

**Randolph Township School District  
Randolph Elementary Schools**

**Science Curriculum  
Grade 4**

*“The future belongs to the curious. The ones who are not afraid to try it, explore it, poke at it, question it, and turn it inside out.”-Anonymous*

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**Randolph Township School District  
Randolph Elementary Schools  
Fourth Grade- Science**

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## **Mission Statement**

*We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.*

### **Randolph Township School District Affirmative Action Statement**

#### **Equality and Equity in Curriculum**

The Randolph Township School district ensures that the district's curriculum and instruction are aligned to the state's standards. The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

# **RANDOLPH TOWNSHIP BOARD OF EDUCATION**

## **EDUCATIONAL GOALS**

### **VALUES IN EDUCATION**

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization, which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:

- The needs of the child come first
- Mutual respect and trust are the cornerstones of a learning community
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members
- A successful learning community communicates honestly and openly in a non-threatening environment
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth

**Randolph Township School District**  
**Randolph Elementary Schools**  
**Science~ Grade 4**

Introduction

The fourth grade science curriculum aims to be student centered and engaging. It is intended to include a variety of learning experiences, instructional approaches, and academic support strategies to meet the needs of every student. Guided by a multidisciplinary approach, students learn that information is interconnected and can be applied to all content areas. This curriculum is based on the NJSL-S which are expressed as performance expectations integrating the practices, crosscutting concepts, and disciplinary core ideas. Students will engage in engineering and technology tasks. They will also examine energy, waves, how information can be transferred using technology, plant and animal structures and functions, changes to Earth's surface, rocks and fossils, natural resources and natural hazards.

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Science ~ Grade 4**

<b>SUGGESTED TIME ALLOTMENT</b>	<b>UNIT NUMBER</b>	<b>CONTENT- UNIT OF STUDY</b>
<b>3 Weeks</b>	<b>I</b>	Engineering Design
<b>5 Weeks</b>	<b>II</b>	Energy, Motion, and Weathering
<b>6 Weeks</b>	<b>III</b>	Transfer of Energy and Information
<b>5 Weeks</b>	<b>IV</b>	Waves and Earth Features

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**

**Science ~ Grade 4**

**UNIT I: Engineering Design**

**TRANSFER:** Analyze problems, construct explanations, and design solutions.

<b>STANDARDS / GOALS:</b>	<b>ENDURING UNDERSTANDINGS</b>	<b>ESSENTIAL QUESTIONS</b>
<p><b><u>NJSLS-S</u></b></p> <p><b>3-5-ETS1-1:</b> 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><b>3-5-ETS1-2:</b> 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><b>3-5-ETS1-3:</b> Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p> <p><b><u>ELA/Literacy</u></b> <b>RI.5.1</b></p>	<p>People’s needs and wants change over time, as do their demands for new and improved technologies.</p>	<ul style="list-style-type: none"> <li>• How do engineers define problems and design solutions?</li> </ul>
	<p>Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.</p>	<ul style="list-style-type: none"> <li>• How do engineers test and improve prototypes?</li> </ul>
	<p><b>KNOWLEDGE</b></p>	<p><b>SKILLS</b></p>
	<p><b>Students will know:</b></p> <p>Problems are identified based on local or global need</p> <p>Possible solutions to a problem are limited by available materials and resources.</p>	<p><b>Students will be able to:</b></p> <p>Define a simple design problem that includes specified criteria and considers constraints.</p> <p>Record questions about the problem</p> <p>Research a problem before beginning to design possible solutions</p> <p>Generate and compare multiple possible solutions to a problem.</p>

<p><b>RI.5.7</b>  <b>RI.5.9</b>  <b>W.5.7</b>  <b>W.5.8</b>  <b>W.5.9</b></p> <p><b><u>Mathematics</u></b>  <b>MP.2</b>  <b>MP.4</b>  <b>MP.5</b>  <b>5.OA</b></p> <p><b><u>Technology</u></b>  <b>8.1.5.A.1</b>  <b>8.1.5.A.2</b>  <b>8.1.5.A.3</b>  <b>8.1.5.A.5</b></p>	<p>Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria and constraints.</p> <p>Different solutions need to be tested in order to determine which of them best solves the problem.</p> <p>Collaboration is an important part of the design process, and shared ideas can lead to improved designs.</p> <p><b>KEY TERMS:</b> constraint, criteria, engineering, failure analysis, fair test, optimize</p>	<p>Plan tests in which variables are controlled</p> <p>Carry out tests and record observations.</p> <p>Consider failure points to identify aspects of a model or prototype that can be improved.</p> <p>Interpret information and draw conclusions based on the best analysis</p> <p>Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence</p> <p>Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal</p>
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**ASSESSMENT EVIDENCE: Students will show their learning by:**

