NEXT GENERATION SCIENCE STANDARDS
For States, By States

2-PS1-1 Matter and Its Interactions

Students who demonstrate understanding can:

2-PS1-1. **Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.** [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed.

Observable features of the student performance by the end of the grade:		
1	Identifying the phenomenon under investigation	
	a	Students identify and describe the phenomenon under investigation, which includes the following idea: different kinds of matter have different properties, and sometimes the same kind of matter has different properties depending on temperature.
	b	Students identify and describe the purpose of the investigation, which includes answering a question about the phenomenon under investigation by describing and classifying different kinds of materials by their observable properties.
2	Identifying the evidence to address the purpose of the investigation	
	a	Students collaboratively develop an investigation plan and describe the evidence that will be collected, including the properties of matter (e.g., color, texture, hardness, flexibility, whether is it a solid or a liquid) of the materials that would allow for classification, and the temperature at which those properties are observed.
	b	Students individually describe that:
		i. The observations of the materials provide evidence about the properties of different kinds of materials.
		ii. Observable patterns in the properties of materials provide evidence to classify the different kinds of materials.
3	Planning the investigation	
	a	In the collaboratively developed investigation plan, students include:
		i. Which materials will be described and classified (e.g., different kinds of metals, rocks, wood, soil, powders).
		ii. Which materials will be observed at different temperatures, and how those temperatures will be determined (e.g., using ice to cool and a lamp to warm) and measured (e.g., qualitatively or quantitatively).
		iii. How the properties of the materials will be determined.
		iv. How the materials will be classified (i.e., sorted) by the pattern of the properties.
	b	Students individually describe how the properties of materials, and the method for classifying them, are relevant to answering the question.
4	Collecting the data	
	a	According to the developed investigation plan, students collaboratively collect and record data on the properties of the materials.

2-PS1-2 Matter and Its Interactions

Students who demonstrate understanding can:

2-PS1-2. **Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*** [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [*Assessment Boundary: Assessment of quantitative measurements is limited to length.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended.

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Different properties are suited to different purposes.

Crosscutting Concepts

Cause and Effect

- Simple tests can be designed to gather evidence to support or refute student ideas about causes.

Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science, on Society and the Natural World

- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.

Observable features of the student performance by the end of the grade:		
1	Organizing data	
	a	Using graphical displays (e.g., pictures, charts, grade-appropriate graphs), students use the given data from tests of different materials to organize those materials by their properties (e.g., strength, flexibility, hardness, texture, ability to absorb).
2	Identifying relationships	
	a	Students describe relationships between materials and their properties (e.g., metal is strong, paper is absorbent, rocks are hard, sandpaper is rough).
	b	Students identify and describe relationships between properties of materials and some potential uses purpose (e.g., hardness is good for breaking objects or supporting objects; roughness is good for keeping objects in place; flexibility is good to keep a materials from breaking, but not good for keeping materials rigidly in place).
3	Interpreting data	
	a	Students describe which properties allow a material to be well suited for a given intended use (e.g., ability to absorb for cleaning up spills, strength for building material, hardness for breaking a nut).
	b	Students use their organized data to support or refute their ideas about which properties of materials allow the object or tool to be best suited for the given intended purpose relative to the other given objects/tools (e.g., students could support the idea that hardness allows a wooden shelf to be better suited for supporting materials placed on it than a sponge would be, based on the patterns relating property to a purpose; students could refute an idea that a thin piece of glass is better suited to be a shelf than a wooden plank would be because it is harder than the wood by using data from tests of hardness and strength to give evidence that the glass is less strong than the wood) .
	c	Students describe how the given data from the test provided evidence of the suitability of different materials for the intended purpose.

2-PS1-3 Matter and Its Interactions

Students who demonstrate understanding can:

2-PS1-3. **Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.** [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Different properties are suited to different purposes.
- A great variety of objects can be built up from a small set of pieces.

