



DLM Essential Elements Supporting the Illinois Learning Standards

GRADES
NINTH – TWELFTH

CONDENSED LIST OF CONTENT STANDARDS FOR ELA, MATH AND
SCIENCE

WITH ESSENTIAL ELEMENTS ATTACHED

ENGLISH LANGUAGE ARTS – 9TH – 10TH GRADES
READING STANDARDS 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.
EE.RL.9-10.1 Determine which citations demonstrate 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.
EE.RL.9-10.2 Recount events related to the theme or central idea, including details about character and setting.
- 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.
EE.RL.9-10.3 Determine how characters change or develop over the course of a text.

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).
EE.RL.9-10.4 Determine the meaning of words and phrases as they are used in a text, including idioms, analogies, and figures of speech.
- 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.
EE.RL.9-10.5 Identify where a text deviates from a chronological presentation of events.
- 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.
EE.RL.9-10.6 Determine a point of view or cultural experience in a work of literature from outside the United States and compare it with own point of view or experience.

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).
EE.RL.9-10.7 Compare the representation of a subject or topic in two different artistic mediums (e.g., poetry and illustration).
- 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).
EE.RL.9-10.9 Identify when an author draws upon or references a different text.

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.
EE.RL.9-10.10 Demonstrate understanding of a text while actively engaged in reading or listening to stories, dramas, or poems.

READING STANDARDS 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.
EE.RI.9-10.1 Determine which citations demonstrate what the text says explicitly as well as inferentially.
- 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.
EE.RI.9-10.2 Determine the central idea of the text and select details to support it.
- 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.
EE.RI.9-10.3 Determine logical connections between individuals, ideas, or events in a text.

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).
EE.RI.9-10.4 Determine the meaning of words and phrases as they are used in text, including common idioms, analogies, and figures of speech.
- 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).
EE.RI.9-10.5 Locate sentences that support an author's central idea or claim.
- 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.
EE.RI.9-10.6 Determine author's point of view and compare with own point of view.

Integration and 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.
EE.RI.9-10.7 Analyze two accounts of a subject told in different mediums to determine how they are the same and different.

- 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.
EE.RI.9-10.8 Determine how the specific claims support the argument made in an informational text.
- 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.
EE.RI.9-10.9 Make connections between texts with 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.
EE.RI.9-10.10 Demonstrate understanding while actively engaged in reading or listening to literary nonfiction.

WRITING STANDARDS

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.
EE.W.9-10.1 Write claims about topics or texts.
- 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.
EE.W.9-10.1.a Introduce a topic or text and write one claim and one counterclaim about it.
- 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.
EE.W.9-10.2 Write to share information supported by details.
- 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.
EE.W.9-10.2.a Introduce a topic clearly and use a clear organization to write about it including visual, factual, or multimedia information as appropriate.
- 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.
EE.W.9-10.2.b Develop the topic with facts or details.
- 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.
EE.W.9-10.2.c Use complete, simple sentences as appropriate.
- W.9-10.2.d Use precise language and domain-specific vocabulary to manage the complexity of the topic.
EE.W.9-10.2.d Use domain specific vocabulary when writing claims related to a topic of study or text.
- 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).
EE.W.9-10.2.f Providing a closing or concluding statement.
- 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.
EE.W.9-10.3 Write about events or personal experiences.
- 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.
EE.W.9-10.3.a Write a narrative about a problem, situation, or observation including at least one character, details, and clearly sequenced events.
- 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.
EE.W.9-10.3.c Organize the events in the narrative using temporal words to signal order as appropriate.
- 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.
EE.W.9-10.3.d Use descriptive words and phrases to convey a vivid picture of experiences, events, setting, or characters.
- W.9-10.3.e Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.
EE.W.9-10.3.e Provide a closing.

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.
EE.W.9-10.4 Produce writing that is appropriate for the task, purpose, and audience.
- 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.
EE.W.9-10.5 Develop writing by planning and revising own writing.
- 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.
EE.W.9-10.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products.

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.
EE.W.9-10.7 Conduct research projects to answer questions posed by self and others using multiple sources of information.
- 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.
EE.W.9-10.8 Write answers to research questions by selecting relevant information from multiple resources.
- W.9-10.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.
EE.W.9-10.9 Use information from literary and informational text to support writing.
- 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]").
EE.W.9-10.9.a Apply Essential Elements of Grade 9-10 Reading Standards to literature (e.g., "Identify when an author has drawn upon or included references to another text.").
- 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").
EE.W.9-10.9.b Apply Essential Elements of Grade 9-10 Reading Standards to informational texts (e.g., "Use sound reasons for supporting the claims and argument.").

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 discipline-specific tasks, purposes, and audiences.
EE.W.9-10.10 Write routinely over time for a range of tasks, purposes, and audiences.

