Quinton Township School District
Science
Grade 4
Pacing Guide

Unit	1	**Unit Title:**	Landforms and Rock Formations	**Pacing:**	23 Days

Unit Summary: In this unit of study, students develop understandings of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation. The crosscutting concepts of patterns and cause and effect are called out as organizing concepts. Students demonstrate grade-appropriate proficiency in planning and carrying out investigations and constructing explanations. Students are also expected to use these practices to demonstrate understanding of the core ideas. #

Essential Questions:
What do the shapes of landforms and rock formations tell us about the past?

Objectives:
- Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
- Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

NJSLS-Science Standards: 4-ESS2-1, 4-ESS1-1 and MS.ESS2-4

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Planning and Carrying Out Investigations Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.	**Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break	**Cause and Effect** Cause and effect relationships are routinely identified, tested, and used to explain change.

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Constructing Explanations and Designing Solutions Identify the evidence that supports particular points in an explanation.	rocks, soils, and sediments into smaller particles and move them around. **Biogeology** Living things affect the physical characteristics of their regions. **The History of Planet Earth** Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.	**Patterns** Patterns can be used as evidence to support an explanation.
Interdisciplinary Connections: W.WR.4.5, SL.PE.4.1, 4.DL.A.1, 4.DL.A.2		
Career Readiness, Life Literacies, and Key Skills: 9.1.5.CR.1, 9.1.5.FP.3, 9.1.5.RM.1, 9.4.5.CI.1, 9.4.5.CT.1, 9.4.5.CT.4		
Computer Science and Design Thinking: 9.4.5.IML.2, 9.4.5.IML.3, 9.4.5.IML.7		
Career Education: 9.2.5.CAP.4		

Overview of Activity/Focus	Instructional Materials	Technology Infusion
• Using firsthand observations and media resources of the local environment, observe the types of living things that are common in the region and gather evidence that water, ice, wind, organisms, and gravity have broken down rocks, soils, and sediments into smaller pieces and have	**Core Materials** *National Geographic Science* **Supplemental Resources** Mystery Science	Smart Board Applications Google Applications Chromebooks Gizmo IXL

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moved them from one place to another. ● Build models that demonstrate how wind, water, and ice cause change to the surface of the earth. # ● Change a variable—such as the type of earth material (sand, soil, clay, silt), the angle of a hill's slope, the volume of water flow, the speed of wind—then collect and analyze data in order to determine the effects. ● Conduct an investigation of how plants are used to prevent erosion but can also cause erosion ● Investigate how these forces change land over time by examining local photographs, videos, or fossil evidence.	Little Science Thinkers PBS Learning Media NatGeo Science Video: Bill Nye Erosion Video: Gary's Sand Journal	

Assessments	
Formative Assessments ● Class Discussions ● Self Assessment ● Science Investigation Data Collections	**Summative Assessments** ● Models of Earth Changes ● Post-investigation Oral Assessments ● Final Project
Benchmark Assessments ● District-assigned Benchmark Assessments (e.g. LinkIt, content-specific benchmarks)	**Alternative Assessments** ● Alternative Choice Projects ● Oral Assessments

Differentiation			
Special Education	**MLL**	**At Risk**	**Gifted and Talented**
● **Modify and accommodate as listed in student IEP or 504 plan.** ● **Communicate clear, concise directions and repeat, reword,**	● **Basic Skills Instruction** ● **Speech/Language Therapy** ● **Rosetta Stone** ● **Provide English/Native Language Dictionary for use.**	● **Basic Skills Instruction** ● **Provide after-school tutoring services.** ● **Hold fall and spring parent conferences.**	● **Allow self-directed learning for growth though independent projects.** ● **Challenge students with age-appropriate texts at**

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modify as necessary. • **Use visual aids in lessons.** • **Utilize extended time and/or reduce item number for homework and tests.** • **Vary formative assessment styles to drive next point of instruction.** • **Create modified assessments.** • **Allow students to utilize online audio books, when appropriate.** • **Allow for collaboration through strategically selected groups.** • **Utilize assistive technology as appropriate.** • **Utilize graphic organizers.** • **Provide and model sentence frames/sentence starters.** • **Utilize manipulatives as necessary.** • **Provide breaks to allow for refocusing as necessary.**	• **Place with native-language-speaking teacher/paraprofessional as available.** • **Use target words and cognates to understand texts.** • **Remind students to underline passages and list words they don't understand.** • **Learn/Utilize/Display some words in the students' native language.** • **Provide and model sentence frames to help students participate in discussion.** • **Provide word banks to help students write.** • **Translate printed communications in native language for parents.** • **Hold conferences with translator present.**	• **Make modifications to instructional plans based on I and RS Plan.** • **Utilize wait time effectively.** • **Develop a record system to encourage good behavior and completion of work.** • **Utilize scaffolding to support instruction.** • **Provide counseling if necessary to help students cope with challenges.** • **Utilize strategic grouping with a positive academic role model.** • **Utilize graphic organizers.**	**higher reading levels.** • **Allow for the development and application of productive thinking skills to enable students to re-conceptualize existing knowledge and/or generate new knowledge.** • **Provide for the development of self-understanding of one's relationships with people, societal institutions, nature and culture.**

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Quinton Township School District
Science
Grade 4

Unit	2	**Unit Title:**	Natural Earth Processes	**Pacing:**	23 Days

Unit Summary:

In this unit of study, students apply their knowledge of natural Earth processes to generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. In order to describe patterns of Earth's features, students analyze and interpret data from maps. The crosscutting concepts of *patterns*, *cause and effect*, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, and constructing explanations and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas. #

Essential Questions:

Is it possible to engineer ways to protect humans from natural Earth?

