First Grade

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.
Eco-Schools USA Pathway Alignment

The National Wildlife Federation’s Eco-Schools USA program has aligned their program pathways of sustainability to the NGSS. As a part of the Eco-Schools 7-Step Framework, linking to the curriculum, is a priority. This alignment is designed to highlight the natural connections between our national standards document and the Eco-Schools USA program.

Our program icons are used to denote pathway connections to the NGSS Performance Expectations. Not every topic, with its set of Performance Expectations are a fit with the Eco-Schools USA program and in that case an alignment will not be present.

Green STEM is an initiative of the National Wildlife Federation’s Eco-Schools USA program and is focused on identifying best practice in the STEM fields as it relates to environment-based learning. These elements include:

- Problem-based learning
- Utilizing the school, both inside and out, as a learning laboratory
- The incorporation of two or more STEM disciplines within a single lesson, whole curricula, a set of standards, etc.
- A Maker mentality – design/create/solve
- A commitment to service learning
- An inclusive culture – where all students can learn and all students can participate
Structure, Function, and Information Processing

Students who demonstrate understanding can:

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.* [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.]

1. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. [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.] [Assessment Boundary: Assessment does not include inheritance or habits that undergo metamorphosis or hybrids.]

The performance expectations above were developed using the following elements from the NGSS document: A Framework for K-12 Science Education:

ECO-SCHOOLS USA PATHWAY ALIGNMENT

1. LS1-1, 1. LS1-2, and 1. LS3-1

Whether it is your Certified Schoolyard Habitat™, the trees that surround your school, or your Sustainable Food garden(s), each and all can be used to transform your students into citizen scientists. Project Budburst, http://www.budburst.org/educators/educator_k_4.php, through story and active observation students collect and record real data used by scientists across the country. This exponential learning opportunity allows students to observe the similarities and differences between young seedlings and parent plants. This time outside also gives students the opportunity to observe schoolyard wildlife, including insects, birds and small mammals and rodents. These first hand experiences will help to bridge the pathways needed to create lasting connections to long term memory.

Connections to other DCIs in first grade: N/A


Common Core State Standards Connections:

ELA/Literacy –

RI.1.1 Ask and answer questions about key details in a text. (1. LS1-2), (1. LS3-1)
RI.1.2 Identify the main topic and retell key details of a text. (1. LS1-2)
RI.1.10 With prompting and support, read informational texts appropriately complex for grade. (1. LS1-2)
W.1.7 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), (1. LS3-1)
W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1. LS3-1)

Mathematics –

MP.2 Reason abstractly and quantitatively. (1. LS3-1)
MP.5 Use appropriate tools strategically. (1. LS3-1)
1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols >, =, and <. (1. LS1-2)
1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1. LS1-2)
1.NBT.C.5 Given a two-digit number, mentally find 10 or more than the number, without having to count; explain the reasoning used. (1. LS1-2)
1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (1. LS1-2)
1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1. LS3-1)

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

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Space Systems: Patterns and Cycles

Students who demonstrate understanding can:

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted. [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.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]

1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

The performance expectations above were 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 that can be used to make comparisons. (1-ESS1-2)

**Analyzing and Interpreting Data**
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1-ESS1-1)

**Disciplinary Core Ideas**

**ESS1A: 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)

**ESS1B: Earth and the Solar System**
- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)

**Crosscutting Concepts**

**Patterns**
- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1),(1-ESS1-2)

**Connections to Nature of Science**

**Scientific Knowledge Assumes an Order and Consistency in Natural Systems**
- 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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**ECO-SCHOOLS USA PATHWAY ALIGNMENT**

1-ESS1-1 and 1-ESS1-2

A tremendous opportunity exists to connect students to the natural world when observing patterns and cycles as they relate to the sun, moon, and stars. Plan a nighttime event a family track walk followed by the local astronomy club/department or museum to host a “star party”. Work with the local community to help students begin to understand the patterns and cycles in the sky. Your students likely think the moon and stars are not present during the school day. What an opportunity to provide them with an “aha” moment.

This is also an opportunity to take your students outside and allow them to take pictures of a specific stationary thing. Have them do this once a week or twice a month, same day and time of the week and at the same angle. Do this for a semester. Print the pictures and place them in order with the date from first to last. Students will be able to observe how daylight changes throughout the weeks and months. Another option – take a picture of your class, using the same criteria, and have an all class example of these changes in daylight over time.

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**Connections to other DCIs in first grade:** N/A

**Articulation of DCIs across grade-bands:** 3.PS2.A (1-ESS1-1); 5.PS2.B (1-ESS1-1),(1-ESS1-2) 5-ESS1.B (1-ESS1-1),(1-ESS1-2)

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**Common Core State Standards Connections:**

**ELA/Literacy –**

W.1.7 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-ESS1-1),(1-ESS1-2)

W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1),(1-ESS1-2)

**Mathematics –**

MP.2 Reason abstractly and quantitatively. (1-ESS1-2)

MP.4 Model with mathematics. (1-ESS1-2)

MP.5 Use appropriate tools strategically. (1-ESS1-2)

1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)

1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)

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