



**SUBJECT: SCIENCE/Grade 8**

**Cliffside Park Public Schools**

**GRADE: 8**

**BOE APPROVAL: August 2018**

# Grade 8: Integrated Science





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**GRADE: 8**

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## Unit 1: Overview

### Unit 1: Evolution

**Grade: 8**

**Content Area: Life Science**

**Pacing: 7-9 Weeks**

### Essential Questions

How do mutations, trait variations, and natural selection play a role in evolution?

### Student Learning Objectives (Performance Expectations)

MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

MS-LS4-3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

MS-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

### Core Instructional Materials

Lab Aids: "Evolution"

<https://portals.lab-aids.com/mylibrary.htm>

SEPUP

<http://www.sepuplhs.org/middle/third-edition/>

### Supplemental Materials

NEWSELA:

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READWORKS: READINGA-Z: NSTA : <a href="https://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=10">https://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=10</a> Science News: <a href="https://www.sciencenewsforstudents.org">https://www.sciencenewsforstudents.org</a> SEPUP: NF Titles::	
<b>Unit Summary</b>	
Should an extinct species be brought back to life? Students examine fossils, consider the lines of evidence for evolution, natural selection, and the role of genetic mutations. They then evaluate the impact of humans on the extinction and evolution of species.	
<b>Technical Terms</b>	
Fossil records, Adaption, competition, endangered species, mutation, variation, natural selection, extinction, Law of Superposition, evolutionary, geologic time, radiometric dating, relative dating, homologous structure, DNA, trait,	
<b>Formative Assessment Measures</b>	
<i>Should an extinct species be brought back to life?</i>	
Students who understand the concepts are able to: Students will examine fossils, consider the lines of evidence for evolution, natural selection, and the role of genetic mutations. They then evaluate the impact of humans on the extinction and evolution of species.	
<b>Summative Assessments</b>	
<b>Evolution Unit Test</b> <b>Group Project: Law of Superposition</b>	
<b>Alternative Assessments</b>	
<b>Lab Aids Adaptive Tests:</b> <b>Lab Report: Resistant Bacteria</b> <b>Lab Report: Battling of the Beaks</b>	
<b>Benchmarks</b>	
<b>Natural Selection article based test</b>	
<b>Interdisciplinary Connections</b>	
<b>NJSLS- ELA</b>	<b>NJSLS- Mathematics</b>
RST.6-8.1	6.RP.A.1

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RST.6-8.2	6.RP.A.3
RST.6-8.7	6.SP.B.4
RST.6-8.9	6.SP.B.5
WHST.6-8.2	7.RP.A.2
WHST.6-8.7	
WHST.6-8.9	MP.4
SL.8.1	
<b>Core Instructional Materials</b>	Can include: Textbooks Series, Lab Materials, etc.
<b>21st Century Life and Careers</b>	CRP2, CRP4, CRP5, CRP 6, CRP7, CRP8 ,CRP11,CRP12
<b>Technology Standards</b>	8.1.8.A.1, 8.1.8.A.2, 8.1.8.A.3, 8.1.8.A.4, 8.1.8.A.5, 8.1.8.D.4, 8.1.8.E.1,
<b>Modifications</b>	
<b>Modifications to Support Our English Language Learners</b>	<b>Modifications to Support Our Learners (Students with IEPs/504s and At-Risk Learners)</b>
“Evolution” - Spanish Edition Leveled Articles: Personal Vocabulary Log Intra-act Discussion Web Leveled Articles Scaffolding Word walls Sentence/paragraph frames Bilingual dictionaries/translation Think alouds Read alouds Highlight key vocabulary Annotation guides Think-pair- share Visual aides - Sickle Cell Anemia Infection Simulation Modeling - different types of	Word walls Visual aides - Malaria infection simulators. Graphic organizers for graphing Multimedia - Using Leveled readers - Different article levels from Newsela Assistive technology Notes/summaries Extended time Answer masking Answer eliminator Highlighter Color contrast Teacher tutoring Peer tutoring Study guides Graphic organizers for graphing Extended time
<b>Gifted and Talented</b>	
Curriculum compacting Personal Vocabulary Log Discussion on environmental changes affecting populations. Challenge assignments and questions - Lab Aids Enrichment activities - Investigating current events and connecting it to the activites in class. Tiered activities Independent research/inquiry - SEPUP Collaborative teamwork - Natural Selection Higher level questioning Critical/Analytical thinking tasks Self-directed activities - See what triats have been passed from generation to generation through their family.	