SPEAKING AND LISTENING STANDARDS

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.
EE.SL.9-10.1 Engage in collaborative discussions.
- 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.
EE.SL.9-10.1.a Prepare for discussions by collecting information on the topic.
- 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.
EE.SL.9-10.1.b Work with adults and peers to set rules for discussions.
- 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.
EE.SL.9-10.1.c Relate the topic of discussion to broader themes or ideas.
- SL.9-10.1.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.
EE.SL.9-10.1.d Indicate agreement or disagreement with others during discussions.
- 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.
EE.SL.9-10.2 Determine the credibility of information presented in diverse media or formats.
- 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.
EE.SL.9-10.3 Determine the speaker's point of view on a topic.
- 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.
EE.SL.9-10.4 Present an argument on a topic with logically organized claims, reasons, and evidence.
- 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.
EE.SL.9-10.5 Use digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to support understanding.
- SL.9-10.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
EE.SL.9-10.6 Adapt communication to a variety of contexts and tasks using complete sentences when indicated or appropriate.

LANGUAGE STANDARDS

Conventions of Standard English

- L.9-10.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
EE.L.9-10.1 Demonstrate standard English grammar and usage when communicating.
- 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.
EE.L.9-10.1.b Use a variety of parts of speech (nouns, verbs, pronouns, adjectives, and prepositions) in writing or communication to convey information.
- L.9-10.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
EE.L.9-10.2 Demonstrate understanding of conventions of standard English.
- L.9-10.2.a Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.
EE.L.9-10.2.a Use a comma and conjunction to combine two simple sentences.
- L.9-10.2.c Spell correctly.
EE.L.9-10.2.c Spell most single-syllable words correctly and apply knowledge of word chunks in spelling longer words.

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.
EE.L.9-10.3 Use language to achieve desired outcomes when communicating.
- 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.
EE.L.9-10.3.a Vary syntax when writing and communicating.

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.
EE.L.9-10.4 Demonstrate knowledge of word meanings.
- 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.
EE.L.9-10.4.a Use context to determine the meaning of unknown
- 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).
EE.L.9-10.4.b Identify and use root words and the words that result when affixes are added or removed.
- 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.
EE.L.9-10.4.c Consult reference materials (dictionaries, online vocabulary supports) to clarify the meaning of unfamiliar words encountered when reading.
- L.9-10.5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
EE.L.9-10.5 Demonstrate understanding of word relationships and use.
- L.9-10.5.a Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text.
EE.L.9-10.5.a Interpret common figures of speech.
- L.9-10.5.b Analyze nuances in the meaning of words with similar denotations.
EE.L.9-10.5.b Determine the intended meaning of multiple meaning words.
- 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.
EE.L.9-10.6 Use general academic and domain-specific words and phrases across contexts.

ENGLISH LANGUAGE ARTS – 11TH – 12TH GRADE
READING STANDARDS 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.
EE.RL.11-12.1 Analyze a text to determine its meaning and cite textual evidence to support explicit and implicit understandings.
- 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.
EE.RL.11-12.2 Recount the main events of the text which are related to the theme or central idea.
- 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).
EE.RL.11-12.3 Determine how characters, the setting or events change over the course of the story or drama.

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.)
EE.RL.11-12.4 Determine how words or phrases in a text, including words with multiple meanings and figurative language, impact the meaning.
- 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.
EE.RL.11-12.5 Determine how the author's choice of where to end the story contributes to the meaning.
- 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).
EE.RL.11-12.6 Determine the point of view when there is a difference between the author's actual language and intended meaning.

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.)
EE.RL.11-12.7 Compare two or more interpretations (e.g., recorded or live production of a play or recorded novel or poetry) of a story, drama, or poem.
- 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.
EE.RL.11-12.9 Demonstrate explicit understanding of recounted versions of foundational works of American literature.

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.
EE.RL.11-12.10 Demonstrate understanding while actively engaged in reading or listening to stories, dramas, and poems.

READING STANDARDS 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.
EE.RI.11-12.1 Analyze a text to determine its meaning and cite textual evidence to support explicit and implicit understanding.
- 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.
EE.RI.11-12.2 Determine the central idea of a text; recount 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.
EE.RI.11-12.3 Determine how individuals, ideas, or events change 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).
EE.RI.11-12.4 Determine how words or phrases in a text, including words with multiple meanings and figurative language, impacts the meaning of the text.
- 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.
EE.RI.11-12.5 Determine whether the structure of a text enhances an author's claim.

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.

EE.RI.11-12.6 Determine author's point of view and compare and contrast it with own point of view.

Integration and 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.

EE.RI.11-12.7 Analyze information presented in different media on related topics to answer questions or solve problems.

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).

EE.RI.11-12.8 Determine whether the claims and reasoning enhance the author's argument in an informational text.

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.

EE.RI.11-12.9 Compare and contrast arguments made by two different texts on the same topic.

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.

EE.RI.11-12.10 Demonstrate understanding while actively engaged in reading or listening to literary non-fiction.

WRITING STANDARDS

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.

EE.W.11-12.1 Write arguments to support claims.

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.

EE.W.11-12.1.a Write an argument to support a claim that results from studying a topic or reading a text.

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.

EE.W.11-12.1.b Support claims with reasons and evidence drawn from text.

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.

EE.W.11-12.2 Write to share information supported by details.

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.

EE.W.11-12.2.a Introduce a topic clearly and write an informative or explanatory text that conveys ideas, concepts, and information including visual, factual, or multimedia information as appropriate.

W.11-12.2.b 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.

EE.W.11-12.2.b Develop the topic with relevant facts, details, or quotes.

