its base angles are congruent. Applying a scale transformation to a geometric figure yields a similar figure. The transformation preserves angle measure, and lengths are related by a constant of proportionality.

The definitions of sine, cosine and tangent for acute angles are founded on right triangle similarity, and, with the Pythagorean theorem, are fundamental in many real-world and theoretical situations.

Coordinate geometry is a rich field for exploration. How does a geometric transformation such as a translation or reflection affect the coordinates of points? How is the geometric definition of a circle reflected in its equation? Coordinates can describe locations in three dimensions and extend the use of algebraic techniques to problems involving the three-dimensional world we live in.

Dynamic geometry environments provide students with experimental and modeling tools that allow them to investigate geometric phenomena in much the same was as CAS environments allow them to experiment with algebraic phenomena.

Connections to Equations and Inequalities. The correspondence between numerical coordinates and geometric points allows methods from algebra to be applied to geometry and vice versa. The solution set of an equation becomes a geometric curve, making visualization a tool for doing and understanding algebra. Geometric shapes can be described by equations, making algebraic manipulation into a tool for geometric understanding, modeling and proof.

Content Outline

Congruence

Similarity, Right Triangles, and Trigonometry

Circles

Expressing Geometric Properties with Equations

Trigonometry of General Triangles

Geometric Measurement and Dimension

Modeling with Geometry

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Congruence G-CO

1. Understand that two geometric figures are congruent if there is a sequence of rigid motions (rotations, reflections, translations) that carries one onto the other. This is the principle of superposition.
2. Understand that criteria for triangle congruence are ways to specify enough measures in a triangle to ensure that all triangles drawn with those measures are congruent.
3. Understand that criteria for triangle congruence (ASA, SAS, and SSS) can be established using rigid motions.
4. Understand that geometric diagrams can be used to test conjectures and identify logical errors in fallacious proofs.
5. Know and use (in reasoning and problem solving) definitions of angles, polygons, parallel, and perpendicular lines, rigid motions, parallelograms and rectangles.
6. Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; two lines parallel to a third are parallel to each other; points on a perpendicular bisector of a segment are exactly those equidistant from the segment's endpoints.*
7. Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°, base angles of isosceles triangles are congruent, the triangle inequality, the longest side of a triangle faces the angle with the greatest measure and vice-versa, the exterior-angle inequality, and the segment joining midpoints of two sides of a triangle parallel to the third side and half the length.*
8. Use and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid and kite.
9. Characterize parallelograms in terms of equality of opposite sides, in terms of equality of opposite angles, and in terms of bisection of diagonals; characterize rectangles as parallelograms with equal diagonals.
10. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*
11. Construct an equilateral triangle, a square and a regular hexagon inscribed in a circle.
12. Use two-dimensional representations to transform figures and to predict the effect of translations, rotations, and reflections.
13. Use two-dimensional representations to transform figures and to predict the effect of dilations.

Similarity, Right Triangles, and Trigonometry G-SRT

1. Understand that dilating a line produces a line parallel to the original. (In particular, lines passing through the center of the dilation remain unchanged.)
2. Understand that the dilation of a given segment is parallel to the given segment and longer or shorter in the ratio given by the scale factor. A dilation leaves a segment unchanged if and only if the scale factor is 1.
3. Understand that the assumed properties of dilations can be used to establish the AA, SAS, and SSS criteria for similarity of triangles.
4. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of sine, cosine, and tangent.
5. Understand that a line parallel to one side of a triangle divides the other two proportionally, and conversely.
6. Use triangle similarity criteria to solve problems and to prove relationships in geometric figures. *Include a proof of the Pythagorean theorem using triangle similarity.*
7. Use and explain the relationship between the sine and cosine of complementary angles.
8. Use sine, cosine, tangent, and the Pythagorean Theorem to solve right triangles[2] in applied problems.
9. STEM Give an informal explanation using successive approximation that a dilation of scale factor r changes the length of a curve by a factor of r and the area of a region by a factor of r^2.

Circles G-C

1. Understand that dilations can be used to show that all circles are similar.
2. Understand that there is a unique circle through three non-collinear points, and four circles tangent to three non-concurrent lines.

