

FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Guide Grade 4

Subject: Science	Grade Level: 4
Unit: Structure, Function, And Information Processing	Pacing: 2 months
Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ● What is light? ● What other forms of electromagnetic radiation are there? ● How do the structures of organisms enable life's functions? ● How do organisms detect, process, and use information about the environment? 	<p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> ●An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2) (SL. 4.5) (MP 4) (4.G.A.1) <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> ●Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) (W.4.1) (4.G.A.3) <p>LS1.D: Information Processing</p> <ul style="list-style-type: none"> ●Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2) (SL.4.5) <p>Cause and Effect</p> <ul style="list-style-type: none"> ●Cause and effect relationships are routinely identified. (4-PS4-2) <p>Systems and System Models</p> <ul style="list-style-type: none"> ●A system can be described in terms of its components and their interactions. (4-LS1-1), (4-LS1-2)
NJSL-S Standards	Classroom Applications
<p>4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p> <ul style="list-style-type: none"> ● Assessment does not include knowledge of specific colors 	<p>Objectives:</p> <p>Develop a model or diagram to illustrate how light reflects on objects and enters the eye. (4-PS4-2) (SL. 4.5) (MP 4) (4.G.A.1)</p> <ul style="list-style-type: none"> ● Identify how light travels in a straight line ● Explain light reflection, absorption and bending ● Evaluate how light interacts with various surfaces

reflected and seen, the cellular mechanisms of vision, or how the retina works.

4-LS1-1.

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.

4-LS1-2.

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

Describe how animals receive, process, and respond to different types of information (4-LS1-2) (SL.4.5)

- Interpret instinctive and learned behavior
- Investigate the 5 senses
- Analyze the role of each of the 5 senses

Explain that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (4-LS1-1) (W.4.1) (4.G.A.3)

- Identify basic parts of both plants and animals
- Identify the basic needs of both plants and animals
- Classify needs based on the reactions of the 5 senses
- Construct an argument for the similarities and differences between plants and animals behavior

Teaching Strategies/Materials:

Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure

Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects

Materials: Mentor Texts, DVDs, Internet, Technology (Smart Board, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations

Differentiation Strategies/Modifications

information or the mechanisms of how sensory receptors function.

SWD/ Students at risk of failure: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework
Gifted/Enrichment: computer-based research, high level task, class presentation
ELL: vocabulary support

Connections to other content areas, including 21st Century Skills:

ELA/Literacy -

W.4.1 - Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

SL.4.5 - Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

Mathematics -

MP.4 - Model with mathematics.

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. 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.

21st Century Skills –

9.2.4..1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4. A.2 Identify various life roles and civic and work- related activities in the school, home, and community.

9.2.4.3 Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.

9.2.4. A.4 - Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

Unit Resources:

Pearson Realize Interactive Science for Fourth Grade, Chapter 4: Plants and Animals (Lesson 1: How are plants and animals classified? Lesson 2: How do plants reproduce? Lesson 3: How do plants make food? Lesson 4: What are adaptations?)

Lesson 5: What plant and animal characteristics are inherited? Lesson 6: How do animals respond to their environment?)
Chapter 1: Energy & Heat (Lesson 3:What is light energy?)

Hands-on & Virtual Labs
STEM Quest PBL

Websites:

- PBS Learning Media
- The Concord Consortium
- cK-12.org
- eGFI
- Earth Science Week
- Education Place

Unit Assessment Opportunities:

- Journal Entries, Response Sheets, Writing Pieces
- Observations, Questioning, and Discussions
- Comprehension Checks in Literature
- Class Webs
- Presentations
- Collaboration
- Projects
- Rubrics (<http://www.nextgenscience.org/resources>)
- Unit Test
- Lesson Check
- Lesson Quiz
- Performance Expectations Activities
- Chapter Test

