

**MOORESTOWN TOWNSHIP PUBLIC SCHOOLS
MOORESTOWN, NEW JERSEY**

*Upper Elementary School
Science Department*

Grade 4 Science

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Course Description and Fundamental Concepts

Science in fourth grade helps students formulate answers to questions such as: “What are waves and what are some things they can do? How can water, ice, wind, and vegetation change the land? What patterns of Earth’s features can be determined with the use of maps? How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals? What is energy and how is it related to motion? How is energy transferred? How can energy be used to solve the problem?”

- Students are able to use a model of waves to describe patterns of waves in terms of amplitude and wavelength, and that waves can cause objects to move.
- Students are expected to develop an understanding of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- They apply their knowledge of natural Earth processes to generate and compare multiple solutions to reduce the impacts of such processes on humans.
- In order to describe patterns of Earth’s features, students analyze and interpret data from maps.
- Develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- By developing a model, they describe that an object can be seen when light reflected from its surface enters the eye.
- Students are able to use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object.
- Students are expected to develop an understanding that energy can be transferred from place to place by sound, light, heat, and electric currents or from object to object through collisions.
- They apply their understanding of energy to design, test, and refine a device that converts energy from one form to another.

The crosscutting concepts of patterns; cause and effect; energy and matter; 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 fourth-grade 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, 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 an understanding of the core ideas.

[New Jersey Student Learning Standards \(NJSLs\)](#)

Subject/Content Standards

Include grade-appropriate subject/content standards that will be addressed

Standard #	Standard Description
Energy 4-PS3-1.	Use evidence to construct an explanation relating the speed of an object to the energy of that object. [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.]
4-PS3-2.	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements of energy.]
4-PS3-3.	Ask questions and predict outcomes about the changes in energy that occur when objects collide. [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.]
4-PS3-4.	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.* [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.]
4-ESS3-1	Students who demonstrate understanding can: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from the burning of fossil

<p>Waves 4-PS4-1.</p>	<p style="text-align: center;">Standard Description</p> <p>Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate the wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.]</p>
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<p>4-PS4-3.</p>	<p>Generate and compare multiple solutions that use patterns to transfer information.* [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send a text.]</p>
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<p>Structure, Function, and Information Processing 4-PS4-2.</p> <p>4-LS1-1.</p>	<p>Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]</p> <p>Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]</p>
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<p>4-LS1-2.</p>	<p>Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. [Clarification Statement: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]</p>
<p>Earth's Systems: Processes that Shape the Earth 4-ESS1-1.</p> <p>4-ESS2-1.</p> <p>4-ESS2-2.</p>	<p>Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. [Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of a rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]</p> <p>Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of the wind, the relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]</p> <p>Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]</p>

<p>4-ESS3-2.</p>	<p>Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.* [Clarification Statement: Examples of solutions could include designing an earthquake-resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]</p>
<p>Engineering Standards</p> <p>3-5-ETS1- 1.</p> <p>3-5-ETS1- 2.</p> <p>3-5-ETS1- 3.</p>	<p>Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.</p> <p>Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p> <p>Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>

<p>English Companion Standards</p>		
<p><i>List grade-level appropriate companion standards for History, Social Studies, Science, and Technical Subjects (CTE/Arts) 6-12. English Companion Standards are required in these subject/content areas.</i></p>		
<p>Unit Addressed</p>	<p>Standard #</p>	<p>Standard Description</p>
<p>2,3,4</p>	<p>RI.4.1</p>	<p>Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS3-1)</p>
<p>2</p>	<p>RI.4.3</p>	<p>Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why based on specific information in the text. (4- PS3-1)</p>

3	RI.4.7	Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2)
2,3,4	RI.4.9	Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS3-1)
1,4	SL.4.5	Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2)
1	W.4.1	Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1)
2	W.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4-PS3-1)
2,3	W.4.7	Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2),(4-PS3-3),(4-PS3-4)
2,3	W.4.8	Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-1),(4-PS3-2),(4-PS3-3),(4-PS3-4)
2,3	W.4.9	Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-PS3-1)

21st-Century Skills and Technology Integration (Standard 8)

List appropriate units below for which strands (A through F) will be addressed

Standard 8.1 (K-12)		Educational Technology: <i>All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</i>
Unit Addressed	Strand Letter	Standard Description