- Designing and building an enhancing device that does not rely on batteries (ie: wearable hearing enhancing device)
- Developing a model for a solution to a problem (ie: designing a portable chair)

**KEY LEARNING EVENTS AND INSTRUCTION:**

- Define a design problem and identify the constraints and criteria for a design solution
- Research and design possible solutions to a problem, and investigate how well your solution performs
- Plan, design, and test possible solutions for a prototype to determine which design best solves a problem within given criteria and constraints
- Identify failure points or difficulties with a design and suggest and implement changes that improve it
- Communicate in order to share observations, gain insight, and optimize future solutions and designs

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**

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**UNIT I: Engineering Design**

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 Weeks	UNIT I: Engineering Design	<p><b><u>Suggested Resources</u></b></p> <p><b>Science Dimensions</b>            Unit 1: Lessons 1-3            Unit 1 Performance Task: Designing a Portable Chair</p> <p><b>You Tube</b>  <u>Crash Course Kids:</u>  <i>What's an Engineer?</i>  <a href="https://www.youtube.com/watch?v=owHF9iLyxic">https://www.youtube.com/watch?v=owHF9iLyxic</a>  <i>The Engineering Process</i>  <a href="https://www.youtube.com/watch?v=fxJWin195kU">https://www.youtube.com/watch?v=fxJWin195kU</a></p> <p><b>Safari Montage</b>  <i>Design Squad: Rock On</i>  <a href="https://safari.rtnj.org/?a=259032&amp;d=32851AA">https://safari.rtnj.org/?a=259032&amp;d=32851AA</a></p> <p><b>Literary Resources –</b>  <i>The Most Magnificent Thing</i> By Ashley Spires  <i>What Do You Do With a Problem?</i> By Kobi Yamada  <i>The Kids' Invention Book</i> By Arlene Erlbach  <i>Neo Leo</i> By Gene Barretta  <i>Now &amp; Ben</i> By Gene Barretta  <i>What's the Big Idea, Ben Franklin</i> By Jean Fritz  <i>Winter's Tail</i> By Craig Hatkoff</p>

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**

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**UNIT II: Energy, Motion, and Weathering**

<b>TRANSFER:</b> Analyze the relationship between components of Earth systems.		
<b>STANDARDS / GOALS:</b>	<b>ENDURING UNDERSTANDINGS</b>	<b>ESSENTIAL QUESTIONS</b>
<p><b><u>NJSLS-S</u></b></p> <p><b>4-PS3-1:</b> Use evidence to construct an explanation relating the speed of an object to the energy of that object.</p> <p><b>4-PS3-3:</b> Ask questions and predict outcomes about the changes in energy that occur when objects collide.</p> <p><b>4-ESS1-1:</b> Identify evidence from patterns in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for changes in a landscape over time.</p> <p><b>4-ESS2-1:</b> Make observations and/or measurements to provide evidence of the effects of</p>	Energy can be transferred in various ways and between objects.	<ul style="list-style-type: none"> <li>● How do collisions show energy?</li> </ul>
	Patterns can be used as evidence to support an explanation.	<ul style="list-style-type: none"> <li>● What are some patterns fossils show us?</li> </ul>
	Cause and effect relationships are routinely identified, tested, and used to explain change.	<ul style="list-style-type: none"> <li>● How do water and other factors shape Earth’s surface?</li> </ul>
	<b>KNOWLEDGE</b>	<b>SKILLS</b>
	<p><b>Students will know:</b></p> <p>The faster a given object is moving, the more energy it possesses.</p> <p>Energy can be moved from place to place by moving objects or through sound, light, or electric currents.</p>	<p><b>Students will be able to:</b></p> <p>Use evidence to construct an explanation relating the speed of an object to the energy of that object.</p> <p>Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p>