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natural selection Cognates	Parent communication Modified assignments Counseling Personal Vocabulary Log	
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5E Model	
Evolution	
<p><b>Engage</b> Anticipatory Set</p>	<p><b>Talking it Over:</b> <u>Here Today, Gone Tomorrow?</u>- After reading about extinct mammoths and modern elephants, students discuss whether efforts should be made to save endangered elephants.</p> <p><b>Role Play:</b> <u>A Meeting of Minds</u>- Students role-play an imaginary meeting between Charles Darwin and Jean-Baptiste Lamarck, who present and compare their theories on how evolution occurred.</p> <p><b>Reading:</b> <u>Origins of Species</u>- Students read about mutations and how they provide the genetic variation necessary for natural selection.</p>
<p><b>Exploration</b> Student Inquiry</p>	<p><b>Laboratory:</b> <u>Figuring out Fossils</u>- Students examine eight different fossils as evidence for extinct species.</p> <p><b>Investigation:</b> <u>Fossilized Footprints</u>- Students interpret a series of fossilized footprints, differentiating between observations and influences.</p> <p><b>Investigation:</b> <u>Reading the Rocks</u>- Students examine simulated drill cores in order to develop a stratigraphic column.</p> <p><b>Modeling:</b> <u>Battling Beaks</u>- Students simulate the effect of natural selection of an imaginary species of “forkbirds”.</p> <p><b>Investigation:</b> <u>A Whale of a Tale</u>- Students investigate anatomical evidence for evolution by comparing whale skeletons.</p> <p><b>Investigation:</b> <u>DNA: The Evidence Within</u>- Students investigate how DNA sequence can provide evidence for evolution.</p>
<p><b>Explanation</b> Concepts and Practices</p>	<p><b>Investigation:</b> <u>Family Histories</u>- Students draw and interpret graphs showing changes in the number of fossil families in the fish, reptile, and mammal classes over geological time.</p>
<p><b>Elaboration</b> Extension Activity</p>	<p><b>Modeling:</b> <u>Hiding in the Background</u>- Students use colored toothpicks to model the effect of environment and predation in the process of natural selection.</p>
<p><b>Evaluation</b> Assessment Tasks</p>	<p><b>Modeling:</b> <u>Time for Change</u>- Students develop a geological-style personal time scale and then construct a geologic time scale.</p> <p><b>Project:</b> <u>Should an extinct species be brought back to life?</u>- Students will examine fossils, consider the lines of evidence for</p>

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	evolution, natural selection, and the role of genetic mutations. They then evaluate the impact of humans on the extinction and evolution of species.
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<b>Unit 2: Overview</b>	
<a href="#"><u>Unit 2: Land, Water, and Human Interactions</u></a>	
<b>Grade: 8</b>	
<b>Content Area: Physical Science/ Earth Science</b>	
<b>Pacing: 9 Weeks</b>	
<b>Essential Questions</b>	
How is your community affected by landforms, water systems, and human impact?	
<b>Student Learning Objectives (Performance Expectations)</b>	
<a href="#"><u>MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.</u></a>	
<a href="#"><u>MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.</u></a>	
<a href="#"><u>MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.</u></a>	
<a href="#"><u>MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.</u></a>	
<a href="#"><u>MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</u></a>	
<a href="#"><u>MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.</u></a>	
<a href="#"><u>MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.</u></a>	
<a href="#"><u>MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.</u></a>	
<b>Core Instructional Materials</b>	
Lab Aids: "Evolution"	

