



# PISCATAWAY TOWNSHIP SCHOOLS

**Dr. Frank Ranelli**  
Superintendent of Schools

**Dr. William Baskerville**  
Assistant Superintendent for  
Curriculum and Instruction

## Science 1

**Content Area:** Science  
**Grade Span:** 1  
**Revised by:** Jeffrey Celebre  
**Presented by:** Jeffrey Celebre  
K-8 Supervisor of Science, World Language,  
and Engineering  
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**Piscataway Township Schools**

1515 Stelton Road  
Piscataway, NJ 08854-1332  
732 572-2289, ext. 2561  
Fax 732 572-1540  
[www.piscatawayschools.org](http://www.piscatawayschools.org)

## COURSE OVERVIEW

Description		
<p>The performance expectations in first grade help students formulate answers to questions such as: “What happens when materials vibrate? What happens when there is no light? What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different? What objects are in the sky and how do they seem to move?” Students are expected to develop understanding of the relationship between sound and vibrating materials as well as between the availability of light and ability to see objects. The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of light. Students are also expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how behaviors of parents and offspring help the offspring survive. The understanding is developed that young plants and animals are like, but not exactly the same as, their parents. Students are able to observe, describe, and predict some patterns of the movement of objects in the sky. The crosscutting concepts of patterns; cause and effect; structure and function; and influence of engineering, technology, and science on society and the natural world 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: Spinning Sky	Sun, Moon, and Stars	10-15 days
2: Plant and Animal Superpowers	Plant and Animal Structures and Survival	10-15 days
3: Lights and Sounds	Properties of Light and Sound	10-15 days
Resources		
Mystery Science resources and materials		

## UNIT 1: SPINNING SKY

Summary and Rationale	
This unit will help students develop the idea that the Sun, Moon, and stars change position in the sky in ways that are fun to watch and predict. 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 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.	
Recommended Pacing	
10-15 days	
State Standards (Performance Expectations)	
<b>1-ESS1-1: Use observations of the sun, moon, and stars to describe patterns that can be predicted.</b>	
Clarification Statement	Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.
Boundary Statement	Assessment of star patterns is limited to stars being seen at night and not during the day.
<b>1-ESS1-2: Make observations at different times of the year to relate the amount of daylight to the time of year.</b>	
Clarification Statement	Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.
Boundary Statement	Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.
Instructional Focus	
Unit Enduring Understandings (Crosscutting Concepts)	
<ul style="list-style-type: none"> <li>• <b>Patterns:</b> Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1), (1-ESS1-2)</li> <li>• <b>The Nature of Science:</b> <ul style="list-style-type: none"> <li>• Science assumes natural events happen today as they happened in the past. (1-ESS1-1)</li> <li>• Many events are repeated. (1-ESS1-1)</li> </ul> </li> </ul>	
Unit Essential Questions	
<ul style="list-style-type: none"> <li>• Could a statue's shadow move?</li> <li>• What does your shadow do when you're not looking?</li> <li>• How can the sun help you if you're lost?</li> <li>• Why do the stars come out at night?</li> <li>• How can stars help you if you get lost?</li> </ul>	
Objectives	
<b>Students will know (DCIs):</b> <ul style="list-style-type: none"> <li>• <b>The Universe and its Stars</b> <ul style="list-style-type: none"> <li>• Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.</li> </ul> </li> <li>• <b>Earth and the Solar System</b> <ul style="list-style-type: none"> <li>• Seasonal patterns of sunrise and sunset can be observed, described, and predicted.</li> </ul> </li> </ul>	

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

- Make observations (firsthand or from media) to collect data that can be used to make comparisons (1-ESS1-2).
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions (1-ESS1-1).

