Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT : Science COURSE : Grade 4

Curriculum Development Timeline

School: Township of Ocean Elementary Schools

Course: Science, Grade 4

Department: Science

Board Approval	Supervisor	Notes
February 2009	Jessica Shaw	Born Date
June 2011	Christine Picerno	Revisions
August 2017	Christine Picerno	Revisions
March 2019	Christine Picerno	Review
August 2021	Rich Steckhahn	Alignment to Standards & Revisions
August 2022	Patrick Sullivan	Incorporate State Mandates

Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT : Science

COURSE : Grade 4

Township of Ocean Pacing Guide			
Week	Marking Period 1	**Week**	Marking Period 3
1	Unit 1: Earth Science	21	Unit 3: Physical Science - Energy and Motion
2	Unit 1: Earth Science	22	Unit 3: Physical Science - Energy and Motion
3	Unit 1: Earth Science	23	Unit 3: Physical Science - Energy and Motion
4	Unit 1: Earth Science	24	Unit 3: Physical Science - Energy and Motion
5	Unit 1: Earth Science	25	Unit 3: Physical Science - Energy and Motion
6	Unit 1: Earth Science	26	Unit 3: Physical Science - Energy and Motion
7	Unit 1: Earth Science	27	Unit 3: Physical Science - Energy and Motion
8	Unit 1: Earth Science	28	Unit 3: Physical Science - Energy and Motion
9	Unit 1: Earth Science	29	Unit 3: Physical Science - Energy and Motion
10	Unit 2: From Molecules to Organisms, Structures and Processes	30	Unit 3: Physical Science - Energy and Motion
Week	Marking Period 2	**Week**	Marking Period 4
11	Unit 2: From Molecules to Organisms, Structures and Processes	31	Unit 3: Physical Science - Energy and Motion
12	Unit 2: From Molecules to Organisms, Structures and Processes	32	Unit 3: Physical Science - Energy and Motion
13	Unit 2: From Molecules to Organisms, Structures and Processes	33	Unit 3: Physical Science - Energy and Motion
14	Unit 2: From Molecules to Organisms, Structures and Processes	34	Unit 3: Physical Science - Energy and Motion
15	Unit 2: From Molecules to Organisms, Structures and Processes	35	Unit 4: Physical Science - Waves and Information Transfer
16	Unit 2: From Molecules to Organisms, Structures and Processes	36	Unit 4: Physical Science - Waves and Information Transfer
17	Unit 2: From Molecules to Organisms, Structures and Processes	37	Unit 4: Physical Science - Waves and Information Transfer
18	Unit 2: From Molecules to Organisms, Structures and Processes	38	Unit 4: Physical Science - Waves and Information Transfer
19	Unit 3: Physical Science - Energy and Motion	39	Unit 4: Physical Science - Waves and Information Transfer

Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT : Science COURSE : Grade 4

20	Unit 3: Physical Science - Energy and Motion	40	Unit 4: Physical Science - Waves and Information Transfer

Climate Change: Earth Science (NJSLS-S: 4-ESS3-2)

Core Instructional & Supplemental Materials including various levels of Texts
Mystery Science Lessons, Generation Genius, Wonders Reading Program, Brain Pop, Pebble Go, PBS Kids, Interactive Games/Demonstrations, and various trade books related to unit topics.

Time Frame	9 weeks

Topic

Earth's Systems: Processes That Shape The Earth

Alignment to Standards

4-ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. *[Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]*

4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. *[Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]*

4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features. *[Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]*

4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes and climate change have on humans. *[Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]*

Learning Objectives and Activities

Students will understand that…

- Over time the Earth's surface will change shape due to erosion and weathering.

DEPARTMENT : Science COURSE : Grade 4

- Fossils help to identify the order of rock layers.
- Wind, water, and ice cause changes to the earth's surface.
- Landforms develop and are weathered and eroded.
- Erosion can help show the history of the landscape.
- Rock formations show changes over time.
- Living things affect the physical characteristics of their regions.
- 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.
- Humans cannot eliminate natural hazards(e.g. earthquakes, tsunamis, volcanic eruptions) but can take steps to reduce their impacts.
- Humans must recognize the potential impacts of climate change.