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<a href="https://portals.lab-aids.com/mylibrary.htm">https://portals.lab-aids.com/mylibrary.htm</a> SEPUP <a href="http://www.sepuplhs.org/middle/third-edition/">http://www.sepuplhs.org/middle/third-edition/</a>
<b>Supplemental Materials</b>
NEWSELA: READWORKS: READINGA-Z: NSTA : <a href="https://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=10">https://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=10</a> Science News: <a href="https://www.sciencenewsforstudents.org">https://www.sciencenewsforstudents.org</a> SEPUP: NF Titles::
<b>Unit Summary</b>
Students investigate water quality issues in the fictional community of Willow Grove, the biological and chemical risks in drinking water, and then explore chemical pollution. Through their investigations, students learn about water's properties as a solvent, the properties of acids and bases, and the movement of contaminants through the water cycle. They interpret water quality reports, perform water quality tests, conduct the steps in municipal water treatment, and apply that learning to treat a contaminated water sample. Students make recommendations about Willow Grove Water treatment and sources in the culminating activity.
<b>Technical Terms</b>
water quality, elements and compounds, atoms and molecules, mixtures and solutions, solubility, particle theory of matter, acids and bases
<b>Formative Assessment Measures</b>
<i>Part A: Which recourse of drinking water is the safest for a population: a) treated water at Willow Grove Water district, b) well water, c) tap water, or d) bottled water?</i>
Students who understand the concepts are able to: Explain the trade-offs involved and the advantages and disadvantages of each water source based on information that was gathered over the course of the unit.
<b>Summative Assessments</b>
<b>Land, Water, and Human Interactions Unit Test</b> <b>Group Project: Dissolved Solids</b>
<b>Alternative Assessments</b>
<b>Lab Aids Adaptive Tests:</b> <b>Lab Report: Can You Taste The Difference</b> <b>Lab Report: Solubility</b>





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Benchmarks		
<b>Water Quality Article based test</b>		
Interdisciplinary Connections		
NJSLS- ELA	NJSLS- Mathematics	
RST.6-8.1 RST.6-8.7 RST.6-8.9 WHST.6-8.7 WHST.6-8.8 WHST.6-8.9 SL.8.5	6.EE.B.6 7.EE.B.4 7.EE.3 6.RP.A.1 7.RP.A.2 MP.2	
<b>Core Instructional Materials</b>	Can include: Textbooks Series, Lab Materials, etc.	
<b>21st Century Life and Careers</b>	CRP2, CRP4, CRP5, CRP 6, CRP7, CRP8 ,CRP11,CRP12	
<b>Technology Standards</b>	8.1.8.A.1, 8.1.8.A.2, 8.1.8.A.3, 8.1.8.A.4, 8.1.8.A.5, 8.1.8.D.4, 8.1.8.E.1, 8.1.8.F.1, 8.2.8.A.4,8.2.8.A.5, 8.2.8.B.2, 8.2.8.B.2, 8.2.8.D.1,8.2.8.D.3	
Modifications		
Modifications to Support Our English Language Learners	Modifications to Support Our Learners (Students with IEPs/504s and At-Risk Learners)	Gifted and Talented
“Human Interactions” - Spanish Edition Leveled Articles: Personal Vocabulary Log Intra-act Discussion Web Leveled Articles Scaffolding Word walls Sentence/paragraph frames Bilingual dictionaries/translation	Word walls Visual aides - NOAA and other government websties to show current pollution in air and water. Graphic organizers for graphing Multimedia - Using Leveled readers - Different article levels from Newsela Assistive technology Notes/summaries Extended time Answer masking	Curriculum compacting Personal Vocabulary Log Discussion on environmental changes affecting populations. Challenge assignments and questions - Lab Aids Enrichment activities - Investigating current events and connecting it to the activites in class. Tiered activities



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Think alouds Read alouds Highlight key vocabulary Annotation guides Think-pair- share Visual aides - Demonstration of filtration systems for water Modeling - How pollution affects communities not in direct contact.	Answer eliminator Highlighter Color contrast Teacher tutoring Peer tutoring Study guides Graphic organizers for graphing Extended time Parent communication Modified assignments Counseling Personal Vocabulary Log	Independent research/inquiry - SEPUP Collaborative teamwork - Natural Selection Higher level questioning Critical/Analytical thinking tasks Self-directed activities - See how pollution can affect the human body over many years.
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5E Model	
Land, Water, and Human Interactions	
<b>Engage</b> Anticipatory Set	<p><b>Investigation:</b> <u>Can You Taste the Difference</u>- Students taste and discuss three water samples (tap, distilled, bottled “spring”) as an introduction to drinking water choices.</p> <p><b>Reading:</b> <u>Willow Grove’s Troubled Waters</u>- The scenario of the town and its questioned water supply is introduced.</p> <p><b>Reading:</b> <u>Water Pollution</u>- Students read about the biological and chemical types and sources of water contamination.</p> <p><b>Reading:</b> <u>Acids, Bases, and the pH Scale</u>- Students read about the measurement and significance of pH and about acids and bases in our lives.</p> <p><b>Reading:</b> <u>The Chemistry of Acids and Bases</u>- Students read about the difference between ionic and covalent bonds, the dissolving of ionic and covalent compounds, and the reaction between an acid and a base.</p>
<b>Exploration</b> Student Inquiry	<p><b>Investigation:</b> <u>Mapping Death</u>- Students simulate John Snow’s approach of mapping deaths due to the London Cholera outbreak.</p>



