

Barrington
School District

Haddon Heights
School District

Lawnside
School District

Merchantville
School District



Course Name: Science
Grade: Fourth Grade
Board Approved:

*All curriculum is aligned with the NJSLS in accordance with the Department's curriculum implementation timeline and includes all required components (NJ.A.C.6A:8).

**Resource and activity lists are compiled from all four districts and may not necessarily be reflected in each district or school.

Introduction

New Jersey Student Learning Standards for Science

Michael Heinz, Coordinator

Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions, such as selecting among alternative medical treatments or determining how to invest public funds for water supply options. In addition, understanding science and the extraordinary insights it has produced can be meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering.

Mission: Scientifically literate individuals possess the knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and economic productivity.

Vision: The science standards are designed to help realize a vision for education in the sciences and engineering in which students, over multiple years of school, actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields. The learning experiences provided for students should engage them with fundamental questions about the world and with how scientists have investigated and found answers to those questions. Throughout grades K-12, students should have the opportunity to carry out scientific investigations and engineering design projects related to the disciplinary core ideas (pp. 8-9, NRC, 2012).

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STANDARD:		
<p>4-ESS1: Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.</p> <p>4-ESS2: Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p>		
Unit 1: Weathering and Erosion		
ESTABLISHED GOALS (INDICATOR #)	TRANSFER (How will this apply to their lives?)	
<p>4-ESS1-1- Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.</p> <p>4-ESS2-1- Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p>	<p><i>Students will be able to independently use their knowledge to...</i></p> <ul style="list-style-type: none"> ● Identify patterns in rock formations and fossils in rock layers. ● Provide an explanation for changes in a landscape over time. ● Measure and provide evidence of the effects of weather or the rate of erosion. 	
	MEANING	
	<p>UNDERSTANDINGS:</p> <ul style="list-style-type: none"> ● Cause-and-effect relationships are routinely identified, tested, and used to explain change. ● Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. ● Rainfall helps to shape the land and affects the types of living things found in a region. ● Living things affect the physical characteristics of their regions. ● Science assumes consistent patterns in natural systems. ● Patterns can be used as evidence to support an explanation. ● Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. ● The presence and location of certain fossil types indicate the order in which rock layers were formed. 	<p>ESSENTIAL QUESTIONS:</p> <ul style="list-style-type: none"> ● <i>How can evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation be observed or measured?</i> ● <i>What can rock formations tell us about the past?</i>

Unit 1: Grade 4- Lessons

In this unit of study, students are expected to develop an understanding of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation. As students plan and carry out investigations using models and observe the effects of earth processes in the natural environment, they learn to identify patterns of change; recognize cause-and-effect relationships among the forces that cause change in rocks, soil, and landforms; and construct explanations of changes that occur over time to earth materials.

In the first portion of the unit, fourth graders develop an understanding of cause-and-effect relationships when studying physical weathering and the rate of erosion by water, wind, ice, or vegetation. Students learn that rainfall helps to shape the land and affects the types of living things found in a region, and that living things affect the physical characteristics of a region. Students should make observations of their local environment to observe the types of living things that are common in the region, and they should look for evidence that water, ice, wind, organisms, and gravity have broken down rocks, soils, and sediments into smaller pieces and have moved them from one place to another.

In the classroom, students should build and use models that demonstrate how wind, water, and ice cause change to the surface of the earth. Students should use stream tables, soil, sand, and water to simulate the effects of moving water (rain, rivers) on rocks and soil. Following these types of experiences, students need opportunities to ask questions that will lead to further investigations. They can change a variable—such as the type of earth material (sand, soil, clay, silt), the angle of a hill’s slope, the volume of water flow, the speed of water flow, and the relative rate of deposition—then collect and analyze data in order to determine the effects.

In addition to using models to understand the effects of water and ice on land, students should build and use models to simulate the effects of wind on earth materials. There are a variety of models that can be easily built. Students should have opportunities to change variables, such as the speed or volume of airflow. From these experiences, students should begin to understand that wind, water, and ice cause changes to the earth’s surface, and that the stronger or faster the flow of wind or water, the greater the change it causes.

