

# MIDDLETOWN TOWNSHIP PUBLIC SCHOOLS

## Science – Fourth Grade

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[Standards Update June 2026](#)

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**MIDDLETOWN TOWNSHIP BOARD OF EDUCATION  
EQUAL OPPORTUNITY POLICIES**

The Middletown Township Board of Education affirms its responsibilities to ensure all students in the public schools of this township equal educational opportunity regardless of race, color, creed, religion, sex, ancestry, national origin or social or economic status. Lack of English language skills will not be a deterrent to admission to any program. No otherwise qualified handicapped individuals shall solely by reason of their handicap be denied the benefits of or subjected to discrimination in any activity.

The school system's Affirmative Action Plans for School/Classroom Practices are on file in the Superintendent's office.

**AFFIRMATIVE ACTION GRIEVANCE PROCEDURE**

The Board of Education has established a procedure for staff, students or parents on a student's behalf to follow in filing a complaint dealing with alleged violation, misinterpretation or inequitable application of the policies and practices of the school district relative to provisions of Federal and State anti-discrimination legislation. Details of the grievance procedures are included in the school district's policy manual under Policy #2260.

The Building Principal or designee serves as the first step of this grievance procedure.

The District Affirmative Action Officer is:

Charlene O'Hagan, District Director of Human Resources and Instruction  
Middletown Township Board of Education  
August T. Miner Administrative Offices  
834 Leonardville Road, 2<sup>nd</sup> Floor  
Middletown, New Jersey 07737  
(732) 671-3850

The District 504 Compliance Officer is:

Michele Tiedemann, District Director of Special Education  
Middletown Township Board of Education  
August T. Miner Administrative Offices  
834 Leonardville Road, 2<sup>nd</sup> Floor  
Middletown, New Jersey 07737  
(732) 671-3850

## **Middletown Township Public Schools - 4th Grade Science Curriculum**

### **DISTRICT PHILOSOPHY OF INSTRUCTION**

In order to prepare our students for the ever-increasing demand for a literate, technology-oriented workforce, Middletown Township Public School District embraces an instructional philosophy that is student-centered, inquiry-based, and that differentiates instruction based on student's individual abilities.

Teachers, as facilitators of lifelong learning, challenge students by providing an environment in which the students become active participants engaged in working together on projects and in solving problems that involve or simulate authentic data and events.

Students learn to value a variety of different approaches and are taught to take responsibility for their own meaningful learning as they become more adept at communicating their reasoning and in asking questions to help clarify their thinking and that of their classmates.

### **COURSE PHILOSOPHY**

At the elementary school, science education is focused on developing a love for learning about the natural world and cultivating critical thinking skills. The course will encourage curiosity, exploration, and experimentation while providing a solid foundation in scientific practices and key scientific concepts.

The philosophy of the elementary science curriculum is grounded in the following principles:

1. **Hands-on learning:** Students learn best when they can engage with materials and concepts directly. The curriculum will prioritize hands-on activities, experiments, and investigations to provide students with tangible experiences that support their understanding of scientific concepts.
2. **Inquiry-based learning:** Science is about asking questions and seeking answers. The curriculum will encourage students to ask questions, make observations, and develop explanations that they can test through experiments and other forms of investigation.
3. **Cross-curricular connections:** Science is not studied in isolation; it is connected to other subjects like math, social studies, and language arts. The curriculum will aim to make these connections explicit, showing students how scientific concepts relate to other areas of study.
4. **Real-world relevance:** Science has practical applications in everyday life, and the curriculum will aim to demonstrate this. Students will learn about how scientific knowledge is used in medicine, engineering, and other fields, as well as how it can be used to solve real-world problems.
5. **Inclusivity:** Science is for everyone, regardless of race, gender, or socioeconomic background. The curriculum will be designed to be inclusive and accessible to all students, with a focus on highlighting the contributions of diverse scientists.

Overall, the elementary science curriculum will aim to foster a love of learning about the natural world while providing students with the foundational knowledge and skills they need to pursue further study in science.