[2] A right triangle has five parameters, its three lengths and two acute angles. Given a length and any other parameter, "solving a right triangle" means finding the remaining three parameters.

DRAFT

3. Identify and define radius, diameter, chord, tangent, secant, and circumference.
4. Identify and describe relationships among angles, radii, and chords. *Include the relationship between central, inscribed and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*
5. Determine the arc lengths and the areas of sectors of circles, using proportions.
6. STEM Construct a tangent line from a point outside a given circle to the circle.
7. STEM Prove and use theorems about circles, and use these theorems to solve problems involving:
   a. Symmetries of a circle
   b. Similarity of a circle to any other
   c. Tangent line, perpendicularity to a radius
   d. Inscribed angles in a circle, relationship to central angles, and equality of inscribed angles
   e. Properties of chords, tangents, and secants as an application of triangle similarity.

Expressing Geometric Properties with Equations G-GPE

1. Understand that two lines with well-defined slopes are perpendicular if and only if the product of their slopes is equal to –1.
2. Understand that the equation of a circle can be found using its definition and the Pythagorean Theorem.
3. Understand that transforming the graph of an equation by reflecting in the axes, translating parallel to the axes, or applying a dilation in one of the coordinate directions corresponds to substitutions in the equation.
4. STEM Understand that an ellipse is the set of all points whose distances from two fixed points (the foci) are a constant sum. The graph of $x^2/a^2 + y^2/b^2 = 1$ is an ellipse with foci on one of the axes.
5. STEM Understand that a parabola is the set of points equidistant from a fixed point (the focus) and a fixed line (the directrix). The graph of any quadratic function is a parabola, and all parabolas are similar.
6. STEM Understand that the formula $A = \pi ab$ for the area of an ellipse can be derived from the formula for the area of a circle.★
7. Use the slope criteria for parallel and perpendicular lines to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
8. Find the point on the segment between two given points that divides the segment in a given ratio.
9. Use coordinates to compute perimeters of polygons and areas for triangles and rectangles, e.g. using the distance formula.★
10. Decide whether a point with given coordinates lies on a circle defined by a given equation.
11. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point (0, 2).
12. Complete the square to find the center and radius of a circle given by an equation.
13. STEM Find an equation for an ellipse given in the coordinate plane with major and minor axes parallel to the coordinate axes.
14. STEM Calculate areas of ellipses to solve problems.★

Trigonometry of General Triangles G-TGT

1. STEM Understand that the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle can be derived by drawing an auxiliary line from a vertex perpendicular to the opposite side. Applying this formula in three different ways leads to the Law of Sines.
2. STEM Understand that the Law of Cosines generalizes the Pythagorean Theorem.
3. STEM Understand that the sine, cosine and tangent of the sum or difference of two angles can be expressed in terms of sine, cosine, and tangent of the angles themselves using the addition formulas.
4. STEM Understand that the Laws of Sines and Cosines embody the triangle congruence criteria, in that three pieces of information are usually sufficient to completely solve a triangle. Furthermore, these laws yield two possible solutions in the ambiguous case, illustrating that "Side-Side-Angle" is not a congruence criterion.
5. STEM Explain proofs of the Law of Sines and the Law of Cosines.

★ Standard with close connection to modeling.

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6. STEM Use the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Geometric Measurement and Dimension G-GMD

1. Understand that the area of a decomposed figure is the sum of the areas of its components and is independent of the choice of dissection.
2. STEM Understand that lengths of curves and areas of curved regions can be defined using the informal notion of limit.
3. STEM Understand that Cavalieri's principle allows one to understand volume formulas informally by visualizing volumes as stacks of thin slices.
4. Find areas of polygons by dissecting them into triangles.
5. Explain why the volume of a cylinder is the area of the base times the height, using informal arguments.
6. For a pyramid or a cone, give a heuristic argument to show why its volume is one-third of its height times the area of its base.
7. Apply formulas and solve problems involving volume and surface area of right prisms, right circular cylinders, right pyramids, cones, spheres and composite figures.
8. STEM Identify cross-sectional shapes of slices of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
9. STEM Use the behavior of length and area under dilations to show that the circumference of a circle is proportional to the radius and the area of a circle is proportional to the square of the radius. Identify the relation between the constants of proportionality with an informal argument involving dissection and recomposition of a circle into an approximate rectangle.