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.

EE.W.11-12.2.c Use complete, simple sentences, as well as compound and other complex sentences as appropriate.

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.

EE.W.11-12.2.d Use domain specific vocabulary when writing claims related to a topic of study or text.

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).

EE.W.11-12.2.f Provide a closing or concluding statement.

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.

EE.W.11-12.3 Write about events or personal experiences.

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.

EE.W.11-12.3.a Write a narrative about a problem, situation, or observation including at least one character, details, and clearly sequenced events.

- 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).
EE.W.11-12.3.c Organize the events in the narrative using temporal words to signal order and add cohesion.
- 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.
EE.W.11-12.3.d Use descriptive words and phrases to convey a vivid picture of experiences, events, setting, 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.
EE.W.11-12.3.e Provide a closing.

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.
EE.W.11-12.4 Produce writing that is appropriate to a particular task, purpose, and audience.
- 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.
EE.W.11-12.5 Develop and strengthen writing as needed by planning, revising, editing, and rewriting.
- 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.
EE.W.11-12.6 Use technology, including the Internet, to produce, publish and update an individual or shared writing project.

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.
EE.W.11-12.7 Conduct research projects to answer questions posed by self and others using multiple sources of information.
- 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 over-reliance on any one source and following a standard format for citation.
EE.W.11-12.8 Write answers to research questions by selecting relevant information from multiple resources.
- W.11-12.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.
EE.W.11-12.9 Cite evidence from literary or informational texts.
- 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").
EE.W.11-12.9.a Apply Grades 11-12 Essential Elements for Reading Standards to literature (e.g., "Compare and contrast elements of American literature to other literary works, self, or one's world. [Compare themes, topics, locations, context, and point of view].").
- 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]").
EE.W.11-12.9.b Apply Grades 11-12 Essential Elements for Reading Standards to informational texts (eg., "Compare and contrast reasoning and arguments used in one's work with those used in seminal U.S. texts.").

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 discipline-specific tasks, purposes, and audiences.
EE.W.11-12.10 Write routinely over extended time frames (time for research, reflection, and revision) for a range of tasks, purposes, and audiences.

SPEAKING AND LISTENING STANDARDS

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.
EE.SL.11-12.1 Engage in collaborative discussions.
- 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.
EE.SL.11-12.1.a Prepare for discussions by collecting information on the topic.
- 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.
EE.SL.11-12.1.b Work with peers to set rules and goals for discussions.
- 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.
EE.SL.11-12.1.c Ask and answer questions to verify or clarify own ideas and understandings during a discussion.

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.

EE.SL.11-12.1.d Respond to agreements and disagreements in a discussion.

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.

EE.SL.11-12.2 Determine the credibility and accuracy of information presented across diverse media or formats.

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.

EE.SL.11-12.3 Determine whether the claims and reasoning enhance the speaker's argument on a topic.

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.

EE.SL.11-12.4 Present an argument on a topic using an organization appropriate to the purpose, audience, and task.

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.

EE.SL.11-12.5 Use digital media strategically (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to support understanding and add interest.

SL.11-12.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

EE.SL.11-12.6 Adapt communication to a variety of contexts and tasks using complete sentences when indicated or appropriate.

LANGUAGE STANDARDS

Conventions of Standard English

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

EE.L.11-12.1 Demonstrate standard English grammar and usage when communicating.

L.11-12.1.a Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested.

EE.L.11-12.1.a Use conventions of standard English when needed.

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.

EE.L.11-12.1.b Use digital, electronic, and other resources and tools to improve uses of language as needed.

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

EE.L.11-12.2 Demonstrate understanding of conventions of standard English.

L.11-12.2.a Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.

EE.L.11-12.2.a Demonstrate conventions of standard English including capitalization, ending punctuation, and spelling when writing.

L.11-12.2.b Spell correctly.

EE.L.11-12.2.b Spell most single-syllable words correctly and apply knowledge of word chunks in spelling longer words.

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.

EE.L.11-12.3 Use language to achieve desired outcomes when communicating.

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.

EE.L.11-12.3.a Vary sentence structure using a variety of simple and compound sentence structures.

Vocabulary Acquisition And Use

L.11-12.4 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.

EE.L.11-12.4 Demonstrate knowledge of word meanings.

L.11-12.4.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.

EE.L.11-12.4.a Use context to determine the meaning of unknown words.

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).

EE.L.11-12.4.b Identify and use root words and the words that result when affixes are added or removed.

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).

EE.L.11-12.4.d Consult reference materials (dictionaries, online vocabulary supports) to clarify the meaning of unfamiliar words encountered when reading.

- L.11-12.5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
 - EE.L.11-12.5** Demonstrate understanding of word relationships and use.
- L.11-12.5.a Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.
 - EE.L.11-12.5.a** Interpret simple figures of speech encountered while reading or listening.
- 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.
 - EE.L.11-12.6** Use general academic and domain-specific words and phrases across contexts.

STANDARDS FOR MATHEMATICAL PRACTICE

MP

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

MATHEMATICS – HIGH SCHOOL

ALGEBRA I

QUANTITIES

Q

Reason quantitatively and use units to solve problems.