<p>weathering or the rate of erosion by water, ice, wind, or vegetation.</p> <p><b>3-5-ETS1-2:</b> 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><b><u>ELA/Literacy</u></b>  <b>W.4.2</b>  <b>W.4.7</b>  <b>W.4.8</b>  <b>W.4.9</b>  <b>RI.4.5</b>  <b>RI.4.7</b>  <b>SL.4.1.C</b></p> <p><b><u>Math</u></b>  <b>4.OA.A.3</b>  <b>4.MD.A.1</b>  <b>4.MD.A.2</b>  <b>MP.2</b>  <b>MP.4</b>  <b>MP.5</b></p> <p><b><u>Technology</u></b>  <b>8.1.5.A.1</b>  <b>8.1.5.A.2</b>  <b>8.1.5.A.3</b>  <b>8.1.5.A.5</b></p>	<p>Energy can be transferred from one object to another through collision.</p> <p>Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes.</p> <p>The presence and location of certain fossil types indicate the order in which rock layers were formed.</p> <p>Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.</p> <p>Researching a design to solve a problem should be carried out before testing that solution to see how well it performs under a range of likely conditions.</p>	<p>Ask questions and predict outcomes about the changes in energy that occur when objects collide.</p> <p>Identify evidence from patterns in rock formations to support an explanation for changes in a landscape over time.</p> <p>Identify evidence from fossils in rock layers to support an explanation for changes in a landscape over time.</p> <p>Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p> <p>Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p> <p>Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> <p>Recall relevant information from experiences or gather relevant information from print and digital sources, take notes, and categorize information.</p> <p>Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to discussions.</p>
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	<p><b>KEY TERMS:</b> collision, electric current, energy, energy transfer, energy transformation, heat, vibrate, deposition, erosion, weathering, fossil, relative age</p>	<p>Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.</p>
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**ASSESSMENT EVIDENCE: Students will show their learning by:**

- Planning and carrying out an investigation of energy transfer from one object into another (ie: Truck Pull- design and test a truck)
- Designing solutions to lessen, end or reverse the effects of weathering (ie: Nearby Weathering- affecting weathering near school)

**KEY LEARNING EVENTS AND INSTRUCTION:**

- Recognize common transformations of electrical energy such as how energy flows through an electrical cord
- Observe energy transfers and recognize the correlation between speed and the amount of energy an object possesses
- Identify collisions as a form of motion energy transfer (such as in a game of pool)
- Examine fossils and other geologic evidence to understand what past environments were like
- Examine fossils and other geologic evidence to understand how environments have changed over time, and how changes to Earth's surface have affected them
- Identify, explain, and record evidence about how water shapes Earth's surface and describe ways in which water causes weathering, erosion, and deposition to take place
- Identify how the speed and volume of water affects weathering
- Identify, explain, and record evidence about factors that shape Earth's surface, such as rainfall, organisms, weathering, erosion, and deposition

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UNIT II: Energy, Motion, and Weathering

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
5 Weeks	UNIT II: Energy, Motion, and Weathering	<p><b><u>Suggested Resources</u></b></p> <p><b>Science Dimensions</b> Unit 2: Lessons 1 and 3 Unit 2 Project: Truck Pull Unit 7: Lesson 3 Unit 6: Lessons 1 and 2 Unit 6 Project: Nearby Weathering</p> <p><b>Brainpop</b> <i>Forms of Energy</i> <a href="https://www.brainpop.com/science/energy/formsofenergy/">https://www.brainpop.com/science/energy/formsofenergy/</a> <i>Weathering</i> <a href="https://www.brainpop.com/science/weather/weathering/">https://www.brainpop.com/science/weather/weathering/</a> <i>Erosion</i> <a href="https://www.brainpop.com/science/earthsystem/erosion/">https://www.brainpop.com/science/earthsystem/erosion/</a></p> <p><b>Brainpop Jr.</b> <i>Fast Land Changes</i> <a href="https://jr.brainpop.com/science/land/fastlandchanges/">https://jr.brainpop.com/science/land/fastlandchanges/</a> <i>Slow Land Changes</i> <a href="https://jr.brainpop.com/science/land/slowlandchanges/">https://jr.brainpop.com/science/land/slowlandchanges/</a> <i>Fossils</i> <a href="https://jr.brainpop.com/science/land/fossils/">https://jr.brainpop.com/science/land/fossils/</a></p>