Modeling with Geometry G-MG

1. Understand that models of objects and structures can be built from a library of standard shapes; a single kind of shape can model seemingly different objects.★
2. Use geometric shapes, their measures and their properties to describe objects (e.g., modeling a tree trunk or a human torso or as a cylinder).★
3. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).★
4. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy constraints or minimize cost; working with typographic grid systems based on ratios).★

★ Standard with close connection to modeling.

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Glossary

Addition and subtraction within 10, 20, or 100. Addition or subtraction of whole numbers with whole number answers, and with sum or minuend at most 10, 20, or 100. Example: $8 + 2 = 10$ is an addition within 10, $14 - 5 = 9$ is a subtraction within 20, and $55 - 18 = 37$ is a subtraction within 100.

Additive inverses. Two numbers whose sum is 0 are additive inverses of one another. Example: $3/4$ and $-3/4$ are additive inverses of one another because $3/4 + (-3/4) = (-3/4) + 3/4 = 0$.

Box plot. A method of visually displaying a distribution of data values by using the median, quartiles, and extremes of the data set. A box shows the middle 50% of the data.[3]

Complex fraction. A fraction A/B where A and/or B are fractions.

Congruent. Two plane or solid figures are congruent if one can be obtained from the other by a sequence of rigid motions (rotations, reflections, and translations).

Counting on. A strategy for finding the number of objects in a group without having to count every member of the group. For example, if a stack of books is known to have 8 books and 3 more books are added to the top, it is not necessary to count the stack all over again; one can find the total by *counting on*—pointing to the top book and saying "eight," following this with "nine, ten, eleven. There are eleven books now."

Decade word. A word referring to a single-digit multiple of ten, as in *twenty*, *thirty*, *forty*, etc.

Dot plot. A method of visually displaying a distribution of data values where each data value is shown as a dot or mark above a number line. Also known as a line plot.[4]

Dilation. A transformation that moves each point along the ray through the point emanating from a fixed center, and multiplies distances from the center by a common scale factor.

Empirical probability model. A probablity model based on a data set for a random process in which the probability of a particular type or category of outcome equals the percentage of data points included in the category. Example: If a coin is tossed 10 times and 4 of the tosses are Heads, then the empirical probability of Heads in the empirical probability model is $4/10$ (equivalently 0.4 or 40%).

Equivalent fractions. Two fractions a/b and c/d that represent the same number.

Expanded form. A multidigit number is expressed in expanded form when it is written as a sum of single-digit multiples of powers of ten. For example, $643 = 600 + 40 + 3$.

First quartile. For a data set with median M, the first quartile is the median of the data values less than M. Example: For the data set $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$, the first quartile is 6.[5] *See also* median, third quartile, interquartile range.

Fraction. A number expressible in the form a/b where a is a whole number and b is a positive whole number. (The word *fraction* in these standards always refers to a nonnegative number.) *See also* rational number.

Independently combined probability models. Two probability models are said to be combined independently if the probability of each ordered pair in the combined model equals the product of the original probabilities of the two individual outcomes in the ordered pair.

Integer. A number expressible in the form a or $-a$ for some whole number a.

Interquartile Range. A measure of variation in a set of numerical data, the interquartile range is the distance between the first and third quartiles of the data set. Example: For the data set $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$, the interquartile range is $15 - 6 = 9$. *See also* first quartile, third quartile.

Laws of arithmetic. See Table 3 in this Glossary.

Line plot. See dot plot.

Mean. A measure of center in a set of numerical data, computed by adding the values in a list and then dividing by the number of values in the list.[6] Example: For the data set $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$, the mean is 21.

Mean absolute deviation. A measure of variation in a set of numerical data, computed by adding the distances between each data value and the mean, then dividing by the number of data values. Example: For the data set $\{2, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$, the mean absolute deviation is 20.

