WDE

Grade 9-12 Standards

English Language Arts (ELA) (2012) - Grades 9-10

Reading for Literature

Key Ideas and Details

RL.9-10.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RL.9-10.2 Determine a theme or central idea of a text and analyze in detail its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

RL.9-10.3 Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters, and advance the plot or develop the theme.

Craft and Structure

RL.9-10.4 Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language evokes a sense of time and place; how it sets a formal or informal tone).

RL.9-10.5 Analyze how an author's choices concerning how to structure a text, order events within it (e.g., parallel plots), and manipulate time (e.g., pacing, flashbacks) create such effects as mystery, tension, or surprise.

RL.9-10.6 Analyze a particular point of view or cultural experience reflected in a work of literature from outside the United States, drawing on a wide reading of world literature.

Integration of Knowledge and Ideas

RL.9-10.7 Analyze the representation of a subject or a key scene in two different artistic mediums, including what is emphasized or absent in each treatment (e.g., Auden's "Musée des Beaux Arts" and Breughel's *Landscape with the Fall of Icarus*).

RL.9-10.8 (Not applicable to literature)

RL.9-10.9 Analyze how an author draws on and transforms source material in a specific work (e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare).

Range of Reading and Level of Text Complexity

RL.9-10.10 By the end of grade 9, read and comprehend literature, including stories, dramas, and poems, in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 9–10 text complexity band independently and proficiently.

Reading for Informational Text

Key Ideas and Details

RI.9-10.1 Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.9-10.2 Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

RI.9-10.3 Analyze how the author unfolds an analysis or series of ideas or events, including the order in which the points are made, how they are introduced and developed, and the connections that are drawn between them.

Craft and Structure

RI.9-10.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

RI.9-10.5 Analyze in detail how an author's ideas or claims are developed and refined by particular sentences, paragraphs, or larger portions of a text (e.g., a section or chapter).

RI.9-10.6 Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

Integration of Knowledge and Ideas

RI.9-10.7 Analyze various accounts of a subject told in different mediums (e.g., a person's life story in both print and multimedia), determining which details are emphasized in each account.

RI.9-10.8 Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

RI.9-10.9 Analyze seminal U.S. documents of historical and literary significance (e.g., Washington's Farewell Address, the Gettysburg Address, Roosevelt's Four Freedoms speech, King's "Letter from Birmingham Jail"), including how they address related themes and concepts.

Range of Reading and Level of Text Complexity

RI.9-10.10 By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 10, read and comprehend literary nonfiction at the high end of the grades 9–10 text complexity band independently and proficiently.

Writing

Text Types and Purposes

W.9-10.1 Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

- **W.9-10.1.a.** Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.
- **W.9.1-10.b.** Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns.

W.9-10.1.c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

W.9-10.1.d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

W.9-10.1.e. Provide a concluding statement or section that follows from and supports the argument presented.

W.9-10.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

W.9-10.2.a. Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

W.9-10.2.b. 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.

W.9-10.2.c. Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

W.9-10.2.d. Use precise language and domain-specific vocabulary to manage the complexity of the topic.

W.9-10.2.e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

W.9-10.2.f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

W.9-10.3 Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

W.9-10.3.a. Engage and orient the reader by setting out a problem, situation, or observation, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.

W.9-10.3.b. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.

W.9-10.3.c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.

W.9-10.3.d. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.

W.9.3.e. Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

Production and Distribution of Writing

W.9-10.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards W.9.1 through W.9.1.3.)

W.9-10.5 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. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grades 9-10.) W.9.1 through W.9.1.3

W.9-10.6 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.

Research to Build and Present Knowledge

W.9-10.7 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.

W.9-10.8 Gather relevant information from multiple authoritative print and digital sources, using advanced 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.

W.9-10.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

W.9-10.9.a. Apply grades 9–10 Reading standards to literature (e.g., "Analyze how an author draws on and transforms source material in a specific work [e.g., how Shakespeare treats a theme or topic from Ovid or the Bible or how a later author draws on a play by Shakespeare]").

W.9-10.9.b. Apply grades 9–10 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning").

Range of Writing

W.9-10.10 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.

Speaking and Listening

Comprehension and Collaboration

SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

SL.9-10.1.a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

SL.9-10.1.b. Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

SL.9-10.1.c. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

SL.9.1.d. Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

SL.9-10.3 Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.

Presentation of Knowledge and Ideas

SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

SL.9-10.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grades 9–10 Language standards 1 and 3 for specific expectations.)

Language

Conventions of Standard English

L.9-10-10.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

- **L.9-10.1.a.** Use parallel structure.
- **L.9-10.1.b.** Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

L.9-10-10.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

- **L.9.2.a.** Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.
- **L.9-10.2.b.** Use a colon to introduce a list or quotation.
- **L.9-10.2.c.** Spell correctly.

Knowledge of Language

L.9-10.3 Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

- **L.9-10.3.a.** Write and edit work so that it conforms to the guidelines in a style manual (e.g., *MLA Handbook, Turabian's Manual for Writers*) appropriate for the discipline and writing type.

Vocabulary Acquisition and Use

L.9-10.4 Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9-10 reading and content, choosing flexibly from a range of strategies.

- **L.9-10.4.a.** Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
- **L.9-10.4.b.** Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).
- **L.9-10.4.c.** Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- **L.9-10.4.d.** Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

L.9-10-10.5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

- **L.9.5.a.** Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text.
- **L.9-10.5.b.** Analyze nuances in the meaning of words with similar denotations.

L.9-10.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

English Language Arts (ELA) (2012) - Grades 11-12

Reading for Literature

Key Ideas and Details

RL.11-12.1 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 matters uncertain.

RL.11-12.2 Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.

RL.11-12.3 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

RL.11-12.4 Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful.
(Include Shakespeare as well as other authors.)

RL.11-12.5 Analyze how an author's choices concerning how to structure specific parts of a text (e.g., the choice of where to begin or end a story, the choice to provide a comedic or tragic resolution) contribute to its overall structure and meaning as well as its aesthetic impact.

RL.11-12.6 Analyze a case in which grasping point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, sarcasm, irony, or understatement).

Integration of Knowledge and Ideas

RL.11-12.7 Analyze multiple interpretations of a story, drama, or poem (e.g., recorded or live production of a play or recorded novel or poetry), evaluating how each version interprets the source text.
(Include at least one play by Shakespeare and one play by an American dramatist.)

RL.11-12.8 (Not applicable to literature)

RL.11-12.9 Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics.

Range of Reading and Level of Text Complexity

RL.11-12.10 By the end of grade 11, read and comprehend literature, including stories, dramas, and poems, in the grades 11–CCR* text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 11–CCR* text complexity band independently and proficiently.

*(CCR: "Career and College Readiness"; expectations that must be met for students to be prepared to enter college and workforce training programs ready to succeed)

Reading for Informational Text

Key Ideas and Details

RI.11-12.1 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 matters uncertain.

RI.11-12.2 Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.

RI.11-12.3 Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

Craft and Structure

RI.11-12.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze 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).

RI.11-12.5 Analyze and 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.

RI.11-12.6 Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.

Integration of Knowledge and Ideas

RI.11-12.7 Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

RI.11-12.8 Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning (e.g., in U.S. Supreme Court majority opinions and dissents) and the premises, purposes, and arguments in works of public advocacy (e.g., *The Federalist*, presidential addresses).

RI.11-12.9 Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance (including The Declaration of Independence, the Preamble to the Constitution, the Bill of Rights, and Lincoln's Second Inaugural Address) for their themes, purposes, and rhetorical features.

Range of Reading and Level of Text Complexity

RI.11-12.10 By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR* text complexity band proficiently, with scaffolding as needed at the high end of the range. By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11–CCR* text complexity band independently and proficiently.

*(CCR: "Career and College Readiness"; expectations that must be met for students to be prepared to enter college and workforce training programs ready to succeed)

Writing

Text Types and Purposes

W.11-12.1 Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

- **W.11-12.1.a.** Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.
- **W.11-12.1.b.** Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.
- **W.11-12.1.c.** Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.
- **W.11-12.1.d.** Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- **W.11-12.1.e.** Provide a concluding statement or section that follows from and supports the argument presented.

W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

- **W.11-12.2.a.** Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
- **W.11-12.2b.** Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
- **W.11-12.2.c.** Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
- **W.11-12.2.d.** Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.
- **W.11-12.2.e.** Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
- **W.11-12.2.f.** Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

W.11-12.3 Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

- **W.11-12.3.a.** Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.
- **W.11-12.3.b.** Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters.
- **W.11-12.3.c.** Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).
- **W.11-12.3.d.** Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
- **W.11-12.3.e.** Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

Production and Distribution of Writing

W.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards W.11.1 through W.11.3.)

W.11-12.5 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. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grades 11–12.)

W.11-12.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

W.11-12.7 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.

W.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

W.11-12.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

- **W.11-12.9.a.** Apply grades 11–12 Reading standards to literature (e.g., "Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics").
- **W.11-12.9.b.** Apply grades 11–12 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., *The Federalist*, presidential addresses]").

Range of Writing

W.11-12.10 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.

