### P. Physical Sciences

<table>
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<th>Crosscutting Concepts</th>
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<tr>
<td>Asking Questions and Defining Problems</td>
<td>P51A: Structure and Properties of Matter</td>
<td></td>
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<tr>
<td>Planning and Carrying Out Investigations</td>
<td>• (NYSED) Different kinds of matter exist and many of them can be either solid or liquid. Matter can be described, categorized, and sorted by its observable properties. (P-PS1-1)</td>
<td></td>
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<tr>
<td>Analyzing and Interpreting Data</td>
<td>P52A: Forces and Motion</td>
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<tr>
<td>Scientific Investigations Use a Variety of Methods</td>
<td>• Pushes and pulls can have different strengths and directions. (P-PS2-1)</td>
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</tr>
<tr>
<td>Connections to Nature of Science</td>
<td>• Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (P-PS2-1)</td>
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<tr>
<td></td>
<td>P53C: Relationship Between Energy and Forces</td>
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<tr>
<td></td>
<td>• (NYSED) A push or a pull may cause stationary objects to move, and a stronger push or pull in the same or opposite direction makes an object in motion speed up or slow down more quickly. (secondary to P-PS2-1)</td>
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<tr>
<td></td>
<td>P54A: Wave Properties</td>
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<tr>
<td></td>
<td>• Sound can make matter vibrate, and vibrating matter can make sound. (P-PS4-1)</td>
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<td>ETS1A: Defining Engineering Problems</td>
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<td>• A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (P-PS2-1)</td>
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**New York State Next Generation Learning Standards Connections:**

**ELA/Literacy:**
- PKR1  Participate in discussions about a text. (P-PS1-1), (P-PS2-1), (P-PS4-1)
- PKR4  Exhibit an interest in learning new vocabulary. (P-PS1-1), (P-PS2-1), (P-PS4-1)
- PKW2  Use a combination of drawing, dictating, oral expression, and/or emergent writing to name a familiar topic and supply information in child-centered, authentic, play-based learning. (P-PS1-1), (P-PS2-1), (P-PS4-1)
- PKW3  Use a combination of drawing, dictating, oral expression, and/or emergent writing to narrate an event or events in a sequence. (P-PS1-1), (P-PS2-1), (P-PS4-1)
- PKW7  Engage in a discussion using gathered information from experiences or provided resources. (P-PS1-1), (P-PS2-1), (P-PS4-1)
- PKS2L  Interact with diverse formats and texts. (P-PS1-1), (P-PS2-1), (P-PS4-1)
- PKS3L  Identify the speaker. (P-PS1-1), (P-PS2-1), (P-PS4-1)
- PKS5L  Create a visual display. (P-PS1-1), (P-PS2-1), (P-PS4-1)

**Mathematics:**
- MP.4  Model with mathematics. (P-PS2-1)
- MP.5  Use appropriate tools strategically. (P-PS1-1), (P-PS2-1), (P-PS4-1)
- MP.6  Attends to precision. (P-PS2-1)
- NY-PK.MD.1  Identify measurable attributes of objects, such as length or weight, and describe them using appropriate vocabulary. (P-PS2-1)
- NY-PK.MD.2  Sort objects and shapes into categories; count the objects in each category. (limit category counts to be less than or equal to 10) (P-PS2-1)
- NY-PK.G.3  Explode two- and three-dimensional objects and use informal language to describe their similarities, differences, and other attributes. (P-PS1-1)
- NY-PK.G.4  Create and build shapes from components (e.g., sticks and clay balls). (P-PS2-1)

*Connection boxes updated as of September 2018*
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

**Developing and Using Models**
- Modeling in PK–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.
- With guidance, plan and conduct an investigation in collaboration with peers. (P-LS1-2)

**Analyzing and Interpreting Data**
- Analyzing data in PK–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
- Record information (observations, thoughts, and ideas). (P-PS1-1)
- Analyze data from tests of an object or tool to determine if it works as intended. (P-PS2-1)

**Obtaining, Evaluating, and Communicating Information**
- Obtaining, evaluating, and communicating information in PK–2 builds on prior experiences and uses observations and tests to communicate new information.
- Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (P-LS1-1)

### Disciplinary Core Ideas

**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. (P-LS1-2)

**LS1.C: Organization for Matter and Energy Flow in Organisms**
- (NYSED) All animals need food, air, and water in order to live, grow, and thrive. Animals obtain food from plants or from other animals. Plants need water, air, and light to live, grow, and thrive. (P-LS1-1)

**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. (P-LS1-2)

**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. (P-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. (P-LS3-1)

### Crosscutting Concepts

**Patterns**
- Events have causes that generate observable patterns. (P-LS1-2)

**Cause and Effect**
- Systems in the natural and designed world have parts that work together. (P-LS1-2)

**Systems and System Models**
- The shape and stability of structures of natural and designed objects are related to their function(s). (P-LS1-2)

### Connections to Nature of Science

- Scientists use different ways to study the world. (P-LS1-2)

### Articulation of DCIs across grades K–1:

- **K.LS1.C**
- **K.ESS2.D**
- **K.ESS3.C**
- **1.LS1.A**
- **1.LS1.D**
- **1.LS3.A**
- **1.LS3.B**

### New York State Next Generation Learning Standards Connections:

**ELA/Literacy**
- **PKR1**
- **PKR4**
- **PKW1**
- **PKW2**
- **PKW3**
- **PKW7**
- **PKSL2**
- **PKSL3**
- **PKSL5**

**Mathematics**
- **MP.1**
- **MP.5**
- **NY-PK.OA.2**
- **NY-PK.MD.1**
- **NY-PK.MD.2**

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The performance expectations above were developed using the following elements from the NRC document: 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

K. Matter and Its Interactions

Students who demonstrate understanding can:

**K-PS1-1.** Plan and conduct an investigation to test the claim that different kinds of matter exist as either solid or liquid, depending on temperature. [Clarification Statement: Emphasis should be on solids and liquids at a given temperature and that a solid may be a liquid at higher temperature and a liquid may be a solid at a lower temperature.] [Assessment Boundary: Only a qualitative description of temperature, such as hot, warm, and cool, is expected]

The performance expectations above were developed using the following elements from the NRC document, *A Framework for K-12 Science Education*.

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<td>• 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. (K-PS1-1)</td>
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</tr>
<tr>
<td>Analyzing and Interpreting Data</td>
<td></td>
<td>Energy and Matter</td>
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<tr>
<td>Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</td>
<td></td>
<td>• Students observe objects may break into smaller pieces, be put together into larger pieces, or change shapes. (K-PS1-1)</td>
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<tr>
<td>• Record information (observations, thoughts, and ideas). (K-PS1-1)</td>
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**Scientific Investigations Use a Variety of Methods**

• Scientists use different ways to study the world. (K-PS1-1)

**Connections to Nature of Science**

**Articulation of DCIs across grade-levels:** K.ETS1.A (K-PS2-2); K.ETS1.B (K-PS2-2)

**New York State Next Generation Learning Standards**

**Connections: ELA/Literacy**

**KR1** Develop and answer questions about a text. (K-PS1-1)

**KW6** Develop questions and participate in shared research and exploration to answer questions and to build and share knowledge. (K-PS1-1)

**KSL3** Develop and answer questions to clarify what the speaker says. (K-PS1-1)

**Mathematics**

**MP.2** Reason abstractly and quantitatively. (K-PS1-1)

**NY-K.MD.1** Describe measurable attributes of object(s), such as length or weight, using appropriate vocabulary. (K-PS1-1)

**NY-K.MD.2** Directly compare two objects with a common measurable attribute and describe the difference. (K-PS1-1)

*Connection boxes updated as of September 2018

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**New York State P-12 Science Learning Standards**

### K. Forces and Interactions: Pushes and Pulls

**Students who demonstrate understanding can:**

**K-PS2-1.** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.*  
[Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.]  
[Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.]

**K-PS2-2.** Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.*  
[Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.]  
[Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.]

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### 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.

- With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1)

**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. (K-PS2-2)

### Disciplinary Core Ideas

**PS2.** Forces and Motion

- Pushes and pulls can have different strengths and directions. (K-PS2-1),(K-PS2-2)
- Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1),(K-PS2-2)

**PS2.** Types of Interactions

- When objects touch or collide, they push on one another and can change motion. (K-PS2-1)

**PS3.** Relationship Between Energy and Forces

- A bigger push or pull makes things speed up or slow down more quickly. (secondary to K-PS2-1)

**ETS1.** Defining Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (secondary to K-PS2-2)

### Crosscutting Concepts

**Cause and Effect**

- Simple tests can be designed to gather evidence to support or refute students' ideas about causes. (K-PS2-1),(K-PS2-2)

### Connections to Nature of Science

**Connections to Other Disciplinary Ideas in kindergarten:** K.ETS1.A (K-PS2-2); K.ETS1.B (K-PS2-2)

**Articulation of DCIs across grade-levels:** 2.ETS1.B (K-PS2-2); 3.PS2.A (K-PS2-1),(K-PS2-2); 3.PS2.B (K-PS2-1); 4.PS3.A (K-PS2-1); 4.ETS1.A (K-PS2-2)

**New York State Next Generation Learning Standards Connections:**

**ELA/Literacy**

- **KR** Develop and answer questions about a text. (K-PS2-2)
- **KW6** Develop questions and participate in shared research and exploration to answer questions and to build and share knowledge. (K-PS2-1)
- **KSL3** Develop and answer questions to clarify what the speaker says. (K-PS2-2)

**Mathematics**

- **MP.2** Reason abstractly and quantitatively. (K-PS2-1)
- **NY-K.MD.1** Describe measurable attributes of object(s), such as length or weight, using appropriate vocabulary. (K-PS2-1)
- **NY-K.MD.2** Directly compare two objects with a common measurable attribute and describe the difference. (K-PS2-1)

*Connection boxes updated as of September 2018

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**New York State P-12 Science Learning Standards**

**K. Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment**

Students who demonstrate understanding can:

**K-LS1-1.** Use observations to describe patterns of what plants and animals (including humans) need to survive.

[Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water and other materials to live, grow, and thrive.]

**K-ESS2-2.** Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

[Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]

**K-ESS3-1.** Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

[Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas, and grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]

**K-ESS3-3.** Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment.*

[Clarification Statement: Examples of human impact on the environment (land, water, air, plants, and animals) could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]

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

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</table>
| 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.
  - Use a model to represent relationships in the natural world. (K-ESS3-1) | L5S1.C: Organization for Matter and Energy Flow in Organisms  
  - (NYSED) All animals need food, air, and water in order to live, grow, and thrive. Animals obtain food from plants or from other animals. Plants need water, air, and light to live, grow, and thrive. (K-LS1-1) | Patterns  
  - Patterns in the natural and human designed world can be observed and used as evidence. (K-ESS3-3) |
| 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. (K-LS1) | ESS2.E: Biogeology  
  - Plants and animals can change their environment. (K-ESS2-2) | Cause and Effect  
  - Events have causes that generate observable patterns. (K-ESS3-3) |
| 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. (K-ESS2-2) | ESS3.A: Natural Resources  
  - Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K-ESS3-1) | Systems and System Models  
  - Systems in the natural and designed world have parts that work together. (K-ESS3-2), (K-ESS3-1) |
| Obtaining, Evaluating, and Communicating Information |                         |                       |
| Obtaining, evaluating, and communicating information in K-2 builds on prior experiences and uses observations and tests to communicate new information.
  - Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-1) | 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 to K-ESS3-3) |                       |

*Connections to Nature of Science |

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (K-LS1-1)

Connections to other DCIs in kindergarten: L5T5.1A (K-ESS3-3)

Articulation of DCIs across grade levels: 1.L5S1.A (K-LS1-1), (K-ESS3-1); 2.L5S2.A (K-LS1-1); 2.ETS1.B (K-ESS3-3); 3.L5S2.C (K-ESS3-1); 3.L5S4.B (K-LS1-1); 4.ESS2.E (K-ESS2-2);

New York State Next Generation Learning Standards Connections:

**ELA/Literacy**

- KR1 Develop and answer questions about a text. (K-ESS2-2)
- KW1 Use a combination of drawing, dictating, oral expression and/or emergent writing to state an opinion pieces about a familiar topic, personal experience and state a reason to support that topic. (K-ESS2-2)
- KW2 Use a combination of drawing, dictating, oral expression, and/or emergent writing to name a familiar topic and supply information. (K-ESS2-2), (K-ESS2-3)
- KW7 Develop questions and participate in shared research and exploration to answer questions and to build and share knowledge. (K-LS1-1)

**Mathematics**

- MP.2 Reason abstractly and quantitatively. (K-ESS3-1)
- MP.4 Model with mathematics. (K-ESS3-1)
- NY.K.CC Counting and Cardinality (K-ESS3-1)
- NY.K-MD.2 Directly compare two objects with a common measurable attribute and describe the difference. (K-LS1-1)

*Connection boxes updated as of September 2018

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Students who demonstrate understanding can:

**K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.** [Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.] [Assessment Boundary: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.]

**K-ESS2-2. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.** [Clarification Statement: Emphasis is on local forms of severe weather and local resources available for preparedness measures.]

**K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.** [Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water. Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.]

**K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.** [Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]

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

**Asking Questions and Defining Problems**
- Asking questions based on observations to find more information about the designed world. (K-ESS3-2)

**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. (K-PS3-1)

**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. (K-ESS2-1)

**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.
- Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K-PS3-2)

**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/or use media to obtain scientific information to describe patterns in the natural world.

### Disciplinary Core Ideas

**PS3.B: Conservation of Energy and Energy Transfer**
- Sunlight warms Earth's surface. (K-PS3-1), (K-PS3-2)

**ESS2.D: Weather and Climate**
- Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K-ESS2-1)

**ESS3.B: Natural Hazards**
- Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K-ESS3-2)

**ETS1.A: Defining and Delimiting an Engineering Problem**
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (secondary to K-ESS3-2)

### Crosscutting Concepts

**Patterns**
- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1)

**Cause and Effect**
- Events have causes that generate observable patterns. (K-PS3-1), (K-PS3-2), (K-ESS3-2)

**Connections to Engineering, Technology and Applications of Science**
- Interdependence of Science, Engineering, and Technology
  - People depend on various technologies in their lives; human life would be very different without technology. (K-ESS3-2)
- 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. (K-ESS3-2)

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**Connections to other DCS in kindergarten: K.ETS1.A (K-PS3-2), (K-ESS3-2); K.ETS1.B (K-PS3-2)**
### New York State P-12 Science Learning Standards

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<td><strong>KW6</strong> Develop questions and participate in shared research and exploration to answer questions and to build and share knowledge. (K-PS3-1),(K-PS3-2),(K-ESS2-1)</td>
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<td><strong>KSL3</strong> Develop and answer questions to clarify what the speaker says. (K-ESS3-2)</td>
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</tr>
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<td><strong>NY-K.MD.1</strong> Describe measurable attributes of objects, such as length or weight, using appropriate vocabulary. (K-ESS2-1)</td>
</tr>
<tr>
<td><strong>NY-K.MD.2</strong> Directly compare two objects with a common measurable attribute and describe the difference. (K-PS3-1),(K-PS3-2)</td>
</tr>
<tr>
<td><strong>NY-K.MD.3</strong> Classify objects into given categories; count the objects in each category and sort the categories by count. (K-ESS2-1)</td>
</tr>
</tbody>
</table>

*Connection boxes updated as of September 2018*

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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 technological details for how communication devices work.]

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.]

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### 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.*

2. **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).)

3. **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.]

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### 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. (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)

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**Disciplinary Core Ideas**

**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-LS1-3)

**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)

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### Crosscutting Concepts

**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-LS1-2)

**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 derived from the natural world and is built by using materials derived from the natural world. (1-LS1-1)

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### Articulation of DCIs across grade-levels


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### 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-LS1-3)

**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 ones 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 used. (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)

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*Connection boxes updated as of September 2018*
1. Space Systems: Patterns and Cycles

<table>
<thead>
<tr>
<th>Science and Engineering Practices</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
</tr>
</thead>
</table>
| Planning and Carrying Out Investigations | 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) | Patterns  
- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1,1-ESS1-2) |
| Analyzing and Interpreting Data | ESS1.B: Earth and the Solar System  
- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2) | 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) |

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  
**Mathematics** -  
MP.2  
MP.4  
MP.5  
NY-1.OA.1  
NY-1.MD.4

*Connection boxes updated as of September 2018*
2. Structure and Properties of Matter

### 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. (2-PS1-1)

**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. (2-PS1-2)

**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. (2-PS1-3)

**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. (2-PS1-4)

### Disciplinary Core Ideas

#### PS.LA: 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. (2-PS1-1)
- Different properties are suited to different purposes. (2-PS1-2), (2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (2-PS1-3)

#### PS.LB: Chemical Reactions

- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)

### Crosscutting Concepts

- Patterns
  - Events have causes that generate observable patterns. (2-PS1-4)
  - Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)
- Cause and Effect
  - Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)
- Energy and Matter
  - Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)

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**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.

### Articulation of DOK across grade-levels:


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**New York State Next Generation Learning Standards Connections:**

**ELA/Literacy –**

- **2R1** Develop and answer questions to demonstrate an understanding of key ideas and details in a text. (2-PS1-4)
- **2R3** In informational texts, describe the connections among ideas, concepts, or a series of events. (2-PS1-4)
- **2R8** Explain how specific points the author or illustrator makes in a text are supported by relevant reasons. (2-PS1-2), (2-PS1-4)
- **2W1** Write an opinion about a topic or personal experience, using clear reasons and relevant evidence. Please note: Students in 2nd grade should understand the difference between opinions and arguments and begin to learn how to write arguments with claims and supporting reasons. (2-PS1-4)
- **2W6** Develop questions and participate in shared research and explorations to answer questions and to build knowledge. (2-PS1-1), (2-PS1-2), (2-PS1-3)
- **2W7** Recall and represent relevant information from experiences or gather information from provided sources to answer a question. (2-PS1-1), (2-PS1-2), (2-PS1-3)

**Mathematics –**

- **MP.2** Reason abstractly and quantitatively. (2-PS1-2)
- **MP.4** Model with mathematics. (2-PS1-1), (2-PS1-2)
- **MP.5** Use appropriate tools strategically. (2-PS1-2)
- **NY-2.MD.10** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a picture graph or a bar graph. (2-PS1-1), (2-PS1-2)

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*Connection boxes updated as of September 2018*
### New York State P-12 Science Learning Standards

#### 2. Interdependent Relationships in Ecosystems

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.)*

- **2-LS2-2.** Develop a simple model that illustrates how plants and animals depend on each other for survival.* *(Clarification Statement: Examples could include animals dispersing seeds or pollinating plants, and plants providing food, shelter, and other materials for animals.)*

- **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.)*

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<table>
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<tr>
<th>Science and Engineering Practices</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
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<tbody>
<tr>
<td><strong>Developing and Using Models</strong></td>
<td><strong>LS2.A: Interdependent Relationships in Ecosystems</strong></td>
<td></td>
</tr>
<tr>
<td>Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diagramatic, or storyboard) that represent concrete events or design solutions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Develop a simple model based on evidence to represent a proposed object or tool. <em>(2-LS2-1)</em></td>
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<tr>
<td><strong>Planning and Carrying Out Investigations</strong></td>
<td></td>
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</tr>
<tr>
<td>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.</td>
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</tr>
<tr>
<td>• Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. <em>(2-LS2-1)</em></td>
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<tr>
<td>• Make observations (firsthand or from media) to collect data that can be used to make comparisons. <em>(2-LS4-1)</em></td>
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<tr>
<td><strong>Scientific Knowledge is Based on Empirical Evidence</strong></td>
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<tr>
<td>Scientists look for patterns and order when making observations about the world. <em>(2-LS5-1)</em></td>
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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. *(2-LS5-1)*

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**Crosscutting Concepts**

- **Cause and Effect**
  - Events have causes that generate observable patterns. *(2-LS2-1)*
- **Structure and Function**
  - The shape and stability of structures of natural and designed objects are related to their function(s). *(2-LS2-1)*
- **Patterns**
  - Similarities and differences in patterns can be used to sort and classify organisms. *(2-LS4-1)*

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New York State Next Generation Learning Standards Connections:

**ELA/Literacy**

- **2W6** Develop questions and participate in shared research and explorations to answer questions and to build knowledge. *(2-LS2-1),(2-LS4-1)*
- **2W7** Recall and represent relevant information from experiences or gather information from provided sources to answer a question. *(2-LS2-1),(2-LS4-1)*
- **2SL5** Include digital media and/or visual displays in presentations to clarify or support ideas, thoughts, and feelings. *(2-LS2-1)*

**Mathematics**

- **MP.2** Reason abstractly and quantitatively. *(2-LS2-1),(2-LS4-1)*
- **MP.4** Model with mathematics. *(2-LS2-1),(2-LS4-1)*
- **MP.5** Use appropriate tools strategically. *(2-LS2-1)*
- **NY-2.MD.10** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a picture graph or a bar graph. *(2-LS2-1),(2-LS4-1)*

*Connection boxes updated as of September 2018

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2. Earth’s Systems: Processes that Shape the Earth

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 weathering and erosion of rocks, which may occur slowly. [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]

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 for using rocks, shrubs, grass, and trees to hold back wind, water, and land.

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.

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

The performance expectations above were developed using the following elements from the NRC document: A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas.
New York State P-12 Science Learning Standards

K-2. 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.

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.

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.

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Science and Engineering Practices

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<thead>
<tr>
<th>Asking Questions and Defining Problems</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asking questions and defining problems in K-2 builds on prior experiences and progresses to simple descriptive questions.</td>
<td>ETS1.A: Defining and Delimiting Engineering Problems</td>
<td>Structure and Function</td>
</tr>
<tr>
<td>• Ask questions based on observations to find more information about the natural and/or designed world. (K-2-ETS1-1)</td>
<td>• A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)</td>
<td>• The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)</td>
</tr>
<tr>
<td>• Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)</td>
<td>• Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)</td>
<td></td>
</tr>
<tr>
<td>Developing and Using Models</td>
<td>ETS1.B: Developing Possible Solutions</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>• Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)</td>
<td></td>
</tr>
<tr>
<td>• Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)</td>
<td>ETS1.C: Optimizing the Design Solution</td>
<td></td>
</tr>
<tr>
<td>Analyzing and Interpreting Data</td>
<td>• Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)</td>
<td></td>
</tr>
<tr>
<td>Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</td>
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<tr>
<td>• Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)</td>
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</tbody>
</table>

Connections to K-2-ETS1.A: Defining and Delimiting Engineering Problems include:

Kindergarten: K-PS2-2, K-ESS3-2

Connections to K-2-ETS1.B: Developing Possible Solutions to Problems include:

Kindergarten: K-ESS3-2, First Grade: 1-PS4-4, Second Grade: 2-LS2-2

Connections to K-2-ETS1.C: Optimizing the Design Solution include:

Second Grade: 2-ESS2-1

Articulation of DCIs across grade-bands: 3-5.ETS1.A (K-2-ETS1-1), (K-2-ETS1-2), (K-2-ETS1-3); 3-5.ETS1.B (K-2-ETS1-2), (K-2-ETS1-3); 3-5.ETS1.C (K-2-ETS1-2), (K-2-ETS1-3)

New York State Next Generation Learning Standards Connections:

ELA/Literacy –

2R1. Develop and answer to demonstrate understanding of key ideas and details in a text. (K-2-ETS1-1)

2W7. Recall and represent information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1), (K-2-ETS1-3)

2SL5. Include digital media and/or visual displays in presentations to clarify ideas, thoughts, and feelings. (K-2-ETS1-2)

Mathematics –

MP.2. Reason abstractly and quantitatively. (K-2-ETS1-1), (K-2-ETS1-3)

MP.4. Model with mathematics. (K-2-ETS1-1), (K-2-ETS1-3)

MP.5. Use appropriate tools strategically. (K-2-ETS1-1), (K-2-ETS1-3)

NY-2.MD.10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-2), (K-2-ETS1-3)

*Connection boxes updated as of September 2018

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