

Rocketry Standards

2nd Grade

NGSS Engineering Design Standards

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem

Alaska State Speaking & Listening Standards

SL.2.1.a-c: Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups;

- a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion);
- b. Build on others' talk in conversations by linking their comments to the remarks of others;
- c. Ask for clarification and further explanation as needed about the topics and texts under discussions.

SL.2.2: Retell or describe key ideas or details from a text read aloud or information presented orally or through other media.

SL.2.3: Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.

SL.2.6: Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification

Alaska State Language Standards

L.2.1.a-f: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking;

L.2.3: Use knowledge of language and its conventions when writing, speaking, reading, or listening;

L.2.6: Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe.

National History Standards

K-4: Topic 3: The history of the United States: Democratic principles and values and the peoples from many cultures who contributed to its cultural, economic and political heritage.

- Standard 5: The causes and nature of various movements of large groups of people into and within the United States, now and long ago.
- Standard 6: Regional folklore and cultural contributions that helped to form our national heritage.

K-4: Topic 4: The History of Peoples of Many Cultures around the World

- Standard 7: Selected attributes and historical developments of various societies in Africa, the Americas, Asia, and Europe.
- Standard 8: Major discoveries in science and technology, their social and economic effects and the scientists and inventors responsible for them.

3rd Grade

NGSS Engineering Design Standards

3-5-ETS1-3: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Physical Science Standards

3-PS2-1: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

3-PS2-2: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

National History Standards

K-4: Topic 3: The history of the United States: Democratic principles and values and the peoples from many cultures who contributed to its cultural, economic and political heritage.

- Standard 5: The causes and nature of various movements of large groups of people into and within the United States, now and long ago.
- Standard 6: Regional folklore and cultural contributions that helped to form our national heritage.

K-4: Topic 4: The History of Peoples of Many Cultures around the World

- Standard 7: Selected attributes and historical developments of various societies in Africa, the Americas, Asia, and Europe.
- Standard 8: Major discoveries in science and technology, their social and economic effects and the scientists and inventors responsible for them.

K-4 Historical Thinking Patterns

- Standard 4: Historical Research Capabilities
 - B: Obtain historical data.

Alignment with Common Core Standards

- **5. Interpret data presented in time lines:** Interpret data presented in time lines and create time lines by designating appropriate equidistant intervals of time and recording events according to the temporal order in which they occurred

Alaska State Speaking & Listening Standards

SL.3.1.a-d: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly;

SL.3.2: Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

SL.3.3: Ask and answer questions about information from a speaker, offering appropriate elaboration or explanations and detail.

SL.3.6: Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification.

Alaska State Language Standards

L.3.1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking;

L.3.3: Use knowledge of language and its conventions when writing, speaking, reading, or listening;

L.3.6: Acquire and accurately use grade-appropriate conversational, general academic, and domain-specific words and phrases, including those that signal spatial and temporal relationships

4th Grade

NGSS Engineering Design Standards

3-5-ETS1-3: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem

3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Physical Science Standards

4-PS3-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object.

4-PS3-3: Ask questions and predict outcomes about the changes in energy that occur when objects collide.

National History Standards

K-4: Topic 3: The history of the United States: Democratic principles and values and the peoples from many cultures who contributed to its cultural, economic and political heritage.

- Standard 5: The causes and nature of various movements of large groups of people into and within the United States, now and long ago.
- Standard 6: Regional folklore and cultural contributions that helped to form our national heritage.

K-4: Topic 4: The History of Peoples of Many Cultures around the World

- Standard 7: Selected attributes and historical developments of various societies in Africa, the Americas, Asia, and Europe.
- Standard 8: Major discoveries in science and technology, their social and economic effects and the scientists and inventors responsible for them.

K-4 Historical Thinking Patterns

- Standard 4: Historical Research Capabilities
 - B: Obtain historical data.

Alaska State Language Standards

L.4.1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking;

L.4.3: Use knowledge of language and its conventions when writing, speaking, reading, or listening;

Alaska State Speaking and Listening Standards

SL.4.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly

SL.4.2: Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

SL.4.6: Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation.

5th Grade

Alaska State Speaking and Listening Standards

SL.5.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

SL.5.2: Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

SL.5.3: Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence

Alaska State Language Standards

L.5.1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking

L.5.3: Use knowledge of language and its conventions when writing, speaking, reading, or listening;

L.5.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies;

L.5.6: Acquire and accurately use grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships.

6th Grade

State of Alaska Speaking & Listening Standards

SL.6.1.a-d: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly;

- a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion;
- b. Follow rules for collegial discussions (e.g., establishing norms: taking turns, paraphrasing, respecting diverse viewpoints), set specific goals and deadlines, and define individual roles as needed;
- c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion;
- d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

SL.6.2: Interpret information presented in diverse media (including but not limited to podcasts) and formats (e.g., visually, quantitatively/ data-related, orally) and explain how it contributes to a topic, text, or issue under study.

SL.6.3: Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.