- N.Q.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; choose and interpret the scale and the origin in graphs and data displays.
- N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.
- N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

EE.N-Q.1–3. Express quantities to the appropriate precision of measurement.

SEEING STRUCTURE IN EXPRESSIONS

SSE

Interpret the structure of expressions

- A.SSE.1 Interpret expressions that represent a quantity in terms of its context.
- A.SSE.1.a Interpret parts of an expression, such as terms, factors, and coefficients.
- A.SSE.1.b Interpret complicated expressions by viewing one or more of their parts as a single entity.

EE.A-SSE.1. Identify an algebraic expression involving one arithmetic operation to represent a real-world problem.

Write expressions in equivalent forms to solve problems

- A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
- A.SSE.3.a Factor a quadratic expression to reveal the zeros of the function it defines.
- A.SSE.3.b Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
- A.SSE.3.c Use the properties of exponents to transform expressions for exponential functions.

EE.A-SSE.3. Solve simple algebraic equations with one variable using multiplication and division.

CREATING EQUATIONS

CED

Create equations that describe numbers or relationships

- A.CED.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.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
- A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

EE.A-CED.2–4. Solve one-step inequalities.

REASONING WITH EQUATIONS AND INEQUALITIES

REI

Represent and solve equations and inequalities graphically

- A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
- A.REI.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.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.

EE.A-REI.10–12. Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost of the pizzas.

INTERPRETING FUNCTIONS

IF

Understand the concept of a function and use function notation

- F.IF.1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
- F.IF.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.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.

EE.F-IF.1–3. Use the concept of function to solve problems.

| <i>Interpret functions that arise in applications in terms of the context</i> | |
|---|---|
| F.IF.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. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> |
| F.IF.5 | Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. |
| F.IF.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. |
| EE.F-IF.4–6. Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc. | |

| BUILDING FUNCTIONS | BF |
|--------------------|----|
|--------------------|----|

| <i>Build a function that models a relationship between two quantities</i> | |
|--|---|
| F.BF.1 | Write a function that describes a relationship between two quantities. |
| F.BF.1.a | Determine an explicit expression, a recursive process, or steps for calculation from a context. |
| EE.F-BF.1. Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change. | |

| LINEAR, QUADRATIC, AND EXPONENTIAL MODELS | LE |
|---|----|
|---|----|

| <i>Construct and compare linear, quadratic, and exponential models and solve problems</i> | |
|---|---|
| F.LE.1 | Distinguish between situations that can be modeled with linear functions and with exponential functions. |
| F.LE.1.a | Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. |
| F.LE.1.b | Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. |
| F.LE.1.c | Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another. |
| F.LE.2 | Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). |
| F.LE.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. |
| EE.F-LE.1–3. Model a simple linear function such as $y = mx$ to show that these functions increase by equal amounts over equal intervals. | |

| INTERPRETING CATEGORICAL AND QUANTITATIVE DATA | ID |
|--|----|
|--|----|

| <i>Summarize, represent, and interpret data on a single count or measurement variable</i> | |
|--|--|
| S.ID.1 | Represent data with plots on the real number line (dot plots, histograms, and box plots). |
| S.ID.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. |
| EE.S-ID.1–2. Given data, construct a simple graph (line, pie, bar, or picture) or table, and interpret the data. | |
| S.ID.3 | Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). |
| EE.S-ID.3. Interpret general trends on a graph or chart. | |

**GEOMETRY
CONGRUENCE**

CO

Experiment with transformations in the plane

G.CO.1 Know 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.

EE.G-CO.1. Know the attributes of perpendicular lines, parallel lines, and line segments; angles; and circles.

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

G.CO.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.

EE.G-CO.4–5. Given a geometric figure and a rotation, reflection, or translation of that figure, identify the components of the two figures that are congruent.

Understand congruence in terms of rigid motions

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

EE.G-CO.6–8. Identify corresponding congruent and similar parts of shapes.

EXPRESSING GEOMETRIC PROPERTIES WITH EQUATIONS

GPE

Use coordinates to prove simple geometric theorems algebraically

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

EE.G-GPE.7. Find perimeters and areas of squares and rectangles to solve real-world problems.

GEOMETRIC MEASUREMENT AND DIMENSION

GMD

Explain volume formulas and use them to solve problems

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

EE.G-GMD.1–3. Make a prediction about the volume of a container, the area of a figure, and the perimeter of a figure, and then test the prediction using formulas or models.

Visualize relationships between two-dimensional and three-dimensional objects

G.GMD.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.

EE.G-GMD.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects.

MODELING WITH GEOMETRY

MG

Apply geometric concepts in modeling situations

G.MG.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.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.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).