		<p><b>You Tube</b> Crash Course Kids: <i>Weathering and Erosion</i> <a href="https://www.youtube.com/watch?v=R-Iak3Wvh9c">https://www.youtube.com/watch?v=R-Iak3Wvh9c</a></p> <p><b>Literary Resources –</b> <i>Forms of Energy</i> By Anna Claybourne <i>Fossils</i> By Ann O. Squire <i>The Magic School Bus Inside the Earth</i> By Joanna Cole and Bruce Degen <i>Geology: The Study of Rocks</i> By Susan Gray <i>Grand Canyon National Park</i> By David Petersen <i>Island</i> By Jason Chin <i>On This Spot</i> By Susan Goodman <i>Rocks and Minerals</i> By Judith Bauer Stamper <i>Caves</i> By Judith Bauer Stamper <i>Yellowstone National Park</i> By David Petersen</p>
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**RANDOLPH TOWNSHIP SCHOOL DISTRICT**

**Science ~ Grade 4**

**UNIT III: Transfer of Energy and Information**

<b>TRANSFER:</b> Utilize systems to model relationships.		
<b>STANDARDS / GOALS:</b>	<b>ENDURING UNDERSTANDINGS</b>	<b>ESSENTIAL QUESTIONS</b>
<p><b><u>NJSLS-S</u></b></p> <p><b>4-PS3-2:</b> Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p> <p><b>4-PS4-2:</b> Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p> <p><b>4-PS4-3:</b> Generate and compare multiple solutions that use patterns to transfer information.</p> <p><b>4-LS1-1:</b> Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p>	Energy can be transferred in various ways and between objects.	<ul style="list-style-type: none"> <li>● How is energy transferred?</li> </ul>
	Cause and effect relationships are routinely identified.	<ul style="list-style-type: none"> <li>● How does light reflect from objects?</li> </ul>
	Similarities and differences in patterns can be used to sort and classify designed products.	<ul style="list-style-type: none"> <li>● What are ways information is transferred from place to place?</li> </ul>
	A system can be described in terms of its components and their interactions.	<ul style="list-style-type: none"> <li>● What structures help plants and animals function, grow, and reproduce?</li> </ul>
	<b>KNOWLEDGE</b>	<b>SKILLS</b>
	<p><b>Students will know:</b></p> <p>Energy can be used locally to produce motion, sound, heat or light.</p> <p>Matter effects how light can be seen.</p>	<p><b>Students will be able to:</b></p> <p>Make observations to provide evidence that energy can be used to create new forms of energy.</p> <p>Investigate how images differ when light interacts with air and water.</p>

<p><b>4-LS1-2:</b> 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.</p> <p><b>3-5 ETS1-2:</b> 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>An object can be seen when light reflected from its surface enters the eyes.</p> <p>Digitized information can be transmitted over long distances without significant degradation.</p> <p>Plants internal and external structures that serve various functions.</p>	<p>Develop a model to describe how light reflecting from objects and entering the eye allows objects to be seen.</p> <p>Generate and compare multiple solutions that use patterns to transfer information.</p> <p>Explore and compare patterns in multiple methods of transferring information.</p> <p>Gather evidence about the function and structure of plant parts.</p>
<p><b><u>ELA/Literacy</u></b></p> <p><b>W.4.1</b>  <b>W.4.2</b>  <b>W.4.7</b>  <b>W.4.8</b>  <b>W.4.9</b>  <b>RI.4.1</b>  <b>RI.4.2</b>  <b>RI.4.3</b>  <b>RI.4.5</b>  <b>RI.4.7</b>  <b>RI.4.8</b>  <b>RI.4.9</b>  <b>SL.4.2</b>  <b>SL.4.5</b>  <b>L.4.4</b></p>	<p>Animals have internal and external structures that serve various functions.</p> <p>Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain.</p>	<p>Construct an argument that plants have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <p>Gather evidence about the function and structure of animal parts.</p> <p>Construct an argument that animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <p>Compare similar body parts that have similar and different uses from species to species</p> <p>Use a model to describe how animals receive different types of information through their senses, process, and respond to the information.</p>
<p><b><u>Mathematics</u></b></p> <p><b>4.OA.C.5</b>  <b>4.OA.A.3</b>  <b>4.G.A</b></p>	<p><b>KEY TERMS:</b> transparent, opaque, reflection, translucent, fertilization, leaf, pollination, reproduction, root, seed, spore, stem, external structures, internal structures, organ, organ system, receptors</p>	

