

Marking Period 1	Marking Period 3
<p>Introductory Unit: Engineering Design Introduce the Engineering Design Process</p> <p>Unit 1: Earth Science Earth's System's: Processes That Shape Earth</p>	<p>Unit 3: Physical Science Energy and Motion</p>
Marking Period 2	Marking Period 4
<p>Unit 2: From Molecules to Organisms, Structures and Processes</p>	<p>Unit 4: Physical Science</p>

Time Frame	MP 1
Course	
Earth Science	
Title of Unit	
Earth's System's: Processes That Shape The Earth	
Essential Questions	
<ol style="list-style-type: none"> 1. How can water, ice, wind, and vegetation change the land? 2. What physical features on Earth can be used to order events that occurred? 3. What do the shapes of landforms and rock\ formations tell us about the past? 4. Is it possible to engineer ways to protect humans from Earth's naturally occurring events? 5. What patterns of Earth's feature can be determined by looking at maps? 	
Enduring Understandings	
<p><i>Students will understand that.....</i></p> <ul style="list-style-type: none"> → over time the Earth surface will change shape due to erosion and weathering → fossils help to identify the order of rock layers → wind, water, and ice cause changes to the earth's surface. 	
Key Knowledge	
<p><i>Students will know.....</i></p> <ul style="list-style-type: none"> → the Earth changes over time → landforms develop and are weathered and eroded → erosion can help show the history of the landscape. → rock formations show changes over time → the location of fossil types indicates the order in which rocks were layered → water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. → living things affect the physical characteristics of their regions. → rainfall helps to shape the land and affects the types of living things found in a region. → 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. → humans cannot eliminate natural hazards(e.g. earthquakes, tsunamis, volcanic eruptions) but can take steps to reduce their impacts. 	
Concepts and Skills	
<p><i>Students will be able to...</i></p> <ul style="list-style-type: none"> → identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. → make observations of their local environment to examine the types of living things that are common in the region and how they impede the environment. → look for evidence that water, ice, wind, organisms, or gravity have broken down rocks, soils, and sediments into smaller pieces and have moved them from one place to another. → build and use models that demonstrate how water, and ice cause change to the surface of the earth. → build and use models to simulate the effects of wind on earth materials (sand, soil, clay. silt) → create models in which plants affect the weathering and erosion of earth materials. → analyze and interpret data from maps to describe patterns of Earth's features (include topographic maps of land and ocean floor, location of mountains, continental boundaries, 	

volcanoes, and earthquakes)

→ create solutions to reduce the impacts of natural Earth's natural disasters on humans

Learning Activities

In order to support learning, students will explore and investigate Earth's Systems through hands on activities related to the concepts and skills in this unit.

❖ **Mystery Science: The Birth of Rocks**

- **Mystery 1:** Volcano, Rock Cycle & Earth's Surface: [Could a Volcano pop up in your backyard?](#)
- **Mystery 2:** Volcano, Rock Cycle & Earth's Surface: [Why do some volcanos 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?](#)

In order to support the integration of the NJLS for English Language Arts and Mathematics in this unit, students will have access to multiple sources of information about processes that change Earth. Students will have opportunities to read, analyze, and interpret information from nonfiction text, charts, graphs, diagrams, timelines, and interactive elements on the Internet.

Resources:

Houghton Mifflin Science: Unit C Solid Earth

❖ **Chapter 8 - Forces That Shape Earth's Surface**

- Lesson 1 - Forces That Change Earth
- Lesson 2 - Rapid Changes to Earth
- Lesson 3 - Slow Changes to Earth

❖ **Chapter 9 - Managing Earth's Resources**

- Lesson 1 - Renewable Resources
- Lesson 2 - Nonrenewable Resources
- Lesson 3 - Conserving Resources

Wonders Literature Connections:

❖ **Unit 1 Week 3 Take Action**

A World of Change, Earthquakes, Tornado, Changing Landscapes; Study Sync Blast: Masters of Disasters Inquiry Space: Take a Stand, The Environment