EE.G-MG.1–3. Use properties of geometric shapes to describe real-life objects.

| ALGEBRA II | | |
|---|---|-----|
| THE REAL NUMBER SYSTEM | | RN |
| <i>Extend the properties of exponents to rational exponents.</i> | | |
| N.RN.1 | Explain how the definition of the meaning 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. | |
| | EE.N-RN.1. Determine the value of a quantity that is squared or cubed. | |
| QUANTITIES | | Q |
| <i>Reason quantitatively and use units to solve problems.</i> | | |
| N.Q.2 | Define appropriate quantities for the purpose of descriptive modeling. | |
| | EE.N-Q.1–3. Express quantities to the appropriate precision of measurement. | |
| THE COMPLEX NUMBER SYSTEM | | CN |
| <i>Perform arithmetic operations with complex numbers.</i> | | |
| N.CN.2 | Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. | |
| | EE.N-CN.2.a. Use the commutative, associative, and distributive properties to add, subtract, and multiply whole numbers. | |
| | EE.N-CN.2.b. Solve real-world problems involving addition and subtraction of decimals, using models when needed. | |
| | EE.N-CN.2.c. Solve real-world problems involving multiplication of decimals and whole numbers, using models when needed. | |
| SEEING STRUCTURE IN EXPRESSIONS | | SSE |
| <i>Write expressions in equivalent forms to solve problems</i> | | |
| A.SSE.3 | Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. | |
| | A.SSE.3.c Use the properties of exponents to transform expressions for exponential functions. | |
| | EE.A-SSE.3. Solve simple algebraic equations with one variable using multiplication and division. | |
| A.SSE.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. | |
| | EE.A-SSE.4. Determine the successive term in a geometric sequence given the common ratio. | |
| CREATING EQUATIONS | | CED |
| <i>Create equations that describe numbers or relationships</i> | | |
| A.CED.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. | |
| | EE.A-CED.1. Create an equation involving one operation with one variable, and use it to solve a real-world problem. | |
| REASONING WITH EQUATIONS AND INEQUALITIES | | REI |
| <i>Represent and solve equations and inequalities graphically</i> | | |
| A.REI.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. | |
| | EE.A-REI.10–12. Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost of the pizzas. | |
| INTERPRETING FUNCTIONS | | IF |
| <i>Understand the concept of a function and use function notation</i> | | |
| F.IF.3 | Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. | |
| | EE.F-IF.1–3. Use the concept of function to solve problems. | |
| <i>Interpret functions that arise in applications in terms of the context</i> | | |
| F.IF.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. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> | |
| F.IF.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. | |
| | EE.F-IF.4–6. Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc. | |
| BUILDING FUNCTIONS | | BF |
| <i>Build a function that models a relationship between two quantities</i> | | |
| F.BF.1 | Write a function that describes a relationship between two quantities | |
| | F.BF.1.a Determine an explicit expression, a recursive process, or steps for calculation from a context. | |
| | F.BF.1.b Combine standard function types using arithmetic operations. | |
| | EE.F-BF.1. Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change. | |
| F.BF.2 | Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. | |
| | EE.F-BF.2. Determine an arithmetic sequence with whole numbers when provided a recursive rule. | |

LINEAR, QUADRATIC, AND EXPONENTIAL MODELS**LE***Construct and compare linear, quadratic, and exponential models and solve problems*

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

EE.F-LE.1–3. Model a simple linear function such as $y = mx$ to show that these functions increase by equal amounts over equal intervals.

INTERPRETING CATEGORICAL AND QUANTITATIVE DATA**ID***Summarize, represent, and interpret data on a single count or measurement variable*

S.ID.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 calculators, spreadsheets, and tables to estimate areas under the normal curve.

EE.S-ID.4. Calculate the mean of a given data set (limit the number of data points to fewer than five).

MAKING INFERENCES AND JUSTIFYING CONCLUSIONS**IC***Understand and evaluate random processes underlying statistical experiments*

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

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

EE.S-IC.1–2. Determine the likelihood of an event occurring when the outcomes are equally likely to occur.

CONDITIONAL PROBABILITY AND THE RULES OF PROBABILITY**CP***Understand independence and conditional probability and use them to interpret data*

S.CP.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.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.3 Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, 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.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.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

EE.S-CP.1–5. Identify when events are independent or dependent.

INTEGRATED PATHWAY MATH 1

QUANTITIES

Q

Reason quantitatively and use units to solve problems.

- N.Q.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; choose and interpret the scale and the origin in graphs and data displays.
- N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.
- N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

EE.N-Q.1–3. Express quantities to the appropriate precision of measurement.

SEEING STRUCTURE IN EXPRESSIONS

SSE

Interpret the structure of expressions

- A.SSE.1 Interpret expressions that represent a quantity in terms of its context
- A.SSE.1.a Interpret parts of an expression, such as terms, factors, and coefficients.
- A.SSE.1.b Interpret complicated expressions by viewing one or more of their parts as a single entity.
- EE.A-SSE.1.** Identify an algebraic expression involving one arithmetic operation to represent a real-world problem.

Write expressions in equivalent forms to solve problems

- A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
- A.SSE.3.c Use the properties of exponents to transform expressions for exponential functions.
- EE.A-SSE.3.** Solve simple algebraic equations with one variable using multiplication and division.

CREATING EQUATIONS

CE

Create equations that describe numbers or relationships

- A.CED.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.
- EE.A-CED.1.** Create an equation involving one operation with one variable, and use it to solve a real-world problem.
- A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
- A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
- EE.A-CED.2–4.** Solve one-step inequalities.

REASONING WITH EQUATIONS AND INEQUALITIES

REI

Represent and solve equations and inequalities graphically

- A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
- A.REI.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.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.
- EE.A-REI.10–12.** Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost of the pizzas.