Speaking and Listening

Comprehension and Collaboration

SL.11-12.1 Initiate and participate effectively in a range of collaborative discussions (one- on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

- **SL.11-12.1.a.** Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well- reasoned exchange of ideas.
- **SL.11-12.1.b.** Work with peers to promote civil, democratic discussions and decision- making, set clear goals and deadlines, and establish individual roles as needed.
- **SL.11-12.1.c.** Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
- **SL.11-12.1.d.** Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

SL.11-12.2 Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

SL.11-12.3 Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

Presentation of Knowledge and Ideas

SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

SL.11-12.6 Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate. (See grades 11–12 Language standards 1 and 3 for specific expectations.)

Language

Conventions of Standard English

L.11-12.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

- **L.11-12.1.a.** Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested.
- **L.11-12.1.b.** Resolve issues of complex or contested usage, consulting references (e.g., *Merriam-Webster's Dictionary of English Usage, Garner's Modern American Usage*) as needed.

L.11-12.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

- **L.11-12.2.a.** Observe hyphenation conventions.
- **L.11-12.2.b.** Spell correctly.

Knowledge of Language

L.11-12.3 Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

- **L.11-12.3.a.** Vary syntax for effect, consulting references (e.g., Tufte's *Artful Sentences*) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.

Vocabulary Acquisition and Use

L.11-12-12.4 Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.

- **L.11.4.a.** Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.
- **L.11-12.4.b.** Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable).
- **L.11-12.4.c.** Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.
- **L.11-12.4.d.** Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

L.11-12-12.5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

- **L.11.5.a.** Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.
- **L.11-12.5.b.** Analyze nuances in the meaning of words with similar denotations.

L.11-12.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Science (2016)

These standards are created in grade bands. These are the grade 9-12 high school standards. Please note school districts make local decisions on how to break up/repeat these standards across the 4-year span.

Physical Science

PS1 Matter and Its Interactions

HS-PS1-1 Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

HS-PS1-2 Construct an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties, and revise, as needed.

HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the macroscopic scale to infer the strength of electrical forces between particles.

HS-PS1-4 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

HS-PS1-5 Apply scientific principles and use evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

HS-PS1-6 Evaluate the design of a chemical system by changing conditions to produce increased amounts of products at equilibrium, and refine the design, as needed.

HS-PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

HS-PS1-8 Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

PS2 Motion and Stability: Forces and Interactions

HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

HS-PS2-3 Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

HS-PS2-4 Use mathematical representations to predict the gravitational and/or electrostatic forces between objects using Newton's Law of Gravitation and/or Coulomb's Law, respectively.

HS-PS2-5 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.

HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of materials.

PS3 Energy

HS-PS3-1 Create or apply a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

HS-PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).

HS-PS3-3 Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

HS-PS3-4 Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy distribution among the components in the system.

HS-PS3-5 Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

PS4 Waves and their Applications in Technologies for Information Transfer

HS-PS4-1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

HS-PS4-2 Evaluate the advantages and disadvantages of using digital transmission and storage of information.

HS-PS4-3 Evaluate evidence behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.

HS-PS4-5 Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Life Science

LS1 From Molecules to Organisms: Structure and Processes

HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multi-cellular organisms.

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

HS-LS1-4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

HS-LS1-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS1-6 Construct explanations and revise, as needed, based on evidence for: 1) how carbon, hydrogen, and oxygen may combine with other elements to form amino acids and/or other large carbon-based molecules, and 2) how other hydrocarbons may also combine to form large carbon- based molecules.

HS-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of sugar molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

LS2 Ecosystems: Interactions, Energy, and Dynamics

HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS-LS2-2 Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-3 Construct an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions, and revise as needed.

HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS-LS2-5 Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

HS-LS2-6 Evaluate the claims, evidence, and reasoning that the complex biotic and abiotic interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a modified ecosystem.

HS-LS2-7 Evaluate and assess impacts on the environment and biodiversity in order to refine or design a solution for detrimental impacts or enhancement for positive impacts.

HS-LS2-8 Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

LS3 Heredity: Inheritance and Variation of Traits

HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-2 Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

HS-LS3-3 Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

LS4 Biological Evolution: Unity and Diversity

HS-LS4-1 Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-2 Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-3 Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

HS-LS4-4 Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-LS4-5 Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

HS-LS4-6 Create and/or use a simulation to evaluate the impacts of human activity on biodiversity.

Earth and Space Science

ESS1 Earth's Place in the Universe

HS-ESS1-1 Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.

HS-ESS1-2 Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.

HS-ESS1-3 Communicate scientific ideas about the way stars, over their life cycle, produce elements.
HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
HS-ESS1-5 Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.
HS-ESS1-6 Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.

ESS2 Earth's Systems
HS-ESS2-1 Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
HS-ESS2-2 Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

HS-ESS2-3 Develop a model based on evidence of Earth's interior to describe the cycling of matter by themal convection.
HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
HS-ESS2-6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
HS-ESS2-7 Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.

ESS3 Earth and Human Activity
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
HS-ESS3-2 Evaluate competing design solutions for developing, managing, and using energy and mineral resources based on cost-benefit ratios.
HS-ESS3-3 Use computational tools to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
HS-ESS3-5 Analyze data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
HS-ESS3-6 Use the results of a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Engineering and Design

ETS1 Engineering, Technology, and Applications of Science
HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

HS-ETS1-5 Evaluate the validity and reliability of claims in a variety of materials.

Math (2021) - Grades 9-12

Advanced Standards (+):

The high school standards specify the mathematics that all students should study to be college and career ready. Each standard without a (+) symbol should be in the common mathematics curriculum for all students. Advanced mathematics standards, designated with a (+) sign, are integrated into the higher level math courses after Algebra II. These standards encourage student experiences in higher level mathematical thinking and/or STEM pathways. (Adapted from **CCSS**).

Grade HS Math Practices

MP1 Make sense of problems and persevere in solving them.

HS.MP.1 Students start to examine problems by explaining to themselves the meaning of a problem and restating the problem in their own words. These students analyze the given information in the problem, including constraints, relationships, and goals. Students make conjectures about the form and meaning of the solution, devise a plan, and solve. They will consider both similar problems and simpler forms of the original problem, in order to gain insight and efficiency in problem solving. Students monitor and evaluate their progress and change course if necessary. Students may utilize algebraic methods or technology. Students explain relationships between equations and the following: descriptions/situations, tables, and graphs. Students produce diagrams of important features and relationships, graph data, and search for patterns or trends. They check answers to problems and continually ask if the solution makes sense in context. They understand different approaches to solving complex problems and identify correspondences between different approaches.

MP2 Reason abstractly and quantitatively.

HS.MP.2 Students seek to make sense of quantities and explore relationships in problem situations. Students represent a given situation by defining and manipulating variables. Students consider the units involved and attend to the meaning of quantities in addition to computational reasoning -- knowing and using the different properties of operations.

MP3 Construct viable arguments and critique the reasoning of others.

HS.MP.3 Students understand and use stated assumptions, definitions, and previously established results in constructing arguments. Students make conjectures and build logical progressions of statements to explore the truth of their conjectures. They are able to analyze situations through decomposition and produce counterexample(s) if necessary. Students justify their conclusions, communicate these conclusions, and respond to arguments of others. Students make plausible arguments by reasoning inductively about the data and take into account the context from which the data arose. Students

are able to compare the effectiveness of two plausible arguments, and distinguish correct logic from flawed logic. If there is a flaw in an argument, then they explain why the logic is flawed. Students determine a general process and/or domain to which an argument applies. The students listen or read the arguments of others, decide whether the argument makes sense, and ask useful questions to clarify or improve the arguments.

MP4 Model with mathematics.

HS.MP.4 Students apply their mathematical knowledge to solve problems arising in everyday life, society, and the workplace. Students may use geometry to solve a design problem or they may use a function to describe how one quantity of interest depends on another. Students may use assumptions and approximations to simplify a complicated situation and realize these may need revision later. Students identify important relationships between quantities in a practical situation and map these relationships using tools such as: diagrams, two-way tables, graphs, flowcharts, and formulas. Students analyze those relationships mathematically to draw conclusions and interpret the results in the context of the situation. Students are reflective of the results and may improve the model if it has not served the purpose.

MP5 Use appropriate tools strategically.

HS.MP.5 Students consider appropriate tools when solving a mathematical problem, including but not limited to: a) pencil and paper, b) concrete models, c) ruler, d) protractor, e) calculator, f) spreadsheet, and g) analytical software applications. Students familiar with mathematical tools make sound decisions about when each of these tools may be helpful and recognize both the insight to be gained and the limitations of the tool. Students may use a graphing calculator to analyze graphs of functions knowing that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Students may identify relevant external mathematical resources, such as digital content located on a website, and use those resources to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

MP6 Attend to precision.

HS.MP.6 Students communicate using mathematically correct definitions in their own reasoning and in discussions with others. They state the meaning of symbols they choose, specify units of measure, and label axes in order to clarify the correspondence with quantities in a problem. Students accurately and efficiently calculate. They express numerical answers with the degree of precision appropriate for the problem context.

MP7 Look for and make use of structure.

HS.MP.7 Students look closely to discern a pattern or structure and holistically consider the overview. Students may shift perspectives if needed to gain understanding of the pattern or structure. Students in algebra may use patterns to create equivalent expressions, factor and solve equations, compose functions, and transform figures. They may consider certain algebraic expressions as single objects or as being composed of several objects. Students in geometry recognize the significance of an existing line in a geometric figure and may use the strategy of drawing an auxiliary line for solving problems.

