

Fairfield Public Schools Science Curriculum

Grade 2



FAIRFIELD
PUBLIC SCHOOLS

Grade 2: Description

The elementary science standards are driven by questions to spark curiosity, guide instruction, deepen investigation into phenomena, acquire rigorous content knowledge and enable students to transfer the knowledge of ideas in real-world situations and to design and find solutions to problems. In the performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the disciplinary core ideas in earth science, life science and physical science. The standards define what students should know about the most essential ideas in the major science disciplines. Cross-cutting concepts provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. These standards also tie together the influence of engineering, technology, and science on society and the natural world.

There are three physical science disciplinary core ideas in grade two: 1) Matter and its Interactions, 2) Motion and Stability: Forces and Interactions, 3) Energy. There are two life science disciplinary core ideas: 1) From Molecules to Organisms: Structures and Processes, 2) Ecosystems: Interactions, Energy, and dynamics. And, there are three earth science disciplinary core ideas: 1) Earth's Place in the Universe, 2) Earth's Systems, 3) Earth and Human Activity.

The second grade science performance expectations require that students examine patterns, cause and effect relationships, the structure of matter, and how things can change quickly or slowly over time. Students are expected to observe, ask questions, investigate, and use evidence to describe and classify different materials based on the properties of matter. Students generate questions and design simple tests to gather evidence to support or refute ideas about which materials could be used for a particular purpose. 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 and the interdependence of plants and animals. Students are expected to investigate phenomenon and identify patterns in the natural world as observed through the interactions of land and water. This includes some events that happen quickly such as earthquakes and volcanoes and events that occur over a much longer time period such as erosion. Students are expected to use this information to develop models of land and bodies of water and design solutions to slow the forces (wind and water) that reshape the Earth.

NGSS Standards

SCIENCE AND ENGINEERING PRACTICES (SEP):

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)

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 story board) that represent concrete events or design solutions. Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena Science searches for cause and effect relationships to explain natural events. (2-PS1-4)

CROSS-CUTTING CONCEPTS (CCC):

Patterns

- Patterns in the natural and human designed world can be observed. (2-PS1-1)

Cause and Effect

- 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)

Energy and Matter

- Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)

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)

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. (2-PS1-2)

Grade 2: Overview

Essential Understandings

- Materials have similar and different properties that can be classified and relate to their use.
- We can look for patterns in events to find and to identify or predict causes.
- There is a diversity of life in a given area that is interdependent.
- Events have causes that generate observable patterns created by wind and water which shapes the land, and Earth events can occur quickly or slowly, over a time period much longer than one can observe.
- Pollinators are important to natural systems
- The parts of pollinators have important functions in pollination.
- Testing solutions helps to determine which solution is best
-

Course Essential Questions

- How are materials similar and different from one another?
- 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 and how do they depend on each other?
- How does land change over time and what are some things that cause it to change?
- How can we design a solution to slow or prevent some of these changes?
- How can we use our knowledge of pollination and the Engineering Design process to design and improve a hand pollinator?

Grade 2: Year-at-a Glance

Unit	Title	Unit Essential Questions
1	Properties & Behaviors of Matter	<ul style="list-style-type: none">• How are materials similar and different from one another?• How do the properties of the materials relate to their use?
2	Ecosystems	<ul style="list-style-type: none">• What do plants need to grow?• How many types of living things live in a place and how do they depend on each other?

3	Earth's Systems	<ul style="list-style-type: none"> • How does land change over time and what are some things that cause it to change? • How can we design a solution to slow or prevent some of these changes?
4	Pollinator Design	<ul style="list-style-type: none"> • How can we use our knowledge of pollination and the Engineering Design process to design and improve a hand pollinator for a model flower?

Unit 1: Properties & Behaviors of Matter

Overview

The Properties & Behaviors of Matter Unit is organized around two core ideas. One focuses on the structure and properties of matter and one relates to its potential for chemical changes. Students will learn different kinds of matter exist as either solid or liquid, depending on temperature. Matter can be described through observations which could include color, texture, hardness, and flexibility and classified by its observable properties which could include strength, flexibility, hardness, texture, and absorbency. Also, different properties are best suited to different purposes and a great variety of objects can be built up from a small set of pieces. Examples of pieces could include blocks, building bricks, or other assorted small objects. In addition, heating or cooling a substance may cause observable changes which may be reversible such as melting and freezing or irreversible such as burning fuel or baking a cake.