4.MD.A.1

MP.2

MP.4

**Technology**

8.1.5.A.1

8.1.5.A.2

8.1.5.A.3

8.1.5.A.5

**ASSESSMENT EVIDENCE: Students will show their learning by:**

- Designing a solution to improve lighting conditions in a specific location
- Investigating a problem that can be solved using structures of both plants and animals (ie: plants and animals working together for pollination)

**KEY LEARNING EVENTS AND INSTRUCTION:**

- Understand and observe energy transfer involving light, sound, and heat, and provide evidence illustrating the changes that result
- Transfer information using codes and a pixilated image. [ie: 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.]
- Identify how light interacts with mirrors, lenses, prisms, and non-reflective surfaces due to their unique properties
- In science notebooks, take notes about the function and structure of plant parts in order to construct an argument that these parts are used for survival, growth, reproduction, and behavior
- Describe the process of pollination and fertilization in both flowering and nonflowering plants
- Identify the basic reproductive structures of plants and how the parts form a system for reproduction
- Identify the external parts animals have and how their parts are used for growth, survival, behavior, and reproduction
- Observe and describe some of the internal structures of animals
- Recognize that some animals have modified systems or don't have them at all
- Construct an argument that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**

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**UNIT III: Transfer of Energy and Information**

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
5 Weeks	UNIT III: Transfer of Energy and Information	<p><b><u>Suggested Resources</u></b></p> <p><b>Science Dimensions</b>            Unit 2: Lesson 2            Unit 3: Lessons 2 and 3            Unit 3 Project: Reflecting Light            Unit 4: Lessons 1 and 2            Unit 5: Lessons 1-3            Unit 4 Project: Plant and Animal Partnerships</p> <p><b>Brainpop</b>  <i>Light</i>  <a href="https://www.brainpop.com/science/energy/light/">https://www.brainpop.com/science/energy/light/</a></p> <p><b>Brainpop Jr.</b>  <i>Parts of a Plant</i>  <a href="https://jr.brainpop.com/science/plants/partsofaplant/">https://jr.brainpop.com/science/plants/partsofaplant/</a>  <i>Plant Adaptations</i>  <a href="https://jr.brainpop.com/science/plants/plantadaptations/">https://jr.brainpop.com/science/plants/plantadaptations/</a></p> <p><b>Other Instructional Videos</b>  <i>Super Senses of Animals</i>  <a href="http://mocomi.com/super-senses-of-animals/">http://mocomi.com/super-senses-of-animals/</a></p> <p><b>Literary Resources –</b>  <i>Energy Island</i> By Allan Drummond  <i>My Light How Sunlight Becomes Electricity</i> By Molly Bang</p>

		<p><i>Electrical Wizard How Nikola Tesla Lit up the World</i> By Elizabeth Rusch</p> <p><i>Animal Senses: How Animals See, Hear, Taste, Smell, and Feel</i> By Pamela Hickman</p> <p><i>All About Manatees</i> By Jim Arnosky</p> <p><i>Amphibians</i> By Christine Taylor-Butler</p> <p><i>Bizarre Bug Records</i> By Ryan Herndon</p> <p><i>Bones</i> By Steve Jenkins</p> <p><i>Burp!</i> By Diane Swanson</p> <p><i>The Circulatory Story</i> By Mary Corcoran</p> <p><i>Geckos</i> By Katie Marsico</p> <p><i>Growing Patterns</i> By Sarah Campbell</p> <p><i>I Wonder Why Snakes Shed Their Skins</i> By Amanda O'Neill</p> <p><i>Komodo Dragon vs. King Cobra</i> By Jerry Pallotta</p> <p><i>Monster Plants</i> By Rice</p> <p><i>Nic Bishop: Spiders</i> By Bishop</p> <p><i>Redwoods</i> By Chin</p> <p><i>Scorpions</i> By Franchino</p> <p><i>Wolverine vs. Tasmanian Devil</i> By Jerry Pallotta</p> <p><i>You Can't See Your Bones with Binoculars</i> By Barry Ziefert</p> <p><i>The Magic School Bus Explores the Senses</i> By Joanna Cole</p> <p><i>The Nervous System</i> By Christine Taylor-Butler</p> <p><i>Senses</i> By Jinny Johnson</p> <p><i>What Makes You Cough, Sneeze, Burp, Hiccup, Blink, Yawn, Sweat, and Shiver?</i> By Jean Stangl</p> <p><i>Bouncing Light</i> By Janine Scott</p> <p><i>Alexander Graham Bell</i> By Mike Venezia</p> <p><i>Build a Room Alarm</i> By Sandra Markle</p> <p><i>Experiments with Electricity</i> By Susan Gray</p>
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**RANDOLPH TOWNSHIP SCHOOL DISTRICT**