Subject: Science	Grade Level: 4
Unit: Waves	Pacing: 2 months
Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> • What are the characteristic properties and behaviors of waves? • How are instruments that transmit and detect waves used to extend human senses? • How are engineering, technology, science, and society interconnected? 	<p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> •Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (Note: This grade band endpoint was moved from K–2.) (4-PS4-1) (SL.4.5) (MP. 4) •Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1) (SL.4.5) (MP. 4) <p>PS4.C: Information Technologies and Instrumentation</p> <ul style="list-style-type: none"> •Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3) (RI. 4.1) RI. 4.9) <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> •Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3) <p>Patterns</p> <ul style="list-style-type: none"> •Similarities and differences in patterns can be used to sort, classify, and analyze simple rates of change for natural phenomena. (4-PS4-1) •Similarities and differences in patterns can be used to sort and classify designed products. (4-PS4-3) <p>Interdependence of Science, Engineering, and Technology</p> <ul style="list-style-type: none"> •Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4-3)
NJSL-S Standards	Classroom Applications
4-PS4-1	Objectives:

Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

- Examples of models could include diagrams, analogies, and physical models using wire to illustrate 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.

4-PS4-3

Generate and compare multiple solutions that use patterns to transfer information.

- 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 text.

Develop a model or diagram to illustrate patterns in waves and that waves can cause objects to move. (4-PS4-1) (SL.4.5) (MP. 4)

- Waves are regular patterns of motion caused by a disturbance.
- In longitudinal waves, particles move in the same or opposite direction of the wave.
- In transverse waves, particles move up or down as the wave moves right or left.

Generate and compare multiple solutions that use patterns to transfer information. (4-PS4-3) (RI. 4.1) RI. 4.9)

- In order for us to see, light must reflect off of objects.
- We see colors when they are reflected and other colors are absorbed. When we see white, we are seeing all the colors reflected. When we see black, all the colors were absorbed.
- A plane mirror reflects light at the same angle it hits it and reflects an object the same distance away as it is from the mirror.
- Light bends as it passes from one material to another.
- Computers communicate using Binary, converting information into a list of 1's and 0's that relay information.

Teaching Strategies/Materials:

Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure

Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects

Materials: Mentor Texts, DVDs, Internet, Technology (Smart Board, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations

Differentiation Strategies/Modifications

SWD/ Students at risk of failure: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework

Gifted/Enrichment: computer-based research, high level task, class presentation

ELL: vocabulary support: vocabulary support, word/picture association, visual aids

Connections to other content areas, including 21st Century Skills:

ELA/Literacy -

RI.4.1 - Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

RI.4.9 - Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

SL.4.5 - Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

Mathematics -

MP.4 - Model with mathematics.

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.

21st Century Skills –

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4. A.2 Identify various life roles and civic and work related activities in the school, home, and community.

9.2.4.A.3 Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.

9.2.4. A.4 - Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

Unit Resources:

Pearson Realize Interactive Science for Fourth Grade,
Chapter 2: Motion (Lesson 1: What is motion? Lesson 2: What is speed?)

Chapter 1: Energy & Heat (Lesson 1: What are forms of energy? Lesson 2: What is sound energy?)

Hands-on & Virtual Labs

STEM Quest PBL

Websites:

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Unit Assessment Opportunities:

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FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Guide Grade 4

Subject: Science	Grade Level: 4
Unit: Earth's Systems: Processes that Shape the Earth	Pacing: 2 months

Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> ● How do people reconstruct and date events in Earth’s planetary history? ● How and why is Earth constantly changing? ● Why do the continents move, and what causes earthquakes and volcanoes? ● How do living organisms alter Earth’s processes and structures? ● How do natural hazards affect individuals and societies? ● What is the process for developing potential design solutions? 	<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) (W.4.7) (W. 4.8) (W .4.9) MP. 2) (MP.4) (4. MD.A.1) (4. MD.A.2) <p>ESS2.A: Earth Materials and Systems</p> <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) (W.4.8) (MP.2) (MP .4) (MP.5) (4.MD.A.1) <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"> •The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2) (RI.4.7) (W.4.7) (4.MD.A.2) <p>ESS2.E: Biogeology</p> <ul style="list-style-type: none"> •Living things affect the physical characteristics of their regions. (4-ESS2-1) (W.4.8) (MP.2) (MP .4) (MP.5) (4.MD.A.1) <p>ESS3.B: Natural Hazards</p> <ul style="list-style-type: none"> •A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2) (RI.4.9) (MP.2) (MP.4) (4. OA.A.1) <p>ETS1.B: Designing Solutions to Engineering Problems</p> <ul style="list-style-type: none"> •Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)
NJSL-S Standards	Classroom Application

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.

- 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 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.

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.

