New York State P-12 Science Learning Standards

1. Waves: Light and Sound

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

1-PS4-2. **Make observations (firsthand or from media) to construct an evidence-based account that objects can be seen only when illuminated.** [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]

1-PS4-3. **Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.** [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [Assessment Boundary: Assessment does not include the speed 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.*** [Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drum beats.] [Assessment Boundary: Assessment does not include technological details for how communication devices work.]

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	Disciplinary Core Ideas	Crosscutting Concepts
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 investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1),(1-PS4-3) **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 (1-PS4- 2) ▪ Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) --- *Connections to Nature of Science* **Scientific Investigations Use a Variety of Methods** ▪ Science investigations begin with a question. (1-PS4-1) ▪ Scientists use different ways to study the world. (1-PS4-1)	**PS4.A: Wave Properties** ▪ Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) **PS4.B: Electromagnetic Radiation** ▪ Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2) ▪ 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.) (1-PS4-3) **PS4.C: Information Technologies and Instrumentation** ▪ People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)	**Cause and Effect** ▪ Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3) -- *Connections to Engineering, Technology, and Applications of Science* **Influence of Engineering, Technology, and Science, on Society and the Natural World** ▪ People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

Connections to other DCIs in first grade: N/A

Articulation of DCIs across grade-levels: **K.ETS1.A** (1-PS4-4); **2.PS1.A** (1-PS4-3); **2.ETS1.B** (1-PS4-4); **4.PS4.C** (1-PS4-4); **4.PS4.B** (1-PS4-2); **4.ETS1.A** (1-PS4-4)

New York State Next Generation Learning Standards Connections:

ELA/Literacy –

1W2 Write an informative/explanatory text to introduce a topic, supplying some facts to develop points, and provide some sense of closure. (1-PS4-2),(1-PS4-1),(1-PS4-2),(1-PS4-3),(1-PS4-4)

1W6 Develop questions and participate in shared research and explorations to answer questions and to build knowledge. (1-PS4-1),(1-PS4-2),(1-PS4-3)

1W7 Recall and represent relevant information from experiences or gather information from provided sources to answer a question in a variety of ways. (1-PS4-1),(1-PS4-2),(1-PS4-3)

1SL1 Participate in collaborative conversations with diverse peers and adults (e.g., in small and large groups and during play). (1-PS4-1),(1-PS4-2),(1-PS4-3)

Mathematics –

MP.5 Use appropriate tools strategically. (1-PS4-4)

NY-1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4)

NY-1.MD.2 Measure the length of an object using same-size "length units" placed end to end with no gaps or overlaps. Express the length of an object as a whole number of "length units". (1-PS4-4)

*Connection boxes updated as of September 2018

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea. The text in the "Disciplinary Core Ideas" section is reproduced verbatim from A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas unless it is preceded by (NYSED).

New York State P-12 Science Learning Standards

1. Structure, Function, and Information Processing

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.*** [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-LS1-2. **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-LS3-1. **Make observations to construct an evidence-based account that some young plants and animals are similar to, 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 animals that undergo metamorphosis or hybrids.]

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	Disciplinary Core Ideas	Crosscutting Concepts
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. (1-LS3-1) ▪ Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1) **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. ▪ Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2) --- *Connections to Nature of Science* **Science Knowledge is Based on Empirical Evidence** ▪ Scientists look for patterns and order when making observations about the world. (1-LS1-2)	**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) **LS1.B: Growth and Development of Organisms** ▪ 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) **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) **LS3.A: Inheritance of Traits** ▪ (NYSED) Some young animals are similar to, but not exactly, like their parents. Some young plants are also similar to, but not exactly, like their parents. (1-LS3-1) **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)	**Patterns** ▪ Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2),(1-LS3- 1) **Structure and Function** ▪ The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1) --------------------------------------- *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 by using materials derived from the natural world. (1-LS1-1)

Connections to other DCIs in first grade: N/A

Articulation of DCIs across grade-levels: **K.ETS1.A** (1-LS1-1); **3.LS2.D** (1-LS1-2) **3.LS3.A** (1-LS3-1); **3.LS3.B** (1-LS3-1); **4.LS1.A** (1-LS1-1); **4.LS1.D** (1-LS1-1); **4.ETS1.A** (1-LS1-1)

New York State Next Generation Learning Standards Connections:
ELA/Literacy –
1R1 Develop and answer questions about key ideas and details in a text. (1-LS1-2),(1-LS3-1)
1R2 Identify a main topic or idea in a text and retell important details. (1-LS1-2)
1W6 Develop questions and participate in shared research and explorations to answer questions and to build knowledge. (1-PS4-1),(1-PS4-2),(1-PS4-3),(1-PS4-4)
1W7 Recall and represent 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)
NY-1.NBT.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)
NY-1.NBT.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. Use concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. Relate the strategy to a written method and explain the reasoning uses. (1-LS1-2)
NY-1.NBT.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. (1-LS1-2)
NY-1.NBT.6 Subtract multiples of 10 from the range 10-90 from multiples of 10 in the range 10-90 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)
NY-1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)
*Connection boxes updated as of September 2018

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New York State P-12 Science Learning Standards

1. 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 along the eastern horizon, move in a predictable pathway across the sky, and set along the western horizon; and stars other than our Sun are visible at night depending on weather and other conditions such as light pollution but not visible 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.]

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Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
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)	**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) **ESS1.B: Earth and the Solar System** - Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)	**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)

Connections to other DCIs in first grade: N/A

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

New York State Next Generation Learning Standards Connections:

ELA/Literacy –

1W6 Develop questions and participate in shared research and explorations to answer questions and to build knowledge. (1-ESS1-1),(1-ESS1-2)

1W7 Recall and represent relevant information from experiences or gather information from provided sources to answer a question in a variety of ways. (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)

NY-1.OA.1 Use addition and subtraction within 20 to solve one step word problems involving situations of adding to, taking from, putting together, taking apart, and/or comparing, with unknowns in all positions. (1-ESS1-2)

NY-1.MD.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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