Grade 1
Science
Item Specifications

Missouri
DEPARTMENT OF ELEMENTARY & SECONDARY
EDUCATION

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Introduction

In 2014 Missouri legislators passed House Bill 1490, mandating the development of the Missouri Learning Expectations. In April of 2016, these Missouri Learning Expectations were adopted by the State Board of Education. Groups of Missouri educators from across the state collaborated to create the documents necessary to support the implementation of these expectations.

One of the documents developed is the item specification document, which includes all Missouri grade level/course expectations arranged by domains/strands. It defines what could be measured on a variety of assessments. The document serves as the foundation of the assessment development process.

Although teachers may use this document to provide clarity to the expectations, these specifications are intended for summative, benchmark, and large-scale assessment purposes.

Components of the item specifications include:

Expectation Unwrapped breaks down a list of clearly delineated content and skills the students are expected to know and be able to do upon mastery of the Expectation.

Depth of Knowledge (DOK) Ceiling indicates the highest level of cognitive complexity that would typically be assessed on a large scale assessment. The DOK ceiling is not intended to limit the complexity one might reach in classroom instruction.

Item Format indicates the types of test questions used in large scale assessment. For each expectation, the item format specifies the type best suited for that particular expectation.

Content Limits/Assessment Boundaries are parameters that item writers should consider when developing a large scale assessment. For example, some expectations should not be assessed on a large scale assessment but are better suited for local assessment.

Sample stems are examples that address the specific elements of each expectation and address varying DOK levels. The sample stems provided in this document are in no way intended to limit the depth and breadth of possible item stems. The expectation should be assessed in a variety of ways.

Possible Evidence indicates observable methods in which a student can show understanding of the expectations.

Stimulus Materials defines types of stimulus materials that can be used in the item stems.

Grade 1 SCIENCE

Physical Sciences	1.PS3.A.1
Core Idea	**Energy**
Component	**Definitions of Energy**
MLS	Identify the source of energy that causes an increase in the temperature of an object (e.g., sun, stove, flame, light bulb).

Expectation Unwrapped

SCIENCE AND ENGINEERING PRACTICES

Asking Questions, Defining Problems, and Constructing Explanations

- Ask questions based on observations to find out more information about the natural and/or designed world.
- Ask and/or identify questions that can be answered by an investigation.
- Use information from observations to construct an evidence-based account for natural phenomena.

DISCIPLINARY CORE IDEAS

Definitions of Energy

- Energy sources that increase the temperature of objects (e.g., sun, stove, flame, light bulb, oven)
- The sun is the primary source of energy on Earth.
- Temperature is a measure of hot or cold.

CROSSCUTTING CONCEPTS

Cause and Effect, and Patterns

- Energy can cause the temperature of an object to increase.
- Events have causes that generate observable patterns.
- Simple tests can be designed to gather evidence to support or refute student ideas about causes.

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

Content Limits/Assessment Boundaries

- Descriptions of temperature should be qualitative (e.g., hotter, warmer, colder, cooler, higher, lower).
- Do not assess definitions of energy and temperature or the transfer of energy.
- Do not assess states of matter (solid, liquid, gas) and changes such as melting, freezing, and boiling.

Sample Stems

Grade 1 SCIENCE

Possible Evidence • Identify a source of energy that can increase the temperature of an object. • Explain how a source of energy can cause an increase in the temperature of an object. • Describe, using evidence, that the Sun is a source of energy that can increase temperature.	
Stimulus Materials Graphic organizers, diagrams, graphs, data tables, drawings	

Grade 1 SCIENCE

Physical Sciences	1.PS4.A.1
Core Idea Component MLS	**Waves and Their Applications in Technologies for Information Transfer** **Wave Properties** Plan and conduct investigations to provide evidence that vibrating materials can make sound, and that sound can make materials vibrate.

Expectation Unwrapped

[Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make material (matter) vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.]

SCIENCE AND ENGINEERING PRACTICES

Planning and Carrying Out Investigations

- With guidance, predict, plan and conduct simple investigations to observe the vibrations of various materials producing sounds.
- Record information from observations that sound can make matter vibrate and vibrating matter can make sound.
- With guidance, use qualitative data to compare two alternative solutions to a problem (e.g., sound makes matter vibrate / vibrations make sound).