Median. A measure of center in a set of numerical data. The median of a list of values is the value appearing at the center of a sorted version of the list—or the mean of the two central values, if the list contains an even number of values. Example: For the data set $\{2, 3, 6, 7, 10, 12, 14, 15, 22, 90\}$, the median is 11.

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3 Adapted from Wisconsin Department of Public Instruction, http://dpi.wi.gov/standards/mathglos.html, accessed March 2, 2010.

4 Adapted from Wisconsin Department of Public Instruction, *op. cit.*.

5 Many different methods for computing quartiles are in use. The method defined here is sometimes called the Moore and McCabe method. See Langford, E., "Quartiles in Elementary Statistics," *Journal of Statistics Education* Volume 14, Number 3 (2006),

6 To be more precise, this defines the *arithmetic mean*.

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Multiplication and division within 100. Multiplication or division of whole numbers with whole number answers, and with product or dividend at most 100. Example: $72 \div 8 = 9$.

Multiplicative inverses. Two numbers whose product is 1 are multiplicative inverses of one another. Example: $3/4$ and $4/3$ are multiplicative inverses of one another because $3/4 \times 4/3 = 4/3 \times 3/4 = 1$.

Properties of equality. See Table 4 in this Glossary.

Properties of inequality. See Table 5 in this Glossary.

Properties of operations. Associativity and commutativity of addition and multiplication, distributivity of multiplication over addition, the additive identity property of 0, and the multiplicative identity property of 1.See Table 3 in this Glossary.

Probability. A number between 0 and 1 used to quantify likelihood for processes that have uncertain outcomes (such as tossing a coin, selecting a person at random from a group of people, tossing a ball at a target, testing for a medical condition).

Rational number. A number expressible in the form a/b or $-a/b$ for some fraction a/b. The rational numbers include the integers.

Related fractions. Two fractions are said to be related if one denominator is a factor of the other.[7]

Rigid motion. A transformation of points in space consisting of one or more translations, reflections, and/or rotations. Rigid motions are here assumed to preserve distances and angle measures.

Sample space. In a probability model for a random process, a list of the individual outcomes that are to be considered.

Scatter plot. A graph in the coordinate plane representing a set of bivariate data. For example, the heights and weights of a group of people could be displayed on a scatter plot.[8]

Similarity transformation. A rigid motion followed by a dilation.

Tape diagrams. Drawings that look like a segment of tape, used to illustrate number relationships. Also known as strip diagrams, bar models or graphs, fraction strips, or length models.

Teen number. A whole number that is greater than or equal to 11 and less than or equal to 19.

Third quartile. For a data set with median M, the third quartile is the median of the data values greater than M. Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the third quartile is 15. *See also* median, first quartile, interquartile range.

Uniform probability model. A probability model in which the individual outcomes all have the same probability ($1/N$ if there are N individual outcomes in the sample space). If a given type of outcome consists of M individual outcomes, then the probability of that type of outcome is M/N. Example: if a uniform probability model is used to model the process of randomly selecting a person from a class of 32 students, and if 8 of the students are left-handed, then the probability of randomly selecting a left-handed student is $8/32$ (equivalently $1/4$, 0.25 or 25%).

Whole numbers. The numbers 0, 1, 2, 3, ….

[7] See Ginsburg, Leinwand and Decker (2009), *Informing Grades 1-6 Mathematics Standards Development: What Can Be Learned from High-Performing Hong Kong, Korea, and Singapore?*, Table A1, p. A-5, grades 3 and 4.

[8] Adapted from Wisconsin Department of Public Instruction, *op. cit.*.