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	<p><b>Laboratory:</b> <u>Mystery Liquids</u>- Students investigate various properties of water versus alcohol (solution in water): smell, melting and boiling points (and evaporability), miscibility with oil, density, and cohesion (surface tension and capillary action).</p> <p><b>Modeling:</b> <u>Making Water and Alcohol Molecules</u>- Students use a modeling kit to build and compare water and ethanol.</p> <p><b>Laboratory:</b> <u>What Dissolves?</u>- Students investigate the solubility of several substances in water, exploring saturation and mixtures vs solutions by visual observations and by filtering.</p> <p><b>Laboratory:</b> <u>Dissolving Duel</u>- Students design an inquiry to compare the solubilities of substances in water and alcohol.</p> <p><b>Modeling:</b> <u>Contaminants and the Water Cycle</u>- Students roll a number cube to determine where in the water cycle they travel, decide what form the water is in, how it gets from place to place, and the types of contaminants it may pickup.</p> <p><b>Investigation:</b> <u>Parts Per Million</u>- Students serially dilute food coloring to develop the concepts of parts per million (and parts per billion) for measuring water contaminants.</p> <p><b>Laboratory:</b> <u>Water Purification</u>- Students investigate the use of filters and other methods to purify water.</p> <p><b>Laboratory:</b> <u>Precipitating Specific Contaminants</u>- Students investigate the use of chemicals to precipitate or flocculate contaminants in industrial wastewater.</p> <p><b>Laboratory:</b> <u>Investigating Solutions of Acids and Bases</u>- Students explore the use of (three) pH indicators and test the three water samples from Willow Grove.</p> <p><b>Laboratory:</b> <u>Mixing an Acid and a Base</u>- Students neutralize an acid with a base and explore the use of equations to describe reactions.</p> <p><b>Modeling:</b> <u>A Model for Acid-Base Neutralization</u>- Students explore a particle model to explain neutralization.</p>
<b>Explanation</b> Concepts and Practices	<p><b>Laboratory:</b> <u>Testing Water Quality</u>- Students test simulated water samples for pollutants and make recommendations about whether the water can be used.</p>



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<p><b>Elaboration</b> Extension Activity</p>	<p><b>Talking it Over:</b> <u>John Snow and the Search for Evidence</u>- Students analyze information collected by John Snow that led to his conclusion that the source of the cholera outbreak was contaminated water.</p> <p><b>Reading:</b> <u>Municipal Water Treatment</u>- Students read about, diagram, and discuss how a water treatment plant works.</p> <p><b>Talking it over:</b> <u>Willow Grove’s Water Quality Report</u>- Students read a report on Willow Grove’s Water Quality similar to actual water quality reports of water districts.</p>
<p><b>Evaluation</b> Assessment Tasks</p>	<p><b>Laboratory:</b> <u>Testing and Treating Wastewater</u>- Students test and design a treatment for wastewater before it is discharged to the environment.</p> <p><b>Talking it over:</b> <u>Decisions about Willow Grove’s Water</u>- Students decide whether the three water sources they have tested are suitable for proposed uses. They make recommendations about whether Carla’s neighborhood should join the Willow Grove Water District or continue to use well water, drink bottled or tap water, and any ways to improve water safety in Willow Grove.</p>

## Unit 3: Overview

### [Unit 3: Energy](#)

**Grade: 8**

**Content Area: Physical Science**

**Pacing: 8 Weeks**

#### Essential Question

What energy improvements should a family invest in to make their home more energy efficient?

#### Student Learning Objectives (Performance Expectations)

[MS.PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.](#)

[MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.](#)

[MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.](#)