MP8 Look for and express regularity in repeated reasoning.

HS.MP.8 Students notice repeated calculations, look for general expressions to annotate the calculation, and consider potential shortcuts. Students maintain oversight of a process as they work to solve problems, derive formulas, or make generalizations, while attending to details. They assess the reasonableness of their intermediate results.

NUMBER AND QUANTITY

The Real Number System

Extend the properties of exponents to rational exponents.

N.RN.A.1 Explain how the meaning of the definition of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

N.RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Use properties of rational and irrational numbers.

N.RN.B.3 Explain why the sum or product of rational numbers is rational; 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.

Quantities

Reason quantitatively and use units to solve problems.

N.Q.C.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; and choose and interpret the scale and the origin in graphs and data displays.

N.Q.C.2 Define appropriate quantities for the purpose of descriptive modeling.

N.Q.C.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

The Complex Number System

Perform arithmetic operations with complex numbers.

N.CN.D.1 Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.

N.CN.D.2 Use the relation $i^2 = -1$ and the Commutative, Associative, and Distributive Properties to add, subtract, and multiply complex numbers.

N.CN.D.3 (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.

Represent complex numbers and their operations on the complex plane.

N.CN.E.4 (+) Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.

N.CN.E.5 (+) Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. For example, $(-1 + i\sqrt{3})^3 = 8$ because $(-1 + i\sqrt{3})$ has modulus 2 and argument 120°.

N.CN.E.6 (+) Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.

Use complex numbers in polynomial identities and equations.

N.CN.F.7 Solve quadratic equations with real coefficients that have complex solutions.

N.CN.F.8 (+) Extend polynomial identities to the complex numbers. For example, rewrite $x^2 + 4$ as $(x + 2i)(x - 2i)$.

N.CN.F.9 (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Vector and Matrix Quantities

Represent and model with vector quantities.

N.VM.G.1 (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, $|v|$, $\|v\|$, $\mathbf{v}$).

N.VM.G.2 Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.

N.VM.G.3 Solve problems involving velocity and other quantities that can be represented by vectors.

Perform operations on vectors.

N.VM.H.4 (+) Add and subtract vectors.

- **N.VM.H.4a** Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.
- **N.VM.H.4b** Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.
- **N.VM.H.4c** Understand vector subtraction $v - w$ as $v + (-w)$, where $(-w)$ is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.

N.VM.H.5 (+) Multiply a vector by a scalar.

- **N.VM.H.5a** Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise.
- **N.VM.H.5b** Compute the magnitude of a scalar multiple cv using $\|cv\| = |c|v$. Compute the direction of cv knowing that when $|c|v \neq 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$).

Perform operations on matrices and use matrices in applications.

N.VM.I.6 (+) Use matrices to represent and manipulate data.

N.VM.I.7 (+) Multiply matrices by scalars to produce new matrices.

N.VM.I.8 (+) Add, subtract, and multiply matrices of appropriate dimensions.

N.VM.I.9 (+) Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the Associative and Distributive Properties.

N.VM.I.10 (+) 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.

N.VM.I.11 (+) Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.

N.VM.I.12 (+) Work with 2 X 2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.

ALGEBRA

Seeing Structure in Expressions

Interpret the structure of expressions.

A.SSE.A.1 Interpret expressions that represent a quantity in terms of its context.

A.SSE.A.1a Interpret parts of an expression, such as terms, factors, and coefficients.

A.SSE.A.1b Interpret complicated expressions by viewing one or more of their parts as a single entity.

A.SSE.A.2 Use the structure of an expression to identify ways to rewrite it.

Write expressions in equivalent forms to solve problems.

A.SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

A.SSE.B.3a Factor a quadratic expression to reveal the zeros of the function it defines.

A.SSE.B.3b Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

A.SSE.B.3c Use the properties of exponents to transform expressions for exponential functions. Apply the concepts of decimal and scientific notation to solve real-world and mathematical problems.

A.SSE.B.4 Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems.

Arithmetic With Polynomials And Rational Expressions

Perform arithmetic operations on polynomials.

A.APR.C.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

Understand the relationship between zeros and factors of polynomial.

A.APR.D.2 Know and apply 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).

A.APR.D.3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

Use polynomial identities to solve problems.

A.APR.E.4 Prove polynomial identities and use them to describe numerical relationships.

A.APR.E.5 (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.

Rewrite rational expressions.

A.APR.F.6 Rewrite simple rational expressions in different forms; write $^{a(x)}/_{b(x)}$ in the form $q(x) + {}^{r(x)}/_{b(x)}$, where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x) using inspection, long division, or, for the more complicated examples, a computer algebra system. (i.e. rewriting a rational expression as the quotient plus the remainder over divisor).

A.APR.F.7 (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

Creating Equations

Create equations that describe numbers or relationships.

A.CED.G.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

A.CED.G.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A.CED.G.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context.

A.CED.G.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

Reasoning With Equations And Inequalities

Understand solving equations as a process of reasoning and explain the reasoning.

A.REI.H.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

A.REI.H.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Solve equations and inequalities in one variable.

A.REI.I.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

A.REI.I.4 Solve quadratic equations in one variable.

- **A.REI.I.4a** Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions.
- **A.REI.I.4b** Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.
- **A.REI.I.4c** Derive the quadratic formula from the general form of a quadratic equation.

Solve systems of equations.

A.REI.J.5 Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

A.REI.J.6 Estimate solutions graphically and determine algebraic solutions to linear systems, focusing on pairs of linear equations in two variables.

A.REI.J.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

A.REI.J.8 (+) Represent a system of linear equations as a single matrix equation in a vector variable.

A.REI.J.9 (+) Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).

Represent and solve equations and inequalities graphically.

A.REI.K.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane.

A.REI.K.11 Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

A.REI.K.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

FUNCTIONS

Interpreting Functions

Understand the concept of a function and use function notation.

F.IF.A.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. The graph of f is the graph of the equation y = f(x).

F.IF.A.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

F.IF.A.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

Interpret functions that arise in applications in terms of the context.

F.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

F.IF.B.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

F.IF.B.6 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.

Analyze functions using different representations.

F.IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

- **F.IF.C.7a** Graph linear and quadratic functions and show intercepts, maxima, and minima.
- **F.IF.C.7b** Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
- **F.IF.C.7c** Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
- **F.IF.C.7d (+)** Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
- **F.IF.C.7e** Graph exponential and logarithmic functions, showing intercepts and end behavior.
- **F.IF.C.7f (+)** Graph trigonometric functions, showing period, midline, and amplitude.

F.IF.C.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

F.IF.C.8a Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

F.IF.C.8b Use the properties of exponents to interpret expressions for exponential functions.

F.IF.C.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Building Functions

Build a function that models a relationship between two quantities.

F.BF.D.1 Write a function that describes a relationship between two quantities.

F.BF.D.1a Determine an explicit expression, a recursive process, or steps for calculation from a context.

F.BF.D.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

F.BF.D.1c (+) Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.

F.BF.D.2 (+) Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

Build new functions from existing functions.

F.BF.E.3 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. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

F.BF.E.4 Find inverse functions.

F.BF.E.4a Write an expression for the inverse of a simple, invertible function f(x). Understand that an inverse function can be obtained by expressing the dependent variable of one function as the independent variable of another, as f and g are inverse functions, if and only if, f(x) = y and g(y) = x, for all values of x in the domain of f and all values of y in the domain of g.

F.BF.E.4b (+) Verify by composition that one function is the inverse of another.

F.BF.E.4c (+) Read values of an inverse function from a graph or a table, given that the function has an inverse.

F.BF.E.4d (+) Produce an invertible function from a non-invertible function by restricting the domain.

F.BF.E.5 B**(+)** uild new functions from existing functions. Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

Linear, Quadratic, and Exponential Models

Construct and compare linear, quadratic, and exponential models and solve problems.

F.LE.F.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.

F.LE.F.1a Verify that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.

F.LE.F.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

F.LE.F.1c Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

F.LE.F.2 Construct linear and exponential functions using a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

F.LE.F.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

F.LE.F.4 For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.

Interpret expressions for functions in terms of the situation they model.

F.LE.G.5 Interpret the parameters in a linear or exponential function in terms of a context.

Trigonometric Functions

Extend the domain of trigonometric functions using the unit circle.

F.TF.H.1 (+) Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

F.TF.H.2 (+) Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

F.TF.H.3 (+) Use special triangles to determine geometrically the values of sine, cosine, and tangent for $\pi/3$, $\pi/4$, $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi - x$, $\pi + x$, and $2\pi - x$ in terms of their values for x, where x is any real number.

F.TF.H.4 (+) Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

Model periodic phenomena with trigonometric functions.

F.TF.I.5 (+) Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

F.TF.I.6 (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.

F.TF.I.7 (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.

Prove and apply trigonometric identities.

F.TF.J.8 (+) Prove the Pythagorean identity $\sin^2 A + \cos^2 A = 1$ and use it to find $\sin A$, $\cos A$, or $\tan A$, given $\sin A$, $\cos A$, or $\tan A$, and the quadrant of the angle.