Activities

Mystery Science

- Birth of Rocks

Generation Genius

- Earth's Landscapes
- Natural Disasters
- Weathering & Erosion
- Interactions of Earth's Spheres (climate change)

Houghton Mifflin Science: Unit C Solid Earth

- ***Chapter 8 - Forces That Shape Earth's Surface***
  - Lesson 1 - Forces That Change Earth
  - Lesson 2 - Rapid Changes to Earth
  - Lesson 3 - Slow Changes to Earth
- ***Chapter 9 - Managing Earth's Resources***
  - Lesson 1 - Renewable Resources
  - Lesson 2 - Nonrenewable Resources
  - Lesson 3 - Conserving Resources

Wonders Literature Connections

- **Unit 1 Week 3 Take Action**
  A World of Change, Earthquakes, Tornado, Changing Landscapes;
  Study Sync Blast: Masters of Disasters
  Inquiry Space: Take a Stand, The Environment
- **Unit 3 Week 3 Liberty and Justice**

Judy's Appalachia (environmental, mountaintop strip mining)

Other Literature Connections

- Book: Erosion: Changing Earth's Surface; Author: Robin Koontz
- Book: *Quinto's Volcano*; Author: Aileen Friedman
- Article: How People Have Been Shaping the Earth
- Article: Ducksters Erosion
- ReadWorks article: Our Changing Earth: Plate Tectonics and Large-Scale System Interactions

Related enVision Math and Science Projects

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

Online Resource Links

- **Online Teaching Resources**
  - NGSS powerpoints, activities, articles and quizzes
  - NGSS resources for teachers and students

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

- **Activities**
  - Khan Academy Rock Cycle
  - Making Sedimentary Rocks Project
  - Rock Cycle Worksheet
  - Erosion Project
  - Create Fossils Project
  - Skittles Water Erosion Lab Download File
  - Interactive Rock Cycle Game
  - Rock Cycle and Weathering

DEPARTMENT : Science COURSE : Grade 4

- Mapping Extreme Natural Events

Assessments

Formative Assessments

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

Performance Tasks

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

Summative Assessments

- Labs and engineering based projects
- Associated Unit tests, quizzes
- BrainPop Quizzes
- ReadWorks Quizzes
- Editable Unit Assessment - Processes that Shape the Earth
- Performance Assessment - Designing an Earthquake-Proof Building

Alternative Assessments

- Skittles Water Erosion Lab
- Erosion Project
- Create Fossils Project

Interdisciplinary Connections

NJSLS: ELA

- **W.4.7** Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS1-1), (4-ESS2-1)
- **W.4.8** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources. (4-ESS1-1), (4-ESS2-1)
- **W.4.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. (4- ESS1-1)
- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-ESS3-2)

DEPARTMENT : Science COURSE : Grade 4

- **RI.4.7** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2)
- **RI.4.9** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-ESS3-2)

NJSLS: **Math**

- **MP.2** Reason abstractly and quantitatively. (4-ESS1-1), (4-ESS2-1), (4-ESS3-2)
- **MP.4** Model with mathematics. (4-ESS1-1), (4-ESS2-1), (4-ESS3-2)
- **MP.5** Use appropriate tools strategically. (4-ESS2-1)
- **4.MD.A.1** Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS1-1), (4-ESS2-1)
- **4.MD.A.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1), (4-ESS2-2)
- **4.OA.A.1** Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-2)

NJSLS: Computer Science and Design Thinking

- **8.1.5.DA.1:** Collect, organize, and display data in order to highlight relationships or support a claim.
- **8.1.5.DA.5:** Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Career Readiness, Life Literacies, and Key Skills

Technology Integration

- **9.4.5.CT.1:** Identify and gather relevant data that will aid in the problem-solving process.
- **9.4.5.CT.4:** Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.

Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT : Science COURSE : Grade 4

Career Education

CRP 6. SW demonstrate creativity and innovation while working on Erosion Project, Create Fossils Project and Skittles Water Erosion Lab.
CRP 8. SW utilize critical thinking to make sense of Mystery Science problems and persevere in solving them.

