



Arizona's College and Career Ready Standards

English Language Arts and Literacy in Science and Technical Subjects

Explanations and Examples

Grades 6-8

ARIZONA DEPARTMENT OF EDUCATION
HIGH ACADEMIC STANDARDS FOR STUDENTS

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Grades 6-8: Literacy in Science and Technical Subjects Explanations and Examples

Introduction to Reading Standards

Reading is critical to building knowledge in history/social studies as well as in science and technical subjects. 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 texts 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.

The explanations and examples are intended to be used as a guide to provide possible strategies for incorporating the reading and writing standards within a science and technical subjects classroom; they are not classroom requirements nor do they represent the only approaches to teaching these standards.

Reading Standards for Literacy in Science and Technical Subjects – Explanations and Examples

Reading Standards for Literacy in Science and Technical Subjects (RST)	
Key Ideas and Details	
<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.RST.1. Cite specific textual evidence to support analysis of science and technical texts.</p>	<p>Students examine the details of scientific or technical text to support their analysis of the document. Supporting evidence could include citing evidence that supports the author's claim or conclusion, purpose, or perspective; evidence that supports the credibility and validity of the text, including research design or sample size; date of publication; visual representations of data and findings; or whether the supporting research has been peer reviewed.</p> <p>Common science texts could include magazine or newspaper articles, journal articles, science textbooks, online resources, and personal narratives.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Read a news article about the extent of damage caused by a hurricane. Cite specific evidence in the article that supports the author's claims of damage (cost of repairs, loss of life, habitat damage, etc.). <i>SC06-S3C1-01</i> • Read an article explaining that dominant traits are not always the most common trait in a population. Cite specific evidence from the article that would support that idea and consider research factors (sample size, sampling methods, etc.) that could further support or weaken that claim. <i>SC08-S4C2-03</i>
<p>6-8.RST.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</p>	<p>Students identify the key ideas of their text and provide an accurate summary for an expository text or sequencing summary for a functional text.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Develop an objective summary of the information provided in the text that does not include personal opinions or perspectives. Possible topics could include: <ul style="list-style-type: none"> ○ Difference between plant and animal cells. <i>SC06-S4C1-04</i> ○ Predator and prey relationships. <i>SC07-S4C3-02</i> ○ Dominant and recessive traits. <i>SC08-S4C2-03</i> • When reading safety considerations or procedures prior to a laboratory activity, identify key safety concerns and/or summarize necessary precautions, such as proper handling procedures for acids/bases, how to use pH paper, or how pH paper works. <i>SC08-S5C1-02</i>



Reading Standards for Literacy in Science and Technical Subjects (RST)

Key Ideas and Details *continued*

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.RST.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p>	<p>Students follow a written lab protocol or sequence of steps to accomplish an activity. Students should pay attention to accuracy and precision when taking measurements.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Follow written instructions for conducting scratch tests to determine the hardness of rocks or using a key to classify rocks by their physical properties. <i>SC07-S6C1-01; SC07-S1C2-01</i> • Follow written instructions for using pH paper to determine whether a substance is an acid or base, demonstrating proper procedures and safety precautions. <i>SC08-S5C1-02; SC08-S1C2-01</i>

Reading Standards for Literacy in Science and Technical Subjects (RST)

Craft and Structure

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.RST.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6–8 texts and topics</i>.</p>	<p>Students determine the meaning of words and phrases as they read science content, including textbooks, lab materials, and other print or electronic sources of information. They use a variety of strategies (context clues, linguistic roots and affixes, restatement, examples, contrast, glossary, etc.) to determine the meaning of words and phrases in the text. This standard specifically addresses domain-specific Tier Three words and interpreting symbols in equations or in diagrams and flow charts.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Read about food chains and food webs, and then identify the linguistic roots and affixes to help them identify the meanings of terms related to trophic levels, such as carnivore, herbivore, omnivore, autotroph, and heterotrophy. <i>SC07-S4C3-01</i> • Determine the meaning of the direction of the arrows in the food chains and food webs (<i>SC07-S4C3-01</i>), rock cycle diagrams (<i>SC07-S6C2-01</i>), or water cycle diagrams. <i>SC06-S6C2-01</i> • Determine the meaning of variables in mathematical equations, such as $f=ma$ (<i>SC08-S5C2-03</i>) or the meaning of symbols in the Periodic Table of Elements. <i>SC08-S5C1-06</i>
<p>6-8.RST.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.</p>	<p>Students identify different structures within a text (headings, sub-headings, bold words, pictures, graphs, data tables, and paragraphs) and explain how the visual structures support, reinforce, or provide additional information to the paragraph text.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Read a section from a textbook and analyze how structures within the text (headers, bold words, embedded definitions, and graphics) help the reader understand the meaning of the text. • Read a research article or lab report and explain the purpose for each section (abstract, materials/methods, analysis, conclusion, etc.) and why the information is organized in that format.
<p>6-8.RST.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.</p>	<p>Examples:</p> <ul style="list-style-type: none"> • Read a science article that describes the procedure for measuring earthquakes and then analyze why the author included the procedure in the text. <i>SC07-S6C2-06</i> • Read a newspaper article that provides information about which constellations are visible this month; the article contains an explanation on how to identify the major constellations. Explain why the author included information on how to identify constellations in the article. <i>SC07-S6C3-05</i>

