Grade 1

Unit Summary

The performance expectations in first grade help students formulate answers to questions such as: “What happens when materials vibrate? What happens when there is no light? What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different? What objects are in the sky and how do they seem to move?” First grade performance expectations include PS4, LS1, LS3, and ESS1 Disciplinary Core Ideas from the NRC Framework. Students are expected to develop understanding of the relationship between sound and vibrating materials as well as between the availability of light and ability to see objects. The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of light. Students are also expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how behaviors of parents and offspring help the offspring survive. The understanding is developed that young plants and animals are like, but not exactly the same as, their parents. Students are able to observe, describe, and predict some patterns of the movement of objects in the sky. The crosscutting concepts of patterns; cause and effect; structure and function; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. In the first grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

Lights & Sounds and Communication

NGSS Performance Expectations

Students who demonstrate understanding can:

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

1-PS4-2. Make observations to construct an evidence-based account that objects can be seen only when illuminated.

1-PS4-3. Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.

1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

DCI: 1-PS4 Waves and their Applications for Information Transfer	Student Learning Objectives	Suggested Assessments
PS4.A: Wave Properties ● Sound can make matter vibrate, and vibrating matter can make sound.	● Students explore how to make different sounds using a variety of objects, such as hands, feet, pencil and ruler. Students observe and then describe that the back and forth motion made by such objects is called vibration and that different vibrations make different sounds. (1-PS4-1) ● Students explore different sounds and how they are created. Students observe that when the vibration stops the sound stops too. (1-PS4-1)	**Formative Assessment:** Students will be able to name a sound source and explain that objects vibrate when they make a sound. **Formative Assessment:** Students will draw an object and construct an explanation about where the vibrations are happening.
PS4.B: Electromagnetic Radiation ● Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) ● Objects can be seen if light is available to illuminate them or if they give off their own light.	● Students explore the difference between transparent, translucent, and opaque materials by sorting them.(1-PS4-3) ● Students compare various observations of seeing an object in the dark to seeing the same object illuminated.(1-PS4-2)	**Formative Assessment:** Students identify the relationship between the type of material (cause) and the amount of light that can pass through it (effect). **Formative Assessment:** Students will identify a light source and explain the effect it has on its surroundings.

PS4.B: Electromagnetic Radiation ● People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)	● Students design a mechanism that uses light colors to communicate a message over a long distance. (1-PS4-4)	Engineering Activity ● Students are able to send and receive messages using light colors. (K-2-ETS1-2) Light Lesson

Science and Engineering Practices	Crosscutting Concepts
● Planning and Carrying Out Investigations ● Constructing Explanations and Designing Solutions ***Connections to Nature of Science*** ● Science investigations begin with a question. (1-PS4-1) ● Scientists use different ways to study the world. (1-PS4-1)	● Cause and Effect ***Connections to Engineering,Technology, and Applications of Science*** ● People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

Available Resources:
Light Lesson
Sound Lesson
(other units on this site may also be useful)
www.brainpop.com
www.nsta.org
www.fossweb.com/foss-program
https://climatekids.nasa.gov
https://www.jpl.nasa.gov/edu/teach/tag/search/water

Prior Knowledge and Skills for First Grade Investigations:

Students are expected to develop understanding of patterns and variations in local weather and the purpose of weather forecasting to prepare for, and respond to, severe weather. Students are able to apply an understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze a design solution. Students are also expected to develop understanding of what plants and animals (including humans) need to survive and the relationship between their needs and where they live. The crosscutting concepts of patterns; cause and effect; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. In the kindergarten performance expectations, students demonstrated grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

Differentiation techniques or strategies:

- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understanding.
- Flexible groupings-whole class, individual and small-group opportunities throughout the lesson.
- Allow additional time with the active investigations.
- Students can build explanations of the science concepts orally or in writing or drawings.

Grade 1

Plant and Animal Structures and Survival

NGSS Performance Expectations

Students who demonstrate understanding can:

1-LS1-1. 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.

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

DCI:1-LS1: From Molecules to Organisms: Structure and Processes	**Student Learning Objectives**	**Suggested Assessments**
LS1.A: Structure and Function ● All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)	● Students investigate animal body parts and analyze their effectiveness towards surviving in different environments. ● Students observe animal images to examine their traits. Students explain that some animals have similar traits to their parents **Climate Change: https://climatekids.nasa.gov/menu/plants-and-animals/**	**Formative Assessment:** Students construct arguments why different animal parts help them survive in different environments. **Formative Assessment:** Students match baby animals to their parents.
LS1.A: Structure and Function		**Formative Assessment**:

• Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)	• Students explain why each animal mother engages in behavior to help their offspring survive.	Students draw and write how animal mothers help their young.
LS1.D: Information Processing • Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)	• Students will construct a model to mimic the structure and function of an animal or plan's external parts to design solutions to their problems.	**Engineering Activity**: Students develop a model of an umbrella and conduct an investigation to test wind's effect on it. Students design a solution to solve the problem of needing a shade structure that won't blow over in the wind by mimicking a tree's structure. (K-2-ETS1-1),(K-2-ETS1-2)
LS3.A: Inheritance of Traits • Young animals are very much, but not exactly like, their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1)	• Students describe how adult animals can have young (offspring), and their young resemble their parents.	**Formative Assessment:** Students construct an explanation that animal offspring have some similar traits to their parents, but there are many traits that also differ between them.
LS3.B: Variation of Traits • Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)	• Students compare and contrast the features of one kind of animal to another.	**Formative Assessment:** Students list the differences between the same types of animals and plants. For example, a baby bird may have the same beak and talons as its parent but may be smaller in size, featherless, have thin, fluffy down, or have very stubbly feather growth.