❖ **Unit 3 Week 3 Liberty and Justice**

Judy's Appalachia (environmental, mountaintop strip mining)

Other Literature Connections:

- ❖ Book: *Erosion: Changing Earth's Surface*; Author: Robin Koontz
- ❖ Book: *Quinto's Volcano*; Author: Aileen Friedman
- ❖ Article: [How People Have Been Shaping the Earth](#)
- ❖ Article: [Ducksters Erosion](#)

- ❖ ReadWorks article: [Our Changing Earth: Plate Tectonics and Large-Scale System Interactions](#)

Related enVision Math and Science Projects

- ❖ Topic 1: Erosion
- ❖ Topic 11: Earthquakes
- ❖ Topic 13: Erosion

Online Resource Links:

❖ **Online Teaching Resources**

- [NGSS powerpoints, activities, articles and quizzes](#)
- [NGSS resources for teachers and students](#)

❖ **Videos**

- [BrainPop: Natural Disasters](#)
- [BrainPop Fossils](#)
- [BrainPop Rock Cycle](#)
- [BrainPop Erosion](#)
- [BrainPop Glaciers](#)
- [Grand Canyon: Evidence of Earth's Past](#)
- [Weather and Erosion 1](#)
- [Weather and Erosion 2](#)
- [Erosion Video](#)
- [Inside Earthquakes](#)
- [What is Topography?](#)

❖ **Activities**

- [Khan Academy Rock Cycle](#)
- [Making Sedimentary Rocks Project](#)
- [Rock Cycle Worksheet](#)
- [Erosion Project](#)
- [Create Fossils Project](#)
- [Skittles Water Erosion Lab Download File](#)
- [Interactive Rock Cycle Game](#)
- [Rock Cycle and Weathering](#)
- [Mapping Extreme Natural Events](#)

Assessments

Performance Tasks

- ❖ Developing and refining models
- ❖ Generating, discussing and analyzing data
- ❖ Constructing spoken and written scientific explanations
- ❖ Engaging in evidence-based argumentation
- ❖ Reflecting on their own understanding

Summative Assessments

- ❖ Labs and engineering based projects
- ❖ Associated Unit tests, quizzes

- ❖ BrainPop Quizzes
- ❖ ReadWorks Quizzes
- ❖ Editable Unit Assessment - Processes that Shape the Earth (please make your own copy)
- ❖ Performance Assessment - Designing an Earthquake-Proof Building

Formative Assessments

- ❖ Graphic Organizers & Guided Note Taking
- ❖ Directed Reading
- ❖ Cooperative Group Learning
- ❖ Journal Entries/Foldables

NGSS and NJSLS

Standards: (Note: Include reference to relevant standards in the Core Content Area as well as technology and 21st-century life and careers.)

→ NGSS:

- ◆ **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.
- ◆ **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.
- ◆ **4-ESS2-2:** Analyze and interpret data from maps to describe patterns of Earth's features.
- ◆ **4-ESS3-2:** Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

→ NJSLS: ELA

- ◆ **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 in order to write or speak about the subject knowledgeably.
- ◆ **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.
- ◆ **W.4.9.A** - Apply grade 4 Reading standards to literature (e.g., "Describe in depth a character, setting, or event in a story or drama, drawing on specific details in the text [e.g., a character's thoughts, words, or actions].").
- ◆ **W.4.9.B** - Apply grade 4 Reading standards to informational texts (e.g., "Explain how an author uses reasons and evidence to support particular points in a text").

→ NJSLS: Math

- ◆ **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. For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36),

- ◆ **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.

→ **Technology: 8.1 Educational Technology:** 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. **8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:** 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.

- ◆ **8.1.5.A.1** - Understand and use technology systems.
- ◆ **8.1.5.A.2** - Select and use applications effectively and productively.
- ◆ **8.2.5.A.3** - The core concepts of technology.
- ◆ **8.2.5.A.1** - The characteristics and scope of technology.