In this unit, students also need opportunities to observe ways in which plants affect the weathering and erosion of earth materials. Plants can have a variety of effects on rocks, soils, and landforms. Plants often slow or stop the effects of moving wind and water on land. Students can observe this phenomenon using models. As they make observations, students can change variables, such as the amount or type of plant used to slow or stop erosion, and they can collect and analyze data to determine cause-and-effect relationships between the amount of change and the plants used to prevent it. Then students can walk around the schoolyard and nearby neighborhoods to look for examples of plants that are used to prevent erosion.

In addition to slowing or preventing erosion, plants can cause weathering of rocks. Students can easily find examples in their own environment of growing plant and tree roots causing rocks, sidewalks, and driveways to crack and break down into smaller and smaller components. This phenomenon can also be simulated with models in the classroom. Students can soak lima beans in water overnight, then “plant” them in small cups containing a 2–3 cm. layer of wet Plaster of Paris on top of potting soil. (One or two seeds should be placed in the wet layer of plaster.) After a few days, the seeds will germinate and grow, eventually causing the dried plaster to crack. Again, students need opportunities to change variables, such as the number of seeds planted (one seed vs. multiple seeds, for example) and the type of seeds, then make observations and collect data to determine the amount of weathering each change causes to the dried plaster.

In the second portion of this unit, students learn that patterns can be used as evidence to explain changes to the earth’s landforms and rock formations, and that local, regional, and global patterns of rock formations reveal changes over time due to earth forces. If possible, students should make observations of local landforms; however, pictures from books and online sources can give students the opportunity to identify evidence of change from patterns in rock formations

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and fossils in rock layers. Students can support explanations for changes in a landscape over time in multiple ways, including the following:

- ✓ Pictures of a variety of landforms, such as sand dunes and canyons, can be used to show change due to weathering and erosion that have occurred over time.
- ✓ Pictures or diagrams of rock layers with marine shell fossils above rock layers with plant fossils and no shells can be used to indicate a change from land to water over long periods of time.
- ✓ Pictures of a canyon with different rock layers in the walls and a river at the bottom can be used to show that over time a river cut through the rock to form the canyon.

As students collect evidence, either from firsthand observations or from media resources, they should attempt to explain the changes that have occurred over time in each of the landscapes observed.

Mystery Science Suggested Lessons:

[The Birth of Rocks: Rock Cycle and Earth's Processes](#)

Unit Starter: Fossils and Constructing Explanations: [Fossil Finds](#)

Mystery 1: Volcanoes, Rock Cycle and Earth's Surface: [Could a volcano pop up where you live?](#)

Mystery 2: Volcanoes, Rock Cycle and Earth's Surface: [Why do some volcanoes explode?](#)

Mystery 3: Weathering and Destructive Forces: [Will a mountain last forever?](#)

Mystery 4: Erosion, Natural Hazards and Engineering: [How could you survive a landslide?](#)

Better Lesson Suggested Units:

- [The Fossil Mind Map Unfolds](#) *SWBAT develop an organized mind map of facts they have learned about fossils from reading and visual content.*
- [Fun with Fossils](#) *SWBAT build upon prior knowledge to understand how fossils are formed. (will need to purchase fossil samples)*
- [Starting a Mind Map of Fossils](#) *SWBAT build upon prior knowledge of fossils using a "mind map" as a tool for organizing thoughts and facts.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting concepts
Planning and Carrying Out Investigations <ul style="list-style-type: none"> • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1) Constructing Explanations and Designing Solutions . <ul style="list-style-type: none"> • Identify the evidence that supports particular 	ESS2.A: Earth Materials and Systems <ul style="list-style-type: none"> • Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1) ESS2.E: Biogeology	Cause and Effect <ul style="list-style-type: none"> • Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1) Patterns • Patterns can be used as evidence to support an explanation. (4-ESS1-1) Connections to Nature of Science Scientific