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<a href="#">MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.</a>
<a href="#">MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.</a>
<b>Core Instructional Materials</b>
Lab Aids: "Evolution" <a href="https://portals.lab-aids.com/mylibrary.htm">https://portals.lab-aids.com/mylibrary.htm</a> SEUPUP <a href="http://www.sepuplhs.org/middle/third-edition/">http://www.sepuplhs.org/middle/third-edition/</a>
<b>Supplemental Materials</b>
NEWSELA: READWORKS: READINGA-Z: NSTA : <a href="https://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=10">https://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=10</a> Science News: <a href="https://www.sciencenewsforstudents.org">https://www.sciencenewsforstudents.org</a> SEUPUP: NF Titles::
<b>Unit Summary</b>
In the context of household energy usage, students explore energy transfer and conservation. The activities explore key energy concepts, including the variety of types of energy, energy transfers within and between systems, the energy chains involved when energy is transformed from one type to a more desired type, and the methods used to quantify energy and determine the efficiency of energy transfers.
<b>Technical Terms</b>
Energy transfer and transformations, Kinetic energy, potential energy, heat energy, solar energy, chemical energy, electrical energy, electric interactions, magnetic interaction, gravitational interactions, electrical currents, energy efficiency, renewable and nonrenewable energy
<b>Formative Assessment Measures</b>
<i>Part A: How should a family invest in their home to make it more energy efficient?</i>
Students who understand the concepts are able to: write a report that gives your energy Improvement recommendation for your family within the budget given. In the report, explain why you recommend the improvements. Include a discussion of the trade-offs involved in the choices you've made.
<b>Summative Assessments</b>
<b>Energy Unit Test</b>

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<b>Group Project: Law of Conservation of Energy</b>		
<b>Alternative Assessments</b>		
<b>Lab Aids Adaptive Tests:</b>		
<b>Lab Report: Calculating amount of energy needed to do work</b>		
<b>Lab Report: Rollercoaster</b>		
<b>Benchmarks</b>		
<b>Energy article based test</b>		
<b>Interdisciplinary Connections</b>		
<b>NJSLS- ELA</b>	<b>NJSLS- Mathematics</b>	
RST.6-8.1	6.SP.B.5	
RST.6-8.2	6.NS.C.5	
RST.6-8.3	6.RP.A.1	
RST.6-8.7	6.RP.A.3	
RST.6-8.9	6.EE.A.2	
WHST.6-8.1	7.RP.A.2	
WHST.6-8.7	7.EE.B.3	
WHST.6-8.8	7.EE.B.4	
WHST.6-8.9	MP.2	
	MP.4	
<b>Core Instructional Materials</b>	Can include: Textbooks Series, Lab Materials, etc.	
<b>21st Century Life and Careers</b>	CRP2, CRP4, CRP5, CRP 6, CRP7, CRP8 ,CRP11,CRP12	
<b>Technology Standards</b>	8.1.8.A.1, 8.1.8.A.2, 8.1.8.A.3, 8.1.8.A.4, 8.1.8.A.5, 8.1.8.D.4	
<b>Modifications</b>		
<b>Modifications to Support Our English Language Learners</b>	<b>Modifications to Support Our Learners (Students with IEPs/504s and At-Risk Learners)</b>	<b>Gifted and Talented</b>
“Energy” - Spanish Edition Leveled Articles: Personal Vocabulary Log	Word walls Visual aides - Models of Potential and Kinetic Energy Graphic organizers for graphing	Curriculum compacting Personal Vocabulary Log Discussion on how the different energies can be

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<p>Intra-act Discussion Web          Leveled Articles          Scaffolding          Word walls          Sentence/paragraph frames          Bilingual dictionaries/translation          Think alouds          Read alouds          Highlight key vocabulary          Annotation guides          Think-pair- share          Visual aides - Potential and Kinetic energy simulations.          Modeling - The differences and effect of the different types of energy.          Cognates</p>	<p>Multimedia - Using          Leveled readers - Different article levels from Newsela          Assistive technology          Notes/summaries          Extended time          Answer masking          Answer eliminator          Highlighter          Color contrast          Teacher tutoring          Peer tutoring          Study guides          Graphic organizers for graphing          Extended time          Parent communication          Modified assignments          Counseling          Personal Vocabulary Log</p>	<p>used to create to benefit humankind.          Challenge assignments and questions - Lab Aids          Enrichment activities - Investigating current events and connecting it to the activities in class.          Tiered activities          Independent research/inquiry - SEPUP          Collaborative teamwork - Natural Selection          Higher level questioning          Critical/Analytical thinking tasks          Self-directed activities - Create a lab that demonstates each kind of energy (kinetic and potential).</p>
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5E Model	
Energy	
<p><b>Engage</b>            Anticipatory Set</p>	<p><b>Investigation:</b> <u>Home Energy Use</u>- Students collect data on six human characteristics and discuss causes of human variation.</p> <p><b>Reading:</b> <u>Conservation of Energy</u>- Students read about the Law of the Conservation of Energy, the process of heat transfer during transformations and the principle of energy efficiency.</p> <p><b>Reading:</b> <u>Electricity Generation</u>- Students investigate the sources of electricity in the United States. They read about renewable and nonrenewable sources and discuss the trade-offs of different electricity generation methods.</p>

