



PISCATAWAY TOWNSHIP SCHOOLS

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Science K

Content Area: Science
Grade Span: Kindergarten
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COURSE OVERVIEW

Description		
<p>The performance expectations in kindergarten help students formulate answers to questions such as: “What happens if you push or pull an object harder? What is the weather like today and how is it different from yesterday? Where do plants and animals live and why do they live there? How do people impact the environment as they gather and use what they need to live and grow?” Students are expected to develop understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object. The idea that patterns and variations in local weather and the use of weather forecasting to prepare for and respond to severe weather can be understood by students at this level through ongoing observational practices to identify patterns. Students are also expected to develop understanding of what plants and animals need to survive and the relationship between their needs and where they live. Students compare and contrast what plants and animals need to survive and the relationship between the needs of living things and where they live. Students are able to discuss what humans need to survive and their relationship with the environment and natural resources. The crosscutting concepts of patterns; cause and effect; and the nature of are called out as organizing concepts for these disciplinary core ideas.</p>		
Goals		
<p>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 observational 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.</p>		
Scope and Sequence		
Unit	Topic	Length
1: Force Olympics	Forces, Machines, and Engineering	10-15 days
2: Weather Watching	Weather and Seasons	10-15 days
3: Plant and Animal Secrets	Plant and Animal Needs	10-15 days
Resources		
Mystery Science resources and materials		

UNIT 1: FORCE OLYMPICS

Summary and Rationale	
<p>This unit will help students develop their first concept of “force,” and the idea that by playing with forces and thinking about them, we can accomplish surprisingly big things. The crosscutting concept of cause and effect is called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations and analyzing and interpreting data. Students are also expected to use these practices to demonstrate understanding of the core ideas.</p>	
Recommended Pacing	
10-15 days	
State Standards (Performance Expectations)	
<p>K-PS2-1: Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.</p>	
Clarification Statement	Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.
Boundary Statement	Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.
<p>K-PS2-2: Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.</p>	
Clarification Statement	Examples of problems requiring solutions could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.
Boundary Statement	Assessment does not include friction as a mechanism for change in speed.
<p>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.</p>	
<p>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.</p>	
Instructional Focus	
Unit Enduring Understandings (Crosscutting Concepts)	
<ul style="list-style-type: none"> • Cause and Effect: Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2-1), (K-PS2-2) • 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 use different ways to study the world. (K-PS2-1) 	
Unit Essential Questions	
<ul style="list-style-type: none"> • Why do builders need so many big machines? • How can you knock down a wall made of concrete? 	

- How can we protect a mountain town from falling rocks?

Objectives

Students will know (DCIs):

- **Forces and Motion**
 - Pushes and pulls can have different strengths and directions.
 - Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- **Types of Interactions**
 - When objects touch or collide, they push on one another and can change motion.
- **Relationship Between Energy and Forces**
 - A bigger push or pull makes things speed up or slow down more quickly.

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

- With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1)
- Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2), (K-2-ETS1-3)
- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Resources

Mystery Science Unit: Force Olympics resources and materials

Interdisciplinary Connections

Connections to NJSLS – English Language Arts

- RI.K.1 With prompting and support, ask and answer questions about key details in a text. (K-PS2-2)
- W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-PS2-1)
- SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-PS2-2)

Connections to NJSLS – Mathematics

- MP.2 Reason abstractly and quantitatively. (K-PS2-1)
- K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-PS2-1)
- K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of/less of” the attribute, and describe the difference. (K-PS2-1)

UNIT 2: WEATHER WATCHING

Summary and Rationale	
<p>This unit will help students develop the habit of becoming weather watchers who take pleasure in noticing weather patterns and predicting changes. The crosscutting concept of patterns is called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in analyzing and interpreting data and asking questions. Students are also expected to use these practices to demonstrate understanding of the core ideas.</p>	
Recommended Pacing	
10-15 days	
State Standards (Performance Expectations)	
K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time.	
Clarification Statement	Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.
Boundary Statement	Assessment of quantitative observations is limited to whole numbers and relative measures such as warmer/cooler.
K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.	
Clarification Statement	Emphasis is on local forms of severe weather.
K-PS3-1: Make observations to determine the effect of sunlight on Earth’s surface.	
Clarification Statement	Examples of Earth’s surface could include sand, soil, rocks, and water.
Boundary Statement	Assessment of temperature is limited to relative measures such as warmer/cooler.
K-PS3-2: Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.	
Clarification Statement	Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.
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)	
<ul style="list-style-type: none"> • Patterns: Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1) • Cause and Effect: Events have causes that generate observable patterns. (K-ESS3-2), (K-PS3-1), (K-PS3-2) • 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. (K-ESS2-1)
- Scientists use different ways to study the world. (K-PS3-1)
- **Engineering, Technology, and Applications of Science:**
- People encounter questions about the natural world every day. (K-ESS3-2)
- People depend on various technologies in their lives; human life would be very different without technology. (K-ESS3-2)

Unit Essential Questions

- How can you get ready for a big storm?
- What will the weather be like on your birthday?
- How do you know what to wear for the weather?
- How could you warm up a frozen playground?
- How could you walk barefoot across hot pavement without burning your feet?