F.TF.J.9 (+) Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.

GEOMETRY

Congruence

Experiment with transformations in the plane.

G.CO.A.1 Apply precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

G.CO.A.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).

G.CO.A.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.

G.CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.

G.CO.A.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

Understand congruence in terms of rigid motions.

G.CO.B.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

G.CO.B.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

G.CO.B.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.

Prove geometric theorems.

G.CO.C.9 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; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.

G.CO.C.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180 degrees; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

G.CO.C.11 Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

Make geometric constructions.

G.CO.D.12 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.

G.CO.D.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

Similarity, Right Triangles, and Trigonometry

Understand similarity in terms of similarity transformations.

G.SRT.E.1 Verify heuristically the properties of dilations given by a center and a scale factor.

- **G.SRT.E.1a** A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.
- **G.SRT.E.1b** The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

G.SRT.E.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
G.SRT.E.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Prove theorems involving similarity.
G.SRT.F.4 Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.
G.SRT.F.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

Define trigonometric ratios and solve problems involving right triangles.
G.SRT.G.6 Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
G.SRT.G.7 Explain and use the relationship between the sine and cosine of complementary angles.
G.SRT.G.8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Apply trigonometry to general triangles.
G.SRT.H.9 (+) Derive the formula $A = {}^{1}/_{2}ab\ sin(c)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
G.SRT.H.10 (+) Prove the Laws of Sines and Cosines and use them to solve problems.
G.SRT.H.11 (+) Understand and apply 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).

Circles

Understand and apply theorems about circles.
G.C.I.1 Prove that all circles are similar.
G.C.I.2 Identify and describe relationships among inscribed 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.
G.C.I.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
G.C.I.4 (+) Construct a tangent line from a point outside a given circle to the circle.

Find arc lengths and areas of sectors of circles.
G.C.J.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

Expressing Geometric Properties With Equations

Translate between the geometric description and the equation for a conic section.
G.GPE.K.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
G.GPE.K.2 (+) Derive the equation of a parabola given a focus and directrix.

G.GPE.K.3 (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.

Use coordinates to prove simple geometric theorems algebraically.

G.GPE.L.4 Use coordinates to prove simple geometric theorems algebraically.

G.GPE.L.5 Prove the slope criteria for parallel and perpendicular lines and use them 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).

G.GPE.L.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

G.GPE.L.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, (e.g., using the distance formula).

Geometric Measurement And Dimension

Explain volume formulas and use them to solve problems.

G.GMD.M.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.

G.GMD.M.2 (+) Give an informal argument using Cavalieri's Principle for the formulas for the volume of a sphere and other solid figures.

G.GMD.M.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Visualize relationships between two-dimensional and three-dimensional objects.

G.GMD.M.4 Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.

Modeling With Geometry

Apply geometric concepts in modeling situations.

G.MG.O.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

G.MG.O.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

G.MG.O.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

STATISTICS AND PROBABILITY

Interpreting Categorical And Quantitative Data

Summarize, represent, and interpret data on a single count or measurement variable.

S.ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots) by hand or using technology.

S.ID.A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

S.ID.A.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

S.ID.A.4 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 the Empirical Rule, calculators, spreadsheets, and/or tables to estimate areas under the normal curve.

Summarize, represent, and interpret data on two categorical and quantitative variables.

S.ID.B.5 (+) Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations in the data, and use inferential statistical techniques to show association.

S.ID.B.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

- **S.ID.B.6a** Use a function to describe data trends to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
- **S.ID.B.6b (+)** Informally assess the fit of a function by plotting and analyzing residuals.
- **S.ID.B.6c** Using technology, fit a least squares linear regression function for a scatter plot that suggests a linear association.

Interpret linear models.

S.ID.C.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

S.ID.C.8 Compute (using technology) and interpret the correlation coefficient of a linear fit.

S.ID.C.9 Distinguish between correlation and causation.

Making Inferences And Justifying Conclusions

Understand and evaluate random processes underlying statistical experiments.

S.IC.D.1 (+) Understand statistics as a process for making inferences about population parameters based on a random sample from that population.

S.IC.D.2 (+) Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

S.IC.E.3 (+) Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

S.IC.E.4 (+) 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.

S.IC.E.5 (+) Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

S.IC.E.6 (+) Evaluate reports based on data.

Conditional Probability And The Rules Of Probability

Understand independence and conditional probability and use them to interpret data.

S.CP.F.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").

S.CP.F.2 (+) Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

S.CP.F.3 (+) Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.

S.CP.F.4 (+) Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.

S.CP.F.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

Use the rules of probability to compute probabilities of compound events in a uniform probability model.

S.CP.G.6 (+) Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.

S.CP.G.7 (+) Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.

S.CP.G.8 (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = [P(A)]x[P(B|A)] = [P(B)]x[P(A|B)], and interpret the answer in terms of the model.

S.CP.G.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

Use Probability To Make Decisions

Calculate expected values and use them to solve problems.

S.MD.H.1 (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

S.MD.H.2 (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

S.MD.H.3 (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes.

S.MD.H.4(+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

Use probability to evaluate outcomes of decisions.

S.MD.I.5 (+) Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.

- **S.MD.I.5a** Find the expected payoff for a game of chance. For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.
- **S.MD.I.5b** Evaluate and compare strategies on the basis of expected values. For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.

S.MD.I.6 Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

S.MD.I.7 Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

Social Studies (2014+2018)

These standards are created in grade bands. These are the grade 9-12 standards. Please note school districts make local decisions on how to break up/repeat these standards across the 4-year span.

Citizenship, Government, and Democracy

Students analyze how people create and change structures of power, authority, and governance to understand the continuing evolution of governments and to demonstrate civic responsibility.

SS12.1.1 Analyze unique freedoms, rights, and responsibilities of living in a democratic society and explain their interrelationships.

SS12.1.1.a Compare the rights, duties, and responsibilities (inherent rights, treaty obligations, and tribal sovereignty) of being a tribal member on the Wind River Indian Reservation to the rights, duties, and responsibilities of an American citizen.

SS12.1.2 Explain and/or demonstrate how to participate in the political process and form personal opinions (i.e., tribal, local, state, and national elections).

SS12.1.3 Analyze the historical development of the United States Constitution and treaties (e.g., 1868 Fort Bridger Treaty) and how they have shaped the United States and Wyoming Government (tribal, local, state, federal).

SS12.1.3.a Analyze the historical development of governance of the Indigenous Tribes of Wyoming through U.S. Congressional Acts and U.S. Supreme Court decisions (e.g., Per Capita Act, Marshall Trilogy, U.S. v. Shoshone Tribe of Indians).

SS12.1.4 Distinguish the difference between civil and criminal legal systems and how they apply at the federal, state, and tribal levels.

SS12.1.5 Demonstrate an understanding of the structures of both the United States and Wyoming Constitutions.

SS12.1.5.a Describe the inherent powers held by Indigenous Tribes of Wyoming due to their sovereignty (e.g., taxation, membership, per capita payments, fish and game).

SS12.1.6 Compare and contrast various world political systems (e.g., ideologies, structure, and institutions) with that of the United States.

SS12.1.6.a Compare and contrast various tribal political systems (e.g., ideologies, structure, and institutions) within the United States.

Culture and Cultural Diversity

Students demonstrate an understanding of the contributions and impacts of human interaction and cultural diversity on societies.

SS12.2.1 Analyze and evaluate the ways various groups (e.g., social, political, and cultural) meet human needs and concerns (e.g., individual needs and common good) and contribute to identity (e.g., group, national, and global), situations, and events.

SS12.2.1.a Analyze and evaluate the ways Indigenous Tribes of Wyoming meet human needs and concerns and contribute to tribal identity (e.g., group, nation, and global), as well as historical and contemporary situations and events (e.g., intergenerational care, mineral royalty payments, water rights, tribal economic development, the repopulation of local animal species, and social/cultural events).

SS12.2.2 Analyze human experience and cultural expression (e.g., language, literature, arts, traditions, beliefs, spirituality, values, and behavior) and illustrate integrated views of a specific culture.

SS12.2.2.a Compare and contrast the human experience and cultural expression of Indigenous Tribes of Wyoming (e.g., oral history, Native literature, traditional arts, values, songs, dance, artifacts, and language).

SS12.2.3 Evaluate how the unique characteristics of cultural groups, including Indigenous Tribes of Wyoming, have contributed and continue to influence Wyoming's history and contemporary life (e.g., tribes, explorers, early settlers, and immigrants).

SS12.2.4 Analyze and critique the conflicts resulting from cultural assimilation and cultural preservation in Wyoming, the United States, and the World (e.g., racial, ethnic, social, and institutional).

SS12.2.4.a Evaluate the conflicts resulting from forced assimilation (e.g., mission/boarding schools and relocation) and cultural preservation efforts (e.g., language revitalization and repatriation of human remains and artifacts) on Indigenous Tribes of Wyoming.

Production, Distribution, and Consumption

Students describe the influence of economic factors on societies and make decisions based on economic principles.

SS12.3.1 Analyze the impact of supply, demand, scarcity, prices, incentives, competition, and profits on what is produced, distributed, and consumed.