DRAFT

TABLE 1. Common addition and subtraction situations.[9]

	Result Unknown	Change Unknown	Start Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? $2 + 3 = ?$	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? $2 + ? = 5$	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? $? + 3 = 5$
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? $? - 2 = 3$

	Total Unknown	Addend Unknown	Both Addends Unknown[10]
Put Together/ Take Apart[11]	Three red apples and two green apples are on the table. How many apples are on the table? $3 + 2 = ?$	Five apples are on the table. Three are red and the rest are green. How many apples are green? $3 + ? = 5, \ 5 - 3 = ?$	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? $5 = 0 + 5, 5 = 5 + 0$ $5 = 1 + 4, 5 = 4 + 1$ $5 = 2 + 3, 5 = 3 + 2$

	Difference Unknown	Bigger Unknown	Smaller Unknown
Compare[12]	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? ("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? $2 + ? = 5, \ 5 - 2 = ?$	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? $2 + 3 = ?, \ 3 + 2 = ?$	(Version with "more"): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with "fewer"): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? $5 - 3 = ?, \ ? + 3 = 5$

[9] Adapted from Box 2-4 of National Research Council (2009, op. cit., pp. 32, 33).
[10] These *take apart* situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean *makes* or *results in* but always does mean *is the same number as*.
[11] Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation especially for small numbers less than or equal to 10.
[12] For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using *more* for the bigger unknown and using *less* for the smaller unknown). The other versions are more difficult.

DRAFT

TABLE 2. Common multiplication and division situations.[13]

	Unknown Product	**Group Size Unknown** ("How many in each group?" Division)	**Number of Groups Unknown** ("How many groups?" Division)
	$3 \times 6 = ?$	**$3 \times ? = 18$ and $18 \div 3 = ?$**	**$? \times 6 = 18$ and $18 \div 6 = ?$**
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example*. You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example*. You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example*. You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays,[14] Area[15]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example*. What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example*. A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example*. A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs \$6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example*. A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs \$18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example*. A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs \$18 and a blue hat costs \$6. How many times as much does the red hat cost as the blue hat? *Measurement example*. A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	$a \times b = ?$	$a \times ? = p$ and $p \div a = ?$	$? \times b = p$ and $p \div b = ?$

[13] The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.
[14] The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.
[15] Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

DRAFT

TABLE 3. The laws of arithmetic, including the properties of operations (identified with °). Here a, b and c stand for arbitrary numbers in a given number system. The laws of arithmetic apply to the rational number system, the real number system, and the complex number system.

°*Associative law of addition*	$(a + b) + c = a + (b + c)$
°*Commutative law of addition*	$a + b = b + a$
°*Additive identity property of 0*	$a + 0 = 0 + a = a$
Existence of additive inverses	For every a there exists $-a$ so that $a + (-a) = (-a) + a = 0$.
°*Associative law of multiplication*	$(a \times b) \times c = a \times (b \times c)$
°*Commutative law of multiplication*	$a \times b = b \times a$
°*Multiplicative identity property of 1*	$a \times 1 = 1 \times a = a$
Existence of multiplicative inverses	For every $a \neq 0$ there exists $1/a$ so that $a \times 1/a = 1/a \times a = 1$.
°*Distributive law of multiplication over addition*	$a \times (b + c) = a \times b + a \times c$

TABLE 4. The properties of equality. Here a, b and c stand for arbitrary numbers in the rational, real, or complex number systems.

Reflexive property of equality	$a = a$
Symmetric property of equality	If $a = b$, then $b = a$.
Transitive property of equality	If $a = b$ and $b = c$, then $a = c$.
Addition property of equality	If $a = b$, then $a + c = b + c$.
Subtraction property of equality	If $a = b$, then $a - c = b - c$.
Multiplication property of equality	If $a = b$, then $a \times c = b \times c$.
Division property of equality	If $a = b$ and $c \neq 0$, then $a \div c = b \div c$.
Substitution property of equality	If $a = b$, then b may be substituted for a in any expression containing a.

DRAFT

TABLE 5. The properties of inequality. Here a, b and c stand for arbitrary numbers in the rational or real number systems.

Exactly one of the following is true: $a < b$, $a = b$, $a > b$.
If $a > b$ and $b > c$ then $a > c$.
If $a > b$, then $b < a$.
If $a > b$, then $-a < -b$.
If $a > b$, then $a \pm c > b \pm c$.
If $a > b$ and $c > 0$, then $a \times c > b \times c$.
If $a > b$ and $c < 0$, then $a \times c < b \times c$.
If $a > b$ and $c > 0$, then $a \div c > b \div c$.
If $a > b$ and $c < 0$, then $a \div c < b \div c$.