INTERPRETING FUNCTIONS

IF

Understand the concept of a function and use function notation

- F.IF.1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
- F.IF.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.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
- EE.F-IF.1–3.** Use the concept of function to solve problems.

Interpret functions that arise in applications in terms of the context

- F.IF.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. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
- F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
- F.IF.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.
- EE.F-IF.4–6.** Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc.

BUILDING FUNCTIONS**BF***Build a function that models a relationship between two quantities*

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

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

EE.F-BF.1. Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change.

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

EE.F-BF.2. Determine an arithmetic sequence with whole numbers when provided a recursive rule.**LINEAR, QUADRATIC, AND EXPONENTIAL MODELS****LE***Construct and compare linear, quadratic, and exponential models and solve problems*

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

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

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

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

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

F.LE.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.

EE.F-LE.1–3. Model a simple linear function such as $y = mx$ to show that these functions increase by equal amounts over equal intervals.**CONGRUENCE****CO***Experiment with transformations in the plane*

G.CO.1 Know 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.

EE.G-CO.1. Know the attributes of perpendicular lines, parallel lines, and line segments; angles; and circles.

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

G.CO.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.

EE.G-CO.4–5. Given a geometric figure and a rotation, reflection, or translation of that figure, identify the components of the two figures that are congruent.*Understand congruence in terms of rigid motions*

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

EE.G-CO.6–8. Identify corresponding congruent and similar parts of shapes.**INTERPRETING CATEGORICAL AND QUANTITATIVE DATA****ID***Summarize, represent, and interpret data on a single count or measurement variable*

S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).

S.ID.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.

EE.S-ID.1–2. Given data, construct a simple graph (line, pie, bar, or picture) or table, and interpret the data.

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

EE.S-ID.3. Interpret general trends on a graph or chart.

INTEGRATED PATHWAY MATH 2

THE REAL NUMBER SYSTEM

RN

Extend the properties of exponents to rational exponents.

N.RN.1 Explain how the definition of the meaning 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.

EE.N-RN.1. Determine the value of a quantity that is squared or cubed.

QUANTITIES

Q

Reason quantitatively and use units to solve problems.

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

EE.N-Q.1–3. Express quantities to the appropriate precision of measurement.

THE COMPLEX NUMBER SYSTEM

CN

Perform arithmetic operations with complex numbers.

N.CN.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

EE.N-CN.2.a. Use the commutative, associative, and distributive properties to add, subtract, and multiply whole numbers.

EE.N-CN.2.b. Solve real-world problems involving addition and subtraction of decimals, using models when needed.

EE.N-CN.2.c. Solve real-world problems involving multiplication of decimals and whole numbers, using models when needed.

SEEING STRUCTURE IN EXPRESSIONS

SSE

Interpret the structure of expressions

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

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

EE.A-SSE.1. Identify an algebraic expression involving one arithmetic operation to represent a real-world problem.

Write expressions in equivalent forms to solve problems

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

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

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

EE.A-SSE.3. Solve simple algebraic equations with one variable using multiplication and division.

CREATING EQUATIONS

CED

Create equations that describe numbers or relationships

A.CED.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.

EE.A-CED.1. Create an equation involving one operation with one variable, and use it to solve a real-world problem.

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

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

EE.A-CED.2–4. Solve one-step inequalities.

INTERPRETING FUNCTIONS

IF

Interpret functions that arise in applications in terms of the context

F.IF.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. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

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

F.IF.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.

EE.F-IF.4–6. Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc.

BUILDING FUNCTIONS

BF

Build a function that models a relationship between two quantities

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

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

F.BF.1.b Combine standard function types using arithmetic operations.

EE.F-BF.1. Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change.

GEOMETRIC MEASUREMENT AND DIMENSION

GMD

Explain volume formulas and use them to solve problems

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

EE.G-GMD.1–3. Make a prediction about the volume of a container, the area of a figure, and the perimeter of a figure, and then test the prediction using formulas or models.

CONDITIONAL PROBABILITY AND THE RULES OF PROBABILITY

CP

Understand independence and conditional probability and use them to interpret data

- S.CP.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.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.3 Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, 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.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.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
- EE.S-CP.1–5.** Identify when events are independent or dependent.

INTEGRATED PATHWAY MATH 3

QUANTITIES

Q

Reason quantitatively and use units to solve problems.

- N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.
- EE.N-Q.1–3.** Express quantities to the appropriate precision of measurement.

SEEING STRUCTURE IN EXPRESSIONS

SSE

Write expressions in equivalent forms to solve problems

- A.SSE.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.
- EE.A-SSE.4.** Determine the successive term in a geometric sequence given the common ratio.

CREATING EQUATIONS

CF

Create equations that describe numbers or relationships

- A.CED.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.
- EE.A-CED.1.** Create an equation involving one operation with one variable, and use it to solve a real-world problem.
- A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- EE.A-CED.2–4.** Solve one-step inequalities.

REASONING WITH EQUATIONS AND INEQUALITIES

REI

Represent and solve equations and inequalities graphically

- A.REI.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.
- EE.A-REI.10–12.** Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost of the pizzas.