Units 1-4	Strand A	Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems, and operations.</i>
Units 1-4	Strand B	Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.</i>
Units 1-4	Strand C	Communication and Collaboration: <i>Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.</i>
Units 1-4	Strand D	Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i>
Units 1-4	Strand E	Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i>
Units 1-4	Strand F	Critical thinking, problem-solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i>
Standard 8.2 (K-5)		Technology Education, Engineering, Design, and Computational Thinking - Programming: <i>All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking, and the designed world as they relate to the individual, global society, and the environment.</i>
Units 1-4	Strand A	The Nature of Technology: Creativity and Innovation: <i>Technology systems impact every aspect of the world in which we live.</i>
Units 1-4	Strand B	Technology and Society: <i>Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.</i>
Units 1-4	Strand C	Design: <i>The design process is a systematic approach to solving problems.</i>
Units 1-4	Strand D	Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i>

Units 1-4	Strand E	Computational Thinking: Programming: <i>Computational thinking builds and enhances problem-solving, allowing students to move beyond using knowledge to creating knowledge.</i>
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Career Ready Practices ([Standard 9](#))

List appropriate units below for which CRPs will be addressed

Unit Addressed	Standard #	Standard Description
Units 1-4	CRP1	<i>Act as a responsible and contributing citizen and employee.</i>
Units 1-4	CRP2	<i>Apply appropriate academic and technical skills.</i>
Units 1	CRP3	<i>Attend to personal health and financial well-being.</i>
Units 1-4	CRP4	<i>Communicate clearly and effectively and with reason.</i>
Units 1,3	CRP5	<i>Consider the environmental, social, and economic impacts of decisions.</i>
Units 1-4	CRP6	<i>Demonstrate creativity and innovation.</i>
Units 1-4	CRP7	<i>Employ valid and reliable research strategies.</i>
Units 1-4	CRP8	<i>Utilize critical thinking to make sense of problems and persevere in solving them.</i>
	CRP9	<i>Model integrity, ethical leadership, and effective management.</i>
	CRP10	<i>Plan education and career paths aligned to personal goals.</i>
Units 1-4	CRP11	<i>Use technology to enhance productivity.</i>
Units 1-4	CRP12	<i>Work productively in teams while using cultural global competence</i>

Interdisciplinary Connections

List any other content standards addressed as well as appropriate units

Visual & Performing Arts Integration ([Standard 1](#))

List appropriate units below for which standards (1.1 through 1.4) may be addressed

Unit Addressed	Standard #	Standard Description
Units 1-4	Standard 1.1	The Creative Process: <i>All students will demonstrate an understanding of the elements and principles that govern the creation of works of art in dance, music, theatre, and/or visual art.</i>

	Standard 1.2	History of the Arts and Culture: <i>All students will understand the role, development, and influence of the arts throughout history and across cultures.</i>
Units 1-4	Standard 1.3	Performing/Presenting/Producing: <i>All students will synthesize those skills, media, methods, and technologies appropriate to creating, performing, and/or presenting works of art in dance, music, theatre, and/or visual art.</i>
	Standard 1.4	Aesthetic Responses & Critique Methodologies: <i>All students will demonstrate and apply an understanding of arts philosophies, judgment, and analysis to works of art in dance, music, theatre, and/or visual art.</i>

Other Interdisciplinary Content Standards

List appropriate units below for any other content/standards that may be addressed

Unit Addressed	Content / Standard #	Standard Description
4	4.G.A.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-1),(4-PS4-4)
1	4.G.A.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)
3	4.MD.A.1	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS1-1)
3	4.MD.A.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1),(4-ESS2-2)
3	MP.2	Reason abstractly and quantitatively. (4-ESS1-1)
3,4	MP.4	Model with mathematics. (4-PS4-1),(4-PS4-2)
3	MP.5	Use appropriate tools strategically. (4-ESS2-1)

3	4.OA.A.1	Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-1),(4-ESS3-2)
2	4.OA.A.3	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (4-PS3-4)

Pacing Guide (All Dates are approximate based on the school calendar)

Unit/ Topic	Month (w/Approx number of Teaching Days)
Unit 1: Plant and Animal Structures	September (~19 days)
Unit 1: Plant and Animal Structures	October (~19 days)
Unit 1: Plant and Animal Structures	November (~16 days)
Unit 2: Energy	December (~15 days)
Unit 2: Energy	January (~18 days)
Unit 2: Energy	February (~18 days)
Unit 3: Earth's Changing Surface	March (~15-20 days)
Unit 3: Earth's Changing Surface	April (~15-20 days)
Unit 4: Waves and Information	May (~18 days)
Unit 4: Waves and Information	June (~15 days)

Units

Contact Content Supervisor for Unit Details.