Crosscutting Concepts

Energy and Matter

- Objects may break into smaller pieces and be put together into larger pieces, or change shapes.

Observable features of the student performance by the end of the grade:			
1	Articulating the explanation of phenomena		
	a	Students articulate a statement that relates the given phenomenon to a scientific idea, including that an object made of a small set of pieces can be disassembled and made into a new object.	
	b	Students use evidence and reasoning to construct an evidence-based account of the phenomenon.	
2	Evidence		
	a	Students describe evidence from observations (firsthand or from media), including:	
		i.	The characteristics (e.g., size, shape, arrangement of parts) of the original object.
		ii.	That the original object was disassembled into pieces.
		iii.	That the pieces were reassembled into a new object or objects.
		iv.	The characteristics (e.g., size, shape, arrangement of parts) of the new object or objects.
3	Reasoning		
	a	Students use reasoning to connect the evidence to support an explanation. Students describe a chain of reasoning that includes:	
		i.	The original object was disassembled into its pieces and is reassembled into a new object or objects.
		ii.	Many different objects can be built from the same set of pieces.
		iii.	Compared to the original object, the new object or objects can have different characteristics, even though they were made of the same set of pieces.

2-PS1-4 Matter and Its Interactions

Students who demonstrate understanding can:

2-PS1-4. **Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.** [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Engaging in Argument from Evidence
Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).

- Construct an argument with evidence to support a claim.

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Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Science searches for cause and effect relationships to explain natural events.

Disciplinary Core Ideas

PS1.B: Chemical Reactions

- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns.

Observable features of the student performance by the end of the grade:		
1	Supported claims	
	a	Students make a claim to be supported about a phenomenon. In their claim, students include the idea that some changes caused by heating or cooling can be reversed and some cannot.
2	Identifying scientific evidence	
	a	Students describe the given evidence, including:
		i. The characteristics of the material before heating or cooling.
		ii. The characteristics of the material after heating or cooling.
		iii. The characteristics of the material when the heating or cooling is reversed.
3	Evaluating and critiquing the evidence	
	a	Students evaluate the evidence to determine:
		i. The change in the material after heating (e.g., ice becomes water, an egg becomes solid, solid chocolate becomes liquid).
		ii. Whether the change in the material after heating is reversible (e.g., water becomes ice again, a cooked egg remains a solid, liquid chocolate becomes solid but can be a different shape).
		iii. The change in the material after cooling (e.g., when frozen, water becomes ice, a plant leaf dies).
		iv. Whether the change in the material after cooling is reversible (e.g., ice becomes water again, a plant leaf does not return to normal).
	b	Students describe whether the given evidence supports the claim and whether additional evidence is needed.
4	Reasoning and synthesis	
	a	Students use reasoning to connect the evidence to the claim. Students describe the following chain of reasoning:
		i. Some changes caused by heating or cooling can be reversed by cooling or heating (e.g., ice that is heated can melt into water, but the water can be cooled and can freeze back into ice [and vice versa]).
		ii. Some changes caused by heating or cooling cannot be reversed by cooling or heating (e.g., a raw egg that is cooked by heating cannot be turned back into a raw egg by cooling the

		cooked egg, cookie dough that is baked does not return to its uncooked form when cooled, charcoal that is formed by heating wood does not return to its original form when cooled).

2-LS2-1 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

2-LS2-1. **Plan and conduct an investigation to determine if plants need sunlight and water to grow.** [*Assessment Boundary: Assessment is limited to testing one variable at a time.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on water and light to grow.

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns.