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<p>points in an explanation. (4-ESS1-1)</p>	<ul style="list-style-type: none"> • Living things affect the physical characteristics of their regions. (4-ESS2-1) <p>ESS1.C: The History of Planet Earth</p> <ul style="list-style-type: none"> • Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1- 1) 	<p>Knowledge Assumes an Order and Consistency in Natural Systems</p> <ul style="list-style-type: none"> • Science assumes consistent patterns in natural systems. (4-ESS1-1)
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District/School Formative Assessment Plan	District/School Summative Assessment Plan
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<p><i>Students who understand the concepts can:</i></p> <ul style="list-style-type: none"> • Identify, test, and use cause-and-effect relationships in order to explain change. • Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. • Make observations and/or measurements to produce evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. <i>(Note: Assessment is limited to a single form of weathering or erosion.)</i> Examples of variables to test could include: <ul style="list-style-type: none"> ✓ Angle of slope in the downhill movement of water ✓ Amount of vegetation ✓ Speed of the wind ✓ Relative rate of deposition ✓ Cycles of freezing and thawing of water ✓ Cycles of heating and cooling ✓ Volume of water flow <p>Students who understand the concepts can:</p> <ul style="list-style-type: none"> • Support explanations using patterns as evidence. • Identify the evidence that supports particular points in an explanation. • Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. (Note: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.) 	<p><i>Summative assessment is an opportunity for students to demonstrate mastery of the skills taught during a particular unit.</i></p> <p>Mystery Science Assessments: <i>(all resources are accessible on google drive)</i> The Birth of Rocks: Rock Cycle and Earth's Processes</p>
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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.

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.

The Birth of Rocks: Rock Cycle and Earth's Processes:

[Mystery 1: Volcanoes, Rock Cycle and Earth's Surface](#)

[Mystery 2: Volcanoes, Rock Cycle and Earth's Surface](#)

[Mystery 3: Weathering and Destructive Forces](#)

[Mystery 4: Erosion, Natural Hazards and Engineering](#)

Alternative Assessments

Evaluative Criteria

Assessment Evidence

Suggested Performance Rubric: Use the following or similar rubric to evaluate students' performance on lesson assessments:

4 - Innovating:	Advanced understanding and application of the standard
3 - Applying:	Consistently applies skills independently
2 - Developing:	Progressing towards independent application of skills
1 - Beginning:	Early stages of development, need assistance

Suggested Performance Tasks include, but are not limited to:

Performance Task: Mystery Science- Rocks & Earth's Surface
[Story of a Rock](#)

Resources for Performance Task:
[Story of a Rock Worksheet](#)
[Story of a Rock Rubric](#)
[Story of a Rock Answer Key](#)

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District/School Texts		District/School Supplementary Resources
<p>Haddon Heights - Unit Kits for Science Labs and References</p> <p>Lawnside - Houghton Mifflin Harcourt : Science Fusion</p> <p>Merchantville- Exploring Science (National Geographic Learning)</p>		<p>-Scholastic News</p> <p>-Brain POP</p> <p>-NewsELA</p> <p>-Read Works</p>
<u>Interdisciplinary Connections</u>		
<p>ELA</p> <p>W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS1-1)</p> <p>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-ESS2-1),(4-ESS1-1)</p> <p>W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS1-1)</p>	<p>Math</p> <p>Reason abstractly and quantitatively. (4-ESS2-1), (4-ESS1-1)</p> <p>MP.2 Model with mathematics. (4-ESS2-1), (4-ESS1-1)</p> <p>MP.4 Use appropriate tools strategically. (4-ESS2-1)</p> <p>MP.5 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-ESS2-1), (4-ESS1-1) MD.A.1</p> <p>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.MD.A.2</p>	<p>21st Century Skills/Career Education</p> <p>CRP2. Apply appropriate academic and technical skills.</p> <p>CRP4. Communicate clearly and effectively and with reason</p> <p>CRP11. Use technology to enhance productivity.</p>
<p>Technology</p> <p>8.1.5.A.2 - Format a document using a word processing application to enhance text and</p>		

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include graphics, symbols and/ or pictures. (Google Slides / multimedia presentation)		
Modifications and Accommodations		
<p>Special Education Students</p> <p>Small group Direct instruction restate/rephrase graphic organizers modified assignments chunking leveled text intentional grouping read text extended time breaks Teacher records/ student dictates</p>	<p>English Language Learners</p> <p>Labels word banks visuals student friendly definitions extended time chunking intentional grouping</p>	<p>Students at Risk of School Failure</p> <p>leveled text graphic organizers modified assignments kinesthetic activities restate/rephrase chunking intentional grouping</p>
<p>Gifted and Talented</p> <p>extension project leveled text leadership roles intentional grouping Targeted learning from assessment</p>	<p>Students with 504 Plans</p> <p>breaks chunking preferential seating visual reminders restate/rephrase check-in/check-out system visual time Teacher records/ student dictates</p>	
Unit Duration: 10 days		