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	<p><b>Reading:</b> <u>Household Energy Efficiency</u>- Students read about home energy use, ways to improve energy efficiency and methods of conserving energy.</p>
<p><b>Exploration</b> Student Inquiry</p>	<p><b>Laboratory:</b> <u>Drive a Nail</u>- Students explore energy transfer as they drive a nail into a block. The concepts of kinetic and gravitational potential energy are introduced.</p> <p><b>Investigation:</b> <u>Shake the Shot</u>- Students add mechanical energy to a system and measure the temperature change that results from the energy transformation.</p> <p><b>Laboratory:</b> <u>Motors and Generators</u>- Students construct a simple motor from a wire coil, magnets, and batteries. They investigate ways of making the motor spin faster and observe that a magnetic field is produced around a current-carrying wire. Students then use a motor as a generator to light a light emitting diode (LED).</p> <p><b>Laboratory:</b> <u>Ice Melting Contest</u>- Students explore heat transfer by conduction as they design a method for melting an ice cube as quickly as possible.</p> <p><b>Modeling:</b> <u>Ice-Preserving Contest</u>- Students design a container to preserve an ice cube. They follow this up by reading about ice boxes and refrigeration</p> <p><b>Laboratory:</b> <u>Mixing Hot and Cool Water</u>- Students mix different temperatures and volumes of water in order to analyze the heat transfer that occurs.</p> <p><b>Investigation:</b> <u>Quantifying Energy</u>- Students measure temperature differences with a calorimeter and calculate the energy transferred from Ice to water during melting.</p> <p><b>Laboratory:</b> <u>Measuring Calories</u>- Students use a calorimeter to measure the stored energy in a nut. They use the data to calculate the calories in the nut.</p> <p><b>Laboratory:</b> <u>Energy and Magnetic Fields</u>- Students investigate magnetic fields using a plotting compass. They also read about some of the properties of fields and electromagnets.</p>





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	<p><b>Investigation:</b> <u>Connecting Circuits</u>- Students build simple circuits that transform electrical energy into light, sound, and mechanical energy. They test various materials for conductivity and explore series and parallel circuits.</p> <p><b>Laboratory:</b> <u>Hot Bulbs</u>- Students calculate the efficiency of a flashlight bulb in producing light by measuring how much energy is “wasted” as thermal energy.</p> <p><b>Laboratory:</b> <u>Photovoltaic Cells</u>- Students experiment with photovoltaic cells as they explore the sunlight- electricity energy transformation.</p>
<b>Explanation</b> Concepts and Practices	<p><b>Modeling:</b> <u>Collecting Solar Energy</u>- Students build and compare two boxes; one to absorb as much sunlight as possible and the other one to absorb as little sunlight as possible.</p>
<b>Elaboration</b> Extension Activity	<p><b>Role Play:</b> <u>Roller Coaster Energy</u>- students further examine energy transfer and the transformation between gravitational potential energy and kinetic energy in the context of roller coasters.</p> <p><b>Investigation:</b> <u>Follow the Energy</u>- Students identified different energy types as they follow energy movement in everyday events.</p> <p><b>Laboratory:</b> <u>Solar Heating</u>- Students continue their exploration of solar energy by investigating a model solar heat collector and calculating its efficiency.</p>
<b>Evaluation</b> Assessment Tasks	<p><b>Laboratory:</b> <u>Electrochemical Batteries</u>- Students build a wet cell to explore how different metals react to produce electrical energy. A small motor is used to detect the amount of energy the different reactions produce.</p> <p><b>Investigation:</b> <u>Improving Household Efficiency</u>- Students are presented with the fictional scenarios of families who want to reduce their home energy costs. Using their knowledge of energy concepts, they conduct an economic analysis and make energy-saving recommendations that meet the needs of the family.</p>



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## Unit 4: Overview

### Unit 4: Waves

**Grade: 8**

**Content Area: Physical Science**

**Pacing: 3 Weeks**

### Essential Question

How can different types of waves be hazardous to your health?