Reading Standards for Literacy in Science and Technical Subjects (RST)

Integration of Knowledge and Ideas

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.RST.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</p>	<p>Students will use words in a text and information expressed visually to obtain information about a given topic. Sources of text could include textbooks, magazine or newspaper articles, websites, or product information or safety sheets.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Integrate written descriptions in a textbook with visual images of the rock cycle (<i>SC07-S6C2-01</i>) or water cycle. <i>SC06-S6C2-01</i> • Integrate written descriptions of cell structures to a labeled model of a plant or animal cell. <i>SC06-S4C1-02</i> • Integrate written descriptions of weather systems on a website with graphical representations of weekly weather data. <i>SC06-S6C2-05</i> • Integrate written descriptions in a lab journal of measured movement over time with position-time graphs. <i>SC08-S5C2-05</i>
<p>6-8.RST.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.</p>	<p>Examples:</p> <ul style="list-style-type: none"> • Read a letter to the editor that proposes solutions to prevent flooding during summer rainstorms. Analyze the text to identify which claims are supported by evidence and facts in the text and which claims are based on speculation or reasoned judgment. <i>SC06-S3C1-02; ET06-S3C2-03</i> • Read another student's laboratory report and analyze the text to identify which claims in the conclusion section are supported by evidence and facts and which claims are speculation, reasoned judgment, or unsupported by evidence. <i>SC06-S1C3-03; SC08-S1C3-05; ET06-S3C2-03; ET07-S3C2-03; ET08-S3C2-03</i>

Reading Standards for Literacy in Science and Technical Subjects (RST)

Integration of Knowledge and Ideas *continued*

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.RST.9. Compare and contrast the information gained from experiments, simulations, videos, or multimedia sources with that gained from reading a text on the same topic.</p>	<p>Students compare and contrast the information gained (depth and scope of content, author's purpose, and whether the source provides new information or summarizes known information, etc.) from experiments, simulations, video or multimedia sources with information gained from reading a text on the same topic.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Watch a video that shows wind and water erosion, then read text (textbook, trade book, educational website) that provides information about wind and water erosion. Compare and contrast the amount and type of information conveyed by each source and be able to explain how each helps to develop understanding of erosion. <i>SC06-S3C2-03; ET06-S3C2-03</i> • Perform a series of experiments that show different types of evidence of chemical reactions (precipitate, gas, color change, change in temperature). After collecting data, read text that describes different chemical reactions and the different types of evidence of the reaction. Compare and contrast the amount and type of information conveyed by the experiment to that contained in the text and explain how each source of information helps to develop understanding of chemical reactions. <i>SC08-S5C1-03; ET08-S3C1-02</i>



Reading Standards for Literacy in Science and Technical Subjects (RST)

Range of Reading and Level of Text Complexity

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
6-8.RST.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.	Students read and comprehend text in science and technical subjects at the appropriate grade level. See Appendix B of the College and Career Ready State Standards for text examples and sample performance tasks that would be appropriate for the grades 6-8 complexity band.



Grades 6-8: Literacy in Science and Technical Subjects Explanations and Examples

Introduction to Writing Standards

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.