DISCIPLINARY CORE IDEAS

Wave Properties

- Observe that sound can make materials (matter) vibrate.
- Observe that vibrating materials (matter) can make sound.

CROSSCUTTING CONCEPTS

Cause and Effect

- Vibrations make sound, and sound makes vibrations.
- Events have causes that generate observable patterns in creating sound.
- Simple tests can be designed to gather evidence to support or refute student ideas about the cause and effect relationship of vibrations and sound.

ENGINEERING DESIGN

- Refer to Engineering, Technology, and Application of Science Standard 1.ETS1.AC1 for connections.

DOK Ceiling

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Item Format

Selected Response
Constructed Response
Technology Enhanced

Grade 1 SCIENCE

Content Limits/Assessment Boundaries

- Limit descriptions of sound to relative qualitative terms (e.g., high, low, soft, loud).
- Do not assess changes in vibrations that create changes in sounds (e.g., pitch, volume).
- Do not quantify sound to amplitude or wave length.
- Do not assess the term matter.

Possible Evidence

- Identify material that moves back and forth when vibrating.
- Identify the source of vibrations that make sound.
- Explain, using evidence, how a vibrating object makes sound or sound can make an object vibrate.
- Given a scenario, the student will do the following:
  - Answer questions about the relationship between vibrating materials and sound
  - Describe how to make materials vibrate to make sound
  - Describe how sound can be used to make materials vibrate

Stimulus Materials

Graphic organizers, diagrams, graphs, data tables, drawings

Sample Stems

Grade 1 SCIENCE

Physical Sciences	1.PS4.C.1
Core Idea Component MLS	**Waves and Their Applications in Technologies for Information Transfer** **Information Technologies and Instrumentation** Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

Expectation Unwrapped

[Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.]

SCIENCE AND ENGINEERING PRACTICES

Constructing Explanations, Designing Solutions, and Obtaining, Evaluating, and Communicating Information

- Define a simple problem that can be solved through the development of a new or improved object or tool.
- Make observations to construct an evidence-based account of devices that can help people communicate over long distances.
- Communicate design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.
- With guidance, students use tools and materials to design and build a device that uses light or sound to solve the given problem.

DISCIPLINARY CORE IDEAS

Information Technologies and Instrumentation

- Objects can only be seen if there is light to illuminate them or they give off their own light.
- Objects made of different materials allow light to pass through them in different ways.
- Materials can block light and create shadows.
- Materials (e.g., mirror, aluminum foil) can change the direction of the light.
- People use a variety of devices to communicate over long distances to send and/or receive information.

CROSSCUTTING CONCEPTS

None identified (ETS connections)

- Objects are related to their function(s).

ENGINEERING DESIGN

- People depend on various technologies in their lives; human life would be very different without technology.

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

<table>
<tr><td>

- Refer to Engineering, Technology, and Application of Science Standard 1.ETS1.A.1 and 1.ETS1.C.1 for connections.

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<tr><td>

Content Limits/Assessment Boundaries

- Properties of light (e.g., color, illumination, reflection, absorption, shadows) should not be assessed.
- Assessment should not include the technological details for how devices work.

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Sample Stems

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Possible Evidence

Given a problem/scenario

- Describe how light or sound was used to help people communicate over a distance.
- Evaluate whether the communication device provides a solution to the problem.
- Describe specific expected or required features of the design solution and the materials used to build the device.

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Stimulus Materials

Graphic organizers, diagrams, graphs, data tables, drawings

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Grade 1 SCIENCE

Life Sciences	1.LS1.A.1
Core Idea Component MLS	**From Molecules to Organisms: Structure and Processes** **Structure and Function** Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Expectation Unwrapped

[Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and detecting intruders by mimicking eyes and ears.]