Observable features of the student performance by the end of the grade:		
1	Identifying the phenomenon under investigation	
	a	Students identify and describe the phenomenon and purpose of the investigation, which include answering a question about whether plants need sunlight and water to grow.
2	Identifying the evidence to address the purpose of the investigation	
	a	Students describe the evidence to be collected, including:
		i. Plant growth with both light and water.
		ii. Plant growth without light but with water.
		iii. Plant growth without water but with light.
		iv. Plant growth without water and without light.
	b	Students describe how the evidence will allow them to determine whether plants need light and water to grow.
3	Planning the investigation	
	a	Students collaboratively develop an investigation plan. In the investigation plan, students describe the features to be part of the investigation, including:
		i. The plants to be used.
		ii. The source of light.
		iii. How plants will be kept with/without light in both the light/dark test and the water/no water test.
		iv. The amount of water plants will be given in both the light/dark test and the water/no water test.
		v. How plant growth will be determined (e.g., observations of plant height, number and size of leaves, thickness of the stem, number of branches).
	b	Students individually describe how this plan allows them to answer the question.
4	Collecting the data	
	a	According to the investigation plan developed, students collaboratively collect and record data on the effects on plant growth by:
		i. Providing both light and water,
		ii. Withholding light but providing water,
		iii. Withholding water but providing light, or
		iv. Withholding both water and light.

2-LS2-2 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

2-LS2-2. **Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.***

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool.

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on animals for pollination or to move their seeds around.

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.*(secondary)*

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s).

Observable features of the student performance by the end of the grade:		
1	Components of the model	
	a	Students develop a simple model that mimics the function of an animal in seed dispersal or pollination of plants. Students identify the relevant components of their model, including those components that mimic the natural structure of an animal that helps it disperse seeds (e.g., hair that snares seeds, squirrel cheek pouches that transport seeds) or that mimic the natural structure of an animal that helps it pollinate plants (e.g., bees have fuzzy bodies to which pollen sticks, hummingbirds have bills that transport pollen). The relevant components of the model include:
		i. Relevant structures of the animal.
		ii. Relevant structures of the plant.
		iii. Pollen or seeds from plants.
2	Relationships	
	a	In the model, students describe relationships between components, including evidence that the developed model mimics how plant and animal structures interact to move pollen or disperse seeds.
		i. Students describe the relationships between components that allow for movement of pollen or seeds.
		ii. Students describe the relationships between the parts of the model they are developing and the parts of the animal they are mimicking.
3	Connections	
	a	Students use the model to describe:
		i. How the structure of the model gives rise to its function.
		ii. Structure-function relationships in the natural world that allow some animals to disperse seeds or pollinate plants.

2-LS4-1 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

2-LS4-1. **Make observations of plants and animals to compare the diversity of life in different habitats.** [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [*Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Make observations (firsthand or from media) to collect data which can be used to make comparisons.

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Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world.

Disciplinary Core Ideas

LS4.D: Biodiversity and Humans

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

Crosscutting Concepts

Observable features of the student performance by the end of the grade:		
1	Identifying the phenomenon under investigation	
	a	Students identify and describe the phenomenon and purpose of the investigation, which includes comparisons of plant and animal diversity of life in different habitats.
2	Identifying the evidence to address the purpose of the investigation	
	a	Based on the given plan for the investigation, students describe the following evidence to be collected:
		i. Descriptions based on observations (firsthand or from media) of habitats, including land habitats (e.g., playground, garden, forest, parking lot) and water habitats (e.g., pond, stream, lake).
		ii. Descriptions based on observations (firsthand or from media) of different types of living things in each habitat (e.g., trees, grasses, bushes, flowering plants, lizards, squirrels, ants, fish, clams).
		iii. Comparisons of the different types of living things that can be found in different habitats.
	b	Students describe how these observations provide evidence for patterns of plant and animal diversity across habitats.
3	Planning the investigation	
	a	Based on the given investigation plan, students describe how the different plants and animals in the habitats will be observed, recorded, and organized.
4	Collecting the data	
	a	Students collect, record, and organize data on different types of plants and animals in the habitats.

2-ESS1-1 Earth's Place in the Universe

Students who demonstrate understanding can:

2-ESS1-1. **Use information from several sources to provide evidence that Earth events can occur quickly or slowly.** [Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [*Assessment Boundary: Assessment does not include quantitative measurements of timescales.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations from several sources to construct an evidence-based account for natural phenomena.