Objectives:

- Analyze and interpret data from maps to describe patterns of Earth's features.
- Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

NJSLS-Science Standards: 4-ESS2-2, 4-ESS3-2, 3-5-ETS1-2, and 3-5-ETS1-3.

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Analyzing and Interpreting Data	**Plate Tectonics and Large-Scale System Interactions**	**Patterns** Patterns can be used as evidence to support

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Analyze and interpret data to make sense of phenomena using logical reasoning. **Constructing Explanations and Designing Solutions** Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. **Planning and Carrying Out Investigations** Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.	The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. **Natural Hazards** A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. **Designing Solutions to Engineering Problems** Testing a solution involves investigating how well it performs under a range of likely conditions. **Developing Possible Solutions** Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage,	an explanation. **Cause and Effect** Cause and effect relationships are routinely identified, tested, and used to explain change. - **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science on Society and the Natural World** Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

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	communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. **Optimizing the Design Solution** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	

Interdisciplinary Connections: W.WR.4.5, W.SE.4.6, SL.PI.4.4, 4.DL.A.1, 4.DL.A.2, 2.1.5.CHSS.2, 6.1.5.CivicsPD.3

Career Readiness, Life Literacies, and Key Skills: 9.1.5.CR.1, 9.1.5.RM.1, 9.4.5.CI.1, 9.4.5.CI.3, 9.4.5.CT.1, 9.4.5.CT.2, 9.4.5.CT.3, 9.4.5.CT.4

Computer Science and Design Thinking: 9.4.5.IML.2, 9.4.5.IML.3, 9.4.5.IML.6, 9.4.5.IML.7, 8.1.5.DA.1, 8.1.5.DA.4, 8.1.5.DA.5

Career Education: 9.2.5.CAP.4

Overview of Activity/Focus	Instructional Materials	Technology Infusion
• Use topographic maps of Earth's land and ocean floor in order to locate features such as mountains, mountain ranges, deep ocean trenches, and other ocean floor structures, explaining patterns in the types of structures	**Core Materials** *National Geographic Science* **Supplemental Resources**	Smart Board Applications Google Applications Chromebooks Gizmo

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and where these structures are found. ● Analyze data to identify patterns of earth events, including volcanoes and earthquakes, occurring along these boundaries. ● Engage in the engineering design process such as "Building for the Big One" in order to generate and compare multiple solutions that reduce the impacts of natural Earth processes on humans. # ● Watch videos of environmental engineers and discuss their job responsibilities.	Mystery Science videos & activities Little Science Thinkers PBS Learning Media NatGeo Science Design Challenge: Building for the Big One Lesson: Engineering for the Three Little Pigs Video: Environmental Engineering	IXL

Assessments	
Formative Assessments ● Class Discussions ● Investigation Data ● Exit Tickets ● Journal Responses	**Summative Assessments** ● Design Group Projects ● Post-investigation Oral Assessments ● Unit Assessment
Benchmark Assessments ● District-assigned Benchmark Assessments (e.g. LinkIt, content-specific benchmarks)	**Alternative Assessments** ● Alternative Choice Projects ● Oral Assessments

Differentiation			
Special Education	**MLL**	**At Risk**	**Gifted and Talented**
● **Modify and accommodate as listed in student IEP or 504 plan.** ● **Utilize wait time effectively.**	● **Basic Skills Instruction** ● **Speech/Language Therapy** ● **Rosetta Stone** ● **Provide English/Native**	● **Basic Skills Instruction** ● **Provide after-school tutoring services.** ● **Hold fall and spring parent**	● **self-directed learning for growth though independent projects.** ● **Challenge students with**

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• Communicate clear, concise directions and repeat, reword, modify as necessary. • Use visual aids during lessons and small-group time. • Utilize open-ended questioning techniques. • Utilize extended time and/or reduce number of items given for homework, quizzes, and tests. • Vary formative assessment styles to drive next point of instruction. • Create modified assessments. • Allow students to utilize online audio books, when appropriate. • Allow for collaboration through strategically selected groups. • Utilize assistive technology as appropriate. • Utilize graphic organizers. • Provide and model sentence frames/sentence starters. • Utilize manipulatives as necessary. • Provide breaks to allow for refocusing as necessary.	Language Dictionary for use. • Place with native-language-speaking teacher/paraprofessional as available. • Use target words and cognates to understand texts. • Remind students to underline passages and list words they don't understand. • Learn/Utilize/Display some words in the students' native language. • Provide and model sentence frames to help students participate in discussion. • Provide word banks to help students write. • Translate printed communications in native language for parents. • Hold conferences with translator present.	conferences. • Make modifications to instructional plans based on I and RS Plan. • Utilize wait time effectively. • Develop a record system to encourage good behavior and completion of work. • Utilize scaffolding to support instruction. • Provide counseling if necessary to help students cope with challenges. • Utilize strategic grouping with a positive academic role model. • Utilize graphic organizers.	age-appropriate texts at higher reading levels. • Allow for the development and application of productive thinking skills to enable students to re-conceptualize existing knowledge and/or generate new knowledge. • Provide for the development of self-understanding of one's relationships with people, societal institutions, nature and culture.

