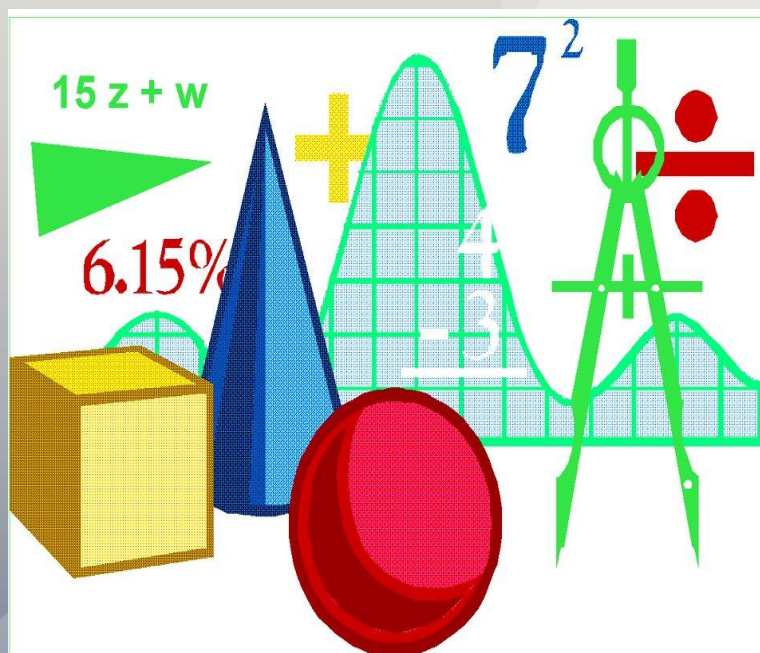


High School

Implementing the Mathematics Common
Core State Standards



A Teacher's Guide to the PARCC Model Content Frameworks

Mathematics

Model Content Frameworks

www.parcconline.org

What are the Model Content Frameworks?

The Model Content Frameworks are offered by PARCC to assist state and local curriculum directors, teachers and administrators in the transition to the Common Core State Standards (CCSS) and to help inform curriculum, instruction and assessment. Partnership for the Assessment of Readiness for College and Careers (PARCC), is a consortium of 23 states working together to develop next generation assessments. The final version of the Model Content Frameworks (MCF) was released in August 2012. The purpose of the MCF is to support implementation of CCSS, as well as to inform development of item specifications. The MCF can assist in evaluating resources and provide awareness of the necessary balance of tasks concerning conceptual understanding, procedural skill, fluency, application and problem solving, as defined in the standards. The MCF does not provide a scope and sequence to the courses, but does define key advances and dependencies where one concept leads to another concept within a grade level. The MCF serves as a bridge between the Common Core State Standards and the PARCC assessments. They were created to provide a frame for the developers of the PARCC assessments.

What are the five claims?

The PARCC assessments are based on five claims to measure the knowledge, skills and understandings essential to achieving college and career readiness.

- ❖ Students solve problems involving the major content for their grade level with connections to practices.
- ❖ Students solve problems involving the additional and supporting content for their grade level with connections to practices.
- ❖ Students express mathematical reasoning by constructing mathematical arguments and critiques.
- ❖ Students solve real world problems engaging particularly in the modeling practice.
- ❖ Students demonstrate fluency in areas set forth by the Standards for Content.

Where to Start?

The Standards for Mathematical Content are arranged differently in high school than in K-8. In high school, the content standards are organized by conceptual category. Therefore, the Model Content Frameworks provide end-of-course assessment boundaries for the three courses in the integrated pathway (Math I, II and III) and the three courses in the traditional pathway (Algebra I, Geometry, and Algebra II).