Modifications

Modifications: (ELLs, Special Education, Gifted and Talented)

- Follow all IEP modifications and 504 plans
- Provide differentiated instruction as needed.
- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.

Time Frame	MP 2
Course	
Life Sciences	
Title of Unit	
Structure, Function, and Information Processing	
Essential Questions	
<ol style="list-style-type: none"> 1. How does the reflection of light aid in sight? 2. How do animals receive information and how do they respond to the information in different ways? 3. How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals? 	
Enduring Understandings	
<i>Students will understand that...</i>	
<ul style="list-style-type: none"> → objects can be seen when light reflected from any surface enters the eye. Light traveling from the object to the eye determines what is seen. → different sense receptors are used for different kinds of information. → sensory information is processed by the brain and can be stored as memories. → animals are able to use their perceptions and memories to guide their actions. → plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction 	
Key Knowledge	
<i>Students will know...</i>	
<ul style="list-style-type: none"> → light enters the eye, allowing objects to be seen. → light reflects off of objects, and then can travel and enter the eye. → objects can be seen only if light follows a path between a light source, the object, and the eye. → animals use their sense to detect different types of information from the environment (sound, odor, light, temperature). → animals use their body parts in different ways to grow, change, and survive. → plants have different parts that help them grow, survive, and reproduce. 	
Concepts and Skills	
<i>Students will be able to...</i>	
<ul style="list-style-type: none"> → develop a model or diagram to describe light reflecting from objects and entering the eye. (The model should include the light source, objects, the path that light follows, and the eye) → 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 (animals reaction to the smell of rotten food or another animal with bright colors). → students make a claim and construct an argument to support the idea that a plant or animals have internal and external structures that function together as part of a system to support survival, growth, behavior, and reproduction (animal or plant adaptation). 	
Learning Activities	
<p><i>In order to support learning, students will explore and investigate Structure, Function, and Information Processing through hands on activities related to the concepts and skills in this unit.</i></p> <p>❖ Mystery Science: Human Machine</p> <p>➤ Mystery 1: Muscles and Skeleton: Why do biceps bulge?</p>	

- **Mystery 2:** Eyes & Vision: [What do blind people see?](#)
- **Mystery 3:** How Eyes Work: [How can some animals see in the dark?](#)
- **Mystery 4:** Brain and Nerves: [How does your brain control your body?](#)

In order to support the integration of the NJLS for English Language Arts and Mathematics in this unit, students will have access to multiple sources of information about life processes and structures. Students will have opportunities to read, analyze, and interpret information from nonfiction text, charts, graphs, diagrams, timelines, and interactive elements on the Internet.

Resources:**Houghton Mifflin Science: Unit A Organization of Living Things**

- ❖ **Chapter 1 - Life Processes**
 - Lesson 1 - Characteristics of Living Things
 - Lesson 2 - Life Processes of Plants
- ❖ **Chapter 2 - Human Body Systems**
 - Lesson 1 - Digestive System
 - Lesson 2 - Circulatory and Respiratory Systems
 - Lesson 3 - Skeletal and Muscular Systems
- ❖ **Chapter 3 - Life Cycles**
 - Lesson 1 - Plant Life Cycles
 - Lesson 2 - Animal Life Cycles
- ❖ **Chapter 4 - Responses of Living Things**
 - Lesson 1 - Reacting the the Environment

Wonders Literature Connections:

- ❖ **Unit 2: Amazing Animals**
 - **Unit 2 Week 3: Natural Connections** - *Rescuing our Reefs, The Buffalo are Back, Energy in the Ecosystem, Saving San Francisco Bay*
 - **Unit 2 Week 4: Adaptations** - *Adapting to Survive, Extreme Animals, Animal Adaptations, Spiders, Anansi and the Birds*
Inquiry Space: Investigate Sharks
 - Study Sync Blast: “Hidden in Plain Sight”