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Quinton Township School District
Science
Grade 4

Unit	3	**Unit Title:**	**Internal and External Structures**	**Pacing:**	23 Days

Unit Summary:
In this unit of study, students develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. The crosscutting concepts of *systems and system models* are called out as organizing concepts for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency in engaging in argument from evidence. Students are also expected to use this practice to demonstrate understanding of the core ideas.

Essential Questions:
How do the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction?

Objectives:
- Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

NJSLS-Science Standards: 4-LS1-1

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Engaging in Argument from Evidence Construct an argument with evidence, data, and/or a model.	**Structure and Function** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.	**Systems and System Models** A system can be described in terms of its components and their interactions.

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Interdisciplinary Connections: W.IW.4.2, W.WR.4.5, SL.PI.4.4		
Career Readiness, Life Literacies, and Key Skills: 9.4.5.CI.3, 9.4.5.CT.3		
Computer Science and Design Thinking: 9.4.5.IML.2, 9.4.5.IML.4		
Overview of Activity/Focus	**Instructional Materials**	**Technology Infusion**
• In nature walks or through multimedia, observe plants and animals, gathering evidence that organisms are living systems. • Working in groups, observe the structures of an animal or plant, explain the function of each, and describe how these structures help the animal grow, survive, and/or reproduce, they should use evidence from their observations to support their explanations. • Present findings to classmates.	**Core Materials** *National Geographic Science* **Supplemental Resources** Mystery Science videos & activities PBS Learning Media NatGeo Science Video: Animal Mouth Structures	Smart Board Applications Google Applications Chromebooks Gizmo IXL
Assessments		
Formative Assessments • Class Discussions • Research Data • Exit Tickets • Journal Responses	**Summative Assessments** • Research Presentations • Post-investigation Oral Assessments • Unit Assessment	
Benchmark Assessments • District-assigned Benchmark Assessments (e.g. LinkIt, content-specific benchmarks)	**Alternative Assessments** • Alternative Choice Projects • Oral Assessments	

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Differentiation			
Special Education	**MLL**	**At Risk**	**Gifted and Talented**
• Modify and accommodate as listed in student IEP or 504 plan. • Communicate clear, concise directions and repeat, reword, modify as necessary. • Use visual aids in instruction. • Utilize extended time and/or reduce number of items given for homework, quizzes, and tests. • Vary formative assessment styles to drive next point of instruction. • Create modified assessments. • Allow students to utilize online audio books, when appropriate. • Utilize assistive technology as appropriate. • Utilize graphic organizers. • Provide and model sentence frames/sentence starters. • Utilize manipulatives as necessary. • Provide breaks to allow for refocuing as necessary.	• Basic Skills Instruction • Speech/Language Therapy • Rosetta Stone • Provide English/Native Language Dictionary for use. • Place with native-language-speaking teacher/paraprofessional as available. • Use target words and cognates to understand texts. • Remind students to underline passages and list words they don't understand. • Learn/Utilize/Display some words in the students' native language. • Provide and model sentence frames to help students participate in discussion. • Provide word banks to help students write. • Translate printed communications in native language for parents. • Hold conferences with translator present.	• Basic Skills Instruction • Provide after-school tutoring services. • Hold fall and spring parent conferences. • Make modifications to instructional plans based on I and RS Plan. • Utilize wait time effectively. • Develop a record system to encourage good behavior and completion of work. • Utilize scaffolding to support instruction. • Provide counseling if necessary to help students cope with challenges. • Utilize strategic grouping with a positive academic role model. • Utilize graphic organizers.	• self-directed learning for growth though independent projects. • Challenge students with age-appropriate texts at higher reading levels. • Allow for the development and application of productive thinking skills to enable students to re-conceptualize existing knowledge and/or generate new knowledge. • Provide for the development of self-understanding of one's relationships with people, societal institutions, nature and culture.

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Quinton Township School District
Science
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Unit	4	**Unit Title:**	Animal Senses and Behavior	**Pacing:**	23 Days

Unit Summary:

In this unit of study, students use information and models to identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth. The crosscutting concept of *patterns* is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in *developing and using models* and *obtaining, evaluating, and communicating information*. Students are also expected to use these practices to demonstrate understanding of the core ideas. They will also examine the role of specialized climate scientists called glaciologists. #

Essential Questions:

How do animals use their perceptions and memories to make decisions?

Objectives:

- 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.
- Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

NJSLS-Science Standards: 4-LS1-2 and 4-PS4-2

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Developing and Using Models Use a model to test interactions concerning the functioning of a natural system.	**Information Processing** Different sense receptors are specialized for particular kinds of information, which may be	**Systems and System Models** A system can be described in terms of its components and their interactions.