INTERPRETING FUNCTIONS

IF

Interpret functions that arise in applications in terms of the context

- F.IF.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. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
 - F.IF.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.
- EE.F-IF.4–6.** Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc.

EXPRESSING GEOMETRIC PROPERTIES WITH EQUATIONS

GPE

Use coordinates to prove simple geometric theorems algebraically

- G.GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
- EE.G-GPE.7.** Find perimeters and areas of squares and rectangles to solve real-world problems.

GEOMETRIC MEASUREMENT AND DIMENSION

GMD

Visualize relationships between two-dimensional and three-dimensional objects

- G.GMD.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.
- EE.G-GMD.4.** Identify the shapes of two-dimensional cross-sections of three-dimensional objects.

MODELING WITH GEOMETRY**MG***Apply geometric concepts in modeling situations*

- G.MG.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.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.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).

EE.G-MG.1–3. Use properties of geometric shapes to describe real-life objects.**INTERPRETING CATEGORICAL AND QUANTITATIVE DATA****ID***Summarize, represent, and interpret data on a single count or measurement variable*

- S.ID.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 calculators, spreadsheets, and tables to estimate areas under the normal curve.

EE.S-ID.4. Calculate the mean of a given data set (limit the number of data points to fewer than five).**MAKING INFERENCES AND JUSTIFYING CONCLUSIONS****IC***Understand and evaluate random processes underlying statistical experiments*

- S.IC.1 Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
- S.IC.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

EE.S-IC.1–2. Determine the likelihood of an event occurring when the outcomes are equally likely to occur.

SCIENCE (NGSS) – HIGH SCHOOL

PHYSICAL SCIENCE

MATTER AND ITS INTERACTIONS

“STUDENTS WHO DEMONSTRATE UNDERSTANDING CAN....”

HS-PS1-2 Construct and revise 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.

EE.HS-PS1-2 **Target Level:** Make a claim supported by evidence to explain patterns of chemical properties that occur in a substance during a common chemical reaction (e.g., baking soda and vinegar).

Precursor Level: Identify the changes that have occurred during a chemical reaction (e.g., metal-rust, paper-burn).

Initial Level: Recognize that a change has occurred during a chemical reaction.

MOTION AND STABILITY: FORCES AND INTERACTIONS

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.

EE.HS-PS2-3 **Target Level:** Evaluate the effectiveness of safety devices and design a solution that could minimize the force of a collision.

Precursor Level: Use data to compare the effectiveness of safety devices to determine which best minimizes the force of a collision.

Initial Level: Identify safety equipment devices that minimize force of a collision (e.g., floor mats, helmets, or steel-toed boots).

ENERGY

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

EE.HS-PS3-4 **Target Level:** Investigate and predict the temperatures of two liquids before and after combining to show uniform energy distribution.

Precursor Level: Compare the temperatures of two liquids of different temperatures before and after combining.

Initial Level: Compare relative difference in temperature (warmth, coldness) of two liquids.

WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER

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.

EE.HS-PS4-5 **Target Level:** Make a claim supported by evidence that shows how some devices use light and sound waves to transmit and capture information.

Precursor Level: Identify common devices which use light or sound waves to transmit information.

Initial Level: Identify how common technological devices are used for different purposes.

LIFE SCIENCE

FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

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

EE.HS-LS1-2 **Target Level:** Use a model to illustrate the organization and interaction of major organs into systems (e.g., circulatory, respiratory, digestive, sensory) in the body to provide specific functions.

Precursor Level: Identify which organs work for a specific function.

Initial Level: Recognize that different organs have different functions.

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

EE.HS-LS1-4 **Target Level:** Use a model to illustrate how growth occurs when cells multiply.

Precursor Level: Use a model to relate the number of cells to the size of a body.

Initial Level: Recognize that organisms are composed of cells.

ECOSYSTEMS: INTERACTIONS, ENERGY, AND DYNAMICS

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.

EE.HS-LS2-2 **Target Level:** Use a graphical representation to explain the dependence of an animal population on other organisms for food and their environment for shelter.

Precursor Level: Recognize the relationship between population size and available resources for food and shelter from a graphical representation.

Initial Level: Identify food and shelter needs for familiar wildlife.

HEREDITY: INHERITANCE AND VARIATION OF TRAITS

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.

EE.HS-LS3-2 **Target Level:** Defend why reproduction may or may not result in offspring with different traits.

Precursor Level: Make a claim supported by evidence that parents and offspring may have different traits.

Initial Level: Compare traits of parents and offspring.

BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY

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.

EE.HS-LS4-2 **Target Level:** Explain how the traits of particular species that allow them to survive in their specific environments.

Precursor Level: Identify factors in an environment that require special traits to survive.

Initial Level: Match particular species to their various environments.

EARTH and SPACE

EARTH'S PLACE IN THE UNIVERSE

HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

EE.HS-ESS1-4 **Target Level:** Use a model of Earth and the Sun to show how Earth's tilt and orbit around the Sun cause changes in seasons.

Precursor Level: Use a model of Earth and sun to show how Earth's positions in its orbit around the Sun correspond with the four seasons.

Initial Level: Identify characteristics of the seasons.

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.

