Fairfield Public Schools
Science Curriculum

Grade 3

Grade 3: 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 is one physical science disciplinary core idea in grade three: 1) Motion and Stability: Forces and Interactions. There are four life science disciplinary core ideas: 1) From Molecules to Organisms: Structures and Processes, 2) Ecosystems: Interactions, Energy, and Dynamics Heredity: Inheritance and Variation of Traits, 4) Biological Evolution: Unity and Diversity. And, there are two earth science disciplinary core ideas: 1) Earth's Systems, 2) Earth and Human Activity.

The third grade science performance expectations require that students examine phenomena for patterns, cause and effect relationships, scale, proportion, and quantity and systems and system models. Students compare and contrast the life cycles of different organisms. Students are expected to understand that organisms have different inherited traits, and that the environment can affect the traits that an organism develops. A comparison is made of the types of organisms that lived long ago and their environments which may have been very different from the present. Students construct an explanation using evidence for how variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. Third graders develop an understanding that when the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. Data is organized and used to describe typical weather conditions expected seasonally and in different regions of the world. Students evaluate and make a claim about design solutions that reduce the impacts of weather-related hazards. Evidence is gathered through observation and predictions made based on observed patterns. The effects of equal and unequal forces on the motion of an object, and the cause and effect relationships of electricity or magnetic interactions between two objects not in contact with each other are observed and data recorded. Understanding of magnetic interactions is used to identify a simple design problem that can be solved with magnets.

NGSS Unit Standards

SCIENCE AND ENGINEERING PRACTICES (SEP):

Asking Questions and Defining Problems

Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.

- Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1)
- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)

CROSS-CUTTING CONCEPTS (CCC):

Patterns

- Patterns of change can be used to make predictions. (3-PS2-2)

Cause and Effect

- Cause and effect relationships are routinely identified. (3-PS2-1)
- Cause and effect relationships are routinely identified, tested, and used to explain change. (3-PS2-3)

Grade 3: Overview

Essential Understandings

- Organisms have diverse life cycles yet follow similar patterns.
- When an environment changes, some organisms survive and reproduce by adapting or moving, while others die.
- Organisms' traits can be inherited from parents and are affected by the environment. Some of the differences in traits within the same species can be advantageous for survival in changing environments.
- Typical weather and climate have predictable patterns based on region and season, and data can be gathered and analyzed to identify these patterns which can be used to predict weather. Weather patterns can be used to design solutions for weather hazards.
- Balanced and unbalanced forces have an effect on objects.
- There are observable patterns of forces acting on an object's motion that can be used to make predictions.

Course Essential Questions

- How do organisms vary in their traits and how can the differences in traits within the species help them to survive?
- What happens to organisms when their environment changes and how do their traits help them to survive and reproduce?
- What does the evidence of plants and animals no longer found on Earth tell us about how and when they lived?
- How can seasonal and regional weather patterns be used to make predictions?
- How can humans reduce impacts of hazardous weather events?
- How do equal and unequal forces have an effect on the movement of an object?
- What effects do electricity and magnetism have on the interaction of objects, even when they are not touching?

Grade 3: Year-at-a Glance

Unit	Title	Unit Essential Questions
1	Interdependent Relationships in Ecosystems/ Hereditary	• How do organisms vary in their traits and how can the differences in traits within the species help them to survive? • What does the evidence of plants and animals no longer found on Earth tell us about how and when they lived? • What happens to organisms when their environment changes?
2	Weather and Climate	• What are typical weather conditions for each season and in different regions of the world? • What data is collected and how is it used to predict future weather including weather related hazards? • What are some solutions that can be used to minimize the impact of weather related hazards?
3	Forces and Motions	• How do balanced and unbalanced forces effect the motion of objects? • What effects do electricity and magnetism have on the interaction of objects, even when they are not touching?

Organisms: Life Cycles, Traits and Interdependence

Overview

The third grade life science unit is organized around three main ideas. One is the study of organisms; how they live and grow and the interdependent relationships between them and their environment. Different organisms go through changes during their life, yet follow a similar pattern. For example, a plant life cycle and a butterfly life cycle are diverse yet have commonalities such as birth, growth, reproduction and death. A third idea is that organisms inherit traits from their parents and there is variation in traits within a group of similar organisms. Certain traits can be influenced by the environment. For instance, normally tall plants may be stunted by a drought. Also, inherited traits may provide advantages for survival, finding mates and reproducing. Examples could be that plants with larger thorns would be less likely to be eaten by predators and animals with better camouflage may be more likely to survive and leave offspring.

Unit Performance Expectations

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

- **3-LS2-1** Construct an argument that some animals form groups that help members survive.
- **3-LS4-1** Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
- **3-LS4-3** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well and some cannot survive at all.
- **3-LS4-4** Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
- **3-LS1-1** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction and death.
- **3-LS3-1** Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
- **3-LS3-2** Use evidence to support the explanation that traits can be influenced by the environment.
- **3-LS4-2** Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates and reproducing.