Writing Standards for Literacy in Science and Technical Subjects – Explanations and Examples

Writing Standards for Literacy in Science and Technical Subjects (WHST)

Text Types and Purposes

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.WHST.1. Write arguments focused on <i>discipline-specific content</i>.</p> <p>a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.</p> <p>b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.</p> <p>c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.</p> <p>d. Establish and maintain a formal style.</p> <p>e. Provide a concluding statement or section that follows from and supports the argument presented.</p>	<p>Students write an argument or claim based on an issue or topic included in the grade level Science Standard. The argument is presented with logical reasoning, accurate science content, and relevant data to support the claim. Cohesion and clarification of claims are created with effective word choice, appropriate use of science vocabulary, and writing style. A sound conclusion supports the argument presented.</p> <p>The writers' skill should be evidenced in a clear and developed thesis statement, a logical organization, accurate use of academic vocabulary, and a detailed and supported argument with transitions and a concluding statement.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Write an essay or argument explaining how Cell Theory was a major milestone in science at the time and the implications of that information on science today. <i>SC06-S2C1-02</i> • Write a persuasive essay that forms a logical argument about the importance of habitat restoration of wetlands or reforestation of clear cut areas. <i>SC07-S3C1-02</i> • Write an essay or argument that evaluates the impact of a major scientific development that occurred within the past decade. <i>SC08-S2C1-03</i> • After completing an experiment that compared the motion of a steel ball on different surfaces, write a conclusion that supports or refutes the statement "Rough surfaces provide more friction than smooth surfaces" and provide evidence to support the claim with the experimentally collected data in addition to other existing research. <i>SC08-S5C2-02</i>

Writing Standards for Literacy in Science and Technical Subjects (WHST)

Text Types and Purposes *continued*

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.WHST.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p> <ol style="list-style-type: none"> Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. Use precise language and domain-specific vocabulary to inform about or explain the topic. Establish and maintain a formal style and objective tone. Provide a concluding statement or section that follows from and supports the information or explanation presented. 	<p>Students select and develop an informational topic aligned to the Arizona Science Standards at their grade level. The topic is well-developed using facts, details and examples. Various writing techniques and rich vocabulary are used to provide clarity and cohesion. A strong conclusion supports the information.</p> <p>Examples:</p> <ul style="list-style-type: none"> Write an informative essay about a technological discovery or invention, such as the microscope, and its influence on science and scientific knowledge. <i>SC06-S3C2-04; SC06-S4C1-02</i> Following a lab investigation on plant or animal cells, write a description of procedure used to prepare cells to view through the microscope and/or the procedure for viewing cells through a microscope. Write descriptions of observations, including any claims that can be made from those observations and evidence that supports the claim. <i>SC06-S4C1-02</i> Write an informative essay that explains the interrelationship between the Earth's tides and the Moon. <i>SC07-S6C3-03</i> Write a research paper documenting the history of the periodic table (<i>SC08-S5C1-06</i>) or other historical advancements in science. <i>SC08-S2C1-01</i>

Writing Standards for Literacy in Science and Technical Subjects (WHST)

Text Types and Purposes *continued*

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.WHST.3. (See note; not applicable as a separate requirement)</p> <p>Note: 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 science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.</p>	<p>Students write step-by-step procedures for their experiments that are detailed enough that others would be able to replicate their experiments, models, or designs in order to achieve the same results.</p> <p>Examples:</p> <ul style="list-style-type: none"> • As part of a lab report, write a step-by-step procedure showing safe and correct use of a microscope or balance. <i>SC06-S1C2-01; SC07-S1C2-01; SC08-S1C2-01</i> • As part of a challenge, design and test model cars with the goal of trying to get the car to go down a ramp and then travel the longest distance. Write a technical report that includes appropriate displays of the test data, descriptions and/or illustrations of the car design, and explanations of how preliminary test data was used to refine the car design. <i>SC08-S3C2-03; SC08-S5C2-02</i>

Writing Standards for Literacy in Science and Technical Subjects (WHST)

