Milford Public Schools Curriculum

Department: SCIENCE
Course Name: Grade 3 Science
Course Description:

The performance expectations in third grade help students formulate answers to questions such as: "What is typical weather in different parts of the world and during different times of the year? How can the impact of weather-related hazards be reduced? How do organisms vary in their traits? How are plants, animals, and environments of the past similar or different from current plants, animals, and environments? What happens to organisms when their environment changes? How do equal and unequal forces on an object affect the object? How can magnets be used?"
The crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. In the third grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems; developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and 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 core ideas.

UNIT 1 – Weather and Climate	
In this unit, students will learn to organize and use data to describe typical weather conditions expected during a particular season. By applying their understanding of weather-related hazards, students will be able to make a claim about the merit of a design solution that reduces the impacts of such hazards.	
LEARNING GOALS	
Enduring Understanding(s): Weather is the minute-by-minute and day-to-day variation of the atmosphere on a local scale. Climate describes the ranges on an area's typical weather conditions over time. Weather can be predicted based upon our understandings of patterns.	**Essential Question(s):** How can patterns be used to describe and explain the weather and help us make predictions for the future?
Content and Skills: ● What is weather? ● How do we measure weather? ● The purpose of weather forecasting ● What influences climate? ● Preparing and responding to severe weather	

Performance Expectations:
Students will be able to:

Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (3-ESS2-1) [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]

Obtain and combine information to describe climates in different regions of the world. (3-ESS2-2)

Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. (3-ESS3-1) [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]

Standards Addressed:

NGSS Scientific and Engineering Practices
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Obtaining, Evaluating, and Communicating Information
Engaging in Argument from Evidence

NGSS Disciplinary Core Ideas

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.
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.

ESS2.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.

NGSS Crosscutting Concepts
Patterns
Cause and Effect

Common Core State Standards Connections:
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.3.9 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)

Performance Task(s):

Students will collect and analyze weather data over time from direct local observations and the National Weather Service forecasts to determine patterns and construct an argument regarding validity of weather forecasts to determine patterns.

Students will create a postcard that describes life in a different climate than their own.

Students will work in partnerships to create trifolds describing a specific type of extreme weather and how to prepare for the outcome of that type of extreme weather.

Students will work in small groups to design a waterproof roof "Waterproof that Roof" activity.

UNIT 2 – Survival of Living Things

In this unit, students are expected to develop an understanding of the similarities and differences of organisms' life cycles. Students will discover that organisms have different inherited traits, and that the environment can also affect the traits that an organism develops. In addition, students will be able to construct an explanation using evidence for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. Students are expected to develop an understanding of types of organisms that lived long ago and also about the nature of their environments. Third graders are expected to develop an understanding of the idea that when the environment changes some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. These environmental changes can lead to changes in the types of organisms that live on Earth over time.

LEARNING GOALS

Enduring Understanding(s):	**Essential Question(s):**
All living things have a life cycle and change throughout their lifetimes. Organisms of the same kind differ in their individual characteristics or traits. Living things interact with their environments. Life on Earth has changed over time and will continue to change in the future.	Why do living things look and act the way they do? Why are living things so different yet alike? How does our habitat affect the way we live? Why are there so many different types of living things?

Content and Skills:

- Reproduction is vital to living things
- All plants and animals have life cycles

- Characteristics (traits) of living things [body structures and behaviors]
- Offspring are a mix of traits from their parents
- The environment can affect the traits of living things
- Needs of living things for survival/Living things and their habitats (the relationship between what they need and where they live)
- Changes in the environment affects the survival of living things
- Group behavior of some living things aid in survival
- Fossil evidence for changes in living things over time on Earth
- Some individuals of the same species are more successful (survive, have more offspring) than others
- Changes in the environment can be helpful or harmful to living things
- Different living things in the same environment can have different needs for survival and thus changes in the environment might affect them differently

Performance Expectations:
Students will be able to:

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. [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]

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. [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]

3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]

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. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]

3-LS2-1. Construct an argument that some animals form groups that help members survive.

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. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]

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.* [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]

Standards Addressed:

NGSS Scientific and Engineering Practices
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Developing and Using Models
Engaging in Argument from Evidence

NGSS Disciplinary Core Ideas

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.

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)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.

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

LS4.A: Evidence of Common Ancestry and Diversity

- Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: moved from K-2) (3-LS4-1)
- Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)

LS4.B: Natural Selection

- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

LS4.C: Adaptation

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

LS4.D: Biodiversity and Humans

- Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

NGSS Crosscutting Concepts
Patterns
Cause and Effect
Systems and System Models
Scale, Proportion, and Quantity

Common Core State Standards Connections:
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)
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-LS1-1)
3.NBT Number and Operations in Base Ten (3-LS1-1)
3.NF Number and Operations—Fractions (3-LS1-1)

Performance Tasks(s):

Students will obtain and communicate the advantages of animals living in groups

Students will investigate plant growth under varying environmental conditions (sunlight, water, soil) in order to collect data and determine how environmental conditions affect the growth, while testing a hypothesis.

Students will analyze and interpret data in order to draw conclusions regarding how environmental conditions affect traits of an organism.

Students will engage in an argument where they defend why animals living in groups are better able to survive. Students will formulate evidence based on their own understanding of the reading on this same topic.

Students will design, test, and evaluate a solution to clean up an oil spill in a model river.

UNIT 3 – Forces and Interactions: Magnetism

In this unit, students will discover the effects of balanced and unbalanced forces on the motion of an object and the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. They will then able to apply their understanding of magnetic interactions to define a simple design problem that can be solved with magnets.

LEARNING GOALS

Enduring Understanding(s):	**Essential Question(s):**

Motion is characterized by change in position and is caused by a push or pull (force) on an object**.**	How and why do objects move?

Content and Skills:

- Forces have both strength and direction
- Objects in contact exert forces on each other
- Observing patterns of motion in order to predict future motion
- Some forces do not require contact (magnetic, electric, gravitational)
- Investigating sizes of magnetic forces

Performance Expectations:
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. [Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.]

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. [Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.] [Assessment Boundary: Assessment does not include technical terms such as period and frequency.]

3-PS2-3. Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. [Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.] [Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.]

3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets.* [Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]

Standards Addressed:

NGSS Scientific and Engineering Practices

Asking Questions and Defining Problems
Planning and Carrying Out Investigations

Developing and Using Models
Analyzing and Interpreting Data
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence

NGSS Disciplinary Core Ideas

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)

NGSS Crosscutting Concepts

Patterns

Cause and Effect

Common Core State Standards Connections:

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)

Performance Tasks(s)

Students will plan and conduct an investigation to move a cotton ball through an obstacle course blowing through a straw

Students will construct a pendulum, make observations and measurements of the motion of the pendulum, and then use the data to make a prediction about future motion

Students will investigate the magnetic pull of a bar magnet at varying distances with the use of paper clips

Students will design a plan to move an object without physical or wind force.