Unit Performance Expectations

At the conclusion of this unit, students will be able to:

2-PS1-1. Describe and classify different materials by their observable properties

2-PS1-2. Analyze data to determine which materials have the properties that are best suited for a given purpose

2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be assembled and made into a new object

2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot

Unit Essential Questions

- How are materials similar and different from one another?
- How do the properties of the materials relate to their use?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

PS1.A. 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)

PS1.B. 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)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence

Connections to Nature of Science

- Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

CROSS-CUTTING CONCEPTS (CCC):

Patterns

- Cause and Effect
- Energy and Matter

Connections to Engineering, Technology, and Applications of Science

- Influence of Engineering, Technology, and Science, on Society and the Natural World

Corresponding Connecticut Core Standards:

ELA/Literacy —

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)

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 2: Ecosystems

Overview

The Ecosystems Unit is organized around two main standards. The first standard focuses on performance expectations that relate to the interactions, energy, and dynamics within ecosystems. Students will develop an understanding of what plants need to grow limited to one variable at a time and how plants depend on animals for seed dispersal and pollination. The second standard focuses on performance expectations that relate to the diversity of organisms. Students will compare the diversity of life in different habitats.

Unit Performance Expectations

At the conclusion of this unit, students will be able to:

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

2-LS4-1. Make observations of plants and compare the diversity of life in different habitats.

Unit Essential Questions

- What do plants need to grow?
- How many types of living things live in a place and how do they depend on each other?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on water and light to grow. (2-LS2-1)
- Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

LS4.D: 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. (2-LS4-1)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- Developing and Using Models
- Planning and Carrying Out Investigations
- Connections to Nature of Science
- Scientific Knowledge is Based on Empirical Evidence

CROSS-CUTTING CONCEPTS (CCC):

- Cause and Effect
- Structure and Function

Corresponding Connecticut Core Standards:

ELA/Literacy –

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)

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. (2-LS2-2),(2-LS4-1)

Unit 3: Earth's Systems

Overview

The Earth's Systems Unit is organized around two main standards. The first standard focuses on a performance expectation that relates to how events on Earth may change slowly or rapidly. Students will learn that events happen over a time period much longer than one can observe. Examples of events and timescales could include volcanic explosions which happen quickly and erosion of rocks which occurs slowly. The second standard focuses on performance expectations that relate to patterns within Earth's systems. Students will apply their understanding of the idea that wind and water can change the shape of the land and will compare design solutions to slow or prevent such change. Also, students will use information and models to identify and represent the shapes and kinds of land and bodies of water in an area. In addition, they will research where water is found on earth and that it can be solid or liquid.

Unit Performance Expectations

At the conclusion of this unit, students will be able to:

- 2-ESS1-1.** Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
- 2-ESS2-1.** Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*
- 2-ESS2-2.** Develop a model to represent the shapes and kinds of land and bodies of water in an area.
- 2-ESS2-3.** Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Unit Essential Questions

- How does land change over time and what are some things that cause it to change?
- How can we design a solution to slow or prevent some of these changes?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

ESS1.C: The History of Planet Earth

- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)

ESS2.A: Earth Materials and Systems

- Wind and water can change the shape of the land. (2-ESS2-1)

ESS2.B: 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. (2-ESS2-2)

ESS2.C: 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. (2-ESS2-3)

ETS1.C: Optimizing the Design Solution

- 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)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- Developing and Using Models
- Constructing Explanations and Designing Solutions
- Obtaining, Evaluating, and Communicating Information

CROSS-CUTTING CONCEPTS (CCC):

- Patterns
- Stability and Change

Connections to Engineering, Technology, and Applications of Science

- Influence of Engineering, Technology, and Science on Society and the Natural World

Connections to Nature of Science

- Science Addresses Questions About the Natural and Material World

Corresponding Connecticut Core Standards:

ELA/Literacy –

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)

Mathematics –

MP.2 Reason abstractly and quantitatively. (2-ESS2-1),(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 4: Pollinator Design

Overview

In this unit, students explore and discuss the field of agricultural engineering, the role of insects in pollination, and the technology of hand pollination. Students learn that agricultural engineers utilize insects' anatomies and natural behaviors to produce crops. Students also learn how Integrated Pest Management is used to minimize damage from harmful insects.

Unit Performance Expectations

At the conclusion of this unit, students will be able to:

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

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.

Unit Essential Questions

- How can we use our knowledge of pollination and the Engineering Design process to design and improve a hand pollinator for a model flower?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

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.

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.

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.

ETS1.A: Defining and Delimiting Engineering Problems

A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2- ETS1-1)

Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)

Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

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. (K-2-ETS1-2)

ETS1.C: Optimizing the Design Solution

Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- **Developing and Using Models**
- **Obtaining, Evaluating, and Communicating Information**

CROSS-CUTTING CONCEPTS (CCC):

- **Structure and Function** The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)

Corresponding Connecticut Core Standards:

ELA/Literacy –

RI.2.1 Ask and answer questions such as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (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.2.5 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)