SS12.3.2 Analyze and evaluate how people organize for the production, distribution, and consumption of goods and services in various economic systems (e.g., capitalism, communism, and socialism).

SS12.3.3 Analyze and evaluate the impact of current and emerging technologies at the micro and macroeconomic levels (e.g., jobs, education, trade, and infrastructure) and their impact on global economic interdependence.

SS12.3.4 Explain how financial and government institutions make economic decisions (e.g., banking, investment, credit, regulation, and debt).

SS12.3.5 Evaluate how values and beliefs influence microeconomic and macroeconomic decisions.

Time, Continuity, and Change

Students analyze events, people, problems, and ideas within their historical contexts.

SS12.4.1 Describe patterns of change (cause and effect) and evaluate how past events impacted future events and the modern world.

SS12.4.1.a Describe patterns of change (cause and effect) and evaluate how past events impact current realities for Indigenous Tribes of Wyoming (e.g., migration, evolution of tribal leadership, treaties, Powder River Expedition, Red Cloud's War, Great Sioux War, Battle of Little Bighorn, land cessions, and 1905 Shoshone Reservation Congressional Act).

SS12.4.2 Analyze the development and impact of tools and technology and how it shaped history and influenced the modern world.

SS12.4.3 Given a significant current event, critique the actions of the people or groups involved; hypothesize how this event would have played out in another country.

SS12.4.4 Describe the historical interactions between and among individuals, groups, and/or institutions (e.g., family, neighborhood, political, economic, religious, social, cultural, and workplace) and their impact on significant historical event.

SS12.4.4.a Describe the historical interactions between Indigenous Tribes of Wyoming, state, and federal governments (e.g. Chief Washakie and the federal government, treaties, 1871 Indian Appropriations Act, Dawes Act, and the 1956 Indian Relocation Act).

SS12.4.5 Using primary and secondary sources, apply historical research methods to interpret and evaluate important historical events from multiple perspectives.

SS12.4.5.a Interpret and evaluate historical events with primary and secondary sources, including oral tradition and traditional storytelling of Indigenous Tribes of Wyoming (e.g., traditional drama and theater, song, and dance).

People, Places, and Environments

Students apply their knowledge of the geographic themes (location, place, movement, region, and human/environment interactions) and skills to demonstrate an understanding of interrelationships among people, places, and environment.

SS12.5.1 Use geographic tools and reference materials to interpret, analyze, evaluate, and synthesize historical and geographic data to demonstrate an understanding of global patterns and interconnectedness.

SS12.5.1.a Use geographic tools and reference materials to compare ancestral locations of Indigenous Tribes of Wyoming to reservations today.

SS12.5.2 Describe regionalization and analyze how physical characteristics distinguish a place, influence human trends, political, and economic development, and solve immediate and long-range problems.

SS12.5.2.a Analyze how the value placed on physical characteristics and natural resources cause conflict among different groups (e.g., Black Hills, energy development, Big Horn River Adjudication, Devils Tower/Bear Lodge, and Yellowstone).

SS12.5.3 Analyze, interpret, and evaluate how conflict, demographics, movement, trade, transportation, communication, and technology affect humans' sense of place.

SS12.5.3.a Analyze how conflict, demographics, movement, trade, transportation, communication and technology affect the Indigenous Tribes of Wyoming's sense of place.

SS12.5.4 Analyze how environmental changes and modifications positively and negatively affect communities, tribes, and the world both economically and socially.

Technology, Literacy, and Global Connections

Students use technology and literacy skills to access, synthesize, and evaluate information to communicate and apply social studies knowledge to global situations.

SS12.6.1 Analyze, evaluate, and/or synthesize multiple sources of information in diverse formats and media in order to address a question or solve a problem.

SS12.6.2 Assess the extent to which the reasoning and evidence in a text supports the author's claims.

SS12.6.3 Use digital tools to research, design, and present social studies concepts (e.g., understand how individual responsibility applies in usage of digital media). **ISTE student standards**.

SS12.6.4 Evaluate and integrate accurate, sufficient, and relevant information from primary and secondary sources to support writing.

Career and Vocational Education (CTE) (2014)

These standards are created in grade bands. These are the grade 9-12 standards. Please note school districts make local decisions on how to break up/repeat these standards across the 4-year span.

Career Development and Readiness

Students demonstrate career planning and employability skills.

CV12.1.1 College and career-ready students evaluate current knowledge and interests in order to set career goals.

CV12.1.2 College and career-ready students explore careers including outlook, salary, needed training, duties, and lifestyle, utilizing all available resources including mentors and industry experts.

CV12.1.3 College and career-ready students prepare an educational and career plan to enable them to gain desired knowledge and experience.

CV12.1.4 College and career-ready students demonstrate employability skills that enable them to be responsible and contributing citizens and employees.

Communication and Collaboration

Students develop the skills necessary to effectively lead, collaborate, and communicate.

CV12.2.1 College and career-ready students communicate clearly, effectively, and with reason.

CV12.2.2 College and career-ready students identify and model integrity, ethical leadership, and effective management skills.

CV12.2.3 College and career-ready students work productively in teams while using cultural global competence.

CV12.2.4 College and career-ready students apply safe, legal, and responsible use of information and technology as appropriate to the task.

Critical Thinking and Problem Solving

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate technology, tools, and resources.

CV12.3.1 College and career-ready students identify and define authentic problems and significant questions for investigation.

CV12.3.2 College and career-ready students identify trends, forecast possibilities, and explore complex systems and issues.

CV12.3.3 College and career-ready students employ valid and reliable research strategies and apply prior knowledge to solve a problem or complete a project.

CV12.3.4 College and career-ready students demonstrate creativity and innovation while considering the environmental, social, and economic impacts of decisions.

Technical Literacy

Students effectively read, evaluate, write, and communicate technical information.

CV12.4.1 College and career-ready students produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (CCSS W.11.4)

CV12.4.2 College and career-ready students determine the meaning of symbols, key terms, and other content-specific words and phrases as they are used in technical context. (Adapted from CCSS RL.9.11)

CV12.4.3 College and career-ready students acquire, manipulate, analyze, diagnose, and/or report information, using the appropriate technology.

CV12.4.4 College and career-ready students precisely follow a complex multistep procedure when performing technical tasks. (Adapted from CCSS RL.9.3)

Technical Proficiency and Productivity

Students safely, ethically, and productively use existing and new technologies and systems.

CV12.5.1 College and career-ready students manage resources to develop, analyze, and implement systems and applications.

CV12.5.2 College and career-ready students productively complete tasks taking constraints, priorities, and resources into account.

CV12.5.3 College and career-ready students safely and ethically use current industry-standard tools and emerging technologies.

CV12.5.4 College and career-ready students utilize technology to develop innovative solutions or products.

Health (2012) - Grades 9-12

These standards are created in grade bands. These are the grade 9-12 standards. Please note school districts make local decisions on how to break up/repeat these standards across the 4-year span.

Health Information, Products, and Resources

Students will access, analyze, and evaluate health information, products, and resources.

HE12.1.1 Locate and evaluate appropriate resources at school, in the community, and beyond that help to enhance health (e.g., human resources, printed and electronic resources, equipment and facilities, etc.). PA, PH, ME

HE12.1.2 Locate and evaluate appropriate resources at school, in the community, and beyond that help to reduce health risks. (e.g., human resources, printed and electronic resources, equipment and facilitates, etc.). ATOD, SEXUALITY, PH

HE12.1.3 Use criteria to evaluate the validity of health information from a variety of sources (e.g., written, verbal, visual, electronic, etc.). ATOD, SEXUALITY, NUT

HE12.1.4 Use criteria to evaluate products that can enhance health and reduce health risks (e.g., Examine carefully performance supplements and make a judgment about the short and long term impact on an adolescent's health.). NUT, PA, ATOD

Problem Solving and Decision Making

Students will use critical thinking and systematic processes to examine health related problems and make decisions that enhance health and reduce or avoid health risks.

HE12.2.1 Analyze the types of decisions that would be appropriate for a specific health related situation (e.g., 1-step/automatic process appropriate for emergency, 5-step process appropriate for long-term decision). ATOD, SEXUALITY, IP/S

HE12.2.2 Apply a systematic decision making process that includes evaluation of consequences to *enhance* health (e.g., impact of decision on self, on others). SEXUALITY, IP/S, CEH

HE12.2.3 Apply a systematic decision making process that includes evaluation of consequences to *reduce* or *avoid* health risks. ATOD, SEXUALITY, IP/S

HE12.2.4 Evaluate how peers, culture, media, and technology influence decisions students make about health practices and risk behaviors. SEXUALITY, ATOD, ME

HE12.2.5 Apply a systematic process to evaluate the evidence, claims, beliefs, and/or points of view about non-familiar health related issues or problems. ATOD, PA, NUT

Effective Communication

Students will demonstrate the ability to use interpersonal communication skills to enhance health and reduce or avoid health risks.