**Science ~ Grade 4**

**UNIT IV: Waves and Earth Features**

<b>TRANSFER:</b> Analyze patterns and systems and their impact on Earth.		
<p><b>STANDARDS / GOALS:</b></p> <p><b><u>NJSLS-S</u></b></p> <p><b>4-PS4-1:</b> Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.</p> <p><b>4-ESS2-1:</b> Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p> <p><b>4-ESS2-2:</b> Analyze and interpret data from maps to describe patterns of Earth’s features.</p> <p><b>4-ESS3-1:</b> Obtain and combine information to describe that energy</p>	<p><b>ENDURING UNDERSTANDINGS</b></p>	<p><b>ESSENTIAL QUESTIONS</b></p>
	Similarities and differences in patterns can be used to sort, classify, and analyze simple rates of change for natural phenomena.	<ul style="list-style-type: none"> <li>● How do patterns help us understand Earth’s features?</li> </ul>
	Cause and effect relationships are routinely identified and used to explain change.	<ul style="list-style-type: none"> <li>● What renewable and nonrenewable resources are used for energy?</li> </ul>
	Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and meet societal demands.	<ul style="list-style-type: none"> <li>● How can people reduce the impact of land and water-based hazards?</li> </ul>
	<p><b>KNOWLEDGE</b></p>	<p><b>SKILLS</b></p>
<p><b>Students will know:</b></p> <p>Different properties of waves will produce unique patterns of energy.</p>	<p><b>Students will be able to:</b></p> <p>Analyze the relationship between energy patterns and wave properties.</p> <p>Determine variables that affect a wave’s amplitude and wavelength.</p>	

<p>and fuels are derived from natural resources and their uses affect the environment.</p> <p><b>4-ESS3-2:</b> Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.</p> <p><b><u>ELA/Literacy</u></b></p> <p><b>W.4.1</b>  <b>W.4.7</b>  <b>W.4.8</b>  <b>W.4.9</b>  <b>RI.4.1</b>  <b>RI.4.5</b>  <b>RI.4.7</b>  <b>RI.4.9</b>  <b>SL.4.5</b></p> <p><b><u>Mathematics</u></b></p> <p><b>4.MD.A.1</b>  <b>4.MD.A.2</b>  <b>4.OA.A.1</b>  <b>MP.2</b>  <b>MP.4</b></p> <p><b><u>Technology</u></b></p> <p><b>8.1.5.A.1</b>  <b>8.1.5.A.2</b>  <b>8.1.5.A.3</b>  <b>8.1.5.A.5</b></p>	<p>Waves of the same type can differ in amplitude and wavelength.</p> <p>Wave energy crashing along the coast can cause land to changes.</p> <p>Maps can help locate the different land and water features found on Earth, which occur in patterns.</p> <p>Energy and fuels that humans use are derived from natural sources.</p> <p>Some energy and fuels that humans use are renewable over time, and others are not</p> <p>A variety of hazards result from natural processes.</p> <p>Humans can take steps to reduce the impacts of natural hazards.</p>	<p>Describe wave patterns in terms of varying amplitude and wavelength.</p> <p>Develop a model to demonstrate patterns of waves</p> <p>Analyze the effects of waves on landforms.</p> <p>Communicate findings on the cause and effect relationship of waves and landforms.</p> <p>Analyze and interpret data from maps to describe patterns of Earth’s features.</p> <p>Obtain information to describe that energy and fuels are derived from natural resources.</p> <p>Compare and contrast renewable and nonrenewable resources.</p> <p>Explain how the use of energy and fuels affect the environment.</p> <p>Analyze hazards that occur as a result of natural processes.</p> <p>Generate multiple solutions to reduce the impacts of natural Earth processes on humans.</p> <p>Compare and contrast the benefits and drawbacks of each solution.</p>
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	<p><b>KEY TERMS:</b> amplitude, crest, trough, volume, wave, wavelength, continent, ocean trench, desert, rain forest, elevation, scale, drawback, natural hazard, natural resource, nonrenewable resource, pollution, renewable resource, resource</p>	<p>Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal</p>
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**ASSESSMENT EVIDENCE: Students will show their learning by:**