Science and Engineering Practices	Crosscutting Concepts
• Constructing Explanations and Designing Solutions • Obtaining, Evaluating, and Communicating Information ***Connections to Nature of Science*** • Scientists look for patterns and order when making observations about the world. (1-LS1-2)	• Patterns • Structure and Function ***Connections to Engineering, Technology, and Applications of Science*** • Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)

Interdisciplinary Connections

ELA: Throughout research and integration of science practices students read leveled texts to gain additional information.

- Students participate in discussion and partnerships to gain further information on various scientific topics. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS3-1) **RI.3.1**
- Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-1) **RI.3.2**
- Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS3-1) **RI.3.3**
- Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1-1) **W.1.7**
- Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-1) **SL.3.4**
- Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS3-1) **W.3.2**

Mathematics: Through Science labs students are required to incorporate the following math standards in order to accurately complete the various tasks related to science:

- Reason abstractly and quantitatively. (3-LS3-1) MP.2
- Model with mathematics. (3-LS3-1) MP.4
- Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS3-1) 3.MD.B.4

21st Century Life and Careers - Technology (link to standard 8.1 and 8.2) / Career and 21st Century Skills (link to standard 9.1, 9.2, 9.2) (Include standard number and activity examples from each area):

Technology:

- 8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.

Civic Responsibility:

There are actions individuals can take to help make this world a better place

- 9.1.2.CR.1: Recognize ways to volunteer in the classroom, school and community Example: Students will develop understanding and value of the importance of making contributions to classroom discussions to support the learning community.

Creativity and Innovation:

Brainstorming can create new, innovative ideas

- 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
- 9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).

Critical Thinking and Problem-solving:

Critical thinkers must first identify a problem then develop a plan to address it to effectively solve the problem:

- 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2)
- 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Students will understand the expectation that true mathematical problems require a strong perseverance to develop partial or complete solutions. Classroom communication strategies and routines will support student transfer of critical thinking skills.

Digital Citizenship:

Individuals should practice safe behaviors when using the Internet:

- 9.4.2.DC.3: Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).

Warren QSAC Accommodations Chart

Available Resources
The Wonder of Science
www.brainpop.com
www.nsta.org
bioGraphic
www.fossweb.com/foss-program

Prior Knowledge and Skills for First Grade Investigations:

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Grade 1
Sun, Moon and Stars

NGSS Performance Expectations

Students who demonstrate understanding can:

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted.

1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year.

DCI: 1-ESS1: Earth's Place in the Universe	Student Learning Objectives	Suggested Assessments
ESS1.A: The Universe and its Stars ● Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)	● Students will observe changing shadows, and the Sun's position moving across the sky. ● Students make observations of the moon's appearance. They analyze the data to help predict when the next full moon will appear. ● Students develop and use a model of the stars in the night sky. Students explain about stars being outshone by the Sun in the daytime sky, and then being visible again when the Sun sets.	**Formative Assessment:** Students draw the sun's position in the sky based on an object's shadow. **Formative Assessment:** Student's identify the shape of the moon appears to change over a period of time in a predictable pattern. Students draw the moon shape to complete the pattern. **Formative Assessment:** Students write an explanation of why you can't see stars at night.

ESS1.B: Earth and the Solar System ● Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)	● Students describe the number of hours of daylight changes predictably through the seasons. **Climate Change** **What's the Difference Between Weather and Climate?**	**Formative Assessment:** Students match the season with the length of daylight each day. The assessment should be limited to relative amounts of daylight, not quantifying the hours or time of daylight.

Science and Engineering Practices	Crosscutting Concepts
● Planning and Carrying Out Investigation ● Analyzing and Interpreting Data	● Patterns ***Connections to Nature of Science*** ● Science assumes natural events happen today as they happened in the past. (1-ESS1-1) ● Many events are repeated. (1-ESS1-1)

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21st Century Life and Careers - Technology (link to standard 8.1 and 8.2) / Career and 21st Century Skills (link to standard 9.1, 9.2, 9.2) (Include standard number and activity examples from each area):

- 8.1.P.A.1 Use an input device to select an item and navigate the screen.
- 8.1.P.A.5 Demonstrate the ability to access and use resources on a computing device.
- 8.1.2.A.4 Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).

CRP1. Act as a responsible and contributing citizen and employee. Example: Students will develop understanding and value of the importance of making contributions to classroom discussions to support the learning community.
CRP4. Communicate clearly and effectively and with reason. Example: Students will learn and apply classroom protocols that support clear and effective communication to express, refine, and critique mathematical reasoning.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them: Students will understand the expectation that true mathematical problems require a strong perseverance to develop partial or complete solutions. Classroom communication strategies and routines will support student transfer of critical thinking skills.
2- Digital Citizenship: Students recognize the rights, responsibilities, and opportunity of learning, living and working in an interconnected digital world and they act and model in ways that are safe, legal and ethical. Students use Chromebooks to explore online resources and complete differentiated assignments. Example: goal setting lessons, growth mindset

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