SCIENCE AND ENGINEERING PRACTICES

Constructing Explanations and Designing Solutions

- Define a simple problem that can be solved through mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
- Design a solution to a given human problem by mimicking how plants and animals use their structures.
- Ask questions based on observations of how different plants and animals use their body parts in different ways to protect themselves.
- Develop a model to represent relationships in the natural world, such as animals' external parts and the animals' ability to move from place to place.
- Make observations (firsthand or from media) to construct an evidence-based account for how plant and animal sturctures (e.g., roots of plants, duck feet) help them survive and grow**.**

DISCIPLINARY CORE IDEAS

Structure and Function

- All organisms have external parts that they use to perform daily functions.
- Different animals use their body parts in different ways (e.g., see; hear; grasp objects; protect themselves; move from place to place; seek, find, and take in food, water, and air).
- Plants have different parts (e.g., roots, stems, leaves, flowers, fruits) that help them survive and grow.
- Animals have body parts that capture and convey different kinds of information needed for growth and survival.
- Animals respond to inputs with behaviors that help them survive. Plants also respond to external inputs.

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

Grade 1 SCIENCE

CROSSCUTTING CONCEPTS

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s).
- Describe simple tests that can be designed to gather evidence to support or refute student ideas about how different plant and animal parts contribute to survival.

ENGINEERING DESIGN

- Refer to Engineering, Technology, and Application of Science Standard 1.ETS1.B.1 and 1.ETS1.C.1 for connections.

Content Limits/Assessment Boundaries

- Tasks should avoid internal structures' and/or reproductive structures' functions (e.g., lungs, gills, pollen, anther, pistil).
- Tasks should avoid the interdependent structures and relationships of plants and animals (e.g. pollination, seed dispersal).

Possible Evidence

- Identify the relationships between the external physical structures of animals (e.g., beaks, sensory organs, body coverings, appendages) and their functions.
- Identify the relationships between the external physical structures of plants and their functions (taking in water, obtaining food, absorption of light and water).
- Explain how plants and animals use external structures to help them survive, grow, and/or meet their needs.
- Explain how plants and animals respond to information from the environment.
- Compare human-designed solutions (e.g., bike helmet, coat, eye glasses, silverware) to animal and plant structures that carry out the same functions.
- Explain how to use materials and the features of the design to mimic structures of a plant or an animal to help a human solve a given problem in a particular situation (e.g., hot, cold, wet, protection, movement, obtain water or food).

Stimulus Materials

Graphic organizers, diagrams, graphs, data tables, drawings

Sample Stems

Grade 1 SCIENCE

Life Sciences	1.LS3.A.1
Core Idea	**Heredity: Inheritance and Variation of Traits**
Component	**Inheritance of Traits**
MLS	Make observations to construct an evidence based account that young plants and animals are like, but not exactly like, their parents.

Expectation Unwrapped

[Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and a particular breed of dog looks like its parents but is not exactly the same.]

SCIENCE AND ENGINEERING PRACTICES

Constructing Explanations and Designing Solutions

- Make observations (firsthand or from media [e.g., books, videos]) to collect data that can be used to make comparisons of parent and baby plants and animals.
- Read grade-appropriate texts and/or use media to obtain scientific information to determine patterns in and/or evidence about similarities in young plants and animals and their parents.
- Make qualitative observations to compare and contrast parents and offspring.
- Observe the growth of a plant from seed to flowering plant.

DISCIPLINARY CORE IDEAS

Inheritance of Traits

- Adult plants and animals can have young.
- Animals and plants of the same kind have the same structures (e.g., wings, number of legs, fur, leaf shape, flower).
- Young organisms are very much, but not exactly, like their parents and also resemble other organisms of the same kind.

CROSSCUTTING CONCEPTS

Patterns

- Observe the pattern that parents and their young are alike, but not exactly alike (i.e., animals and plants).
- Observe the pattern that animals and plants of the same kind have the same structures.

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

Grade 1 SCIENCE

Content Limits/Assessment Boundaries

- Animals that undergo complete metamorphosis (e.g., butterfly, frog) should not be included.
- Life cycle of the plant and/or animal should not be assessed.
- Animal and plant reproduction should not be assessed.
- Inherited information and effect of the environment on traits are not assessed.