Time Frame	9 weeks

Topic

Structure, Function, and Information Processing

Alignment to Standards

4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. *[Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]*

4-LS1-2 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. *[Clarification Statement: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]*

4-PS4-2 Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. *[Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]*

Learning Objectives and Activities

Students will understand that…

- Objects can be seen when light reflected from any surface enters the eye. Light traveling from the object to the eye determines what is seen.
- Different sense receptors are used for different kinds of information.
- Sensory information is processed by the brain and can be stored as memories.
- Animals are able to use their perceptions and memories to guide their actions.
- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction,

Activities

Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT : Science COURSE : Grade 4

Mystery Science

- Human Machine

Generation Genius

- Brain Processing of Senses
- Human Body Systems
- Structure of Living Things
- Adaptations and the Environment
- Light Reflection & Vision

Houghton Mifflin Science: Unit A Organization of Living Things

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

Wonders Literature Connections

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

Other Literature Connections

- ReadWorks article: Sensing the World Around Us
- ReadWorks article: Animal Instinct
- ReadWorks article: A Plant Puzzle
- Book: *Animal Senses: How Animals See Hear Taste Smell and Feel* (Animal Behavior)

Home of the Spartans!
#spartanlegacy

DEPARTMENT : Science COURSE : Grade 4

Author: Pamela Hickman
- Book: Adaptation, Author: Melanie Waldron

Related enVision Math and Science Projects
- Topic 7: Animal Traits for Survival
- Topic 8: Animals' Special Senses
- Topic 16: Animals' Eyes

Online Resource Links
- **Online Teaching Resources**
  - NGSS powerpoints, activities, articles and quizzes
  - NGSS resources for teachers and students

- **Videos**
  - Bill Nye the Science Guy on The Eye
  - Structures of a Plant
  - Parts of a Cell
  - Human Body Parts - Brain
  - Stimulus and Responses
  - Brainpop - Human Body Systems: Brain
  - Brainpop -Human Body Systems - Eyes

Activities
  - Virtual Lab: How are Birds Adapted to Their Habitat?
  - Animal Senses Game
  - Animal Adaptations Interactive Games

Assessments

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

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

Summative Assessments

DEPARTMENT : Science COURSE : Grade 4

- Labs and engineering based projects
- Associated Unit tests, quizzes
- BrainPop Quizzes
- ReadWorks Quizzes
- Editable Unit Assessment - Human Body Unit Assessment
- Performance Assessment - Create-a-Creature

Alternative Assessments

- Virtual Lab: How are Birds Adapted to Their Habitat?

Interdisciplinary Connections

NJSLS: ELA

- **W.4.1** Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4- LS1-1)
- **SL.4.5** Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2**),** (4-PS4-2)

NJSLS: **Math**

- **MP.4** Model with mathematics.(4-PS4-2)
- **4.G.A.1** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-2)
- **4.G.A.3** Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)

NJSLS: Computer Science and Design Thinking

- **8.1.5.IC.1:** Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.
- **8.1.5.IC.2:** Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.

Career Readiness, Life Literacies, and Key Skills

- **9.2.5.CAP.4:** Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.

Technology Integration

- **9.4.5.CT.4:** Apply critical thinking and problem-solving strategies to different types of

problems such as personal, academic, community and global.
- **9.4.5.IML.1:** Evaluate digital sources for accuracy, perspective, credibility and relevance.

Career Education

CRP 6. SW demonstrate creativity and innovation when working on the Virtual Lab: How are Birds Adapted to Their Habitat?
CRP 8. SW utilize critical thinking to make sense of Mystery Science problems and persevere in solving them.
CRP 11. SW use technology to enhance productivity while accessing the following online resources:

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

Time Frame	16 weeks

Topic

Energy

Alignment to Standards

4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object. *[Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.]*

4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. *[Assessment Boundary: Assessment does not include quantitative measurements of energy.]*

4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide. *[Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment*

DEPARTMENT : Science COURSE : Grade 4

does not include quantitative measurements of energy.]

4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. *[Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.] .*

3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard. *[Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]*

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Learning Objectives and Activities

Students will understand that…….