DRAFT

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Appendix B1-4

International Benchmarking of Common Core Standards

The following is information on international benchmarking of the Common Core Standards provided by the Council of Chief State School Officers.

International Benchmarking and the Common Core

The Common Core State Standards (CCSS) are designed to be **college- and career-ready** and **internationally benchmarked**. To that end, the development process included the review and consideration of many sources, including research studies, existing standards from the U.S and abroad, and the professional judgment of teachers, content area experts, and college faculty. This paper will briefly describe how international benchmarking was used to develop the CCSS.

What documents were used to ensure that the CCSS were internationally benchmarked?
To ensure that the standards prepare students to be globally competitive, the development team used a number of sources, including: the frameworks for PISA and TIMSS; the International Baccalaureate syllabi; the American Institutes for Research report, **Informing Grades 1-6 Mathematics Standards Development: What Can Be Learned From High-Performing Hong Kong, Korea, and Singapore** and; the A+ Composite found in **A Coherent Curriculum: The Case for Mathematics *by Bill Schmidt, Richard Houang, and Leland Cogan.***

In addition, the development team looked to the standards of a number of individual countries and provinces to inform the content, structure and language of the CCSS. In *mathematics*, twelve set of standards were selected to help guide the writing of the standards: Belgium, Canada [Alberta], China, Chinese Taipei, England, Finland, Hong Kong, India, Ireland, Japan, Korea, and Singapore.[1] In *English language arts*, the writing team looked closely at ten sets of standards from Australia (New South Wales and Victoria), Canada (Alberta, British Columbia, and Ontario), England, Finland, Hong Kong, Ireland, and Singapore.[2]

How were the international benchmarks used to inform the development of the CCSS?
The goal of the international benchmarking in the common core state standards development process was to ensure that the CCSS are as rigorous as comparable standards in the high-performing and other countries. However, the use of international benchmarks as evidence is no easy feat; it is not simply a matter of identifying the "best" source and copying it, or of aggregating all viable sources to find some set of shared expectations. Rather, international benchmarks were used to guide critical decisions in the following areas:

[1] Eight of these were high-performers on either TIMSS, PISA or both: Belgium, Canada [Alberta], Chinese Taipei, Finland, Hong Kong, Japan, Korea, and Singapore. England and Ireland, which have uneven performances on international assessments, were included because of their cultural links to the United States. China and India were included because of their growing global competitiveness.

[2] Differences in language have a greater impact on the teaching and learning of language arts than of mathematics, so the teams looked primarily at English-speaking countries. All were high-performers on PISA except Singapore, which did not participate, and England, which as in mathematics was selected partly for its cultural links to the United States.

- *Whether particular content should be included:* One of the principal ways international standards were used in this development process was as a guide when making tough decisions about whether content should be included or excluded.
- *When content should be introduced and how that content should progress*: The progression of topics in the international mathematics standards helped the development team make decisions about when to introduce topics in the CCSS as well as when to stop focusing on them.
- *Ensuring focus and coherence*: Standards from other countries tend to be very focused, including only what is absolutely necessary.
- *Organizing and formatting the standards*: Certain organizational aspects or characteristics of international standards that promoted clarity and ease of reading and use served as a model for the CCSS.
- *Determining emphasis on particular topics in standards*: Where emphasis on particular topics was found repeatedly in international standard, this was instructive in determining their importance for inclusion in the CCSS.

* * * * *

When the final version of the K-12 Common Core State Standards is released, it will be accompanied by a discussion of the evidence that was used in their development. In the meantime, the evidence from the September 2009 draft of the College and Career Ready Standards is available: The URL for the ELA document is http://www.corestandards.org/Files/ELAEvidence.pdf, and the URL for the mathematics document is http://www.corestandards.org/Files/MathEvidence.pdf.