SL.6.6: Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

Alaska State Language Standards

L.6.1.a-c: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking;

- a. Ensure that pronouns are in the proper case (subjective, objective, possessive);
- b. Use intensive pronouns (e.g., myself, ourselves);
- c. Recognize and correct inappropriate shifts in pronoun number and person*;
- d. Recognize and correct vague pronouns (i.e., ones with unclear or ambiguous antecedents)*;

- e. Recognize variations from standard English in their own and others' writing and speaking, and identify and use strategies to improve expression in conventional language.

L.6.3.a-b: Use knowledge of language and its conventions when writing, speaking, reading, or listening;

- a. Vary sentence patterns for meaning, reader/listener interest, and style*;
- b. Maintain consistency in style and tone.

L.6.4.a-d: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 6 reading and content, choosing flexibly from a range of strategies;

- a. Determine meaning of unfamiliar words by using knowledge of word structure (root words, prefixes, suffixes, abbreviations) and language structure through reading words in text (word order, grammar), context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase;
- b. Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., audience, auditory, audible);
- c. Consult reference materials (e.g., dictionaries, glossaries, thesauruses and specialized reference materials), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech;
- d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

L.6.6: Acquire and accurately use grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Middle School

NGSS Physical Science Standards

MS-PS2-1: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

MS-PS2-2: Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

MS-PS2-4: Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

MS-PS2-5: Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

NGSS Engineering Design

MS.ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS.ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS.ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS.ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Alaska State Standards for Reading and Literacy in History

RH.6-7-8.3: Identify key steps in a text's description of a process related to history/social studies (e.g., how a bill becomes law, how interest rates are raised or lowered).

RH.6-7-8.5: Describe how a text presents information (e.g., sequentially, comparatively, causally)

RH.6-7-8.7: Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

RH.6-7-8.8: Distinguish among fact, opinion, and reasoned judgment in a text.

RH.6-7-8.9: Analyze the relationship between a primary and secondary source on the same topic.

RH.6-7-8.10: By the end of grade 8, read and comprehend history/social studies texts in the grades 6-8 text complexity band independently and proficiently.

7th Grade

State of Alaska Speaking and Listening Standards

SL.7.1.a-d: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly;

- a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion;
- b. Follow rules for collegial discussions (e.g., establishing norms: taking turns, paraphrasing, respecting diverse viewpoints), track progress toward specific goals and deadlines, and define individual roles as needed;
- c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed;
- d. Acknowledge new information expressed by others and, when warranted, modify their own views.

SL.7.2: Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively/data-related, orally) and explain how the ideas clarify a topic, text, or issue under study.

SL.7.3: Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.

SL.7.4: Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

SL.7.6: Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

State of Alaska Language Standards

L.7.1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking

L.7.3: Use knowledge of language and its conventions when writing, speaking, reading, or listening;

L.7.5: Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

L.7.6: Acquire and accurately use grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Alaska State Reading Standards for Informational Text

RI.7.1: Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.7.2: Determine the central idea and subtopics in a text and analyze their development over the course of the text; restate and summarize the central idea or events, in correct sequence when necessary, after reading a text.

RI.7.3: Analyze the interactions between individuals, events, and ideas presented in a text (e.g., how ideas influence individuals or events, or how individuals influence ideas or events).

RI.7.4: Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of a specific word choice on meaning and tone.

RI 7.9: By the end of the year, read and comprehend literary nonfiction, within a complexity band appropriate to grade 7 (from upper grade 6 to grade 8), with scaffolding as needed at the high end of the range.

8th Grade

State of Alaska Speaking & Listening Standards

SL.8.1.a-d: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly;

- a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion;
- b. Follow rules for collegial discussions (e.g., establishing norms: taking turns, paraphrasing, respecting diverse viewpoints), and decision-making (e.g., coming to consensus), track progress toward specific goals and deadlines, and define individual roles as needed;
- c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas;
- d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.

SL.8.2: Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively/data-related, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.

SL.8.3: Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.

SL.8.4: Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate

Alaska State Reading Standards for Informational Text

RI.8.4: Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.

RI.8.6: Determine an author's purpose (to inform, persuade, entertain, critique, etc.) and point of view in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.

RI.8.10: By the end of the year, read and comprehend literary nonfiction, within a complexity band appropriate to grade 8 (from upper grade 7 to grade 9), with scaffolding as needed at the high end of the range.

High School

NGSS Physical Science

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

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

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

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

HS-PS2-4: Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

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

NGSS Engineering Process

HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering

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

State of Alaska Reading Standards for Literacy in Science and Technical Subjects

RST.9-10-1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2: Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

RST.9-10.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

RST.9-10.5: Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

RST.9-10.6: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

RST.9-10.8: Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

RST.9-10.10: By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

RST.11-12.1: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

RST.11-12.2: Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RST.11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

RST.11-12.6: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

RST.11-12.7: Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

RST.11-12.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

RST.11-12.9: Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon or concept, resolving conflicting information when possible.

RST.11-12.10: By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.

State of Alaska Speaking and Listening Standards

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

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

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

SL.11-12.2: 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 or information.

SL.11-12.3: Identify and 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.