- Energy can be changed from one form to another.
- Energy is present whenever there are moving objects, sound, light, or heat.
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.
- When objects collide, energy can be transferred from one object to another, thereby changing their motion.
- Energy and fuels that humans use are derived from natural sources.
- The use of energy and fuels from natural sources affects the environment in multiple ways.
- Some resources are renewable over time, and others are not.
- The faster a given object is moving, the more energy it possesses.
- The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use.

Activities

Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT : Science COURSE : Grade 4

Mystery Science

- Energizing Everything

Generation Genius

- Collisions
- Energy Transfer
- Renewable vs. Nonrenewable Resources

Houghton Mifflin Science: Unit F Energy and Motion

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

Wonders Literature Connections

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

Other Literature Connections

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

Related enVision Math and Science Projects

- Topic 2: Speed of Cars

DEPARTMENT : Science COURSE : Grade 4

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

Online Resource Links

- **Online Teaching Resources**
  - NGSS powerpoints, activities, articles and quizzes
  - NGSS resources for teachers and students
  - Renewable Resources / Slideshow

- **Videos**
  - Bill Nye the Science Guy on Electricity
  - Kinetic and Potential Energy
  - Nonrenewable Resources
  - BrainPop Forms of Energy
  - BrainPop Potential Energy
  - BrainPop Kinetic Energy
  - BrainPop Natural Resources
  - Force and Motion
  - Olympic Snowboarding Physics
  - Olympic Hockey Slapshot Physics

- **Activities**
  - Thermal Energy Transfer
  - Make an Indoor Slingshot
  - Glaciers, Water, and Wind, Oh My!

Assessments

Formative Assessments

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

Performance Tasks

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

Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT : Science COURSE : Grade 4

Summative Assessments

- Labs and engineering based projects
- Associated Unit tests, quizzes
  - BrainPop Quizzes
  - ReadWorks Quizzes
  - Editable Unit Assessment - Energizing Everything

Alternative Assessments

- Thermal Energy Transfer
- Make an Indoor Slingshot
- Glaciers, Water, and Wind, Oh My!

Interdisciplinary Connections

NJSLS: ELA

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS3-1)
- **RI.4.3** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. (4-PS3-1)
- **RI.4.9** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS3-1)
- **W.4.2** Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4- PS3-1)
- **W.4.7** Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2), (4-PS3-3), (4-PS3-4), (4- ESS3-1)
- **W.4.8** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information and provide a list of sources. (4-PS3-1), (4-PS3-2), (4- PS3-3), (4-PS3-4), (4- ESS3-1)
- **W.4.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. (4- PS3-1), (4- ESS3-1)
- **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (3-5-ETS1-2)
- **RI.5.1** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (3-5-ETS1-2)
- **RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2)
- **W.5.7** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-1), (3-5-ETS1-3)
- **W.5.8** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished

DEPARTMENT : Science COURSE : Grade 4

work and provide a list of sources. (3-5-ETS1-1), (3-5-ETS1-3)
- **W.5.9** Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5- ETS1-1), (3-5-ETS1-3)

NJSLS: **Math**
- **4.OA.A.1** Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-1)
- **4.OA.A.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (4-PS3-4)
- **MP.2** Reason abstractly and quantitatively. (3-5-ETS1-1), (3-5-ETS1-2), (3-5-ETS1-3)
- **MP.4** Model with mathematics. (3-5-ETS1-1), (3-5-ETS1-2), (3-5-ETS1-3)
- **MP.5** Use appropriate tools strategically. (3-5-ETS1-1), (3-5-ETS1-2), (3-5-ETS1-3)
- **3-5.OA** Operations and Algebraic Thinking (3-5-ETS1-1), (3-5-ETS1-2)

NJSLS: Computer Science and Design Thinking
- **8.1.5.DA.1:** Collect, organize, and display data in order to highlight relationships or support a claim.
- **8.1.5.DA.5:** Propose cause and effect relationships, predict outcomes, or communicate ideas using data.

Career Readiness, Life Literacies, and Key Skills

Technology Integration

- **9.4.5.CI.3:** Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.
- **9.4.5.CT.4:** Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.