EE.HS-ESS2-1 **Target Level:** Use a model to show how constructive forces (e.g., volcanoes) and destructive mechanisms (e.g., weathering, coastal erosions) change Earth's surface.

Precursor Level: Recognize if processes that change Earth's surface are constructive or destructive.

Initial Level: Recognize changes (e.g., mountain formation, erosion, and glacial changes) that occurred on Earth's surface.

HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth systems result in changes in climate.

EE.HS-ESS2-4 **Target Level:** Using a model, recognize how the effects of changes in climate can impact human lives.

Precursor Level: Recognize climate changes have occurred (e.g., a change in average temperature, precipitation patterns, glacial ice volumes, sea levels).

Initial Level: Recognize the differences between geographical climates (e.g., Minnesota versus Florida, desert versus rainforest).

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.

EE.HS-ESS3-1 **Target Level:** Construct an explanation based on evidence for how natural hazards have influenced human activity.

Precursor Level: Recognize how natural hazards (e.g., floods, earthquakes, tornadoes) influence human activity.

Initial Level: Recognize characteristics of natural hazards (e.g., floods, earthquakes, tornadoes).

HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

EE.HS-ESS3-2 **Target Level:** Construct an argument for a strategy to conserve, recycle, or reuse resources.

Precursor Level: Describe the factors that would favor one strategy to conserve, recycle, or reuse resources over another.

Initial Level: Recognize strategies to manage objects (e.g., dispose, repurpose, or recycle).

HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

EE.HS-ESS3-3 **Target Level:** Analyze data to determine the effects of a conservation strategy on the level of a natural resource.

Precursor Level: Organize data on the effects of conservation strategies (e.g., using less energy, using rechargeable batteries, recycling or repurposing materials).

Initial Level: Gather data on the effects of a local (e.g., class or school-wide) conservation strategy.

Biology High School

FROM MOLECULES TO ORGANISMS: STRUCTURES 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.

EE.HS-LS1-1 **Target Level:** Explain how different organs of the body carry out essential functions of life.

Precursor Level: Indicate the function of major organs of the body.

Initial Level: Identify major organs of the body.

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

EE.HS-LS1-2 **Target Level:** Use a model to illustrate the organization and interaction of major organs into systems (e.g., circulatory, respiratory, digestive, sensory) in the body to provide specific functions.

Precursor Level: Identify which organs work for a specific function.

Initial Level: Recognize that different organs have different functions.

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

EE.HS-LS1-3 **Target Level:** Collect data from an investigation to show how different organisms react to changes (e.g., heart rate increases with exercise, pupils react to light).

Precursor Level: Compare before and after data on changes that occur to an organism.

Initial Level: Identify changes in the data display (e.g. objects, pictures, graphs, charts, etc.).

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

EE.HS-LS1-4 **Target Level:** Use a model to illustrate how growth occurs when cells multiply.

Precursor Level: Use a model to relate the number of cells to the size of a body.

Initial Level: Recognize that organisms are composed of cells.

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.

EE.HS-LS2-1 **Target Level:** Use a graphical representation to explain changes over time in the population size of an animal species (e.g., currently on the endangered list).

Precursor Level: Use a graphical representation to show changes in population size.

Initial Level: Recognize that there was a change in the population size.

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.

EE.HS-LS2-2 **Target Level:** Use a graphical representation to explain the dependence of an animal population on other organisms for food and their environment for shelter.

Precursor Level: Recognize the relationship between population size and available resources for food and shelter from a graphical representation.

Initial Level: Identify food and shelter needs for familiar wildlife.

HEREDITY: INHERITANCE AND VARIATION OF TRAITS

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.

EE.HS-LS3-2 **Target Level:** Defend why reproduction may or may not result in offspring with different traits.

Precursor Level: Make a claim supported by evidence that parents and offspring may have different traits.

Initial Level: Compare traits of parents and offspring.

BIOLOGICAL EVOLUTION: UNITY AND DIVERSITY

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.

EE.HS-LS4-2 **Target Level:** Explain how the traits of particular species that allow them to survive in their specific environments.

Precursor Level: Identify factors in an environment that require special traits to survive.

Initial Level: Match particular species to their various environments.

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.

EE.HS-LS4-3 **Target Level:** Interpret data sets to identify an advantageous heritable trait.

Precursor Level: Using data sets, identify organisms that would survive better in certain environment.

Initial Level: Recognize that some organisms survive better in certain environments.

HS-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

EE.HS-LS4-6 **Target Level:** Evaluate a strategy to protect a species.

Precursor Level: Using a mathematical model, determine which human actions help or harm a species.

Initial Level: Identify a human activity that has an effect on a species.

Resources

Dynamic Learning Maps: Illinois Page

This provides districts specific information with regards to the Dynamic Learning Maps-Alternate Assessment for Illinois

<http://dynamiclearningmaps.org/illinois>

Professional Development

This provides districts professional development for how to implement the Essential Elements within the classroom.

<http://dlmpd.com/>

Illinois Learning Standards Teacher Resources

Illinois Classrooms in Action – Your first stop for K-12 resources! All of these books can be downloaded from this website under the “Standards Books” page. (www.ilclassroomsinaction.org/standardsbooks.html)

www.ilclassroomsinaction.org