### Student Learning Objectives (Performance Expectations)

[MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.](#)

[MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.](#)

### Core Instructional Materials

Lab Aids: "Waves"

<https://portals.lab-aids.com/mylibrary.htm>

### Supplemental Materials

NEWSELA:

READWORKS:

READINGA-Z:

NSTA : <https://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=10>

Science News: <https://www.sciencenewsforstudents.org>

NSTA: <https://ngss.nsta.org/Classroom-Resources.aspx>

### Unit Summary

By exploring the decibel scale, students come to recognize the range of human hearing. The concepts of frequency, wavelength, wave types, and transmission through different media are apply to sound waves. Understanding the various nature of waves students then transition to exploring electromagnetic waves. In doing so, they consider the increased health risks of cataracts and skin cancers due to ultraviolet wave exposure for individuals with different exposure and risk factor profiles. They investigate the varying energy levels of electromagnetic waves and Explorer selected transmission, reflection, and absorption. They design and conduct an experiment to compare the ability of sunscreen to absorb or reflect ultraviolet waves.

### Technical Terms



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Amplitude, wavelength, electromagnetic waves, longitudinal waves, reflected waves, absorbed waves, transverse waves, mechanical waves, light pulses, radio wave pulses, wave properties, sound, light, reflection, transmission, absorption, sound intensity, UV radiation	
<b>Formative Assessment Measures</b>	
<i>Part A: How can waves be hazardous to your health?</i>	
Students who understand the concepts are able to: Use mathematical representations to describe and/or support scientific conclusions about how the amplitude of a wave is related to the energy in a wave. Use mathematical representations to describe a simple model.	
<i>Part B: How can you reduce your risk of ultraviolet exposure?</i>	
Students who understand the concepts are able to: Prepare a personal ultraviolet protection plan by making a list of all the things you can do to reduce your ultraviolet exposure while still participating in the outdoor activities that you enjoy the most. Then identify any trade-offs that are part of your new strategy.	
<b>Summative Assessments</b>	
<b>Waves Unit Test</b> <b>Group Project</b>	
<b>Alternative Assessments</b>	
<b>Lab Aids Adaptive Tests</b> <b>Lab Report: Making Sound Waves</b>	
<b>Benchmarks</b>	
<b>Light wave article based test</b> <b>Sound wave article based test</b>	
<b>Interdisciplinary Connections</b>	
<b>NJSLS- ELA</b>	<b>NJSLS- Mathematics</b>
RST.6-8.1	6.RP.A.1
RST.6-8.3	7.RP.A.2
RST.6-8.9	MP.2
WHST.6-8.9	MP.4
<b>Core Instructional Materials</b>	Can include: Textbooks Series, Lab Materials, etc.
<b>21st Century Life and Careers</b>	CRP2, CRP4, CRP5, CRP 6, CRP7, CRP8 ,CRP11,CRP12



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<b>Technology Standards</b>	8.1.8.A.1, 8.1.8.A.2, 8.1.8.A.3, 8.1.8.A.4, 8.1.8.A.5, 8.1.8.D.4, 8.1.8.E.1,	
<b>Modifications</b>		
<b>Modifications to Support Our English Language Learners</b>	<b>Modifications to Support Our Learners (Students with IEPs/504s and At-Risk Learners)</b>	<b>Modifications to Support Our Gifted and Talented</b>
“Waves” - Spanish Edition Leveled Articles: Personal Vocabulary Log Intra-act Discussion Web Scaffolding Sentence/paragraph frames Bilingual dictionaries/translation Think alouds Read alouds Highlight key vocabulary Annotation guides Think-pair- share Visual aids: light vs. sound wave diagrams Modeling- wave types	Word walls Visual aides- Models of light wave vs. sound wave. Graphic organizers for graphing Personal Vocabulary Log Multimedia Leveled readers - what articles and what levels? Testing Accommodations: Assistive technology, Notes/summaries, Extended time, Answer masking, Answer eliminator, Highlighter, Color contrast	Curriculum compacting Personal Vocabulary Log Discussion Web on waves in the real world Challenge assignments- Create your own lab investigating how spf works. Enrichment activities - Investigating how SPF works. Tiered activities Independent research/inquiry - Collaborative teamwork: Debate (How waves affect our bodies) Higher level questioning Critical/Analytical thinking tasks Self-directed activities

<b>5E Model</b>	
<b>Waves</b>	
<b>Engage</b> Anticipatory Set	<b>Investigation: It’s a Noisy World-</b> Students are introduced to the physical properties of waves with a scenario that engages them in the properties of sound within the context of hearing loss. Students use mathematical representations to analyze data and identify patterns and sound intensity.