Other Literature Connections:

- ❖ ReadWorks article: [Sensing the World Around Us](#)
- ❖ ReadWorks article: [Animal Instinct](#)
- ❖ ReadWorks article: [A Plant Puzzle](#)
- ❖ Book: [Animal Senses: How Animals See Hear Taste Smell and Feel](#) (Animal Behavior)
Author: Pamela Hickman
- ❖ Book: [Adaptation](#), Author: Melanie Waldron

Related enVision Math and Science Projects:

- ❖ Topic 7: Animal Traits for Survival
- ❖ Topic 8: Animals’ Special Senses
- ❖ Topic 16: Animals’ Eyes

Online Resource Links:

- ❖ **Online Teaching Resources**

- [NGSS powerpoints, activities, articles and quizzes](#)
- [NGSS resources for teachers and students](#)

❖ **Videos**

- [Bill Nye the Science Guy on The Eye](#)
- [Structures of a Plant](#)
- [Parts of a Cell](#)
- [Human Body Parts - Brain](#)
- [Stimulus and Responses](#)
- [Brainpop - Human Body Systems: Brain](#)
- [Brainpop - Human Body Systems - Eyes](#)

❖ **Activities**

- [Virtual Lab: How are Birds Adapted to Their Habitat?](#)
- [Animal Senses Game](#)
- [Animal Adaptations Interactive Games](#)

Assessments

Performance Tasks

- ❖ Developing and refining models
- ❖ Generating, discussing and analyzing data
- ❖ Constructing spoken and written scientific explanations
- ❖ Engaging in evidence-based argumentation
- ❖ Reflecting on their own understanding

Summative Assessments

- ❖ Labs and engineering based projects
- ❖ Associated Unit tests, quizzes
- ❖ BrainPop Quizzes
- ❖ ReadWorks Quizzes
- ❖ Editable Unit Assessment - [Human Body Unit Assessment](#) *(please make your own copy)*
- ❖ Performance Assessment - [Create-a-Creature](#)

Formative Assessments

- ❖ Graphic Organizers & Guided Note Taking
- ❖ Directed Reading
- ❖ Cooperative Group Learning
- ❖ Journal Entries/Foldables

NGSS and NJSLS

Standards: (Note: Include reference to relevant standards in the Core Content Area as well as technology and 21st-century life and careers.)

→ **NGSS:**

- ◆ **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.]
- ◆ **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.]

- ◆ **4-PS4-2.** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

→ **NJSLS: ELA**

- ◆ **W.4.1** Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- ◆ **SL.4.5** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

→ **NJSLS: Math**

- ◆ **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 along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

→ **Technology:** *8.1 Educational Technology:* 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. *8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:* 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.

- ◆ **8.1.5.A.1** - Understand and use technology systems.
- ◆ **8.1.5.A.2** - Select and use applications effectively and productively.
- ◆ **8.2.5.A.3** - The core concepts of technology.
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Modifications

Modifications: (ELLs, Special Education, Gifted and Talented)

- Follow all IEP modifications and 504 plans
- Provide differentiated instruction as needed.
- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.