The High School Model Content Frameworks Course Specific Analysis includes:

❖ Individual end-of-course overviews

- The chart at the end of each course description lists each of the clusters and an emphasis to encourage focus.
 - Green indicates the **major** work in the grade.
 - Blue indicates **supporting** content.
 - Yellow denotes **additional** content.
- **Major** content identifies where the majority of instructional time and focus should be. PARCC has said that at least 70% of the assessment will focus on the major content clusters.
- **Supporting** standards are designed to strengthen the areas of major emphasis. Connections of supporting to the major clusters are provided.
- **Additional** are those standards that do not connect tightly or explicitly to the major work.
- This chart lists the specific standards as a **numerical list of standards in parentheses**.
- Note that an entire cluster may not be included in one course.
- Standards that are underlined will be assessed on more than one end-of-course assessment.
- Delineation on what the scope of that standard per course will be is available in the Assessment Limit Sections

❖ Key advances from previous grades or courses

- Highlights grade-to-grade steps in the progression of knowledge and skill

❖ Discussion of Mathematical Practices in relation to course content

- Highlights opportunities to connect content and practice within the context of working a problem. Separating the practices from the content is not what the standards require.
- The Standards for Mathematical Practice should be embedded in classroom instruction, discussions, and activities.
- Students need the opportunity to experience designed standards-based mathematical tasks that vary in difficulty, context and type.
- The practice standards interact and overlap with each other. Like the content standards, the practice standards should not be used as a checklist, but placed where organic connections can be made between the content and practices.
- Modeling with mathematics is a conceptual category, as well as a practice standard in high school. Modeling standards are marked with a star in the CCSSM to emphasize places for problems to look at the content connections to everyday life, society and the workplace.

❖ Fluency recommendations

- The high school standards do not explicitly set fluency requirements. But, fluency in algebra helps students get past computational detail to see the overall structure and patterns of problems.
- Fluency is an outcome of a progression of learning and thoughtful practice and does not come at the expense of understanding

❖ Pathway summary tables

- Each table shows one pathway with the three end-of-course assessments' standards.
- Each **required standard** (not including the + standards) with the sub-parts is listed with a **dot** in each course that it is assessed in.

- Standards that are assessed in more than one course are shown as shaded cells.
- ❖ **Assessment limit tables for standards assessed on more than one end-of-course test**
- An explanation is given for the limits of each standard that is assessed in more than one course.
- Some examples are for standards that address multiple types of functions, this table would explain which standards would be assessed in each course.

The High School Model Content Frameworks General Analysis includes:

- ❖ **Opportunities for connections among standards, clusters, domains or conceptual categories**
 - Highlights opportunities to connect content in assessment, curriculum and instruction.
 - Avoid using the standards as a disparate checklist.
- ❖ **Opportunities for connecting mathematical content and mathematical practices**
 - Highlights opportunities to connect content and practice across course boundaries.
 - The practice standards interact and overlap with each other. Like the content standards, the practice standards should not be used as a checklist, but placed where organic connections can be made between the content and practices.
 - Modeling with mathematics is a conceptual category, as well as a practice standard in high school.

How do I use the Model Content Frameworks?

- ❖ Use the **major**, **supporting** and **additional** clusters to inform instructional decisions on time and resources.
- ❖ Use the **supporting** clusters and Standards for Mathematical Practice to highlight the focus on the **major** work through sense-making, reasoning, critiquing, modeling, etc.
- ❖ Evaluate instructional materials and professional development ideas based on the **major**, **supporting** and **additional** clusters.
- ❖ **Do not** simply sort clusters from major to supporting and teach them in that order. Coherence is one of the key shifts of the CCSSM.
- ❖ **Do** refer to the progression documents for more information regarding sequence of instruction. <http://ime.math.arizona.edu/progressions/>
- ❖ Use in conjunction with the CCSSM. Despite the fact that only the clusters are listed in the MCF, the individual wording of each content standard is important. <http://www.corestandards.org/the-standards>
- ❖ Don't use the MCF or the CCSSM to do cross-walk exercises. The analysis of curricular materials is more than just topic-matching. Each standard is very specific and needs to be addressed with precision.

What should I know about focus and coherence?

The standards are based on focus and coherence. Focus allows time for deep rich discussions and interactions, so students have sufficient time to think, practice and

integrate new ideas into their growing knowledge structure. Coherence requires connections both in grade and across grade level progressions. Coherence also needs to occur between the content and practice standards. Focus and coherence recognize that the standards are not a checklist, nor should they be fragmented to meet mastery.