- Examples of variables to test

Objectives:

Observe evidence that shows that landscapes change over time. (4-ESS2-1) (W.4.8) (MP.2) (MP.4) (MP.5) (4.MD.A.1)

- The Earth has four systems that work together.
- Earth's four systems are the atmosphere, biosphere, geosphere, and hydrosphere.
- The layer of Earth that tells us the most about Earth's history is the crust.
- Sedimentary rocks form in layers and fossils in these layers can help geologists determine how old the rocks are relative to one another.
- Earth's crust is made up of tectonic plates that float on the mantle and interact at their boundaries.
- Many of the features on Earth's surface exist at tectonic plate boundaries.

Identify evidence of weathering and erosion. (4-ESS2-2) (RI.4.7) (W.4.7) (4.MD.A.2)

- Weathering is the break down or dissolving of rocks on Earth's surface.
- Mechanical weathering is when physical processes break down rock.
- Chemical weathering is when chemicals change the materials that make up a rock.
- Erosion is the movement of broken down rocks

Observe how living organisms affect their environment, the Earth. (4-ESS1-1) (W.4.7) (W.4.8) (W.4.9) (MP.2) (MP.4) (4.MD.A.1) (4.MD.A.2)

- All living things affect the physical characteristics of their environment

Makes observations that natural hazards affect individuals and societies, but understand steps can be taken to reduce their impacts. (4-ESS3-2) (RI.4.9) (MP.2) (MP.4) (4.OA.A.1)

- Rainfall impacts what an environment is like and what organisms live there.

Teaching Strategies/Materials:

Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure

Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects

could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.

- Assessment is limited to a single form of weathering or erosion.

4-ESS2-2

Analyze and interpret data from maps to describe patterns of Earth's features.

- 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.

4-ESS3-2

Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

- Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.

Materials: Mentor Texts, DVDs, Internet, Technology (Smart Board, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations

Differentiation Strategies/Modifications

SWD/ Students at risk of failure: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework

Gifted/Enrichment: computer-based research, high level task, class presentation

ELL: vocabulary support

- Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.

Connections to other content areas, including 21st Century Skills:

ELA/Literacy -

RI.4.1 - Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

RI.4.7 - Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

RI.4.9 - Integrate information from two texts on the same topic to write or speak about the subject knowledgeably.

W.4.7 - Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

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.

W.4.9 - Draw evidence from literary or informational texts to support analysis, reflection, and research.

Mathematics -

MP.2 - Reason abstractly and quantitatively.

MP.4 - Model with mathematics.

MP.5 - Use appropriate tools strategically.

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. 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.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.

21st Century Skills –

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4. A.2 Identify various life roles and civic and work related activities in the school, home, and community.

9.2.4.A.3 Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.

9.2.4. A.4 - Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

Unit Resources:

Pearson Realize Interactive Science for Fourth Grade,

Chapter 2: Motion (Lesson 1: What is motion?)

Chapter 1: Energy & Heat (Lesson 1: What are forms of energy? Lesson 2: What is sound energy?)

Chapter 6: Earth's Resources (lesson 1: How are minerals classified? Lesson 2 : How are rocks classified? Lesson 3: What are weathering & erosion? Lesson 4: How can earth's surface change rapidly? Lesson 5: Where is Earth's water? Lesson 6: What is the water cycle?)

Chapter 5: Ecosystems (Lesson 1: What are ecosystems? Lesson 2: How do living things affect the environment? Lesson 3: What are natural resources? What are fossils? Lesson 5: What can fossils tell us?)

Hands-on & Virtual Labs

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- Chapter Test

**FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Guide Grade 4**

Subject: Science	Grade Level: 4
Unit: Energy	Pacing: 2 months
Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> • How is energy transferred and conserved? • What is energy? • What is meant by conservation of 	PS3.A: Definitions of Energy <ul style="list-style-type: none"> •The faster a given object is moving, the more energy it possesses. (4-PS3-1) (RI.4.1) (RI.4.3) (RI.4.9) (W.4.2) (W.4.8) (W.4.9) (MP.2) (MP.4) (4. OA.A.1)

energy?

- How is energy transferred between objects or systems?
- How are forces related to energy?
- How do food and fuel provide energy?
- How do humans depend on Earth's resources?

•Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2), (4-PS3-3) (W.4.7) (W.4.8)

PS3.B: Conservation of Energy and Energy Transfer

•Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; thus, the air gets heated and sound is produced. (4-PS3-2), (4-PS3-3) (W.4.7) (W.4.8)

•Light also transfers energy from place to place. (4-PS3-2) (W.4.7) (W.4.8)

•Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2), (4-PS3-4) (W.4.7) (W.4.8) (4. OA.A.3)

PS3.C: Relationship Between Energy and Forces

•When objects collide, the contact forces transfer energy to change the objects' motions. (4-PS3-3) (W.4.7) (W.4.8)

PS3.D: Energy in Chemical Processes and Everyday Life

•The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) (W.4.7) (W.4.8) (4. OA.A.3)

ESS3.A: Natural Resources

•Energy and fuels that humans use is derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1) (W.4.7) (W.4.8) (W.4.9) (MP.2) (MP.4) (4. OA.A.1)

ETS1.A: Defining Engineering Problems

•Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals

	<p>for solutions can be compared based on how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4)</p> <ul style="list-style-type: none"> • Most scientists and engineers work in teams. (4-PS3-4) • Science affects everyday life. (4-PS3-4)
<p>NJSL-S Standards</p>	<p>Classroom Application</p>
<p>4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object.</p> <ul style="list-style-type: none"> • 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. <p>4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p> <ul style="list-style-type: none"> • Assessment Boundary: Assessment does not include quantitative measurements of energy. <p>4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.</p> <ul style="list-style-type: none"> • 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 	<p>Objectives:</p> <p>Use evidence to construct an explanation relating the speed of an object to the energy of that object. (4-PS3-1) (RI.4.1) (RI.4.3) (RI.4.9) (W.4.2) (W.4.8) (W.4.9) (MP.2) (MP.4) (4. OA.A.1)</p> <ul style="list-style-type: none"> • Energy is an objects' ability to do work. • Energy shifts between kinetic and potential. • Energy is not created or destroyed. • Energy is transferred among its various forms. • Force is a way that energy can be transferred. <p>Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. (4-PS3-2) (4-PS3-4) (W.4.7) (W.4.8) (4. OA.A.3)</p> <ul style="list-style-type: none"> • Energy can be kinetic or potential, and has many different forms <p>Ask questions and predict outcomes about the changes in energy that occur when objects collide. (4-PS3-3) (W.4.7) (W.4.8)</p> <ul style="list-style-type: none"> • Energy shifts between kinetic and potential. <p>Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. (4-PS3-4) (W.4.7) (W.4.8) (4. OA.A.3)</p> <ul style="list-style-type: none"> • Energy is not created or destroyed. • Energy is transferred among its various forms. • Force is a way that energy can be transferred. <p>Obtain and combine information to describe that energy and fuels are derived</p>

measurements of energy.

4-PS3-4

Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

- 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

Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

- Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; nonrenewable 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 burning of fossil fuels.

from natural resources and their uses affect the environment. (4-ESS3-1) (W.4.7) (W.4.8) (W.4.9) (MP.2) (MP.4) (4. OA.A.1)

Teaching Strategies/Materials:

Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure

Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects

Materials: Mentor Texts, DVDs, Internet, Technology (Smart Board, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations

Differentiation Strategies/Modifications

SWD/ Students at risk of failure: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework

Gifted/Enrichment: computer-based research, high level task, class presentation

ELL: vocabulary support word/picture association, visual aids

Connections to other content areas, including 21st Century Skills:

ELA/Literacy -

RI.4.1 - Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

RI.4.3 - 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.

RI.4.9 - Integrate information from two texts on the same topic to write or speak about the subject knowledgeably.

W.4.2 - Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.4.7 - Conduct short research projects that build knowledge through investigation of different aspects of a topic.

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.

W.4.9 - Draw evidence from literary or informational texts to support analysis, reflection, and research.

Mathematics -

MP.2 - Reason abstractly and quantitatively.

MP.4 - Model with mathematics.

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.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.

21st Century Skills –

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4.A.2 Identify various life roles and civic and work related activities in the school, home, and community.

9.2.4.A.3 Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.