Time Frame	MP 3
Course	
Physical Science	
Title of Unit	
Energy	
Essential Questions	
<ol style="list-style-type: none"> 1. What is energy and how is it related to motion? 2. How is energy transferred? 3. How can energy be used to solve problems? 4. What is the relationship between the speed of an object and the energy of that object? 5. Where do we get the energy we need for modern life? 6. How does energy move? 7. From what natural resources are energy and fuels derived? 8. In what ways does the human use of natural resources affect the environment? 	
Enduring Understandings	
<p><i>Students will understand that.....</i></p> <ul style="list-style-type: none"> → When and where Energy is present and how it can be transferred. → Natural resources are used to create energy and fuels → Moving objects have energy → When objects collide stored energy is transferred → Energy can be changed from one form to another 	
Key Knowledge	
<p><i>Students will know.....</i></p> <ul style="list-style-type: none"> → Energy is present whenever there are moving objects, sound, light, or heat. → Energy can be moved from place to place by moving objects or through sound, light, or electric currents. → When objects collide, energy can be transferred from one object to another, thereby changing their motion. → Energy and fuels that humans use are derived from natural sources. → The use of energy and fuels from natural sources affects the environment in multiple ways. → Some resources are renewable over time, and others are not. → The faster a given object is moving, the more energy it possesses. → When objects collide, the contact forces transfer energy so as to change the object's' motions. → The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. 	
Concepts and Skills	
<p><i>Students will be able to.....</i></p> <ul style="list-style-type: none"> → Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric → Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment → Use evidence to construct an explanation relating the speed of an object to the energy of that object. → Ask questions and predict outcomes about the changes in energy that occur when objects collide. → Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. 	

Learning Activities

In order to support learning, students will explore and investigate Energy through hands on activities related to the concepts and skills in this unit.

❖ **Mystery Science Links: Energizing Everything**

- **Mystery 1:** Speed & Energy [How can a car run without gas?](#)
- **Mystery 2:** Energy Conversion & Engineering [What makes roller coasters go so fast?](#)
- **Mystery 3:** Energy & Collisions [Why is the first hill of a roller coaster always the highest?](#)
- **Mystery 4:** Energy & Engineering [Could you knock down a building using only dominoes?](#)
- **Mystery 5:** Energy & Engineering [Can you build a chain reaction machine?](#)
- **Mystery 6:** Electrical Energy [What if there were no electricity?](#)

In order to support the integration of the NJLS for English Language Arts and Mathematics in this unit, students will have access to multiple sources of information about life processes and structures. Students will have opportunities to read, analyze, and interpret information from nonfiction text, charts, graphs, diagrams, timelines, and interactive elements on the Internet.

Resources:

Houghton Mifflin Science: Unit F Energy and Motion

- ❖ **Chapter 14 - Energy Changes**
 - Lesson 1 - Energy
- ❖ **Chapter 15 - Electricity and Magnetism**
 - Lesson 2 - Electric Currents
- ❖ **Chapter 16 - Motion and Machines**
 - Lesson 2 Forces and Motion

Wonders Literature Connections:

- ❖ **Unit 1 Week 4: Ideas in Motion**
 - *A Crash Course in Forces and Motion with Max Axiom, Super Scientist, The Big Race, George's Giant Wheel*
- ❖ **Unit 3 Inquiry Space - Take a Stand: The Environment**
- ❖ **Unit 5 Week 3 Inventions**
 - *How Ben Franklin Stole the Lightning, Energy is Everywhere, A Telephone Mix-Up, The Inventive Lewis Latimer*

Other Literature Connections:

- ❖ Book: [Energy](#); Author: Matt Mullins
- ❖ Book: *The Boy Who Harnessed the Wind* By William Kamkawamba and Bryan Mealer
- ❖ ReadWorks article: [Energy for Life](#)
- ❖ ReadWorks article: [Up to Speed](#)
- ❖ ReadWorks article: [The Simple Physics of Soccer](#)

Related enVision Math and Science Projects:

- ❖ Topic 2: Speed of Cars
- ❖ Topic 12: Transfer of Energy
- ❖ Topic 15: Bumper Cars (Collision)

Online Resource Links:**❖ Online Teaching Resources**

- [NGSS powerpoints, activities, articles and quizzes](#)
- [NGSS resources for teachers and students](#)
- [Renewable Resources / Slideshow](#)

❖ Videos

- [Bill Nye the Science Guy on Electricity](#)
- [Kinetic and Potential Energy](#)
- [Nonrenewable Resources](#)
- [BrainPop Forms of Energy](#)
- [BrainPop Potential Energy](#)
- [BrainPop Kinetic Energy](#)
- [BrainPop Natural Resources](#)
- [Force and Motion](#)
- [Olympic Snowboarding Physics](#)
- [Olympic Hockey Slapshot Physics](#)