- ❖ An **emphasis on modeling** weaves through algebra, function, geometry and statistics.
- ❖ The standards **focus on crucial material** so that students can have more time to discuss, reflect upon and practice.
- ❖ A number of individual content standards use the word “**understand**” in connection with important mathematical concepts. The CCSSM states “There is a world of difference between a student who can summon a mnemonic device and a student who can explain where the mnemonic comes from.

PARCC’s recommended list of resources:

<http://ime.math.arizona.edu/progressions/>

<http://illustrativemathematics.org>

<http://commoncoretools.wordpress.com>

<http://www.achieve.org/files/TriState-Mathematics-Quality-RubricFINAL-May2012.pdf>

<http://www.achieve.org/achieving-common-core>

Standards for Mathematical Practices

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

Notes Regarding the High School Pathways

There have been multiple high school scopes and/or sequences published in the last two years. Keep in mind; every set of pathways has the same set of standards. The Common Core State Standards for Mathematics do not change, just the placement in the high school course. Each scope and sequence gives two high school pathway possibilities: integrated (Math I, II, and III) and traditional (Algebra I, Geometry and Algebra II). Here are descriptions of each of these publications.

1. Appendix A: This sequence was created by the authors of the CCSSM and has frequently been attached to the CCSSM document itself. <http://www.corestandards.org/the-standards> This plan breaks the standards into courses and units within each pathway. An explanation with a clear delineation is provided for any standards that are in more than one grade level in a

- particular pathway. The Algebra 1 focus is on linear, quadratic and exponential functions.
2. The Brad Findell and Dan Callahan Scope and Sequence: This was posted on Bill McCallum's blog and is a multi-colored table in pdf form.
<http://commoncoretools.me/2012/03/16/arranging-the-high-school-standards-into-courses/>
There is no indication of origin on the actual document, but the title at the top of the traditional page says "Grade 9: Algebra One". This was done with Gates funding and differs from both Appendix A and the PARCC Model Content Frameworks.
 3. In November 2011, PARCC released a draft of the Model Content Frameworks (MCF). It did not specify which standards would be assessed at each grade-level, but did give expectations of what functions they anticipated in each course. They did make a general statement that Algebra 1 would focus on linear and quadratic functions.
 4. In June 2012, PARCC released a more specific draft of the high school pathways. They listed which standards would be assessed at the end of each pathway. In the cases of standards that were in more than one course, they laid out which part of the standard would be assessed in each grade. PARCC solicited public review and comment.
 5. In August 2012, PARCC released the final version of the Model Content Frameworks.
<http://www.parcconline.org/parcc-model-content-frameworks> This is very similar to the June release, but still significantly different than the other versions listed, including Appendix A. Some things to be aware of:
 - a. The PARCC MCF does not give an order within the course, but specifies only what will be assessed by the end of the year. In-course sequencing is still being left to the teacher/school/district.
 - b. PARCC has identified standards in each course as being major, supporting or additional. Seventy percent of the assessment will focus on the major clusters.
 - c. More functions are specified at the Algebra 1 and Math 1 level in the MCF. Algebra 1 focuses on linear, quadratic, and exponential functions with domain in the integers. It also suggests work with the piecewise functions (including step and absolute value), square root and cube root in several standards, unlike Appendix A.
 - d. The PARCC MCF does state, "In Algebra 1, students will master linear and quadratic functions. Students encounter other kinds of functions to ensure that general principles are perceived in generality" (MCF p. 8). This implies that despite the exposure to some of the more advanced functions, the longer amount of time will be spent on linear and quadratic.
 - e. The unit on probability has moved from Algebra 1 in Appendix A to Geometry in the PARCC MCF.
 - f. There were minor changes from the June version. Some of which include: A.CED.1, F.IF.3 and F.LE.2 are now standards that are assessed in both Algebra 1 and Algebra 2. These standards will now be split into sub-parts to be assessed in each of these courses.
 - g. F.LE.1, 2 and 3, G.CO.1, 2, 3 and 4 are within major clusters in the integrated pathway, but supporting clusters in the traditional pathway.
 - h. A.SSE.3, A.APR.2 and 3 are within major clusters in the traditional pathway and supporting clusters in the integrated pathway.