**Resources**

Mystery Science Unit: Stormy Skies resources and materials

**Interdisciplinary Connections**

*Connections to NJSLS – English Language Arts*

- W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-ESS1-1), (1-ESS1-2)
- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1), (1-ESS1-2)

*Connections to NJSLS – Mathematics*

- MP.2 Reason abstractly and quantitatively. (1-ESS1-2)
- MP.4 Model with mathematics. (1-ESS1-2)
- MP.5 Use appropriate tools strategically. (1-ESS1-2)
- 1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2)
- 1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)

## UNIT 2: PLANT AND ANIMAL SUPERPOWERS

Summary and Rationale	
This unit will help students develop the idea that, like a superhero has special powers, every animal and plant has special parts and behaviors that help them to grow and meet their needs. The crosscutting concepts of patterns and structure and function are called out as organizing concepts for the disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in obtaining, evaluating, and communicating information, constructing explanations, designing solutions, and in developing and using models. Students are also expected to use these practices to demonstrate understanding of the core ideas.	
Recommended Pacing	
10-15 days	
State Standards (Performance Expectations)	
<b>1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. *Integrates Engineering Design Performance Expectations*</b>	
Clarification Statement	Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears
<b>1-LS1-2: Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.</b>	
Clarification Statement	Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).
<b>1-LS3-1: Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.</b>	
Clarification Statement	Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.
Boundary Statement	Assessment does not include inheritance or animals that undergo metamorphosis or hybrids
<b>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.</b>	
<b>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.</b>	
Instructional Focus	
Unit Enduring Understandings (Crosscutting Concepts)	
<ul style="list-style-type: none"> <li><b>Patterns:</b> Patterns in the natural world can be observed, used to describe phenomena, and used as evidence (1-LS1-2), (1-LS3-1).</li> </ul>	

<ul style="list-style-type: none"> <li>• <b>Structure and Function:</b> The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1), (K-2-ETS1-2)</li> <li>• <b>Engineering, Technology, and Applications of Science:</b> Every human-made product is designed by applying some knowledge of the natural world and is built by using materials derived from the natural world. (1-LS1-1)</li> </ul>
<b>Unit Essential Questions</b>
<ul style="list-style-type: none"> <li>• Why do birds have beaks?</li> <li>• How do baby ducks follow their mother?</li> <li>• Why are polar bears white?</li> <li>• Why do family members look alike?</li> <li>• Why don't trees blow down in the wind?</li> </ul>
<b>Objectives</b>
<p><b>Students will know (DCIs):</b></p> <ul style="list-style-type: none"> <li>• <b>Structure and Function</b> <ul style="list-style-type: none"> <li>• 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.</li> </ul> </li> <li>• <b>Growth and Development of Organisms</b> <ul style="list-style-type: none"> <li>• 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.</li> </ul> </li> <li>• <b>Information Processing</b> <ul style="list-style-type: none"> <li>• 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.</li> </ul> </li> <li>• <b>Inheritance of Traits</b> <ul style="list-style-type: none"> <li>• Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents.</li> </ul> </li> <li>• <b>Variation of Traits</b> <ul style="list-style-type: none"> <li>• Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.</li> </ul> </li> </ul> <p><b>Students will be able to (Science and Engineering Practices):</b></p> <ul style="list-style-type: none"> <li>• Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)</li> <li>• Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena (1-LS3-1).</li> <li>• Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world (1-LS1-2).</li> </ul>
<b>Resources</b>
Mystery Science Unit: Plant and Animal Superpowers resources and materials
<b>Interdisciplinary Connections</b>
<p><i>Connections to NJSL – English Language Arts</i></p> <ul style="list-style-type: none"> <li>• RL.1.1 Ask and answer questions about key details in a text. (1-LS1-2), (1-LS3-1)</li> <li>• RL.1.2 Identify the main topic and retell key details of a text. (1-LS1-2)</li> <li>• RL.1.10 With prompting and support, read and comprehend stories and poetry at grade level text complexity or above. (1-LS1-2)</li> <li>• W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a</li> </ul>

given topic and use them to write a sequence of instructions). (1-LS1-1), (1-LS3-1)

- W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)