❖ Activities

- [Thermal Energy Transfer](#)
- [Make an Indoor Slingshot](#)
- [Glaciers, Water, and Wind, Oh My!](#)

Assessments**Performance Tasks**

- ❖ Developing and refining models
- ❖ Generating, discussing and analyzing data
- ❖ Constructing spoken and written scientific explanations
- ❖ Engaging in evidence-based argumentation
- ❖ Reflecting on their own understanding

Summative Assessments

- ❖ Labs and engineering based projects
- ❖ Associated Unit tests, quizzes
 - BrainPop Quizzes
 - ReadWorks Quizzes
 - Editable Unit Assessment - [Energizing Everything](#) *(please make your own copy)*

Formative Assessments

- ❖ Graphic Organizers & Guided Note Taking
- ❖ Directed Reading
- ❖ Cooperative Group Learning
- ❖ Journal Entries/Foldables

NGSS and NJSL

Standards: (Note: Include reference to relevant standards in the Core Content Area as well as technology and 21st-century life and careers.)

→ **NGSS:**

- ◆ **4-PS3-1.** Use evidence to construct an explanation relating the speed of an object to the energy of that object.
- ◆ **4-PS3-2.** Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- ◆ **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.]*
- ◆ **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.]*
- ◆ **4-ESS3-1.** 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; 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.]*

→ **NJSLS: ELA**

- ◆ **W.4.2** Write informative/explanatory texts to examine a topic and convey ideas and information clearly. **(4-PS3-1)**
- ◆ **W.4.7** Conduct short research projects that build knowledge through investigation of different aspects of a topic. **(4-PS3-2),(4-ESS3-1)**
- ◆ **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-PS3-2),(4-ESS3-1)**
- ◆ **W.4.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. **(4-ESS3-1)**
- ◆ **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. **(4-PS3-1)**
- ◆ **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)**
- ◆ **SL 4.5** Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes..

→ **NJSLS: Math**

- ◆ **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.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)**

→ **Technology: 8.1 Educational Technology:** All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and

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collaborate and to create and communicate knowledge. **8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:** 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.

- ◆ **8.1.5.A.1** - Understand and use technology systems.
- ◆ **8.1.5.A.2** - Select and use applications effectively and productively.
- ◆ **8.2.5.A.3** - The core concepts of technology.
- ◆ **8.2.5.A.1** - The characteristics and scope of technology.

Modifications

Modifications: (ELLs, Special Education, Gifted and Talented)

- Follow all IEP modifications and 504 plans
- Provide differentiated instruction as needed.
- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
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- Provide ELL students with multiple literacy strategies.

Time Frame	MP 4
Course	
Physical Science	
Title of Unit	
Waves and Information Transfer	
Essential Questions	
1. develop a model of waves to describe patterns of waves in terms of amplitude and wavelength 2. show that waves can cause objects to move. 3. demonstrate the transfer of information using technological resources.	
Enduring Understandings	
<i>Students will understand that...</i> <ul style="list-style-type: none">→ wave can differ in amplitude and wavelength→ waves can cause objects to move→ information can be converted from a sound wave into a digital signal→ high-tech devices can be used to help us convert and transmit information	
Key Knowledge	
<i>Students will know.....</i> <ul style="list-style-type: none">→ waves can differ in amplitude and wavelength	

- waves can cause objects to move
- information can be converted from a sound wave into a digital signal
- high-tech devices can be used to help us convert and transmit information

Concepts and Skills

Students will be able to...

- develop a model of waves to describe patterns of waves in terms of amplitude and wavelength
- show that waves can cause objects to move.
- demonstrate the transfer of information using technological resources.

Learning Activities

In order to support learning, students will explore and investigate Waves through hands on activities related to the concepts and skills in this unit.