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Develop a model to describe phenomena.	then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. **Electromagnetic Radiation** An object can be seen when light reflected from its surface enters the eyes.	**Cause and Effect** Cause and effect relationships are routinely identified.

Interdisciplinary Connections: W.WR.4.5, SL.PE.4.1, 4.DL.A.1, 4.DL.A.4

Career Readiness, Life Literacies, and Key Skills: 9.4.5.CI.3, 9.4.5.CT.4

Computer Science and Design Thinking: 9.4.5.IML.2, 9.4.5.IML.3, 9.4.5.IML.7

Overview of Activity/Focus	Instructional Materials	Technology Infusion
• Observe animals, either through direct observation or using text and digital resources, to create drawings, diagrams, and/or pictures to describe the ways that animals (and humans) receive, process, store, and respond to information from the environment in order to survive, grow, and reproduce. • Demonstrate the construct and mechanism of a pinhole viewer. Then have students go outside and view objects using the pinhole viewers. As students make observations, they should document what they observed. • Draw diagrams of the human eye and compare how the pinhole viewer and eye are similar.	**Core Materials** *National Geographic Science* **Supplemental Resources** Mystery Science videos & activities Little Science Thinkers PBS Learning Media NatGeo Science Video: Human Eye Lesson: Pinhole Cameras and Eyes	Smart Board Applications Google Applications Chromebooks Gizmo IXL

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Assessments	
Formative Assessments ● Class Discussions ● Recorded Observations ● Exit Tickets ● Journal Responses	**Summative Assessments** ● Completed Eye Diagrams ● Post-investigation Oral Assessments ● Unit Assessment
Benchmark Assessments ● District-assigned Benchmark Assessments (e.g. LinkIt, content-specific benchmarks)	**Alternative Assessments** ● Alternative Choice Projects ● Oral Assessments

Differentiation			
Special Education	**MLL**	**At Risk**	**Gifted and Talented**
● **Modify and accommodate as listed in student IEP or 504 plan.** ● **Communicate clear, concise directions and repeat, reword, modify as necessary.** ● **Use visual aids in instruction.** ● **Utilize extended time and/or reduce number of items given for homework, quizzes, and tests.** ● **Vary formative assessment styles to drive next point of instruction.** ● **Create modified assessments.** ● **Allow students to utilize online audio books, when appropriate.** ● **Allow for collaboration through strategically selected**	● **Basic Skills Instruction** ● **Speech/Language Therapy** ● **Rosetta Stone** ● **Provide English/Native Language Dictionary for use.** ● **Place with native-language-speaking teacher/paraprofessional as available.** ● **Use target words and cognates to understand texts.** ● **Remind students to underline passages and list words they don't understand.** ● **Learn/Utilize/Display some words in the students' native language.** ● **Provide and model sentence frames to help students participate in discussion.** ● **Provide word banks to help**	● **Basic Skills Instruction** ● **Provide after-school tutoring services.** ● **Hold fall and spring parent conferences.** ● **Make modifications to instructional plans based on I and RS Plan.** ● **Utilize wait time effectively.** ● **Develop a record system to encourage good behavior and completion of work.** ● **Utilize scaffolding to support instruction.** ● **Provide counseling if necessary to help students cope with challenges.** ● **Utilize strategic grouping with a positive academic role model.** ● **Utilize graphic organizers.**	● **self-directed learning for growth though independent projects.** ● **Challenge students with age-appropriate texts at higher reading levels.** ● **Allow for the development and application of productive thinking skills to enable students to re-conceptualize existing knowledge and/or generate new knowledge.** ● **Provide for the development of self-understanding of one's relationships with people, societal institutions, nature and culture.**

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groups. • **Utilize assistive technology as appropriate.** • **Utilize graphic organizers.** • **Provide and model sentence frames/sentence starters.** • **Utilize manipulatives as necessary.** • **Provide breaks to allow for refocusing as necessary.**	**students write.** • **Translate printed communications in native language for parents.** • **Hold conferences with translator present.**		

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Quinton Township School District
Science
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Unit	5	**Unit Title:**	Energy Transfers	**Pacing:**	22 Days

Unit Summary:
In this unit of study, fourth-grade students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents. Students also obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment. The crosscutting concepts of *cause and effect, energy and matter*, and *the interdependence of science, engineering, and technology,* and *influence of science, engineering, and technology on society and the natural world* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations and obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate understanding of the core ideas. #

Essential Questions:
Where do we get the energy we need for modern life?

Objectives:
- Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

NJSLS-Science Standards: 4-PS3-2 and 4-ESS3-1

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Planning and Carrying Out Investigations	**Definitions of Energy**	**Energy and Matter**

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Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. **Obtaining, Evaluating, and Communicating Information** Obtain and combine information from books and other reliable media to explain phenomena.	Energy can be moved from place to place by moving objects or through sound, light, or electric currents. **Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. **Light also transfers energy from place to place.** Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. **Natural Resources** Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.	Energy can be transferred in various ways and between objects. **Cause and Effect** Cause and effect relationships are routinely identified and used to explain change.