HE12.3.1 Evaluate verbal and non-verbal techniques for communicating effectively with family, peers, and others to *enhance* health. PH, CEH, ME

HE12.3.2 Evaluate verbal and non-verbal techniques for communicating effectively with family, peers, and others to *reduce* or *avoid* health risks. ATOD, SEXUALITY, VP/B

HE12.3.3 Demonstrate the ability to use effective communication techniques to advocate for personal and community health. PH, CEH

HE12.3.4 Demonstrate the ability to use refusal, negotiation, and collaboration skills to *enhance* health. ME, CEH, VP/B

HE12.3.5 Demonstrate the ability to use refusal, negotiation, and collaboration skills to *reduce* or *avoid* health risks. ATOD, SEXUALITY, VP/B

HE12.3.6 Demonstrate the ability to use strategies to prevent, manage, or resolve interpersonal conflicts without harming self or others. IP/S, VP/B, ME

HE12.3.7 Delineate a speaker's health argument and specific claims, distinguishing health claims that are supported by reasons and evidence from health claims that are not supported by reasons and evidence. ANY CONTENT AREA

Personal and Social Responsibility

Students will demonstrate the ability to use personal and social skills that are associated with taking responsible action for enhancing health and reducing or avoiding health risks.

HE12.4.1 Analyze the relationship between personal health and their effect on self, others, and society. CEH, PCD, PA

HE12.4.2 Demonstrate the ability to use a strategic approach to manage health risks and enhance health. NUT, PA, ME

HE12.4.3 Demonstrate an understanding of behaviors that prevent the spread of disease. SEXUALITY, ATOD, PCD

HE12.4.4 Explain signs of stress and how stress can affect health status. ME, ATOD

HE12.4.5 Analyze age appropriate factors that create good stress and bad stress. ME, ATOD, SEXUALITY

HE12.4.7 Evaluate the appropriateness of various strategies for managing stress and avoiding stress overload in specific situations (e.g. regular exercise to deal with divorce, regular sleep prior to testing, etc.). PA, NUT, PH

HE12.4.8 Use criteria to set a long-term personal health goal and make a plan for achieving it. ME, PA, NUT

HE12.4.9 Monitor progress toward achieving a long-term personal health goal and evaluate the effectiveness of the plan for meeting the goal (e.g., a plan to meet the goal of reducing body fat by the end of the semester was effective because it included a variety of activities that met scientific principles for fitness and weight loss [e.g., aerobic activity for 30-45 minutes daily, reducing sugar intake, increasing water intake, attending PE every day, etc.]). ME, PA, NUT

HE12.4.10 Evaluate strategies for being respectful of others and opposing stereotyping and prejudice. VP/B, CEH, ME

HE12.4.11 Demonstrate the ability to advocate for the prevention of violence and bullying. VP/B, CEH, ME

HE12.4.12 Analyze the relationship between physical, social, and mental and emotional health. VP/B, CEH, ME

Physical Education (PE) (2014)

These standards are created in grade bands. These are the grade 9-12 standards. Please note school districts make local decisions on how to break up/repeat these standards across the 4-year span.

Movement

The physically literate individual demonstrates competency and applies knowledge of a variety of movement skills, movement patterns, concepts, principles, and strategies/tactics as they apply to the learning and performance of physical activities.

PE 12.1.1 Students demonstrate combined movement skills and patterns in specialized settings.
PE 12.1.2 Students demonstrate specialized manipulative skills in team activities.
PE 12.1.3 Students demonstrate specialized skills in individual, dual, or lifetime activities.
PE 12.1.4 Students apply specialized tactical concepts and performance principles in team activities.
PE 12.1.5 Students apply specialized tactical concepts and performance principles in individual, dual, or lifetime activities.
PE 12.1.6 Students evaluate specialized skills used by self/others in team activities.
PE 12.1.7 Students evaluate specialized skills used by self/others in individual, dual, or lifetime activities.
PE 12.1.8 Students evaluate the use of specialized strategies and tactics in a variety of physical activities.

Fitness

The physically literate individual demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness.

PE 12.2.1 Students create, monitor, and evaluate a personal plan using current levels of fitness and physical activity.
PE 12.2.2 Students evaluate the health benefits of a variety of physical activities.
PE 12.2.3 Students create, monitor, and evaluate a plan applying the principles and components of health-related fitness.
PE 12.2.4 Students engage in a variety of physical activities that will enhance health-related fitness (inside and/or outside of school).
PE 12.2.5 Students will use criteria to critique fitness-related products, technology, and resources related to fitness literacy.

Personal and Social Behavior

The physically literate individual exhibits responsible personal and social behavior that respects self and others and recognizes the value of physical activity for challenge, self-expression, and/or social interaction.

PE 12.3.1 Students demonstrate leadership by holding self and others responsible for following safe practices, rules, procedures, and etiquette in physical activity settings.
PE 12.3.2 Students initiate responsible personal social behavior and positively influence the behavior of others in physical activity settings.
PE 12.3.3 Students use physical activity to promote personal growth, goal setting, and enjoyment.
PE 12.3.4 Students pursue physical activities that promote self-expression and provide opportunities for social and group interaction.

Foreign/ World Language (2013)

These standards were created across the K-12 grade band. The committee recognized students approach these standards at different levels, not based on their grade, but based on their level of expertise or exposure to the language(s). Not shown here, the committee created 6 levels of performance level descriptors ranging from Novice-Mid to Advanced-Low.

Interpretive

All students will be able to use a foreign language other than English to understand and interpret spoken and written language, concepts, and ideas, while also gaining an understanding of the perspectives of other cultures. Through language study, they will make connections with other content areas, compare the language and culture studied with their own, and participate in home and global communities.

FL1.IL.1 Students will perform at Intermediate Low Level while listening to a culturally authentic **audio** source.

FL1.IL.2 Students will perform at Intermediate Low level while viewing a culturally authentic **audio-visual** source.

FL1.IL.3 Students will perform at Intermediate Low level while reading culturally authentic **printed** material.

Interpersonal

All students will be able to use a foreign language other than English to negotiate meaning through the spoken or written exchange of information, concepts, and ideas, while gaining an understanding of the relationships among the products, practices, and perspectives of other cultures. Through language study, they will make connections with other content areas, compare the language and culture studied with their own, and participate in home and global communities.

FL2.IL.1 Students will perform at Intermediate Low level in **spoken** communication (2 way).

FL2.IL.2 Students will perform at Intermediate Low level in **written** communication (2 way).

Presentational

All students will be able to use a foreign language other than English to present information, concepts, and ideas, while also gaining an understanding of the perspectives of other cultures. Through language study, they will make connections with other content areas, compare the language and culture studied with their own, and participate in home and global communities.

FL3.IL.1 Students will present at the Intermediate Low level in a **spoken** presentation.

FL3.IL.2 Students will present at the Intermediate Low level in a **written** presentation.

Computer Science (2019)

These standards are created in grade bands. These are the grade 9-12 standards. Please note school districts make local decisions on how to break up/repeat these standards across the 4-year span.

Computer Science (CS) Practices

1. Fostering an Inclusive Computing Culture
2. Collaborating Around Computing
3. Recognizing and Defining Computational Problems
4. Developing and Using Abstractions
5. Creating Computational Artifacts
6. Testing and Refining Computational Artifacts
7. Communicating About Computing

Computing Systems

Devices (D), Hardware & Software (HS), and Troubleshooting (T)

L1.CS.D.01 Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects. [Practice 4.1 Developing and Using Abstractions]

L1.CS.HS.01 Explain the interactions between application software, system software, and hardware layers. [Practice 4.1 Developing and Using Abstractions]

L2.CS.HS.01 Categorize the roles of operating system software. [Practice 4.1 Developing and Using Abstractions] [Practice 7.2 Communicating About Computing]

L1.CS.T.01 Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and resolve errors. [Practice 6.1 & 6.2 Testing and Refining Computational Artifacts]

L2.CS.T.01 Identify how hardware components facilitate logic, input, output, and storage in computing systems, and their common malfunctions. [Practice 7.2 Communicating About Computing]

Network and the Internet

Network, Communication, & Organization (NCO) and Cybersecurity (C)

L1.NI.NCO.01 Evaluate the scalability and reliability of networks by describing the relationship between routers, switches, servers, topology, and addressing. [Practice 4.1 Developing and Using Abstractions] [Practice 7.2 Communicating About Computing]

L2.NI.NCO.01 Describe the issues that impact network functionality (e.g., bandwidth, load, latency, topology). [Practice 7.2 Communicating About Computing]

L1.NI.C.01 Give examples to illustrate how sensitive data can be affected by malware and other attacks. [Practice 7.2 Communicating About Computing]

L2.NI.C.01 Compare ways software developers protect devices and information from unauthorized access. [Practice 7.2 Communicating About Computing]

L1.NI.C.02 Recommend cybersecurity measures to address various scenarios based on factors such as efficiency, feasibility, and ethical impacts. [Practice 3.3 Recognizing and Defining Computational Problems]

L1.NI.C.03 Compare various security measures, considering trade-offs between the usability and security of a computing system. [Practice 6.3 Testing and Refining Computational Artifacts]

L1.NI.C.04 Explain trade-offs when selecting and implementing cybersecurity recommendations. [Practice 7.2 Communicating About Computing]

Data Analysis

Storage (S), Collection, Visualization, & Transformation (CVT), and Inference & Models (IM)

L1.DA.S.01 Translate between different bit representations of real-world phenomena, such as characters, numbers, and images. [Practice 4.1 Developing and Using Abstractions]