Appendix B2-1

PARCC Consortium MOU

PARTNERSHIP FOR ASSESSMENT OF READINESS FOR COLLEGE AND CAREERS
MEMORANDUM OF UNDERSTANDING

Purpose. This document commits states to participate in the Partnership for Assessment of Readiness for College and Career, a state-led consortium that will collaborate on the development of common, high-quality assessments aligned to the Common Core State Standards (CCSS) in English language arts and mathematics for grades 3-8 and high school. The primary goal of the Partnership's work is to measure and document students' college and career readiness against common academic standards and to measure students' progress toward this target throughout the rest of the system.

While participating in the Partnership demonstrates the state's commitment to pursue a common assessment system that enables comparisons against the CCSS across all Partnership states, it does not commit the state to a specific assessment design at this point. Partnership states are still considering several options for the design of a common assessment system in pursuit of the Race to the Top (RTTT) Comprehensive Assessments Grant and will not be asked to commit to the Partnership's application until a later date. Until that time, all participating states will have the opportunity to contribute to and shape the Partnership's proposal.

Preliminary Design Principles. Partnership states have identified the following major purposes and uses for the assessment system. As the Partnership collaborates to develop its application for the RTTT assessment competition, these purposes will guide its work.

- The primary purpose is to measure and document students' **college and career readiness** and to measure students' progress toward this target throughout the rest of the system. Students meeting the college and career readiness standards will be eligible for placement into entry-level credit-bearing, rather than remedial, courses in public 2- and 4-year postsecondary institutions in participating states.

- Additionally, the partnership is committed to ensuring that the assessment results:
  - Are **comparable across states** at the student level;
  - Meet **internationally rigorous benchmarks**;
  - Support valid assessment of **student longitudinal growth**; and
  - Serve as a **signal for good instructional practices**.

- The results must be able to support multiple levels and forms of accountability including:
  - Decisions about **promotion and graduation for individual students**,
  - **Teacher and leader evaluations**, and
  - **School accountability** determinations.

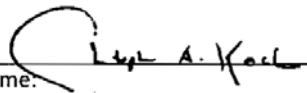
Roles and Responsibilities of Partnership States. The Partnership will employ a multi-level governance and management structure designed to guide the partnership through the submission of the proposal.

- The **Governing States** are comprised of a representative group of leaders from Partnership states that are committed to implementing the assessment system developed by the partnership, should it win a grant from the Race to the Top Comprehensive Assessment System competition, and are responsible for guiding the proposal development process. Each Governing State will commit a team comprised of the chief, assessment director, and other key officials from the SEA, Governor's office, and higher education as appropriate.
- The **Proposal Design Team** will include officials from partnership states who will work with an advisory group of national and international experts to create an assessment system design for the Partnership's proposal. The design team will include as many states as are interested in and capable of contributing to and shaping the design of the proposed next generation assessment system.

- **Participating States** will include other partnership states that are unable to provide staff time to the design team but will provide rapid feedback on drafts of the proposal through the development phase.

State Commitment. This memorandum of understanding is voluntary and non-binding for states. States signing this MOU should do so with the intent of continuing in the Partnership through the proposal development, assessment development, and implementation phases. However, there will be an opportunity for states re-assess their participation in the Partnership before it submits its application for a Race to the Top Comprehensive Assessment Systems Grant by June 23, 2010.

Agreement. The undersigned state leader agrees to the process and structure as described above and attests accordingly by his/her signature below.

Signature(s) for the State of: Illinois	
Authorized State Signature: 	
Name: Christopher A. Koch, Ed.D.	Date: May 11, 2010
Title: State Superintendent of Education	

Appendix B2-2

PARCC Consortium Participants

(as of May 25, 2010)

1. Alabama
2. Arizona
3. Arkansas
4. California
5. Colorado
6. Delaware
7. District of Columbia
8. Florida
9. Georgia
10. Hawaii
11. Illinois
12. Indiana
13. Kentucky
14. Louisiana
15. Maryland
16. Massachusetts
17. Mississippi
18. New Hampshire
19. New Jersey
20. New York
21. North Dakota
22. Ohio
23. Oklahoma
24. Pennsylvania
25. Rhode Island
26. South Carolina
27. Tennessee

Total: 27 States

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