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Interdisciplinary Connections: W.WR.4.5, SL.PE.4.1, 4.DL.A.1		
Career Readiness, Life Literacies, and Key Skills: 9.1.5.EG.3, 9.1.5.FP.2, 9.4.5.CI.1		
Computer Science and Design Thinking: 9.4.5.IML.2, 9.4.5.IML.3, 9.4.5.IML.7		
Career Education: 9.2.5.CAP.4		
Overview of Activity/Focus	**Instructional Materials**	**Technology Infusion**
• Conduct simple investigations, using thermometers to measure changes in temperature as heat energy is transferred from a warmer object to a colder one. Pour hot water into a large Styrofoam cup, and then place a smaller plastic cup of cold water inside the larger cup of water. Using a thermometer can be placed in each cup, observe and record changes in the temperature of the water in each cup every minute over the course of about 10–15 minutes, or until the temperatures are the same. • Use data as evidence to explain a conjecture about heat energy. • Place a thermometer in the palm of a student's hand, close the hands around it, and measure the temperature. Place a piece or two of ice into the student's palms, closing a fist around the ice until it melts. Measure the temperature of the palms, noting the change. Make a conjecture about heat energy based on data. • Build a simple electric circuit to test energy transfer. • Through multimedia sources, explain the advantages and disadvantages of fossil fuels.#	**Core Materials** *National Geographic Science* **Supplemental Resources** Mystery Science videos & activities Little Science Thinkers PBS Learning Media: Thermal Energy Transfer NatGeo Science Project: Switch Energy Project: Wind Generator	Smart Board Applications Google Applications Chromebooks Gizmo IXL

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Assessments	
Formative Assessments ● Class Discussions ● Energy Transfer Data ● Exit Tickets ● Journal Responses	**Summative Assessments** ● Conjectures with Data Support ● Post-investigation Oral Assessments ● Unit Assessment
Benchmark Assessments ● District-assigned Benchmark Assessments (e.g. LinkIt, content-specific benchmarks)	**Alternative Assessments** ● Alternative Choice Projects ● Oral Assessments

Differentiation			
Special Education	**MLL**	**At Risk**	**Gifted and Talented**
● **Modify and accommodate as listed in student IEP or 504 plan.** ● **Communicate clear, concise directions and repeat, reword, modify as necessary.** ● **Use visual aids in instruction.** ● **Utilize extended time and/or reduce number of items given for homework, quizzes, and tests.** ● **Vary formative assessment styles to drive next point of instruction.** ● **Create modified assessments.** ● **Allow students to utilize online audio books, when appropriate.** ● **Allow for collaboration through strategically selected**	● **Basic Skills Instruction** ● **Speech/Language Therapy** ● **Rosetta Stone** ● **Provide English/Native Language Dictionary for use.** ● **Place with native-language-speaking teacher/paraprofessional as available.** ● **Use target words and cognates to understand texts.** ● **Remind students to underline passages and list words they don't understand.** ● **Learn/Utilize/Display some words in the students' native language.** ● **Provide and model sentence frames to help students participate in discussion.** ● **Provide word banks to help**	● **Basic Skills Instruction** ● **Provide after-school tutoring services.** ● **Hold fall and spring parent conferences.** ● **Make modifications to instructional plans based on I and RS Plan.** ● **Utilize wait time effectively.** ● **Develop a record system to encourage good behavior and completion of work.** ● **Utilize scaffolding to support instruction.** ● **Provide counseling if necessary to help students cope with challenges.** ● **Utilize strategic grouping with a positive academic role model.** ● **Utilize graphic organizers.**	● **self-directed learning for growth though independent projects.** ● **Challenge students with age-appropriate texts at higher reading levels.** ● **Allow for the development and application of productive thinking skills to enable students to re-conceptualize existing knowledge and/or generate new knowledge.** ● **Provide for the development of self-understanding of one's relationships with people, societal institutions, nature and culture.**

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groups. • **Utilize assistive technology as appropriate.** • **Utilize graphic organizers.** • **Provide and model sentence frames/sentence starters.** • **Utilize manipulatives as necessary.** • **Provide breaks to allow for refocusing as necessary.**	**students write.** • **Translate printed communications in native language for parents.** • **Hold conferences with translator present.**		

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Quinton Township School District
Science
Grade 4

Unit	6	**Unit Title:**	Speed and Energy Relationships	**Pacing:**	22 Days

Unit Summary:
In this unit of study, students are able to use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object, and are expected to develop an understanding that energy can be transferred from object to object through collisions. The crosscutting concept of e*nergy and matter* is called out as an organizing concept. Students are expected to demonstrate grade-appropriate proficiency in asking questions, defining problems, and constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Essential Questions:
What is the relationship between the speed of an object and the energy of that object?

Objectives:
- 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.

NJSLS-Science Standards: 4-PS3-1 and 4-PS3-3

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Planning and Carrying Out Investigations Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.	**Definitions of Energy** The faster a given object is moving, the more energy it possesses.	**Energy and Matter** Energy can be transferred in various ways and between objects.