Possible Evidence

- Compare plants and animals of the same kind to identify variations.
- Describe and provide evidence from observations that supports the claim adult plants and animals of the same type have similar, but not identical, features (e.g., size and shape of body parts, color and type of any hair, leaf shape, stem rigidity).
- Describe using evidence that young plants and animals are similar to their parents but are not exactly like their parents.
- Identify patterns of similarities and differences (variations) in plant and animal features between parents and offspring (e.g., size and shape of body parts, color and type of any hair, leaf shape, stem rigidity).

Stimulus Materials

Graphic organizers, diagrams, graphs, data tables, drawings

Sample Stems

Grade 1 SCIENCE

Earth and Space Sciences	1.ESS1.A.1
Core Idea	**Earth's Place in the Universe**
Component	**The Universe and its Stars**
MLS	Describe the presence of the sun, moon, and stars in the sky over time.

Expectation Unwrapped

SCIENCE AND ENGINEERING PRACTICES

Analyzing and Interpreting Data

- Make observations of the sun and moon during the day.
- Communicate information with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about the presence of the sun, moon, and stars in the sky over time.

DISCIPLINARY CORE IDEAS

The Universe and Its Stars

- The sun is observed at different positions in the sky at different times of the day (e.g., rises in the morning, sets in the evening, high in the sky midday, moves from east to west).
- The moon is observed at different positions in the sky at different times during the day or night.
- Stars (other than the sun) are not observable in the sky during the day but are observed during the night.
- The moon can be observed during the day and during the night, but the sun can only be observed during the day.

CROSSCUTTING CONCEPTS

Cause and Effect and Patterns

- Describe patterns in the presence of objects in the sky (e.g., sun, moon, stars) over time.
- Events have causes that generate observable patterns (e.g., the sun is visible only during the day, the moon is visible during day and night, stars are visible during the night).
- Some things stay the same while other things change (e.g., the sun during the day, the moon during the day or night).

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

Content Limits/Assessment Boundaries

- Assessment of star patterns is limited to stars being observed at night and not during the day.
- Constellations, phases of the moon, or cardinal directions should not be assessed.

Sample Stems

Grade 1 SCIENCE

Possible Evidence • Use pictures, models, and/or drawings to describe objects visible in the sky during the day and during the night. • Use patterns to predict the objects that can be observed in the sky during the day and during the night. • Compare objects that are visible in the sky during the day and during the night.	
Stimulus Materials Graphic organizers, diagrams, graphs, data tables, drawings	

Grade 1 SCIENCE

Earth and Space Sciences	1.ESS1.A.2
Core Idea	**Earth's Place in the Universe**
Component	**The Universe and its Stars**
MLS	Use observations of the sun, moon, and stars to describe patterns that can be predicted.

Expectation Unwrapped

[Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.]

SCIENCE AND ENGINEERING PRACTICES

Analyzing and Interpreting Data

- Make observations and collect data that can be used to make comparisons and predict patterns of the sun and moon during the day.
- Ask questions based on observations to find more information about the patterns of the sun, moon, and stars.
- Make predictions based on observations of the sun, moon, and stars.
- Use observations to describe patterns and/or relationships of the sun, moon, and stars to answer scientific questions.

DISCIPLINARY CORE IDEAS

The Universe and Its Stars

- Patterns of movement of the sun, moon, and stars as seen from Earth can be observed, described, and predicted.
- The sun is observed at different positions in the sky at different times of the day (e.g., rises in the morning, sets in the evening, high in the sky at midday, moves east to west).
- The moon is observed at different positions in the sky at different times during the day and/or night.