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth

- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.

Crosscutting Concepts

Stability and Change

- Things may change slowly or rapidly.

Observable features of the student performance by the end of the grade:			
1	Articulating the explanation of phenomena		
	a	Students articulate a statement that relates the given phenomenon to a scientific idea, including that Earth events can occur very quickly or very slowly.	
	b	Students use evidence and reasoning to construct an evidence-based account of the phenomenon.	
2	Evidence		
	a	Students describe the evidence from observations (firsthand or from media; e.g., books, videos, pictures, historical photos), including:	
		i.	That some Earth events occur quickly (e.g., the occurrence of flood, severe storm, volcanic eruption, earthquake, landslides, erosion of soil).
		ii.	That some Earth events occur slowly.
		iii.	Some results of Earth events that occur quickly.
		iv.	Some results of Earth events that occur very slowly (e.g., erosion of rocks, weathering of rocks).
		v.	The relative amount of time it takes for the given Earth events to occur (e.g., slowly, quickly, hours, days, years).
	b	Students make observations using at least three sources	
3	Reasoning		
	a	Students use reasoning to logically connect the evidence to construct an evidence-based account. Students describe their reasoning, including:	
		i.	In some cases, Earth events and the resulting changes can be directly observed; therefore those events must occur rapidly.
		ii.	In other cases, the resulting changes of Earth events can be observed only after long periods of time; therefore these Earth events occur slowly, and change happens over a time period that is much longer than one can observe.

2-ESS2-1 Earth's Systems

Students who demonstrate understanding can:

2-ESS2-1. **Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*** [Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Compare multiple solutions to a problem.

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

- Wind and water can change the shape of the land.

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. *(secondary)*

Crosscutting Concepts

Stability and Change

- Things may change slowly or rapidly.

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Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science on Society and the Natural World

- Developing and using technology has impacts on the natural world.

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Connections to Nature of Science

Science Addresses Questions About the Natural and Material World

- Scientists study the natural and material world.

Observable features of the student performance by the end of the grade:		
1	Using scientific knowledge to generate design solutions	
	a	Students describe the given problem, which includes the idea that wind or water can change the shape of the land by washing away soil or sand.
	b	Students describe at least two given solutions in terms of how they slow or prevent wind or water from changing the shape of the land.
2	Describing specific features of the design solution, including quantification where appropriate	
	a	Students describe the specific expected or required features for the solutions that would solve the given problem, including:
		i. Slowing or preventing wind or water from washing away soil or sand.
		ii. Addressing problems created by both slow and rapid changes in the environment (such as many mild rainstorms or a severe storm and flood).
3	Evaluating potential solutions	
	a	Students evaluate each given solution against the desired features to determine and describe whether and how well the features are met by each solution.
	b	Using their evaluation, students compare the given solutions to each other.

2-ESS2-2 Earth's Systems

Students who demonstrate understanding can:

2-ESS2-2. **Develop a model to represent the shapes and kinds of land and bodies of water in an area.** [*Assessment Boundary: Assessment does not include quantitative scaling in models.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a model to represent patterns in the natural world.

Disciplinary Core Ideas

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- Maps show where things are located. One can map the shapes and kinds of land and water in any area.

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed.

Observable features of the student performance by the end of the grade:		
1	Components of the model	
	a	Students develop a model (i.e., a map) that identifies the relevant components, including components that represent both land and bodies of water in an area.
2	Relationships	
	a	In the model, students identify and describe relationships between components using a representation of the specific shapes and kinds of land (e.g., playground, park, hill) and specific bodies of water (e.g., creek, ocean, lake, river) within a given area.
	b	Students use the model to describe the patterns of water and land in a given area (e.g., an area may have many small bodies of water; an area may have many different kinds of land that come in different shapes).
3	Connections	
	a	Students describe that because they can map the shapes and kinds of land and water in any area, maps can be used to represent many different types of areas.