9.2.4. A.4 - Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

Unit Resources:

Pearson Realize Interactive Science for Fourth Grade,

Chapter 1: Energy & Heat (Lesson 1: What are forms of energy? Lesson 2: What is sound energy? Lesson 3: What is light energy? Lesson 4: What is heat?)

Chapter 2: Motion (Lesson 1: What is motion?)

Chapter 6: Earth's Resources (Lesson 1: How are minerals classified? Lesson 2: How are rocks classified? Lesson 3: What are weathering & erosion? Lesson 4: How can earth's surface change rapidly? Lesson 5: Where is Earth's water? Lesson 6: What is the water cycle?)

Hands-on & Virtual Labs

STEM Quest PBL

- Websites:

- PBS Learning Media
- The Concord Consortium
- cK-12.org
- eGFI
- Earth Science Week
- Education Place

Unit Assessment Opportunities:

- Journal Entries, Response Sheets, Writing Pieces
- Observations, Questioning, and Discussions
- Comprehension Checks in Literature
- Class Webs
- Presentations
- Collaboration
- Projects
- Rubrics (<http://www.nextgenscience.org/resources>)
- Unit Test

- Lesson Check
- Lesson Quiz
- Performance Expectations Activities
- Chapter Test

**FAIRFIELD TOWNSHIP SCHOOL
Science Curriculum Guide Grade 4**

Subject: Science	Grade Level: 4
Unit: Engineering Design	Pacing: 2 months
Essential Questions	Enduring Understandings
<ul style="list-style-type: none"> • How do engineers solve problems? • What is a design for? • What is the process for developing potential design solutions? • How can the various proposed design solutions be compared and improved? 	<p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> • Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared based on how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1) <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> • Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a

	<p>range of likely conditions. (3-5-ETS1-2)</p> <ul style="list-style-type: none"> •At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) •Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> •Different solutions need to be tested to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3) Influence of Science, Engineering, and Technology on Society and the Natural World •People’s needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1) •Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)
<p>NJSL-S Standards</p>	<p>Classroom Applications</p>
<p>3-5-ETS1-1. 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>3-5-ETS1-2. 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>3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or</p>	<p>Objectives:</p> <p>Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)</p> <p>Plan and investigate collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)</p> <p>Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)</p> <p>Teaching Strategies/Materials:</p>

<p>prototype that can be improved.</p>	<p>Lesson Structure: Anticipatory Set, Mini-Lesson, Whole Group, Small Group, Independent Work, Closure</p> <p>Strategies: Think-Pair-Share, Read Aloud, Jigsaw, Investigations, Guided Explorations, Projects</p> <p>Materials: Mentor Texts, DVDs, Internet, Technology (Smart Board, student computers/laptops, PowerPoint, Websites, etc.), supplemental books, visual aids, manipulatives, supplemental materials for investigations</p> <p>Differentiation Strategies/Modifications</p> <p>SWD/ Students at risk of failure: 1:1 teacher redirect / re-teach, peer helper, visual aids, modified tests/quizzes, modified homework</p> <p>Gifted/Enrichment: computer-based research, high level task, class presentation</p> <p>ELL: vocabulary support</p>
<p>Connections to other content areas, including 21st Century Skills:</p> <p>ELA/Literacy -</p> <p>RI.5.1 - Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.</p> <p>RI.5.1 - Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> <p>RI.5.9 - Integrate information from several texts on the same topic to write or speak about the subject knowledgeably.</p> <p>W.5.7 - Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>W.5.8 - Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.</p> <p>W.5.9 - Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> <p>Mathematics -</p> <p>3.OA - Operations and Algebraic Thinking</p> <p>MP.2 - Reason abstractly and quantitatively.</p> <p>MP.4 - Model with mathematics.)</p> <p>MP.5 - Use appropriate tools strategically.</p>	

3-5. OA - Operations and Algebraic Thinking

21st Century Skills –

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4. A.2 Identify various life roles and civic and work- related activities in the school, home, and community.

9.2.4.A.3 Investigate both traditional and nontraditional careers and relate information to personal likes and dislikes.

9.2.4. A.4 - Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

Unit Resources:

Pearson Realize Interactive Science for Fourth Grade, Skills Handbook Part 1: The Nature of Science, Skills Handbook Part 2: Technology & Design

Hands-on & Virtual Labs
STEM Quest PBL

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- eGFI
- Earth Science Week
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