CROSSCUTTING CONCEPTS

Patterns

- Make predictions using patterns (e.g., day/night, movement and position of sun and moon, observable during day and/or night).
- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

Grade 1 SCIENCE

Content Limits/Assessment Boundaries	Sample Stems
• Assessment limited to daily patterns; do not assess seasonal patterns. • Assessment of star patterns is limited to stars being observed at night and not during the day. • Constellations, phases of the moon, and cardinal directions should not be assessed.	
Possible Evidence	
• Use pictures, models, and/or drawings to describe predictable patterns of objects visible in the sky during the day and during the night. • Predict the motion of the sun, moon, and stars in the sky based on observed patterns. • Predict the position of the sun and moon at different times during the day (e.g., appear to rise in one part of the sky and set in another part of the sky during the evening). • Predict that the sun and moon will move across the sky.	
Stimulus Materials	
Graphic organizers, diagrams, graphs, data tables, drawings	

Grade 1 SCIENCE

Earth and Space Sciences	1.ESS2.D.1
Core Idea Component MLS	**Earth's System** **Weather and Climate** Identify patterns indicating relationships between observed weather data and weather phenomena (e.g., temperature and types of precipitation, clouds and amounts of precipitation).

Expectation Unwrapped

SCIENCE AND ENGINEERING PRACTICES

Analyzing and Interpreting Data and Obtaining, Evaluating, and Communicating Information

- Make observations and collect data about local weather conditions (e.g., temperature, types of precipitation, amount of precipitation, clouds, sun, wind).
- Record weather information using pictures, drawings, and/or writings of observations.
- Use observations to identify patterns and/or relationships of weather phenomena.
- Use information from observations to construct an evidence-based account for weather phenomena.
- Read grade-appropriate texts and/or use media to obtain scientific and/or technical information
- Determine patterns in and/or evidence about the natural and designed world(s).

DISCIPLINARY CORE IDEAS

Weather and Climate

- Weather is the combination of sunlight, wind, snow or rain, and temperature at a particular time.
- Temperature varies during the day (e.g., cooler, warmer, hotter, colder).
- Types of precipitation (e.g., rain, snow, sleet, hail)
- Relationships between weather conditions (e.g., precipitation and clouds, temperature, type of precipitation)
- People measure weather conditions to describe and record the weather and to notice patterns and relationships over time.

CROSSCUTTING CONCEPTS

Cause and Effect and Patterns

- Weather events have causes that generate observable patterns (e.g., cold temperature cause snow).

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

Grade 1 SCIENCE

Content Limits/Assessment Boundaries

- Assessment of quantitative observations are limited to whole numbers or nonstandard measurements and relative measures such as warmer/cooler.
- Wind speed and direction should not be quantified.
- Types of clouds should not be included, but can be described.
- These weather relationships should not include severe weather.

Possible Evidence

- Use weather data to determine the number of sunny, cloudy, rainy, windy, cool, warm days.
- Identify and describe patterns in the relationship between temperature, and types of precipitation.
- With guidance, use scientific tools to make nonstandard measurements and record the amounts of precipitation.
- Share observations of relative temperatures (e.g., cooler, warmer, hotter, colder) at various times during the day.
- Identify types of precipitation (e.g., rain, snow, sleet, hail).
- Identify the relationship between precipitation and the presence of clouds.
- Use data to identify the relationship between temperature and type of precipitation.

Stimulus Materials

Graphic organizers, diagrams, graphs, data tables, drawings

Sample Stems

Grade 1 SCIENCE

Engineering, Technology, and Application of Science	1.ETS1.A.1
Core Idea Component MLS	**Engineering Design** **Defining and Delimiting Engineering Problems** 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.

Expectation Unwrapped

Clarification: Engineering Standards should be ongoing and continually integrated into science lessons/units. The ETS Standards are written as a K-2 grade span end point. Therefore, by the end of grade 2, students should be proficient in these skills. In grade 1, this engineering standard will be most successful when paired with, but not limited to, the following standard:

1.PS4.C.1: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

SCIENCE AND ENGINEERING PRACTICES

- Ask questions based on observations to find more information about the natural and/or designed worlds.
- Define a simple problem that can be solved through the development of a new or improved object or tool.
- Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.

DISCIPLINARY CORE IDEAS

Defining and Delimiting Engineering Problems

- Before beginning to design a solution, it is important to clearly understand the problem.
- 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.