*Connections to NJSL – Mathematics*

- MP.2 Reason abstractly and quantitatively. (1-LS3-1)
- MP.5 Use appropriate tools strategically. (1-LS3-1)
- 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)
- 1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols  $>$ ,  $=$ , and  $<$ . (1-LS1-2)
- 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1-LS1-2)
- 1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. (1-LS1-2)
- 1.NBT.C.6 Subtract multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (1-LS1-2)

## UNIT 3: LIGHTS AND SOUND

Summary and Rationale	
This unit will develop the idea that by exploring the properties of light and sound, human beings create fun and useful things. The crosscutting concepts of cause and effect and structure and function are called out as organizing concepts for the disciplinary core ideas. Students are expected to demonstrate grade appropriate proficiency in planning and carrying out investigations, constructing explanations, designing solutions and developing and using models. Students are also expected to use these practices to demonstrate understanding of the core ideas.	
Recommended Pacing	
10-15 days	
State Standards (Performance Expectations)	
<b>1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.</b>	
Clarification Statement	Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.
<b>1-PS4-2: Make observations to construct an evidence-based account that objects can be seen only when illuminated.</b>	
Clarification Statement	Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.
<b>1-PS4-3: Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.</b>	
Clarification Statement	Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).
Boundary Statement	Assessment Boundary: Assessment does not include the speed of light.
<b>1-PS4-4: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. *Integrates Engineering Design Performance Expectations*</b>	
Clarification Statement	Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.
Boundary Statement	Assessment does not include technological details for how communication devices work.
<b>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.</b>	
Instructional Focus	
Unit Enduring Understandings (Crosscutting Concepts)	
<ul style="list-style-type: none"> <li><b>Cause and Effect:</b> Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1), (1-PS4-2), (1-PS4-3)</li> </ul>	



<ul style="list-style-type: none"> <li>• <b>Structure and Function:</b> The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)</li> <li>• <b>Engineering, Technology, and Applications of Science:</b> People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)</li> </ul>
<b>Unit Essential Questions</b>
<ul style="list-style-type: none"> <li>• Where do sounds come from?</li> <li>• What if there were no windows?</li> <li>• Can you see in the dark?</li> <li>• How could you send a secret message to someone far away?</li> <li>• How do boats find their way in the fog?</li> </ul>
<b>Objectives</b>
<p><b>Students will know (DCIs):</b></p> <ul style="list-style-type: none"> <li>• <b>Wave Properties</b> <ul style="list-style-type: none"> <li>• Sound can make matter vibrate, and vibrating matter can make sound.</li> </ul> </li> <li>• <b>Electromagnetic Radiation</b> <ul style="list-style-type: none"> <li>• Objects can be seen if light is available to illuminate them or if they give off their own light.</li> <li>• Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light).</li> </ul> </li> <li>• <b>Information Technologies and Instrumentation</b> <ul style="list-style-type: none"> <li>• People also use a variety of devices to communicate (send and receive information) over long distances.</li> </ul> </li> </ul> <p><b>Students will be able to (Science and Engineering Practices):</b></p> <ul style="list-style-type: none"> <li>• Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1), (1-PS4-3)</li> <li>• Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2)</li> <li>• Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4)</li> </ul>
<b>Resources</b>
Mystery Science Unit: Lights and Sounds resources and materials
<b>Interdisciplinary Connections</b>
<p><i>Connections to NJSL – English Language Arts</i></p> <ul style="list-style-type: none"> <li>• W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-PS4-2)</li> <li>• W.1.7 Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions). (1-PS4-1), (1-PS4-2), (1-PS4-3), (1-PS4-4)</li> <li>• W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1), (1-PS4-2), (1-PS4-3)</li> <li>• SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-1), (1-PS4-2), (1-PS4-3)</li> </ul> <p><i>Connections to NJSL – Mathematics</i></p>

- MP.5 Use appropriate tools strategically. (1-PS4-4)
- 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4)
- 1.MD.A.2 Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. (1-PS4-4)