Objectives

Students will know (DCIs):

- **Weather and Climate**
 - Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time.
- **Natural Hazards**
 - Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events.
- **Conservation of Energy and Energy Transfer**
 - Sunlight warms Earth’s surface.

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

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1), (K-PS3-1)
- Ask questions based on observations to find more information about the designed world. (K-ESS3-2)
- Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K-PS3-2)
- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)
- Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

Resources

Mystery Science Unit: Weather Watching resources and materials

Interdisciplinary Connections

Connections to NJSLS – English Language Arts

- RI.K.1 With prompting and support, ask and answer questions about key details in a text. (K-ESS3-2)
- W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-ESS2-1), (K-PS3-1), (K-PS3-2)
- SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-ESS3-2)

Connections to NJSLS – Mathematics

- MP.2 Reason abstractly and quantitatively. (K-ESS2-1)
- MP.4 Model with mathematics. (K-ESS2-1)
- K.CC.A Know number names and the count sequence. (K-ESS2-1)
- K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-ESS2-1)
- K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of/less of” the attribute, and describe the difference. (K-PS3-1), (K-PS3-2)
- K.MD.B.3 Classify objects into given categories; count the number of objects in each category and sort the categories by count. (K-ESS2-1)

UNIT 3: PLANT AND ANIMAL SECRETS

Summary and Rationale	
<p>Animals and plants need things to survive, and their lives are all about meeting those needs. It’s the secret to why they do the many strange and wonderful things they do! Knowing how they meet their needs can even help you find plants and animals near where you live. The crosscutting concepts of patterns and systems and system models are called out as an organizing concept for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in analyzing and interpreting data and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas.</p>	
Recommended Pacing	
10-15 days	
State Standards (Performance Expectations)	
K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.	
Clarification Statement	Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.
K-ESS2-2: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.	
Clarification Statement	Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.
K-ESS3-1: Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.	
Clarification Statement	Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight, so they often grow in meadows. Plants, animals, and their surroundings make up a system.
K-ESS3-3: Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment.	
Clarification Statement	Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.
Instructional Focus	
Unit Enduring Understandings (Crosscutting Concepts)	
<ul style="list-style-type: none"> • Patterns: Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1) • Cause and Effect: Events have causes that generate observable patterns. (K-ESS3-3) • Systems and System Models: Systems in the natural and designed world have parts that work together. (K-ESS2-2), (K-ESS3-1) • The Nature of Science: Scientists look for patterns and order when making observations about the world. (K-LS1-1) 	
Unit Essential Questions	

- Where do animals live?
- How can you find animals in the woods?
- How do animals make their home in the forest?
- How do plants and trees grow?
- Why would you want an old log in your backyard?

Objectives

Students will know (DCIs):

- **Organization for Matter and Energy Flow in Organisms**
 - All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.
- **Biogeology**
 - Plants and animals can change their environment.
- **Human Impacts on Earth Systems**
 - Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.
- **Natural Resources**
 - Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

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

- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)
- Construct an argument with evidence to support a claim. (K-ESS2-2)
- Use a model to represent relationships in the natural world. (K-ESS3-1)
- Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)

Resources

Mystery Science Unit: *Plant and Animal Secrets* resources and materials.

Interdisciplinary Connections

Connections to NJSL – English Language Arts

- RL.K.1 With prompting and support, ask and answer questions about key details in a text (e.g., who, what, where, when, why, how). (K-ESS2-2)
- W.K.1 Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book. (K-ESS2-2)
- W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS2-2), (K-ESS3-3)
- W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS-1)
- SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-ESS3-2)
- SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS3-1)

Connections to NJSL – Mathematics

- MP.2 Reason abstractly and quantitatively. (K-ESS3-1)

- MP.4 Model with mathematics. (K-ESS3-1)
- K.CC Know number names and the count sequence. (K-ESS3-1)
- K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of/less of” the attribute, and describe the difference. (K-LS-1)