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Asking Questions and Defining Problems Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. **Constructing Explanations and Designing Solutions** Use evidence (e.g., measurements, observations, patterns) to construct an explanation.)	Energy can be moved from place to place by moving objects or through sound, light, or electric currents. **Conservation of Energy and Energy Transfer** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. **Relationship Between Energy and Forces** When objects collide, the contact forces transfer energy so as to change the objects' motions.	

Interdisciplinary Connections: W.WR.4.5, SL.PE.4.1, 4.DL.A.1

Career Readiness, Life Literacies, and Key Skills: 9.1.5.EG.3, 9.1.5.FP.2, 9.4.5.CI.1

Computer Science and Design Thinking: 9.4.5.IML.2, 9.4.5.IML.3, 9.4.5.IML.7

Career Education: 9.2.5.CAP.4

Overview of Activity/Focus	Instructional Materials	Technology Infusion
• Explore objects in motion by rolling balls down ramps,	**Core Materials**	Smart Board Applications

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building and racing rubber band cars, or building roller coasters. Collect data about the relative speed of objects in relation to the strength of the force applied to them. ● Conduct multiple trials, increasing and decreasing the amount of energy, then collect qualitative data observing the impact differing amounts of energy have on the relative speed of the object in motion. ● Write an explanation of the relationship between the relative speed of an object and its energy. ● Investigate the relationship between speed and energy and collisions to find effects of: ○ Change(s) in the direction of motion, in speed in the type of energy (e.g., motion energy to sound energy, sound energy to heat energy) and in the type of motion (rolling to bouncing). ● Explore the qualifications and responsibilities of rocket and car designers and engineers.	*National Geographic Science* **Supplemental Resources** Mystery Science videos & activities Little Science Thinkers PBS Learning Media: Rubber Band Car NatGeo Science Project: Popcan Porsche Lessons: NASA Rockets	Google Applications Chromebooks Gizmo IXL

Assessments	
Formative Assessments ● Class Discussions ● Investigation Data ● Exit Tickets ● Journal Responses	**Summative Assessments** ● Written Explanations with Data Support ● Post-investigation Oral Assessments ● Unit Assessment
Benchmark Assessments ● District-assigned Benchmark Assessments (e.g. LinkIt, content-specific benchmarks)	**Alternative Assessments** ● Alternative Choice Projects ● Oral Assessments

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Differentiation			
Special Education	**MLL**	**At Risk**	**Gifted and Talented**
• Modify and accommodate as listed in student IEP or 504 plan. • Communicate clear, concise directions and repeat, reword, modify as necessary. • Use visual aids in instruction. • Utilize extended time and/or reduce number of items given for homework, quizzes, and tests. • Vary formative assessment styles to drive next point of instruction. • Create modified assessments. • Allow students to utilize online audio books, when appropriate. • Allow for collaboration through strategically selected groups. • Utilize assistive technology as appropriate. • Utilize graphic organizers. • Provide and model sentence frames/sentence starters. • Utilize manipulatives as necessary. • Provide breaks to allow for refocusing as necessary.	• Basic Skills Instruction • Speech/Language Therapy • Rosetta Stone • Provide English/Native Language Dictionary for use. • Place with native-language-speaking teacher/paraprofessional as available. • Use target words and cognates to understand texts. • Remind students to underline passages and list words they don't understand. • Learn/Utilize/Display some words in the students' native language. • Provide and model sentence frames to help students participate in discussion. • Provide word banks to help students write. • Translate printed communications in native language for parents. • Hold conferences with translator present.	• Basic Skills Instruction • Provide after-school tutoring services. • Hold fall and spring parent conferences. • Make modifications to instructional plans based on I and RS Plan. • Utilize wait time effectively. • Develop a record system to encourage good behavior and completion of work. • Utilize scaffolding to support instruction. • Provide counseling if necessary to help students cope with challenges. • Utilize strategic grouping with a positive academic role model. • Utilize graphic organizers.	• self-directed learning for growth though independent projects. • Challenge students with age-appropriate texts at higher reading levels. • Allow for the development and application of productive thinking skills to enable students to re-conceptualize existing knowledge and/or generate new knowledge. • Provide for the development of self-understanding of one's relationships with people, societal institutions, nature and culture.

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Quinton Township School District
Science
Grade 4

Unit	7	**Unit Title:**	Designing Energy Conservation Devices	**Pacing:**	22 Days

Unit Summary:
In this unit of study, students use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object. Students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents or from objects through collisions. They apply their understanding of energy to design, test, and refine a device that converts energy from one form to another. The crosscutting concepts of *energy and matter* and *the influence of engineering, technology, and science on society and the natural world* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems, planning and carrying out investigations, constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate their understanding of the core ideas.

Essential Questions:
How can scientific ideas be applied to design, test, and refine a device that converts energy from one form to another?

Objectives:
- Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 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.
- 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.