BOE adopted 5/2017



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	<p><b>Reading:</b> <u>The Nature of Sound</u>- Students learn about longitudinal waves as they obtain, evaluate, and communicate information from text, diagrams, and graphs. Students engage with the cross-cutting concept of structure and function as they read about the hearing process and the anatomy of the ear.</p> <p><b>Reading:</b> <u>The Electromagnetic Spectrum</u>- Students complete a reading that integrates textual and visual information that extends their understanding of the electromagnetic spectrum. Through the examples of classic experiments, student see that scientific knowledge is based on logical and conceptual connections between evidence and explanations. While reading about applications of electromagnetic energy, students are shown how technologies extend the capabilities of scientific investigation.</p>
<p><b>Exploration</b> Student Inquiry</p>	<p><b>Investigation:</b> <u>Making Sound Waves</u>- students experiment with producing noises of varied intensity and frequency as they begin to build an understanding of the properties of sound. Students then create a model of a sound wave using a metal spring.</p> <p><b>Investigation:</b> <u>Noise- Induced Hearing Loss</u>- Students use mathematics and computational thinking as they analyze and interpret data related to the risk of noise-induced hearing loss. Students read the profiles of several individuals and evaluate the risk of noise-induced hearing loss for each one. Students examine the structure and function of the protection provided by two kinds of ear protection.</p> <p><b>Investigation:</b> <u>Telephone Model</u>- Students model how noise interference affects the transmission and reception of analog and digital signals. They find that the structure of digitized signals, sent as wave pulses, function as a more reliable way to encode and transmit information.</p> <p><b>Laboratory:</b> <u>Wave Reflection</u>- Students investigate the reflection of sound and light waves. Building on observations of the relationship between the direction of incident and reflected sound waves, students analyze collected data and deduce the law of reflection as applied to light waves. They model the law as they create ray diagrams to represent both regular and diffuse reflection.</p> <p><b>Laboratory:</b> <u>Refraction of Light</u>- Students experiment with the transmission of light rays by planning and carrying out an investigation of the refraction of light through water. Looking for patterns in their data, student search for qualitative relationship between the angle of incidence, angle of refraction, and total internal reflection.</p> <p><b>Laboratory:</b> <u>Comparing Colors</u>- students collect evidence that indicates that different colors of light carry different amounts of energy. Students analyze and interpret light transmission graphs for three different sunglass lenses. They determine which sunglass lens (structure) provides the best protection (function) for the eyes.</p>



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	<p><b>Laboratory: <u>Selective Transmission</u></b>- Students conduct an investigation to test how different films affect the transmission and absorption of light. As they analyze and interpret the data they have collected, they learned that invisible waves are present at both ends of the visible spectrum. Students select and justify which structural films would be most functional to use on windows in three different situations.</p>
<p><b>Explanation</b> Concepts and Practices</p>	<p><b>Investigation: <u>Another Kind of Wave</u></b>- Students use a model to identify patterns to deduce the inverse relationship between frequency and wavelength, and the direct relationship between amplitude and energy. Students perform calculations and make conceptual connections to make an explanation of the relationships found.</p> <p><b>Laboratory: <u>Where Does the Light Go?</u></b>- Students conduct an investigation on the behavior of ultraviolet and infrared on different services. Students analyze and interpret patterns in their data and then use the model in the activity to explain how structures can be designed to minimize or maximize reflection or absorption.</p>
<p><b>Elaboration</b> Extension Activity</p>	<p><b>Reading: <u>Analog and Digital Technology</u></b>- Students clarify the findings of the previous activity by integrating those results with information in written text. Students explore the history of the development of hearing aids as an example of how technology influences the progress of Science and how science has influenced advances in technology.</p>
<p><b>Evaluation</b> Assessment Tasks</p>	<p><b>Laboratory: <u>Blocking Out Ultraviolet</u></b>- students apply the concepts of transmission, reflection, and absorption of ultraviolet while planning and carrying out an investigation. Students use models to compare the effectiveness of sunscreen and moisturizing lotion and blocking ultraviolet.</p> <p><b>Talking it over: <u>Personal Protection Plan</u></b>- students integrate scientific and Technical information in a table with written text to evaluate the relative risk of developing cataracts and skin cancer for several individual profiles. Students create connections between scientific knowledge and society by having students consider how the consequences of actions relate to exposure to ultraviolet.</p>