PISCATAWAY
TOWNSHIP SCHOOLS

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Science 2

Content Area: Science
Grade Span: 2
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COURSE OVERVIEW

Description

The performance expectations in second grade help students formulate answers to questions such as: “How does land change and what are some things that cause it to change? What are the different kinds of land and bodies of water? How are materials similar and different from one another, and how do the properties of the materials relate to their use? What do plants need to grow? How many types of living things live in a place?” Students are expected to develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students are also expected to compare the diversity of life in different habitats. An understanding of observable properties of materials is developed by students at this level through analysis and classification of different materials. Students are able to apply their understanding of the idea that wind and water can change the shape of the land to compare design solutions to slow or prevent such change. Students are able to use information and models to identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth. The crosscutting concepts of patterns; cause and effect; energy and matter; structure and function; stability and change; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

Goals

This course aims to: ● develop student ability in asking questions based on observations ● develop student use of models as scientific explanation ● enable students to plan and conduct investigations ● develop student ability to analyze and interpret data ● advance student ability to construct explanations and design solutions clearly and effectively ● allow students to obtain, evaluate, and communicate information ● allow students opportunities to demonstrate understanding of the core ideas within this course ● engage students in engineering practices including design and evaluation

Scope and Sequence

Unit	Topic	Length
1: Work of Water	Erosion and Earth’s Surface	14-16 days
2: Material Magic	Properties and Phases of Matter	17-20 days
3: Animal Adventures	Animal Biodiversity	13-15 days
4: Plant Adventures	Plant Adaptations	14-16 days

Resources

Mystery Science resources and materials

UNIT 1: WORK OF WATER

Summary and Rationale

This unit helps students develop the idea that water is a powerful force that reshapes the Earth's surface. Students see that water isn't just something we drink. It carries sand to create beaches, carves out canyons and valleys and, as ice, scrapes entire areas flat. The crosscutting concept of *patterns* is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in developing and using models and obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Recommended Pacing

14-16 days

State Standards (Performance Expectations)

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 erosion of rocks, which occurs slowly.
Boundary Statement	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. *Integrates Engineering Design Performance Expectations*	
Clarification Statement	Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.
2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.	
Boundary Statement	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.	
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.	

Instructional Focus

Unit Enduring Understandings (Crosscutting Concepts)

- **Patterns:** Patterns in the natural world can be observed. (2-ESS2-2), (2-ESS2-3)
- **Stability and Change:** Things may change slowly or rapidly. (2-ESS1-1), (2-ESS2-1)
- **Structure and Function:** The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)
- **Engineering, Technology, and Applications of Science:** Developing and using technology has impacts on the natural world. (2-ESS2-1)

- **The Nature of Science:** Scientists study the natural and material world. (2-ESS2-1)

Unit Essential Questions

- If you floated down a river, where would you end up?
- Why is there sand at the beach?
- What's strong enough to make a canyon?
- How can you stop a landslide?

Objectives

Students will know (DCIs):

- **The History of Planet Earth**
  - Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.
- **Earth Materials and Systems**
  - Wind and water can change the shape of the land.
- **Plate Tectonics and Large-Scale System Interactions**
  - Maps show where things are located. One can map the shapes and kinds of land and water in any area.
- **The Roles of Water in Earth's Surface Processes**
  - Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.

Students will be able to (Science and Engineering Practices):

- Develop a model to represent patterns in the natural world. (2-ESS2-2)
- 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)
- 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)

Resources

Mystery Science Unit: Work of Water resources and materials

Interdisciplinary Connections

Connections to NJSLS - English Language Arts

• RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1)

• 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)

• RI.2.9 Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1)

• 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)

• 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)

• W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1), (2-ESS2-3)

• 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)

• 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)

Connections to NJSLS - Mathematics

- MP.2 Reason abstractly and quantitatively. (2-ESS1-1), (2-ESS2-1), (2-ESS2-2)
- MP.4 Model with mathematics. (2-ESS1-1), (2-ESS2-1), (2-ESS2-2)
- MP.5 Use appropriate tools strategically. (2-ESS2-1)
- 2.NBT.A Understand place value. (2-ESS1-1)
- 2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2)
- 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)

UNIT 2: MATERIAL MAGIC

Summary and Rationale

This unit develops the idea that by taking advantage of the properties of materials, we can solve many problems in our lives. Students will develop an appreciation for the manmade materials of everyday objects, and learn to recognize that those materials are chose based on their properties. Through hands-on investigation, students will explore the material properties involved in meeting basic needs (such as clothing and cooking). They'll consider the solid and liquid states of matter to understand why plastic was invented. The unit ends with a brainstorming activity about futuristic inventions that might be possible using new materials. The crosscutting concepts of patterns, cause and effect, and energy and matter are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, constructing explanations, designing solutions, and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Recommended Pacing

17-20 days

State Standards (Performance Expectations)

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. *Integrates Engineering Design Performance Expectations*	
Clarification Statement	Examples of properties could include strength, flexibility, hardness, texture, and absorbency.
Boundary Statement	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	Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.
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.	

Instructional Focus

Unit Enduring Understandings (Crosscutting Concepts)

- **Patterns:** Patterns in the natural and human designed world can be observed. (2-PS1-1)
- **Cause and Effect:**
  - Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)
  - Events have causes that generate observable patterns. (2-PS1-4)
- **Structure and Function:** The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)
- **Engineering, Technology, and Applications of Science:** Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (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)

Unit Essential Questions

- Can you really fry an egg on a hot sidewalk?
- Why are so many toys made out of plastic?
- What materials might be invented in the future?
- Can you build a house out of paper?

Objectives

Students will know (DCIs):

- **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.
  - Different properties are suited to different purposes.
  - A great variety of objects can be built up from a small set of pieces.
- **Chemical Reactions**
  - Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.

Students will be able to (Science and Engineering Practices):

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1)
- Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2),
- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3)
- Construct an argument with evidence to support a claim. (2-PS1-4)
- Scientists search for cause and effect relationships to explain natural events. (2-PS1-4)

Resources

Mystery Science Unit: Material Magic resources and materials

Interdisciplinary Connections

Connections to NJSLS - English Language Arts

• RI.2.1 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)

Connections to NJSLS - 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)

UNIT 3: ANIMAL ADVENTURES

Summary and Rationale

This unit helps students develop a sense of wonder for biodiversity: the sheer range and variety of animals found on Earth. Students gain practical experience in identifying animals and sorting them into scientific groups, and apply their knowledge in an engineering design challenge. This unit introduces two critically important concepts in biology: "habitat" and "species," foundational concepts which will be revisited and refined at higher grade levels. The crosscutting concept of structure and function is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in making observations, and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Recommended Pacing

13-15 days

State Standards (Performance Expectations)

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.
Boundary Statement	Assessment does not include specific animal and plant names in specific habitats.

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.

Instructional Focus

Unit Enduring Understandings (Crosscutting Concepts)

- **Structure and Function:** The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)
- **The Nature of Science:** Scientists look for patterns and order when making observations about the world. (2-LS4-1)

Unit Essential Questions

- How many different kinds of animals are there?
- Why do frogs say "ribbit"?
- How could you get more birds to visit a bird feeder?

Objectives

Students will know (DCIs):

- **Biodiversity and Humans**
  - There are many different kinds of living things in any area, and they exist in different places on land and in water.

Students will be able to (Science and Engineering Practices):

- Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1)

Resources

Mystery Science Unit: Animal Adventures resources and materials

Interdisciplinary Connections

Connections to NJSLS - English Language Arts

• 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-LS4-1)

• W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS4-1)

Connections to NJSLS - Mathematics

• MP.2 Reason abstractly and quantitatively. (2-LS4-1)

• MP.4 Model with mathematics. (2-LS4-1)

• 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-LS4-1)

UNIT 4: PLANT ADVENTURES

Summary and Rationale

This unit develops the idea that plants are truly alive and face challenges every bit as dramatic as those of animals. Students will learn that plants have needs, and will reason from evidence to understand how plants meet their needs. The crosscutting concept of cause and effect is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in planning and carrying out investigations and developing and using models. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Recommended Pacing

14-16 days

State Standards (Performance Expectations)

2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.

Boundary Statement	Assessment is limited to testing one variable at a time.

2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

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.
Boundary Statement	Assessment does not include specific animal and plant names in specific habitats.

Instructional Focus

Unit Enduring Understandings (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 functions. (2-LS2-2)
- **The Nature of Science:** Scientists look for patterns and order when making observations about the world. (2-LS4-1)

Unit Essential Questions

- How can a tree travel halfway around the world?
- Could a plant survive without light?
- Why do trees grow so tall?
- Should you water a cactus?
- Where do plants grow best?

Objectives

Students will know (DCIs):

- **Interdepended Relationships in Ecosystems**
  - Plants depend on water and light to grow.
  - Plants depend on animals for pollination or to move their seeds around.
- **Biodiversity and Humans**
  - There are many different kinds of living things in any area, and they exist in different places on land and in water.

Students will be able to (Science and Engineering Practices):

- Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)
- 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 which can be used to make comparisons. (2-LS4-1)

Resources

Mystery Science Unit: Plant Adventures resources and materials

Interdisciplinary Connections

Connections to NJSLS - English Language Arts

• 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)

• W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1), (2-LS4-1)

• 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)

Connections to NJSLS - Mathematics

• MP.2 Reason abstractly and quantitatively. (2-LS2-1), (2-LS4-1)

• MP.4 Model with mathematics. (2-LS2-1), (2-LS2-2), (2-LS4-1)

• MP.5 Use appropriate tools strategically. (2-LS2-1)

• 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-LS2-2), (2-LS4-1)