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NJSLS-Science Standards: 4-PS3-4, 3-5-ETS1-1, 3-5-ETS1-2, and 3-5-ETS1-3		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Constructing Explanations and Designing Solutions Apply scientific ideas to solve design problems. Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. **Asking Questions and Defining Problems** Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. **Planning and Carrying Out Investigations** Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.	**Conservation of Energy and Energy Transfer** Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. **Relationship Between Energy and Forces** When objects collide, the contact forces transfer energy so as to change the objects' motions. **Energy in Chemical Processes and Everyday Life** The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. **Defining and Delimiting Engineering Problems** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be	**Energy and Matter** Energy can be transferred in various ways and between objects. **Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science on Society and the Natural World** Engineers improve existing technologies or develop new ones. **Connections to Nature of Science** **Science is a Human Endeavor** Most scientists and engineers work in teams. Science affects everyday life. **Influence of Science, Engineering, and Technology on Society and the Natural World** People's needs and wants change over time, as do their demands for new and improved technologies. Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

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	compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. **Developing Possible Solutions** Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. **Optimizing the Design Solution** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	
Interdisciplinary Connections: W.WR.4.5, SL.PE.4.1, 4.DL.A.1		
Career Readiness, Life Literacies, and Key Skills: 9.1.5.EG.3, 9.1.5.FP.2, 9.4.5.CI.1		
Computer Science and Design Thinking: 9.4.5.IML.2, 9.4.5.IML.3, 9.4.5.IML.7		
Career Education: 9.2.5.CAP.4		

Overview of Activity/Focus	Instructional Materials	Technology Infusion
• Apply scientific ideas about force, motion, and energy in order to design, test, and refine a device that converts energy from one form to another. • As a class, create a list of all the concepts that they have learned about force, motion, and energy. • Brainstorm examples of simple devices that convert energy from one form to another. As students give examples, the teacher should draw one or two and have students describe how each device converts energy from one form to another. • Present a "Design Challenge" to build a simple device that converts energy from one form to another. (Limited to those that convert motion energy to electric energy or that use stored energy to cause motion or produce light or sound. • In small groups, create a poster that includes a diagram of the device and a description of how the device transfers energy from one form to another. Every group should have the opportunity to present their device and explain how it works. • Compare each of the design solutions based on how well they meet criteria and constraints, giving evidence to support their thinking. • Refine their designs based on class feedback.	**Core Materials** *National Geographic Science* **Supplemental Resources** Mystery Science videos & activities Little Science Thinkers PBS Learning MediaProject: Make a Lantern Lessons: The Sound of Science Book: *The Boy Who Harnessed the Wind*	Smart Board Applications Google Applications Chromebooks Gizmo IXL

Assessments	
Formative Assessments	**Summative Assessments**

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• Class Discussions • Prototype Designs • Design Peer Feedback • Exit Tickets • Journal Responses	• Completed Project Designs • Post-investigation Oral Assessments • Unit Assessment
Benchmark Assessments • District-assigned Benchmark Assessments (e.g. LinkIt, content-specific benchmarks)	**Alternative Assessments** • Alternative Choice Projects • Oral Assessments

Differentiation			
Special Education	**MLL**	**At Risk**	**Gifted and Talented**
• **Modify and accommodate as listed in student IEP or 504 plan.** • **Communicate clear, concise directions and repeat, reword, modify as necessary.** • **Use visual aids in instruction.** • **Utilize extended time and/or reduce number of items given for homework, quizzes, and tests.** • **Vary formative assessment styles to drive next point of instruction.** • **Create modified assessments.** • **Allow students to utilize online audio books, when appropriate.** • **Allow for collaboration through strategically selected groups.** • **Utilize assistive technology**	• **Basic Skills Instruction** • **Speech/Language Therapy** • **Rosetta Stone** • **Provide English/Native Language Dictionary for use.** • **Place with native-language-speaking teacher/paraprofessional as available.** • **Use target words and cognates to understand texts.** • **Remind students to underline passages and list words they don't understand.** • **Learn/Utilize/Display some words in the students' native language.** • **Provide and model sentence frames to help students participate in discussion.** • **Provide word banks to help students write.** • **Translate printed**	• **Basic Skills Instruction** • **Provide after-school tutoring services.** • **Hold fall and spring parent conferences.** • **Make modifications to instructional plans based on I and RS Plan.** • **Utilize wait time effectively.** • **Develop a record system to encourage good behavior and completion of work.** • **Utilize scaffolding to support instruction.** • **Provide counseling if necessary to help students cope with challenges.** • **Utilize strategic grouping with a positive academic role model.** • **Utilize graphic organizers.**	• **self-directed learning for growth though independent projects.** • **Challenge students with age-appropriate texts at higher reading levels.** • **Allow for the development and application of productive thinking skills to enable students to re-conceptualize existing knowledge and/or generate new knowledge.** • **Provide for the development of self-understanding of one's relationships with people, societal institutions, nature and culture.**

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as appropriate. • **Utilize graphic organizers.** • **Provide and model sentence frames/sentence starters.** • **Utilize manipulatives as necessary.** • **Provide breaks to allow for refocusing as necessary.**	**communications in native language for parents.** • **Hold conferences with translator present.**		

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Quinton Township School District
Science
Grade 4

Unit	8	**Unit Title:**	Waves	**Pacing:**	22 Days

Unit Summary:
In this unit of study, students use a model of waves to describe patterns of waves in terms of amplitude and wavelength and to show that waves can cause objects to move. The crosscutting concepts of *patterns*; *interdependence of science, engineering, and technology*; and i*nfluence of engineering, technology, and science on society and the natural world* are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, and constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate their understanding of the core ideas.

Essential Questions:
How can we use waves to gather and transmit information?

Objectives:
- Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
- Generate and compare multiple solutions that use patterns to transfer information.
- 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.
- 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.

NJSLS-Science Standards: 4-PS4-1, 4-PS4-2, 4-PS4-3

Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**

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Constructing Explanations and Designing Solutions Apply scientific ideas to solve design problems. Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. **Asking Questions and Defining Problems** Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. **Planning and Carrying Out Investigations** Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.	**Conservation of Energy and Energy Transfer** Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. **Relationship Between Energy and Forces** When objects collide, the contact forces transfer energy so as to change the objects' motions. **Energy in Chemical Processes and Everyday Life** The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. **Defining and Delimiting Engineering Problems** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. **Developing Possible Solutions**	**Energy and Matter** Energy can be transferred in various ways and between objects. - **Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science on Society and the Natural World** Engineers improve existing technologies or develop new ones. - **Connections to Nature of Science Science is a Human Endeavor** Most scientists and engineers work in teams. Science affects everyday life. **Influence of Science, Engineering, and Technology on Society and the Natural World** People's needs and wants change over time, as do their demands for new and improved technologies. Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

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	Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. **Optimizing the Design Solution** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	

Interdisciplinary Connections: W.WR.4.5, SL.PE.4.1, 4.DL.A.1

Career Readiness, Life Literacies, and Key Skills: 9.1.5.EG.3, 9.1.5.FP.2, 9.4.5.CI.1

Computer Science and Design Thinking: 9.4.5.IML.2, 9.4.5.IML.3, 9.4.5.IML.7

Overview of Activity/Focus	Instructional Materials	Technology Infusion
• Model the properties of waves by disturbing the surface of water in a variety of pans and buckets, observing and describing similarities and differences in the wave patterns created, including directionality, height	**Core Materials** *National Geographic Science* **Supplemental Resources**	Smart Board Applications Google Applications Chromebooks Gizmo

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(amplitude), and distance between wave peaks (wavelength). ● Develop models using drawings, diagrams, or physical models (such as a slinky or jump rope) to show the basic properties of waves (amplitude and wavelength). Discuss other real-world examples of waves, including sound and light waves. ● As a class, brainstorm a list of ways in which patterns have been used in the past to communicate over distance. Some examples include the use of smoke signals, drums, and Morse code on a telegraph. ● Small groups collaboratively conduct research to determine other possible ways of communicating using patterns over distances. ● As a class, determine criteria and possible constraints on the design solutions. Criteria might include that groups must communicate information using patterns, the design solution must communicate over a predetermined distance, and groups must be able to describe how patterns were used in the design to communicate over a distance. Possible constraints might include materials available to build/create a device and the amount of time available to design and build. ● Small groups work collaboratively to design and build a device or design a process for communicating information over a distance. Some examples could include: ○ Drums sending coded information through sound waves	Mystery Science videos & activities Little Science Thinkers PBS Learning Media NatGeo Science Project: Make a Lantern Lessons: Utah Education Network	IXL

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Use a flashlight to convey information using a pattern of on and off.
Use Morse code to send information.
Build an instrument with a box and rubber bands of varying sizes that can be plucked in a pattern to communicate information.
Use musical patterns on a xylophone or tuning forks to convey information.
Use string and cups to build a simple “phone” to send information.

Present designs to class and compare solutions.

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plan. • Communicate clear, concise directions and repeat, reword, modify as necessary. • Use visual aids in instruction. • Utilize extended time and/or reduce number of items given for homework, quizzes, and tests. • Vary formative assessment styles to drive next point of instruction. • Create modified assessments. • Allow students to utilize online audio books, when appropriate. • Allow for collaboration through strategically selected groups. • Utilize assistive technology as appropriate. • Utilize graphic organizers. • Provide and model sentence frames/sentence starters. • Utilize manipulatives as necessary. • Provide breaks to allow for refocusing as necessary.	• Rosetta Stone • Provide English/Native Language Dictionary for use. • Place with native-language-speaking teacher/paraprofessional as available. • Use target words and cognates to understand texts. • Remind students to underline passages and list words they don't understand. • Learn/Utilize/Display some words in the students' native language. • Provide and model sentence frames to help students participate in discussion. • Provide word banks to help students write. • Translate printed communications in native language for parents. • Hold conferences with translator present.	services. • Hold fall and spring parent conferences. • Make modifications to instructional plans based on I and RS Plan. • Utilize wait time effectively. • Develop a record system to encourage good behavior and completion of work. • Utilize scaffolding to support instruction. • Provide counseling if necessary to help students cope with challenges. • Utilize strategic grouping with a positive academic role model. • Utilize graphic organizers.	projects. • Challenge students with age-appropriate texts at higher reading levels. • Allow for the development and application of productive thinking skills to enable students to re-conceptualize existing knowledge and/or generate new knowledge. • Provide for the development of self-understanding of one's relationships with people, societal institutions, nature and culture.

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