9th – 10th Grade
Science and Technical Subjects

A Teacher's Guide to the Literacy Standards in Science and Technical Subjects

Model Content Frameworks

Although PARCC has not designed Model Content Frameworks for History/Social Studies and Science/Technical Subjects, the following information will assist district staff in understanding the design of these tools. Illinois has chosen to move ahead with a teacher's guide for 6-12 Content Areas that compliments the 3rd – 11th grade teacher guides based on the PARCC information.

The Model Content Frameworks are voluntary resources offered by PARCC to help curriculum developers and teachers as they work to implement the standards in their states and districts. The Model Content Frameworks offer one way of organizing the standards — in this instance into quarterly modules. Equally successful models could be based around semesters, trimesters or other school schedules. Model Content Frameworks allow educators the flexibility to order the modules and the content within the modules in any way that suits their desired purposes. Because the knowledge and skills embedded across the four modules address all the standards for a given grade level, the order in which the four modules may be used is not critical. The Model Content Frameworks are designed with the following purposes in mind:
1. Supporting implementation of the Common Core State Standards, and
2. Informing the development of item specifications and blueprints for the **PARCC assessments** in grades 3–8 and high school.

The proposed **PARCC Assessment System** will be designed to measure knowledge, skills and understandings essential to achieving college and career readiness. In ELA/Literacy, these include the following areas as defined by the standards:
Reading complex texts:
1. This requires students to read and comprehend a range of grade-level complex texts, including texts from the domains of ELA, science, history/social studies, technical subjects and the arts.
2. Because vocabulary is a critical component of reading comprehension, it will be assessed in the context of reading passages.
3. Students are expected to conduct close, analytic readings as well as compare and synthesize ideas across texts.

Each module suggests both the number and types of texts that students read and analyze. Students then write about these texts either to express an opinion/make an argument or to inform/explain. In addition, research and narrative writing tasks appear in each module.

Writing effectively when using and/or analyzing sources:
This requires students to demonstrate the interrelated literacy activities of reading, gathering evidence about what is read, as well as analyzing and presenting that evidence in writing.
Conducting and reporting on research:
 This expands on "writing when analyzing sources" to require students to demonstrate their ability to
1. gather resources,
2. evaluate their relevance, and
3. report on information and ideas they have investigated (i.e., conducting research to answer questions or to solve problems).

The importance of the above skills is reflected in the emphasis the Model Content Frameworks place on students' needing regular opportunities to grapple with the **close, analytic reading** of grade-level complex texts and to construct increasingly sophisticated **responses in writing**. The Model Content Frameworks therefore provide a helpful guide in preparing students for the future **PARCC assessments**.

9th – 10th Grade Model Curriculum for Science and Technical Texts

Optional model to consider when constructing a year long course of instruction.

1st Quarter-Length Module

Reading Science and Technical Texts

Strive to infuse as many of the following reading standards into each quarter as possible, making sure to amply cover them all to proficiency by the end of the 1oth grade year.

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- ☐ Cite specific textual evidence to support analysis of science and technical texts attending to the precise details of explanations and descriptions
- ☐ Determine the central ideas or conclusions of a text
- ☐ Trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text
- ☐ Follow precisely a complex multistep procedure when carrying out experiments, taking measurements or performing technical tasks, attending to special cases or exceptions defined in the text
- ☐ Determine the meanings of symbols, key terms, and other domain-specific words and phrases

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Teach these skills with the content that students read.

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- ☐ Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy)
- ☐ Analyze the author's purpose in providing an explanation, describing a procedure or discussing an experiment in a te**x**t defining the question the author seeks to address
- ☐ Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words
- ☐ Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem
- ☐ Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts

Writing About Texts

Write Routinely Over Extended Time Frames and for a Range of Discipline-Specific Tasks, Purposes and Audiences

- • Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose and audience.
- • Develop and 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
- • Use technology, including the internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically

Writing Arguments

- ☐ Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons and evidence
- ☐ Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates knowledge level and concerns
- ☐ Use words, phrases, and clauses to link the major sections of a text, create cohesion and clarify the relationships between claim(s), and reasons, between reasons and evidence, and between claim(s) and counterclaims
- ☐ Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing
- ☐ Provide a concluding statement or section that follows from and supports the argument presented

Writing Research Projects

- ☐ Conduct short as well as more sustained research projects to answer a question (including a self-generated question)or solve a problem, narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation
- ☐ Gather relevant information from multiple authoritative print and digital sources, using advance searches effectively
- ☐ Assess the usefulness of each source in answering the research question
- ☐ Integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation
- ☐ Draw evidence from informational texts to support analysis, reflection and research

9th – 10th Grade Model Curriculum for Science and Technical Texts

2nd Quarter-Length Module

Reading Science and Technical Texts

Strive to infuse as many of the following reading standards into each quarter as possible, making sure to amply cover them all to proficiency by the end of the 1oth grade year.

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- ☐ Cite specific textual evidence to support analysis of science and technical texts attending to the precise details of explanations and descriptions
- ☐ Determine the central ideas or conclusions of a text
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- ☐ Follow precisely a complex multistep procedure when carrying out experiments, taking measurements or performing technical tasks, attending to special cases or exceptions defined in the text
- ☐ Determine the meanings of symbols, key terms, and other domain-specific words and phrases
- ☐ Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy)
- ☐ Analyze the author's purpose in providing an explanation, describing a procedure or discussing an experiment in a te**x**t defining the question the author seeks to address
- ☐ Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into Distinguish among facts, reasoned judgment based on research findings, and speculation in a text
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Writing About Texts

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- • Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose and audience.
- • With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
- • Use technology, including the internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

Writing Informative/Explanatory Texts, Including the Narration of Scientific Procedures/Experiments or Technical Processes

- ☐ Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., heading), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension
- ☐ Develop the topic with well-chosen, relevant and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic
- ☐ Use varied transitions and sentence structures to link the major sections of the text, create cohesion and clarify the relationships among ideas and concepts
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3rd Quarter-Length Module

Reading Science and Technical Texts

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Taken from www.corestandards.org

Elements, Euclid

"Classifying the Stars", Cannon, Annie J.
Students *cite specific textual evidence* from Annie J. Cannon's "Classifying the Stars" *to support their analysis of* the scientific importance of the discovery that light is composed of many colors. Students *include* their *analysis precise details* from the text (such as Cannon's repeated use of the image of the rainbow) to buttress their explanation. [RST.9-10.1]

"Amusement Park Physics", Walker, Jeari
Students determine how Jearl Walker clarifies the phenomenon of acceleration in his essay "Amusement Park Physics" accurately summarizing his conclusions regarding the physics of roller coasters and tracing how supporting details regarding the processes of rotational dynamics and energy conversion are incorporated in his explanation. [RST.9-10.2]

The Hot Zone: A Terrifying True Story, Preston, Richard

Life By the Numbers, Devlin, Keith

The Race to Save Lord God Bird, Hoose, Phillip
Students read in Phillip Hoose's Race to Save Lord God Bird about the attempts scientists and bird-lovers made to save the ivory-billed woodpecker from extinction and *assess the extent to which the reasoning and evidence* Hoose presents *supports his scientific analysis* of why protecting this particular species was so challenging. [RST.9-10.8]

The Story of Science: Newton at the Center, Hakim, Joy

Circumference: Eratosthenes and the Ancient Quest to Measure the Globe, Nicastro, Nicholas

Recommended Levels of Insulation, U.S. Environmental Protection Agency/U.S. Department of Energy