Career Education

CRP 8. SW utilize critical thinking to make sense of Mystery Science extension activities and persevere in solving them.
CRP 11. SW use technology to enhance productivity when accessing the following online resources:
- Bill Nye the Science Guy on Electricity

DEPARTMENT : Science COURSE : Grade 4

- Kinetic and Potential Energy
- Nonrenewable Resources
- BrainPop Forms of Energy
- BrainPop Potential Energy
- BrainPop Kinetic Energy
- BrainPop Natural Resources
- Force and Motion
- Olympic Snowboarding Physics
- Olympic Hockey Slapshot Physics

Time Frame	6 weeks

Topic

Waves and Information Transfer

Alignment to Standards

4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. *[Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.]*

4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information. *[Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.]*

Learning Objectives and Activities

Students will understand that…

- Waves can differ in amplitude and wavelength.
- Waves can cause objects to move.
- Information can be converted from a sound wave into a digital signal.
- High-tech devices can be used to help us convert and transmit information.

Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:
Meeting the needs of all students with a proud tradition of academic excellence.

DEPARTMENT : Science COURSE : Grade 4

Activities

Mystery Science
- Waves of Sound

Generation Genius
- Wave Properties
- Information Transfer

Houghton Mifflin Science: Unit F Energy and Motion
- **Chapter 14 - Energy Changes**
  - Lesson 2 - Light Waves
  - Lesson 3 - Sound Waves

Wonders Literature Connections
- **Unit 1 Week 3 Take Action**
  - *A World of Change, Earthquakes, Tornado, Changing Landscapes*
    Study Sync Blast: Masters of Disasters

Other Literature Connections
- Book - Eye: How It Works; Author: David Macaulay
- Book - Sound Waves; Author: Ian F. Mahaney
- Book - What Are Light Waves?; Author: Robin Johnson
- Read Works Article: Now Hear This!
- Read Works Article: Now Hear This! Care for Your Ears

Related enVision Math and Science Projects
- Topic 5: Sound Instruments
- Topic 9: Morse Code
- Topic 10: Light
- Topic 14: Sound Waves

Online Resource Links
- **Online Teaching Resources**
  - NGSS powerpoints, activities, articles and quizzes
  - NGSS resources for teachers and students
- **Videos**
  - Amazing Water & Sound Experiment
  - Sound
  - BrainPop Waves
  - BrainPop Light
  - Brainpop: Sound

DEPARTMENT : Science COURSE : Grade 4

- Waves
- Dolphin Sound Echoes
- Bill Nye the Science Guy on Light

- **Activities**
  - Making a Sound Game
  - Making a Wave with a Plunger Game

Assessments

Formative Assessments

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

Performance Tasks

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

Summative Assessments

- Labs and engineering based projects
- Associated Unit tests, quizzes
- BrainPop Quizzes
- ReadWorks Quizzes
- Editable Unit Assessment - Waves of Sound

Interdisciplinary Connections

NJSLS: ELA

- **RI.4.1** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS4-3)
- **RI.4.9** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS4-3)

DEPARTMENT : Science COURSE : Grade 4

- **SL.4.5** Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-1)

NJSLS: **Math**

- **MP.4** Model with mathematics. (4-PS4-1)
- **4.G.A.1** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-1)

NJSLS: Computer Science and Design Thinking

- **8.1.5.IC.1:** Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.
- **8.1.5.IC.2:** Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.

Career Readiness, Life Literacies, and Key Skills

- **9.2.5.CAP.4:** Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.

Technology Integration

- **9.4.5.CI.4:** Research the development process of a product and identify the role of failure as a part of the creative process.
- **9.4.5.CT.3**: Describe how digital tools and technology may be used to solve problems.
- **9.4.5.IML.2:** Create a visual representation to organize information about a problem or issue.

Career Education

CRP 8. SW utilize critical thinking to make sense of problems and persevere in solving them by completing the Mystery Science challenge.
CRP 11. SW use technology to enhance productivity.

Modifications (ELL, Special Education, At Risk Students, Gifted & Talented, & 504 Plans)

ELL:

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson

- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

Supports for Students With IEPs:

- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

At-Risk Students:

- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach
- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

Gifted and Talented:

- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

Supports for Students With 504 Plans:

- Follow all the 504 plan modifications

DEPARTMENT : Science COURSE : Grade 4

- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns