

DRAFT - New York State P-12 Science Learning Standards – DRAFT

2. Structure and Properties of Matter

Students who demonstrate understanding can:

- 2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.** [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]
- 2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*** [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]
- 2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.** [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]
- 2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.** [Clarification Statement: An example of a reversible change could include freezing and melting. An example of an irreversible change could include cooking an egg.]

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
<p>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.</p> <ul style="list-style-type: none"> Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1) <p>Analyzing and Interpreting Data Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</p> <ul style="list-style-type: none"> Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2) <p>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.</p> <ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) <p>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).</p> <ul style="list-style-type: none"> Construct an argument with evidence to support a claim. (2-PS1-4) <p style="text-align: center;">-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>-----</p> <p>Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena</p> <ul style="list-style-type: none"> Scientists search for cause and effect relationships to explain natural events. (2-PS1-4) 	<p>PS1.A: Structure and Properties of Matter</p> <ul style="list-style-type: none"> 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) <p>PS1.B: Chemical Reactions</p> <ul style="list-style-type: none"> 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) 	<p>Patterns</p> <ul style="list-style-type: none"> Patterns in the natural and human designed world can be observed. (2-PS1-1) <p>Cause and Effect</p> <ul style="list-style-type: none"> 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) <p>Energy and Matter</p> <ul style="list-style-type: none"> Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3) <p style="text-align: center;">-----</p> <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>-----</p> <p>Influence of Engineering, Technology, and Science on Society and the Natural World</p> <ul style="list-style-type: none"> Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (2-PS1-2)

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels: **4.ESS2.A** (2-PS1-3); **5.PS1.A** (2-PS1-1),(2-PS1-2),(2-PS1-3); **5.PS1.B** (2-PS1-4); **5.LS2.A** (2-PS1-3)

Common Core State Standards Connections:

ELA/Literacy –

- RI.1.1** Ask and answer such questions as *who, what, where, when, why,* and *how* to demonstrate understanding of key details in a text. (2-PS1-4)
- RI.2.3** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-PS1-4)
- RI.2.8** Describe how reasons support specific points the author makes in a text. (2-PS1-2),(2-PS1-4)
- W.2.1** Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., *because, and, also*) to connect opinion and reasons, and provide a concluding statement or section. (2-PS1-4)
- W.2.7** Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-1),(2-PS1-2),(2-PS1-3)
- W.2.8** Recall 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)
- 2.MD.D.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. (2-PS1-1),(2-PS1-2)

*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).

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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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Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models 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.</p> <ul style="list-style-type: none"> ▪ Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2) <p>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.</p> <ul style="list-style-type: none"> ▪ Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1) ▪ Make observations (firsthand or from media) to collect data that can be used to make comparisons. (2-LS4-1) <p style="text-align: center;">-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> ▪ Scientists look for patterns and order when making observations about the world. (2-LS4-1) 	<p>LS2.A: Interdependent Relationships in Ecosystems</p> <ul style="list-style-type: none"> ▪ Animals depend on plants or other animals for food. (2-LS2-2) ▪ (NYSED) Plants depend on water, light and air to grow. (2-LS2-1) ▪ (NYSED) Some plants depend on animals for pollination and for dispersal of seeds from one location to another. (2-LS2-2) <p>LS4.D: Biodiversity and Humans</p> <ul style="list-style-type: none"> ▪ There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> ▪ (NYSED) Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas to other people (<i>secondary to 2-LS2-2</i>) 	<p>Cause and Effect</p> <ul style="list-style-type: none"> ▪ Events have causes that generate observable patterns. (2-LS2-1) <p>Structure and Function</p> <ul style="list-style-type: none"> ▪ The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2) <p>Patterns</p> <ul style="list-style-type: none"> ▪ Similarities and differences in patterns can be used to sort and classify organisms. (2-LS4-1)
<p><i>Connections to other DCIs in second grade: N/A</i></p> <p><i>Articulation of DCIs across grade-levels: K.LS1.C (2-LS2-1); K.ESS3.A (2-LS2-1); K.ETS1.A (2-LS2-2); 3.LS4.C (2-LS4-1); 3.LS4.D (2-LS4-1); 5.LS1.C (2-LS2-1); 5.LS2.A (2-LS2-2); (2-LS4-1)</i></p> <p><i>Common Core State Standards Connections:</i></p> <p><i>ELA/Literacy –</i></p> <p>W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1),(2-LS4-1)</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1),(2-LS4-1)</p> <p>SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-LS2-2)</p> <p><i>Mathematics –</i></p> <p>MP.2 Reason abstractly and quantitatively. (2-LS2-1),(2-LS4-1)</p> <p>MP.4 Model with mathematics. (2-LS2-1),(2-LS2-2),(2-LS4-1)</p> <p>MP.5 Use appropriate tools strategically. (2-LS2-1)</p> <p>2.MD.D.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. (2-LS2-2),(2-LS4-1)</p>		

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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*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models 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.</p> <ul style="list-style-type: none"> ▪ Develop a model to represent patterns in the natural world. (2-ESS2-2) <p>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.</p> <ul style="list-style-type: none"> ▪ Make observations from several sources to construct an evidence-based account for natural phenomena. (2-ESS1-1) ▪ Compare multiple solutions to a problem. (2-ESS2-1) <p>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.</p> <ul style="list-style-type: none"> ▪ Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3) 	<p>ESS1.C: The History of Planet Earth</p> <ul style="list-style-type: none"> ▪ Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1) <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> ▪ Wind and water can change the shape of the land. (2-ESS2-1) <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"> ▪ Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) ▪ <p>ESS2.C: The Roles of Water in Earth's Surface Processes</p> <ul style="list-style-type: none"> ▪ Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3) <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> ▪ Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2-ESS2-1) 	<p>Patterns</p> <ul style="list-style-type: none"> ▪ Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3) <p>Stability and Change</p> <ul style="list-style-type: none"> ▪ Things may change slowly or rapidly. (2-ESS1-1),(2-ESS2-1) <hr style="border-top: 1px dashed black;"/> <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <hr style="border-top: 1px dashed black;"/> <p>Influence of Engineering, Technology, and Science on Society and the Natural World</p> <ul style="list-style-type: none"> ▪ Developing and using technology has impacts on the natural world. (2-ESS2-1) <hr style="border-top: 1px dashed black;"/> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <hr style="border-top: 1px dashed black;"/> <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> ▪ Scientists study the natural and material world. (2-ESS2-1)
<p><i>Connections to other DCIs in second grade: 2.PS1.A (2-ESS2-3)</i></p> <p><i>Articulation of DCIs across grade-levels: K.ETS1.A (2-ESS2-1); 3.LS2.C (2-ESS1-1); 4.ESS1.C (2-ESS1-1); 4.ESS2.A (2-ESS1-1),(2-ESS2-1); 4.ESS2.B (2-ESS2-2); 4.ETS1.A (2-ESS2-1); 4.ETS1.B (2-ESS2-1); 4.ETS1.C (2-ESS2-1); 5.ESS2.A (2-ESS2-1); 5.ESS2.C (2-ESS2-2),(2-ESS2-3)</i></p>		
<p><i>Common Core State Standards Connections:</i></p> <p><i>ELA/Literacy –</i></p> <p>RI.2.1 Ask and answer such questions as <i>who, what, where, when, why,</i> and <i>how</i> to demonstrate understanding of key details in a text. (2-ESS1-1)</p> <p>RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1),(2-ESS2-1)</p> <p>RI.2.9 Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1)</p> <p>W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1),(2-ESS2-3)</p> <p>W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)</p> <p>W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1),(2-ESS2-3)</p> <p>SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)</p> <p>SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)</p> <p><i>Mathematics –</i></p> <p>MP.2 Reason abstractly and quantitatively. (2-ESS2-1),(2-ESS2-1),(2-ESS2-2)</p> <p>MP.4 Model with mathematics. (2-ESS1-1),(2-ESS2-1),(2-ESS2-2)</p> <p>MP.5 Use appropriate tools strategically. (2-ESS2-1)</p> <p>2.NBT.A Understand place value. (2-ESS1-1)</p> <p>2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2)</p> <p>2.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. (2-ESS2-1)</p>		

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