- Develop models to demonstrate the effects of how a land feature is changed by wind or water.
- Develop a solution to minimize the risk of a hazard in a community. (ie: planning strategies to minimize the danger and damage of flooding)

**KEY LEARNING EVENTS AND INSTRUCTION:**

- Differentiate between wavelength and amplitude using a model
- Observe how waves interact
- Analyze the cause and effect relationship of wave energy and changes to landform
- Interpret map contents that illustrate topographical features
- Use maps as sources of data about Earth's features
- Identify and explain where on Earth's surface earthquakes, volcanoes, mountains, and ocean trenches can be found
- Use maps to describe the patterns observed in the locations of land and water forms
- Understand that humans use energy and fuels derived from natural resources
- Use books and other media to explain the use and reuse of natural resources as well as gain the knowledge that human needs change over time
- Understand that humans use energy and fuels derived from natural resources
- Investigate renewable resources and apply that knowledge to evaluate the benefits and drawbacks of renewable resources
- Describe a variety of Earth processes on land that can be hazardous to humans, and how the impact of these processes can be lessened
- Analyze and describe a variety of water-based processes that can be hazardous to humans
- Design and test multiple solutions to lessen the impacts of these natural Earth processes on humans

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**

Science ~ Grade 4

**UNIT IV: Waves and Earth Features**

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
6 Weeks	UNIT IV: Waves and Earth Features	<p><b><u>Suggested Resources</u></b></p> <p><b>Science Dimensions</b>            Unit 3: Lesson 1            Unit 6: Lessons 3 and 4            Unit 8: Lessons 1-4            Unit 8 Performance Task: Avoiding Disaster</p> <p><b>Brainpop</b>  <i>Waves</i>  <a href="https://www.brainpop.com/science/energy/waves/">https://www.brainpop.com/science/energy/waves/</a>  <i>Natural Disasters</i>  <a href="https://www.brainpop.com/science/earthsystem/naturaldisasters/">https://www.brainpop.com/science/earthsystem/naturaldisasters/</a>  <i>Earthquakes</i>  <a href="https://www.brainpop.com/science/earthsystem/earthquakes/">https://www.brainpop.com/science/earthsystem/earthquakes/</a>  <i>Tsunamis</i>  <a href="https://www.brainpop.com/science/earthsystem/tsunami/">https://www.brainpop.com/science/earthsystem/tsunami/</a>  <i>Volcanoes</i></p>

<https://www.brainpop.com/science/earthsystem/volcanoes/Mountains>  
<https://www.brainpop.com/science/earthsystem/mountains/Humans and the Environment>  
<https://www.brainpop.com/science/ourfragileenvironment/humansandtheenvironment/>

**Literary Resources –**

*Sound* By Anna Claybourne  
*The Flood That Came to Grandma’s House* By Linda Stallone  
*What Shapes the Land* By Bobbie Kalman  
*Sound, Heath, & Light: Energy At Work* By Melvin Berger  
*Energy* By Matthew Mullins  
*The Industrial Revolution* By Melissa McDaniel  
*The Shocking Truth About Energy* By Loreen Leedy  
*Maps and Mapping* By Deborah Chancellor  
*I Survived the San Francisco Earthquake* By Lauren Tarshis  
*If You Liveed at the Time of the Great San Francisco Earthquake* Ellen Levine  
*Magic Tree House Research Guide: Tsunamis and Other Natural Disasters* By Natalie Boyce  
*Seymour Simon’s Wild Earth* By Seymour Simon  
*Tsunami!* By Kimiko Kajikawa  
*Tsunamis* By Chana Stiefel  
*Volcano* By Patricia Lauber  
*Volcanoes and Earthquakes* By Patricia Lauber