CROSSCUTTING CONCEPTS

- Simple tests can be designed to gather evidence to support or refute student ideas about causes.
- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

Grade 1 SCIENCE

Content Limits/Assessment Boundaries

- Provide a situation or simple problem to be changed or improved.
- Identify constraints or limitations of the problem to be solved (rules may be a better age- appropriate term).
- K–2 tasks must be built on prior knowledge and experiences from the classroom and/or real world.

Possible Evidence

- Students ask questions and make observations to gather information about a situation that people want to change.
- Identify key features of an improved object or tool and how students address situation that people want to change.
- Students' questions, observations and information gathering are focused on the following:
  - A given situation that people want to change
  - Why the given situation needs to change
  - The desired outcome of the new or improved object or tool developed
- Students' questions are based on observations and information gathered about a scientific phenomenon that is important to the situation that people want to change.

Stimulus Materials

Graphic organizers, diagrams, graphs, data tables, drawings

Sample Stems

Grade 1 SCIENCE

Engineering, Technology, and Application of Science	1.ETS1.B.1
Core Idea Component MLS	**Engineering Design** **Developing Possible Solutions** 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.

Expectation Unwrapped

Clarification: Engineering Standards should be ongoing and continually integrated into science lessons/units. The ETS Standards are written as a K-2 grade span end point. Therefore, by the end of grade 2, students should be proficient in these skills. In grade 1, this engineering standard will be most successful when paired with, but not limited to, the following standard:

1.LS1.A.1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

SCIENCE AND ENGINEERING PRACTICES

- Distinguish between a model and the actual object, process, and/or events the model represents.
- Develop a simple model based on evidence to represent a proposed object or tool.
- Define a simple problem that can be solved through the development of a new or improved object or tool.
- Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.

DISCIPLINARY CORE IDEAS

Developing Possible Solutions

- 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.
- 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).

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

Grade 1 SCIENCE

Content Limits/Assessment Boundaries

- Provide a scenario or problem to be solved.
- Identify constraints or limitations of the problem to be solved (rules may be a better age-appropriate term).
- K–2 tasks must be built on prior knowledge and experiences from the classroom and/or real world.
- Revision of a model is not appropriate for K–2.

Possible Evidence

- Collaboratively (with guidance, group work) develop a sketch, drawing, or physical model of an object.
- Describe how the shape of the object helps it function.
- Describe how the object helps to solve a given problem.
- Explain using evidence how choices were made in the development of the solution.

Stimulus Materials

Graphic organizers, diagrams, graphs, data tables, drawings

Sample Stems

Grade 1 SCIENCE

Engineering, Technology, and Application of Science	1.ETS1.C.1
Core Idea Component MLS	**Engineering Design** **Optimizing the Solution Process** Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Expectation Unwrapped

Clarification: Engineering Standards should be ongoing and continually integrated into science lessons/units. The ETS Standards are written as a K-2 grade span end point. Therefore, by the end of grade 2, students should be proficient in these skills. In grade 1, this engineering standard will be most successful when paired with, but not limited to, the following standards:

1.PS4.A.1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
1. PS4.C.1: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
1.LS1.A.1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs

SCIENCE AND ENGINEERING PRACTICES

- Analyze data from tests of an object or a tool to determine whether it works as intended.
- Make observations and/or measurements of a proposed object, tool, or solution to determine whether it solves a problem or meets a goal.
- Use quantitative data to compare two alternative solutions to a problem.

DISCIPLINARY CORE IDEAS

Optimizing the Design Solution

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

CROSSCUTTING CONCEPTS

Cause and Effect and Structure and Function

- Simple tests can be designed to gather evidence to support or refute student ideas about causes.
- The shape and stability of structures and designed objects are related to their function(s).

DOK Ceiling

3

Item Format

Selected Response
Constructed Response
Technology Enhanced

Grade 1 SCIENCE

Content Limits/Assessment Boundaries	Sample Stems
• K–2 tasks must be built on prior knowledge and experiences from the classroom and/or real world. • Data can be provided for analysis and not necessarily collected by the students. • This standard will require guidance and support.	
Possible Evidence • 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 object. • Analyze the data to compare the strengths and weaknesses of how each object performs.	
Stimulus Materials Graphic organizers, diagrams, graphs, data tables, drawings	