L1.DA.S.02 Evaluate the trade-offs in how data elements are organized and where data is stored. [Practice 3.3 Recognizing and Defining Computational Problems]

L1.DA.CVT.01 Create interactive data representations using software tools to help others better understand real-world phenomena (e.g., paper surveys and online data sets). [Practice 4.4 Developing and Using Abstractions]

L2.DA.CVT.01 Use data analysis tools and techniques to identify patterns in data representing complex systems. [Practice 4.1 Developing and Using Abstractions] [Practice 7.1 Communicating About Computing]

L2.DA.CVT.02 Select data collection tools and techniques, and use them to generate data sets that support a claim or communicate information. [Practice 7.1 & 7.2 Communicating About Computing]

L1.DA.IM.01 Create computational models that represent the relationships among different elements of data collected from a phenomenon or process. [Practice 4.4 Developing and Using Abstractions]

L2.DA.IM.01 Formulate, refine, and test scientific hypotheses using models and simulations. [Practice 4.4 Developing and Using Abstractions]

Algorithms and Programming

Algorithms (A), Variables (V), Control (C), Modularity (M), and Program Development (PD)

L1.AP.A.01 Create a prototype that uses algorithms (e.g., searching, sorting, finding shortest distance) to provide a possible solution for a real-world problem relevant to the student. [Practice 5.2 Creating Computational Artifacts]

L2.AP.A.01 Critically examine and trace classic algorithms. Use and adapt classic algorithms to solve computational problems (e.g., selection sort, insertion sort, binary search, linear search). [Practice 4.2 Developing and Using Abstractions]

L1.AP.A.02 Describe how artificial intelligence algorithms drive many software and physical systems. [Practice 7.2 Communicating About Computing]

L2.AP.A.02 Develop an artificial intelligence algorithm to play a game against a human opponent or solve a real-world problem. [Practice 5.2 & 5.3 Creating Computational Artifacts]

L2.AP.A.03 Evaluate algorithms (e.g., sorting, searching) in terms of their efficiency, correctness, and clarity. [Practice 4.2 Developing and Using Abstractions]

L1.AP.V.01 Use lists to simplify solutions, generalizing computational problems instead of repeatedly using simple variables. [Practice 4.1 Developing and Using Abstractions]

L2.AP.V.01 Compare and contrast simple data structures and their uses (e.g., lists, stacks, queues). [Practice 4.2 Developing and Using Abstractions]

L1.AP.C.01 Justify the selection of specific control structures when tradeoffs involve implementation, readability, and program performance, and explain the benefits and drawbacks of choices made. [Practice 5.2 Creating Computational Artifacts]

L2.AP.C.01 Trace the execution of recursion, illustrating output and changes in values of named variables. [Practice 3.2 Recognizing and Defining Computational Problems]

L1.AP.C.02 Trace the execution of loops and conditional statements, illustrating output and changes in values of named variables. [Practice 3.2 Recognizing and Defining Computational Problems]

L1.AP.C.03 Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions. [Practice 5.2 Creating Computational Artifacts]

L1.AP.M.01 Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. [Practice 3.2 Recognizing and Defining Computational Problems]

L2.AP.M.01 Construct solutions to problems using student-created components, such as procedures, modules, and/or objects. [Practice 4.3 Developing and Using Abstractions] [Practice 5.2 Creating Computational Artifacts]

L1.AP.M.02 Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. [Practice 5.2 Creating Computational Artifacts]

L2.AP.M.02 Analyze a large-scale computational problem and identify generalizable patterns that can be applied to a solution. [Practice 4.1 Developing and Using Abstractions]

L2.AP.M.03 Demonstrate code reuse by creating programming solutions using libraries and APIs. [Practice 4.2 Developing and Using Abstractions] [Practice 5.3 Creating Computational Artifacts]

L1.AP.PD.01 Plan and develop programs by analyzing a problem and/or process, developing and documenting a solution, testing outcomes, and adapting the program for a variety of users. [Practice 5.1 Creating Computational Artifacts]

L2.AP.PD.01 Plan and develop programs that will provide solutions to a variety of users using a software life cycle process. [Practice 5.1 Creating Computational Artifacts]

L1.AP.PD.02 Evaluate licenses that limit or restrict use of computational artifacts when using resources such as libraries. [Practice 7.3 Communicating About Computing]

L2.AP.PD.02 Use version control systems, integrated development environments (IDEs), and collaborative tools and practices (e.g., code documentation) in a group software project. [Practice 2.4 Collaborating Around Computing]

L1.AP.PD.03 Use debugging tools to identify and fix errors in a program. [Practice 6.2 Testing and Refining Computational Artifacts]

L2.AP.PD.03 Develop programs for multiple computing platforms. [Practice 5.2 Creating Computational Artifacts]

L1.AP.PD.04 Design and develop computational artifacts, working in team roles, using collaborative tools. [Practice 2.4 Collaborating Around Computing]

L2.AP.PD.04 Evaluate key qualities of a program through a process such as a code review (e.g., qualities could include correctness, usability, readability, efficiency, portability, and scalability). [Practice 6.3 Testing and Refining Computational Artifacts]

L1.AP.PD.05 Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. [Practice 7.2 Communicating About Computing]

L2.AP.PD.05 Develop and use a series of test cases to verify that a program performs according to its design specifications. [Practice 6.1 Testing and Refining Computational Artifacts]

L1.AP.PD.06 Evaluate and refine computational artifacts to make them more usable and accessible. [Practice 6.3 Testing and Refining Computational Artifacts]

L2.AP.PD.06 Explain security issues that might lead to compromised computer programs. [Practice 7.2 Communicating About Computing]

L2.AP.PD.07 Modify an existing program to add additional functionality and discuss intended and unintended implications (e.g., breaking other functionality). [Practice 5.3 Creating Computational Artifacts]

L2.AP.PD.08 Compare multiple programming languages and discuss how their features make them suitable for solving different types of problems. [Practice 7.2 Communicating About Computing]

Impacts of Computing

Culture (C), Social Interactions (SI), and Safety, Law, and Ethics (SLE)

L1.IC.C.01 Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. [Practice 1.2 Fostering an Inclusive Computing Culture]

L2.IC.C.01 Evaluate the beneficial and harmful effects that computational artifacts and innovations have on society. [Practice 1.2 Fostering an Inclusive Computing Culture]

L1.IC.C.02 Test and refine computational artifacts to reduce bias and equity deficits. [Practice 1.2 Fostering an Inclusive Computing Culture]

L2.IC.C.02 Evaluate the impact of equity, access, and influence on the distribution of computing resources in a global society. [Practice 1.2 Fostering an Inclusive Computing Culture]

L1.IC.C.03 Demonstrate how a given algorithm applies to problems across disciplines. [Practice 3.1 Recognizing and Defining Computational Problems]

L2.IC.C.03 Predict how computational innovations that have revolutionized aspects of our culture might evolve. [Practice 5.2 Creating Computational Artifacts]

L1.IC.SI.01 Use tools and methods for collaboration. [Practice 2.4 Collaborating Around Computing]

L2.IC.SI.01 Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior. [Practice 2.1 Collaborating Around Computing] [Practice 7.3 Communicating About Computing]

L1.IC.SI.02 Practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior. [Practice 2.1 Collaborating Around Computing] [Practice 7.3 Communicating About Computing]

L1.IC.SLE.01 Explain the beneficial and harmful effects that intellectual property laws can have on innovation. [Practice 7.3 Communicating About Computing]

L2.IC.SLE.01 Debate laws and regulations that impact the development and use of software and technology. [Practice 1.1 Recognizing and Defining Computational Problems] [Practice 7.3 Communicating About Computing]

L1.IC.SLE.02 Explain the privacy concerns related to the collection and generation of data through automated processes that may not be evident to users. [Practice 7.2 Communicating About Computing]

L2.IC.SLE.02 Using grade level appropriate content and complexity, discuss the legal, social, and ethical impacts associated with software development and use, including both positive and malicious intent. [Practice 3.3 Fostering an Inclusive Computing Culture] [Practice 7.2 Communicating About Computing]

L1.IC.SLE.03 Evaluate the social and economic implications of privacy in the context of safety, law, or ethics. [Practice 7.3 Communicating About Computing]

L1.IC.SLE.04 Using grade level appropriate content and complexity, discuss the legal, social, and ethical impacts associated with software development and use, including both positive and malicious intent. [Practice 1.1 Fostering an Inclusive Computing Culture] [Practice 7.2 Communicating About Computing]

Fine and Performing Arts (FPA) (2013)

These standards are created in grade bands. These are the grade 9-12 standards under each of 4 disciplines: Visual Arts, Dance, Music, and Theatre. Please note: school districts make local decisions on how to break up/repeat these standards across the 4-year span.

Visual Arts

Creative Expression Through Production

Students create, perform, exhibit or participate in the arts.

FPA11.1.A.1 Students conceptualize, create and revise original art to express ideas, experiences, and stories.

FPA11.1.A.2 Students envision, create, communicate experiences and ideas, and work toward artistic goals through use of media, techniques, technologies, and processes.