❖ **Mystery Science: Waves of Sound - Sound, Waves, & Communication**

- **Mystery 1:** Sound & Vibrations [How far can a whisper travel?](#)
- **Mystery 2:** Sound & Vibrations [What would happen if you screamed in outer space?](#)
- **Mystery 3:** Energy and Collisions: Sound, Vibrations & Waves [Why are some sounds high and some sounds low?](#)

In order to support the integration of the NJLS for English Language Arts and Mathematics in this unit, students will have access to multiple sources of information about Waves. Students will have opportunities to read, analyze, and interpret information from nonfiction text, charts, graphs, diagrams, timelines, and interactive elements on the Internet.

Resources:

Houghton Mifflin Science: Unit F Energy and Motion

❖ **Chapter 14 - Energy Changes**

- Lesson 2 - Light Waves
- Lesson 3 - Sound Waves

Wonders Literature Connections:

❖ **Unit 1 Week 3 Take Action**

- *A World of Change, Earthquakes, Tornado, Changing Landscapes*
Study Sync Blast: Masters of Disasters

Other Literature Connections:

- ❖ Book - [Eye: How It Works](#); Author: David Macaulay
- ❖ Book - [Sound Waves](#); Author: Ian F. Mahaney
- ❖ Book - [What Are Light Waves?](#); Author: Robin Johnson
- ❖ Read Works Article: [Now Hear This!](#)
- ❖ Read Works Article: [Now Hear This! Care for Your Ears](#)

Related enVision Math and Science Projects:

- ❖ Topic 5: Sound Instruments
- ❖ Topic 9: Morse Code
- ❖ Topic 10: Light
- ❖ Topic 14: Sound Waves

Online Resource Links:❖ **Online Teaching Resources**

- [NGSS powerpoints, activities, articles and quizzes](#)
- [NGSS resources for teachers and students](#)

❖ **Videos**

- [Amazing Water & Sound Experiment](#)
- [Sound](#)
- [BrainPop Waves](#)
- [BrainPop Light](#)
- [Brainpop: Sound](#)
- [Waves](#)
- [Dolphin Sound Echoes](#)
- [Bill Nye the Science Guy on Light](#)

❖ **Activities**

- [Making a Sound Game](#)
- [Making a Wave with a Plunger Game](#)

Assessments**Performance Tasks**

- ❖ Developing and refining models
- ❖ Generating, discussing and analyzing data
- ❖ Constructing spoken and written scientific explanations
- ❖ Engaging in evidence-based argumentation
- ❖ Reflecting on their own understanding

Summative Assessments

- ❖ Labs and engineering based projects
- ❖ Associated Unit tests, quizzes
- ❖ BrainPop Quizzes
- ❖ ReadWorks Quizzes
- ❖ Editable Unit Assessment - [Waves of Sound](#) *(please make your own copy)*

Formative Assessments

- ❖ Graphic Organizers & Guided Note Taking
- ❖ Directed Reading
- ❖ Cooperative Group Learning
- ❖ Journal Entries/Foldables

NGSS and NJSL

Standards: (Note: Include reference to relevant standards in the Core Content Area as well as technology and 21st-century life and careers.)

→ **NGSS:**

- ◆ **4-PS4-1.** 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 wavelength and amplitude of waves.]*

- ◆ **4-PS4-3.** 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 text.*]

→ **NJSLS: ELA**

- ◆ **RI.4.9** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. **(4-PS4-3)**
- ◆ **SL.4.5** Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. **(4-PS4-1)**
- ◆ **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. **(3-5-ETS1-2)**
- ◆ **RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. **(3-5-ETS1-2)**
- ◆ **W.5.7** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. **(3-5-ETS1-3)**
- ◆ **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.**(3-5-ETS1-3)**
- ◆ **W.5.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. **(3-5-ETS1-3)**

→ **NJSLS: Math**

- ◆ **3-5.OA** Operations and Algebraic Thinking **(3-ETS1-2)**
- ◆ **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- PS4-2)**

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