Production and Distribution of Writing

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.WHST.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <ul style="list-style-type: none"> Produce clear and coherent functional writing (e.g., formal letters, envelopes, procedures, labels, timelines, graphs/tables, experiments, maps, captions, charts, and diagrams) in which the development, organization, and style are appropriate to task, purpose, and audience. 	<p>Examples:</p> <ul style="list-style-type: none"> Write a lab report based on an activity aligned to the grade level Science Standard. In the report, include procedures, tables, graphs, charts, and/or diagrams that communicate the purpose, results, and conclusions of the research. <i>SC06-S1C4; SC07-S1C4; SC08-S1C4</i> Write a letter to the head of a governmental agency or a company, comparing solutions that best address possible solutions for the environmental risks in biological or geological systems. <i>SC07-S3C1-03</i>
<p>6-8.WHST.5. 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.</p>	<p>Students develop and strengthen their writing through the writing process with a focus on purpose and audience. Writing in science utilizes an academic voice and is mostly non-fiction and formal. At this level the writing process students can use peers and adults to provide feedback on drafts of their writing.</p> <p>The writing process and peer/adult review of drafts can be used for any and all writing assignments within the science classroom.</p>
<p>6-8.WHST.6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.</p>	<p>This standard requires the use of technology (Internet, keyboarding skills, formatting, storing) to create a published piece wherein information and ideas are connected and presented clearly and efficiently.</p> <p>Example:</p> <ul style="list-style-type: none"> Use technology to create and publish any writing assignment aligned to the grade level Arizona Science Standard. The written product could be shared on a school or classroom website, blog, or discussion board. <i>ET06-S2C1-01; ET07-S2C1-01; ET08-S2C1-01</i>

Writing Standards for Literacy in Science and Technical Subjects (WHST)

Research to Build and Present Knowledge

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.WHST.7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p>	<p>Students conduct short (1-2 lab periods) research projects or experimental investigations meant to answer a question or solve a problem. Students answer questions - including those they create themselves - through research (online, library and laboratory investigations), to solve a problem. They will use and combine information from multiple sources to construct their claims, evidence, and explanations.</p> <p>Examples:</p> <ul style="list-style-type: none"> • Generate questions about the migration behavior of hummingbirds or monarch butterflies (migration paths, time of year and duration) and then test the question experimentally or by researching published data. <i>SC08-S4C4-05</i> • Following the study of plate boundary movements, formulate a question about how or when a particular landform formed and conduct research using a variety of print and digital resources to make a claim that answers the question; support that claim with evidence gathered during research. <i>SC07-S6C2-05</i>
<p>6-8.WHST.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 while avoiding plagiarism and following a standard format for citation.</p>	<p>Students gather relevant information from a variety of credible print and digital sources (e.g., encyclopedias, Internet websites, experts, journal articles, magazine articles, and textbooks). Students will then use quotations correctly and/or paraphrase information to avoid plagiarism. Citations will be in a standard recognized format (e.g., MLA) in both the text and the bibliography.</p> <p>Example:</p> <ul style="list-style-type: none"> • Following a class discussion about weather-related natural disasters, find information about how people plan for and/or respond to tornadoes or flooding. Use multiple sources and include appropriate quotations and paraphrasing. <i>SC06-S3C1-02</i>
<p>6-8.WHST.9. Draw evidence from informational texts to support analysis, reflection, and research.</p>	<p>Students use evidence from informational texts (e.g., research papers, credible web sites, journal articles, and textbooks) to support their claims, analyses, reflections, and/or research.</p> <p>Example:</p> <ul style="list-style-type: none"> • Following a lab aligned to the grade level Science Standard, make a research claim and then find supporting evidence or scientific principles that support the claim. These additional sources can either be teacher provided or student researched.

Writing Standards for Literacy in Science and Technical Subjects (WHST)

Range of Writing

<u>Standards</u> <i>Students are expected to:</i>	<u>Explanations and Examples</u>
<p>6-8.WHST.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 discipline-specific tasks, purposes, and audiences.</p>	<p>Students should be given multiple opportunities to write about a wide range of science topics aligned to their grade level Science Standard. Writing assignments should be of varying lengths (e.g., one paragraph responses, multiple paragraph essays, and research projects).</p> <p>Examples:</p> <ul style="list-style-type: none"> • Write short explanations of tables or graphs to demonstrate understanding of the displayed data (population graphs, geological timelines, data tables, and/or velocity-time graphs). • Write short explanations of diagrams or images to demonstrate understanding of the illustration (cell models, diagrams of animal digestive or circulatory systems, food webs, rock cycle, and/or models of Earth's structures). • Use reflective journaling as a concluding activity on any topic in a science classroom. • Write a letter to the editor of a paper or magazine critiquing the accuracy, reliability, or validity of a published science article. • Write a research paper or laboratory report about a relevant topic over an extended time period.