Unit Essential Questions

- How do organisms vary in their traits and how can the differences in traits within the species help them to survive?
- What does the evidence of plants and animals no longer found on Earth tell us about how and when they lived?
- What happens to organisms when their environment changes?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.B: Growth and Development of Organisms

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

LS2.D: Social Interactions and Group Behavior

- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (3-LS2-1)

LS3.A: Inheritance of Traits

- Many characteristics of organisms are inherited from their parents. (3-LS3-1)
- Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)

LS3.B: Variation of Traits

- Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)
- The environment also affects the traits that an organism develops. (3-LS3-2)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- Asking Questions and Defining Problems
- Developing and Using Models
- Engaging in Argument from Evidence
- Analyzing and Interpreting Data
- Constructing Explanations and Designing Solutions

CROSS-CUTTING CONCEPTS (CCC):

- Patterns
- Cause and Effect

Corresponding Connecticut Core Standards:
ELA/Literacy –
RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1)
SL.3.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)
Mathematics –
MP.4 Model with mathematics. (3-LS1-1)
3.NBT Number and Operations in Base Ten (3-LS1-1)
3.NF Number and Operations—Fractions (3-LS1-1)
ELA/Literacy –
RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS2-1)
RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS2-1)
W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1)
Mathematics –
MP.4 Model with mathematics. (3-LS2-1)
3.NBT Number and Operations in Base Ten (3-LS2-1)
ELA/Literacy –
RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS3-1),(3-LS3-2)
RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-1),(3-LS3-2)
RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS3-1),(3-LS3-2)
W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-1),(3-LS3-2)
SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS3-1),(3-LS3-2)
Mathematics –
MP.2 Reason abstractly and quantitatively. (3-LS3-1),(3-LS3-2)
MP.4 Model with mathematics. (3-LS3-1),(3-LS3-2)
3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units- whole numbers, halves or quarters. (3-LS3-1),(3-LS3-2)

Weather and Climate

Overview

The grade three unit on weather and climate is focused around three main ideas. The first is that typical weather conditions can be observed seasonally and in different regions of the world, and that climate defines typical weather of a region and its variation over the years. The second idea is that weather and climate conditions can be observed, recorded and represented in pictographs and bar graphs. This data can be used to make weather predictions. The third idea is hazardous weather conditions exist and solutions can be made to minimize their impact.

Unit Performance Expectations

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

- **3-ESS2-1.** Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
- **3-ESS2-2.** Obtain and combine information to describe climates in different regions of the world.
- **3-ESS3-1.** Make a claim about the merit of a design solution that reduces the impacts of a weather related hazard.

Unit Essential Questions

- What are typical weather conditions for each season and in different regions of the world?
- How is data collected and used to predict future weather including weather related hazards?
- What are some solutions that can be used to minimize the impact of weather related hazards?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

ESS2.D: Weather and Climate

- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)

ESS3.B: Natural Hazards

- A variety of natural hazards result from natural processes.
- Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- Analyzing and Interpreting Data
- Obtaining, Evaluating, and Communicating
- Information
- Engaging in Argument from Evidence

CROSS-CUTTING CONCEPTS (CCC):

- Patterns
- Cause and Effect

Corresponding Connecticut Core Standards:
ELA/Literacy –
RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-ESS2-2)
RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2)
W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-ESS2-2)
Mathematics –
MP.2 Reason abstractly and quantitatively. (3-ESS2-1),(3-ESS2-2)
MP.4 Model with mathematics. (3-ESS2-1),(3-ESS2-2)
MP.5 Use appropriate tools strategically. (3-ESS2-1)
3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-ESS2-1)
3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in bar graphs. (3-ESS2-1)
Common Core State Standards Connections:
ELA/Literacy –
W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-ESS3-1)
W.3.7 Conduct short research projects that build knowledge about a topic. (3-ESS3-1)
Mathematics –
MP.2 Reason abstractly and quantitatively. (3-ESS3-1)
MP.4 Model with mathematics. (3-ESS3-1)

Forces and Motions

Overview

The third grade unit on forces and motion is organized around two main ideas. The first idea is that balanced and unbalanced forces affect the motion of an object. For example, a force on one side of a ball can make it start moving while balanced forces pushing on a box from opposite sides will not produce any motion at all. The second idea is that electric or magnetic forces can cause interactions between two objects not in contact with each other. For instance, the force on hair from an electrically charged balloon or the force between an electromagnet and steel paper clips. Information gained in the unit will be used to identify a simple problem involving magnetic interactions and design a solution that can be solved with magnets.

Unit Performance Expectations

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

- **3-PS2-1.** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- **3-PS2- 2.** Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
- **3- PS2-3.** Ask questions to determine cause and effect relationships of electrical or magnetic interactions between two objects not in contact with each other.
- **3-PS2-4.** Identify a simple problem and design a solution that can be solved by applying scientific ideas about magnets.

Unit Essential Questions

- How do equal and unequal forces affect the motion of objects?
- What effects do electricity and magnetism have on the interaction of objects, even when they are not touching?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

PS2.A: Forces and Motion

- Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) (3-PS2-1)
- The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2)

PS2.B: Types of Interactions

Objects in contact exert forces on each other. (3-PS2-1) Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- Asking Questions and Defining Problems
- Planning and Carrying Out Investigations

CROSS-CUTTING CONCEPTS (CCC):

- Patterns
- Cause and Effect

Corresponding Connecticut Core Standards:

ELA/Literacy –

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-PS2-1),(3-PS2-3)

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-PS2-3)

RI.3.8 Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence). (3-PS2-3)

W.3.7 Conduct short research projects that build knowledge about a topic. (3-PS2-1),(3-PS2-2)

W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-PS2-1),(3-PS2-2)

SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail. (3-PS2-3)

Mathematics –

MP.2 Reason abstractly and quantitatively. (3-PS2-1)

MP.5 Use appropriate tools strategically. (3-PS2-1)

3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem (3-PS2-1)