

Simple Machines Standards

Kindergarten

Physical Science Standards: (NGSS)

K-PS2-1: Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

K-PS2-2: Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

Engineering Process Standards: (NGSS)

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.

State of AK Speaking & Listening Standards

SL.K.2: Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.

SL.K.5: Add drawings or other visual displays to descriptions as desired to provide additional details.

State of AK Language Standards:

L.K.1.a-f: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking;

- a. Print many upper- and lowercase letters;
- b. Use frequently occurring nouns and verbs;
- c. Form regular plural nouns orally by adding /s/ or /es/ (e.g., dog, dogs; wish, wishes);
- d. Understand and use question words (interrogatives) (e.g., who, what, where, when, why, how);

- e. Use the most frequently occurring prepositions (e.g., to, from, in, out, on, off, for, of, by, with);
- f. Produce and expand complete sentences in shared language activities.

L.K.2.a-d: Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing;

- a. Capitalize the first word in a sentence, the first letter of the student's name, and the pronoun I;
- b. Recognize and name end punctuation;
- c. Write a letter or letters for most consonant and short-vowel sounds (phonemes);
- d. Spell simple words phonetically, drawing on knowledge of sound-letter relationships.

L.K.4.a-b: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on kindergarten reading and content;

- a. Identify new meanings for familiar words and apply them accurately (e.g., knowing duck is a bird and learning the verb to duck);
- b. Use the most frequently occurring inflections and affixes (e.g., -ed, -s, re-, un-, pre-, -ful, -less) as a clue to the meaning of an unknown word.

L.K.5.a-c: With guidance and support from adults, explore word relationships and nuances in word meanings;

- a. Sort common objects into categories (e.g., shapes, foods) to gain a sense of the concepts the categories represent;
- b. Demonstrate understanding of frequently occurring verbs and adjectives by relating them to their opposites (antonyms);
- c. Identify real-life connections between words and their use (e.g., note places at school that are colorful);

1st Grade

Engineering Process Standards: (NGSS)

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.

State of Alaska Speaking & Listening Standards

SL.1-2.1.a-c: Participate in collaborative conversations with diverse partners about grade 1-2 topics and texts with peers and adults in small and larger groups;

- a. Follow agreed-upon rules for discussions (e.g., 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 responding to the comments of others through multiple exchanges;
- c. Ask questions to clear up any confusion about the topics and texts under discussion.

SL.1.2: Ask and answer questions about key details in a text read aloud or information presented orally or through other media.

SL.1-2.3: Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.

SL.1-2.4: Tell a story or retell an experience with relevant facts and relevant, descriptive details, speaking audibly in coherent sentences.

SL.1-2.5: Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

State of Alaska Language Standards

L.1.1.a-j: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking;

- a. Print all upper- and lowercase letters;
- b. Use common, proper, and possessive nouns;

- c. Use singular and plural nouns with matching verbs in basic sentences (e.g., He hops.; We hop.);
- d. Use personal, possessive, and indefinite pronouns (e.g., I, me, my; they, them, their, anyone, everything);
- e. Use verbs to convey a sense of past, present, and future (e.g., Yesterday I walked home.; Today I walk home.; Tomorrow I will walk home.);
- f. Use frequently occurring adjectives;
- g. Use frequently occurring conjunctions (e.g., and, but, or, so, because);
- h. Use determiners (e.g., articles, demonstratives);
- i. Use frequently occurring prepositions (e.g., during, beyond, toward);
- j. Produce and expand complete simple and compound declarative, interrogative, imperative, and exclamatory sentences in response to prompts

L.1-2.2.a-e: Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing;

- a. Capitalize dates and names of people;
- b. Use end punctuation for sentences;
- c. Use commas in dates and to separate single words in a series;
- d. Use conventional spelling for words with common spelling patterns and for frequently occurring irregular words;
- e. Spell untaught words phonetically, drawing on phonemic awareness and spelling conventions.

L.1.6: Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships (e.g., because).

2nd Grade

Engineering Process Standards: (NGSS)

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.

State of Alaska Speaking & Listening Standards:

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

State of Alaska Language Standards:

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

- a. Use collective nouns (e.g., group);
- b. Form and use frequently occurring irregular plural nouns (e.g., feet, children, teeth, mice, fish);
- c. Use reflexive pronouns (e.g., myself, ourselves);
- d. Form and use the past tense of frequently occurring irregular verbs (e.g., sat, hid, told);
- e. Use adjectives and adverbs, and choose between them depending on what is to be modified;
- f. Produce, expand, and rearrange complete simple and compound sentences

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.

3rd Grade

Physical Science Standards: (NGSS)

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.

Engineering Process Standards

3-5-ETS1-1: 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.

State of Alaska 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 3-4 topics and texts, building on others' ideas and expressing their own clearly;

- a. After learning a protocol (e.g., Socratic method), come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion;
- b. 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);
- c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others;
- d. Explain their own ideas and understanding in light of the discussion.

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

4th Grade

Physical Science Standards: (NGSS)

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.

Engineering Process Standards

3-5-ETS1-1: 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.

State of Alaska Speaking & Listening Standards

SL.4.1.a-d: 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;

- a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion;
- b. Follow agreed-upon rules for discussions and carry out assigned roles;
- c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others;
- d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

5th Grade

Engineering Process Standards

3-5-ETS1-1: 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.

State of Alaska Reading Standards for Informational Text:

RI.5.10: By the end of the year, read and comprehend a range of informational texts, including history/social studies, science, and technical texts within a complexity band appropriate to grade 5 (from upper grade 4 to grade 6), with scaffolding as needed at the high end of the range.

State of Alaska Speaking and Listening Standards:

SL.5.1.a-d: 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;

- a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion;
- b. Follow agreed-upon rules for discussions and carry out assigned roles;
- c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others;
- d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

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

Middle School Standards

NGSS Engineering Process

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.