2-ESS2-3 Earth's Systems

Students who demonstrate understanding can:

2-ESS2-3. **Obtain information to identify where water is found on Earth and that it can be solid or liquid.**

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question.

Disciplinary Core Ideas

ESS2.C: The Roles of Water in Earth's Surface Processes

- Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed.

Observable features of the student performance by the end of the grade:			
1	Obtaining information		
	a	Students use books and other reliable media as sources for scientific information to answer scientific questions about:	
		i.	Where water is found on Earth, including in oceans, rivers, lakes, and ponds.
		ii.	The idea that water can be found on Earth as liquid water or solid ice (e.g., a frozen pond, liquid pond, frozen lake).
		iii.	Patterns of where water is found, and what form it is in.
2	Evaluating Information		
	a	Students identify which sources of information are likely to provide scientific information (e.g., versus opinion).	

K-2-ETS1-1 Engineering Design

Students who demonstrate understanding can:

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.**

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Asking Questions and Defining Problems
Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions.

- Ask questions based on observations to find more information about the natural and/or designed world(s).
- Define a simple problem that can be solved through the development of a new or improved object or tool.

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

Crosscutting Concepts

Observable features of the student performance by the end of the grade:		
1	Addressing phenomena of the natural or designed world	
	a	Students ask questions and make observations to gather information about a situation that people want to change. Students' questions, observations, and information gathering are focused on:
		i. A given situation that people wish to change.
		ii. Why people want the situation to change.
		iii. The desired outcome of changing the situation.
2	Identifying the scientific nature of the question	
	a	Students' questions are based on observations and information gathered about scientific phenomena that are important to the situation.
3	Identifying the problem to be solved	
	a	Students use the information they have gathered, including the answers to their questions, observations they have made, and scientific information, to describe the situation people want to change in terms of a simple problem that can be solved with the development of a new or improved object or tool.
4	Defining the features of the solution	
	a	With guidance, students describe the desired features of the tool or object that would solve the problem, based on scientific information, materials available, and potential related benefits to people and other living things.

K-2-ETS1-2 Engineering Design

Students who demonstrate understanding can:

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.**

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool.

Disciplinary Core Ideas

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

Crosscutting Concepts

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s).

Observable features of the student performance by the end of the grade:		
1	Components of the model	
	a	Students develop a representation of an object and the problem it is intended to solve. In their representation, students include the following components:
		i. The object.
		ii. The relevant shape(s) of the object.
		iii. The function of the object.
	b	Students use sketches, drawings, or physical models to convey their representations.
2	Relationships	
	a	Students identify relationships between the components in their representation, including:
		i. The shape(s) of the object and the object's function.
		ii. The object and the problem is it designed to solve.
3	Connections	
	a	Students use their representation (simple sketch, drawing, or physical model) to communicate the connections between the shape(s) of an object, and how the object could solve the problem.

K-2-ETS1-3 Engineering Design

Students who demonstrate understanding can:

K-2-ETS1-3. **Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.**

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Analyze data from tests of an object or tool to determine if it works as intended.	**ETS1.C: Optimizing the Design Solution** • Because there is always more than one possible solution to a problem, it is useful to compare and test designs.	

Observable features of the student performance by the end of the grade:		
1	Organizing data	
	a	With guidance, students use graphical displays (e.g., tables, pictographs, line plots) to organize given data from tests of two objects, including data about the features and relative performance of each solution.
2	Identifying relationships	
	a	Students use their organization of the data to find patterns in the data, including:
		i. How each of the objects performed, relative to:
		1. The other object.
		2. The intended performance.
		ii. How various features (e.g., shape, thickness) of the objects relate to their performance (e.g., speed, strength).
3	Interpreting data	
	a	Students use the patterns they found in object performance to describe:
		i. The way (e.g., physical process, qualities of the solution) each object will solve the problem.
		ii. The strengths and weaknesses of each design.
		iii. Which object is better suited to the desired function, if both solve the problem.