FPA11.1.A.3 Students plan and create artistic works based on use of design elements and principles.

FPA11.1.A.4 Students collaborate with others in creative artistic processes.

FPA11.1.A.5 Students use art materials and tools in a safe and responsible manner.

FPA11.1.A.6 Students select, prepare, and exhibit their artwork and explain their choice(s).

Aesthetic Perception

Students respond to, analyze, and make informed judgments about the arts.

FPA11.2.A.1 Students observe and describe in detail the physical properties of works of art.

FPA11.2.A.2 Students interpret and analyze the intentions of artists through themes, subjects, and symbols. Students question and explore the implications of the artists' various purposes.

FPA11.2.A.3 Students state preferences for individual works of art and provide rationale for those preferences based on an analysis of artistic elements and principles.

FPA11.2.A.4 Students form and defend their preferences for artists, specific works, and styles.

Historical and Cultural Context

Students demonstrate an understanding of the arts in relation to history, cultures, and contemporary society.

FPA11.3.A.1 Students differentiate among a variety of historical, environmental, and cultural contexts in terms of characteristics and purposes of works of art.

FPA11.3.A.2 Students describe the function and explore the meaning of specific art objects within varied cultures, eras, and environments.

FPA11.3.A.3 Students analyze relationships of works of art to one another in terms of history, aesthetics, environment, and culture and place their work within the continuum of the visual arts.

Artistic Connections

Students relate the arts to other disciplines, careers, and everyday life.

FPA11.4.A.1 Students synthesize the creative and analytical processes and techniques of the visual arts and other disciplines.

FPA11.4.A.2 Students identify artistic skills and determine how they apply to a variety of careers and recreational opportunities.

FPA11.4.A.3 Students analyze the contributions that art and visual artists make to their local community and contemporary society.

FPA11.4.A.4 Students demonstrate appropriate behavior in a variety of art settings.

Dance

Creative Expression Through Production

Students create, perform, exhibit, or participate in the arts.

FPA11.1.D.1 Students analyze and evaluate a wide range of isolated and coordinated dance movements with body awareness and intent.

FPA11.1.D.2 Students refine movement skills and evaluate alignment, balance, initiation of movement, range of motion, weight shift, elevation and landing, fall and recovery.

FPA11.1.D.3 Students apply and evaluate the elements of dance in their own and others' performance.

FPA11.1.D.4 Students phrase movement artistically and musically and explain their choices.

FPA11.1.D.5 Students choreograph a dance using recognized structures and forms; students critique the use of choreographic structures and forms in a specific dance.

FPA11.1.D.6 Explore and use technology with dance.

FPA11.1.D.7 Students synthesize elements of dance and choreography to communicate a coherent idea in a performance.

Aesthetic Perception

Students respond to, analyze, and make informed judgments about the arts.

FPA11.2.D.1 Students interpret and analyze themes and symbolic movements in a dance performance.

FPA11.2.D.2 Students observe and critique performance of dance, based on their intellectual, kinesthetic, and emotional response to the performance.

FPA11.2.D.3 Students use dance terminology to analyze how technical, organizational, and dance elements contribute to the ideas, aesthetic quality, and impact of the performance.

FPA11.2.D.4 Students evaluate how production elements contribute to the ideas, aesthetic quality, and impact of the performance.

Historical and Cultural Context

Students demonstrate an understanding of the arts in relation to history, cultures, and contemporary society.

FPA11.3.D.1 Students analyze the role of dance in reflecting the values and beliefs of various societies.

FPA11.3.D.2 Students analyze the relationships between historical events and the development of dance.

FPA11.3.D.3 Students analyze the contributions of selected dance artists to various styles of dance and how they have used materials, inventions, and technologies in their work.

FPA11.3.D.4 Students analyze the contributions that dance and its artists make to their local community.

Artistic Connections

Students relate the arts to other disciplines, careers, and everyday life.

FPA11.4.D.1 Students identify and explain commonalities and differences between dance and other disciplines.

FPA11.4.D.2 Students identify how dance skills and experiences support and apply to a variety of careers and recreational opportunities.

FPA11.4.D.3 Students understand how media and social environment affect a dancer. Students analyze strategies to maintain personal health and well-being through dance.

FPA11.4.D.4 Students are attentive and respond appropriately to vocal, musical, social, or observed cues.

FPA11.4.D.5 Students analyze the economics of dance including the role of management, patronage, philanthropy, and advocacy.

Music

Creative Expression Through Production

Students create, perform, exhibit, or participate in the arts.

FPA11.1.M.1 Students refine musicianship through individual practice, rehearsal, revision, and performance.

FPA11.1.M.2 Students perform independently and with others a varied repertoire of music, refining musicianship and technical accuracy.

FPA11.1.M.3 Students improvise rhythms, melodies, and accompaniments within a consistent style, meter, and tonality, and discuss their musical choices.

FPA11.1.M.4 Students compose and arrange music within specified guidelines, demonstrating creativity in using the elements of music for expressive effect.

FPA11.1.M.5 Students demonstrate musical literacy through reading, sight-reading, and notating music.

Aesthetic Perception

Students respond to, analyze, and make informed judgments about the arts.

FPA11.2.M.1 Students analyze compositional devices and techniques used in a musical work and give examples of other works that make similar uses of these devices and techniques.

FPA11.2.M.2 Students respond to aural examples by evaluating musical elements and expressive devices of a varied repertoire of music.

FPA11.2.M.3 Students apply criteria in evaluating their own and others' performances, compositions, arrangements, or improvisations by comparing and contrasting them to similar or exemplary models.

FPA11.2.M.4 Students form and defend their preferences for musicians, musical works, and genres.

Historical and Cultural Context

Students demonstrate an understanding of the arts in relation to history, cultures, and contemporary society.

FPA11.3.M.1 Students classify, by genre or style and by historical period or culture, unfamiliar music and explain the reasoning behind their classifications.

FPA11.3.M.2 Students listen to a varied repertoire of music, emphasizing American music, and analyze the characteristics that cause a work to be considered historically or culturally significant.

FPA11.3.M.3 Students evaluate the various purposes of music, select music for a specific purpose, and defend their choice.

Artistic Connections

Students relate the arts to other disciplines, careers, and everyday life.

FPA11.4.M.1 Students demonstrate safe, responsible, and appropriate behavior in a variety of musical settings.

FPA11.4.M.2 Students examine the creative and analytical processes of music in relationship to other disciplines.

FPA11.4.M.3 Students identify how musical skills and dispositions are applied to careers, cultural and recreational opportunities.

FPA11.4.M.4 Students analyze the economics of music including the role of management, patrons, philanthropy, and advocacy.

Theatre

Creative Expression Through Production

Students create, perform, exhibit, or participate in the arts.

FPA11.1.T.1 Students perform in a theatrical setting using a variety of dramatic styles.

FPA11.1.T.2 Students design and create for a theatrical setting using a variety of technical theatre skills and technologies.

FPA11.1.T.3 Students refine theatrical skills and self-discipline through rehearsal, practice, memorization, and revision.

FPA11.1.T.4 Students apply collaborative skills to create and critique theatrical works.

FPA11.1.T.5 Students research characters, themes, and historical events to support the creation of theatrical productions.

FPA11.1.T.6 Students use a script to inform their performances and technical theatre designs.

Aesthetic Perception

Students respond to, analyze, and make informed judgments about the arts.

FPA11.2.T.1 Students view and critique a live performance, including responses to the intellectual and emotional effects of the performance.

FPA11.2.T.2 Students observe and evaluate how technical, organizational, and theatrical elements contribute to the ideas, aesthetic quality, and impact of the theatrical form.

FPA11.2.T.3 Students interpret and analyze the intentions and artistic choices of dramatic artists through themes, subjects, and symbols through use of theatrical terminology. Students question and explore the implications of the dramatic artists' various purposes.

FPA11.2.T.4 Students form and defend preferences for specific theatrical works using a rationale based on an analysis of theatrical elements and personal experiences.

FPA11.2.T.5 Students read, analyze, and evaluate scripts.

Historical and Cultural Context

Students demonstrate an understanding of the arts in relation to history, cultures, and contemporary society.

FPA11.3.T.1 Students analyze dramatic works and distinguishing features from a variety of cultures and historical periods.

FPA11.3.T.2 Students examine the role and development of the theatre arts in a variety of cultures and historical periods.

FPA11.3.T.3 Students evaluate how a work of theatre impacts and is influenced by authorial, social, cultural, and historical contexts.

Artistic Connections

Students relate the arts to other disciplines, careers, and everyday life.

FPA11.4.T.1 Students demonstrate appropriate etiquette in a variety of theatrical settings.

FPA11.4.T.2 Students model and practice safe and responsible behavior in theatrical spaces.

FPA11.4.T.3 Students connect the creative and analytical processes and techniques of theatre with other disciplines, and understand how theatre influences and enhances other disciplines.

FPA11.4.T.4 Students identify theatrical skills and determine how they apply to a variety of careers and recreational opportunities.

FPA11.4.T.5 Students analyze the contributions that theatre and its artists make to their local community and contemporary society.

FPA11.4.T.6 Students analyze the economics of theatre including the role of management, patronage, philanthropy, and advocacy.