### **INTRODUCTION**

The goal of the New Jersey Student Learning Standards is to provide consistent standards and prepare students for college and careers, so that when they graduate they will have met benchmarks that will allow them to succeed in college or the 21st century workforce regardless of where in the state they have lived. The curriculum is aligned to the New Jersey Student Learning Standards developed by the New Jersey Department of Education to guide districts as they design curriculum that will support the work of teachers and promote student achievement. Climate-related concepts are integrated across units through patterns, environmental observations, and problem-solving aligned with NJSLs 2025 expectations.

## Middletown Township Public Schools - 4th Grade Science Curriculum

| New Jersey Student Learning Standards                                                                                                           | 21st Century Themes                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NJSLs that apply to the course<br><a href="https://www.nj.gov/education/standards/science/">https://www.nj.gov/education/standards/science/</a> | Career Readiness, Life Literacies and Key Skills<br><a href="https://www.nj.gov/education/standards/clicks/index.shtml">https://www.nj.gov/education/standards/clicks/index.shtml</a> |

The structure of the elementary school science curriculum presents topics and themes to help students understand the world around them. Each topic is grade specific but connects to other grade levels to aid students in building their own understanding of complex natural phenomena. The focus of each unit is aligned with the New Jersey Student Learning Standards and the specific content and complexity of activities and student expectations increase across the grade levels. All grade level curriculum guides integrate the 3 dimensions of science instruction and learning. Disciplinary core ideas, science and engineering practices, and crosscutting concepts are infused in each performance expectation that represents the end of grade level goal. The 4 domains of Life Science, Earth and Space Science, Physical Science, and Engineering are integrated in all elementary grades.

Curriculum units for all grade levels follow the same format and include the following:

- The NJSLs that are aligned with the unit, including 21st Century Themes
- Enduring Understandings
- Essential Questions
- Student Learning Outcomes
- Suggested Resources/Materials

The recommended activities section on the following pages includes activities for the purpose of differentiating instruction to meet the needs of Special Education, Students with 504s, MLs, Students at Risk of Failure, and G&T students. The following are suggested modifications for teachers to use in each unit as appropriate:

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with choices including multiple options for how they can represent their understandings (e.g., conversations via digital tools such as SKYPE, experts from the community helping with a project, journal articles, biographies, multisensory techniques --auditory/visual aids: pictures, illustrations, graphs, charts, data tables, multimedia, modeling; etc.).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Use project-based learning to help students engage with content in an authentic way.
- Structure learning around explaining or solving a social or community-based issue.
- Provide ML students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. (Science specific)

The district's expectation is for **ALL** teachers planning instruction for students with IEP's to thoroughly read and implement modifications and accommodations accordingly and consult with co-teacher.

Middletown Township Public Schools - **4th Grade Science Curriculum**  
**ADOPTED TEXTBOOK/PROGRAM and RESOURCES**

Mystery Science  
Generation Genius

***PLEASE NOTE:*** Any resource or material that falls outside of the approved lists included within the curriculum document must have administrative approval prior to use. These resources or materials must also be noted in the teacher's lesson plan after approval is granted.

## **Recommended Time Frame and Sequence**

(including District Assessments)

| <b><u>Unit Focus</u></b>                                                | <b><u>Suggested Time Frame</u></b> |
|-------------------------------------------------------------------------|------------------------------------|
| <a href="#"><u>Unit 1: Weathering, Erosion, and Earth Processes</u></a> | Trimester 1                        |
| <a href="#"><u>Unit 2: Structure and Function</u></a>                   | Trimester 1                        |
| <a href="#"><u>Unit 3: How Organisms Process Information</u></a>        | Trimester 1 and 2                  |
| <a href="#"><u>Unit 4: Transfer of Energy</u></a>                       | Trimester 2                        |
| <a href="#"><u>Unit 5: Forces and Motion and Engineering Design</u></a> | Trimester 2 and 3                  |
| <a href="#"><u>Unit 6: Waves and Information</u></a>                    | Trimester 3                        |

| Unit 1 - Weathering, Erosion, and Earth Processes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Duration: 20 days |
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| <p>Summary:<br/> <i>What do the shapes of landforms and rock formations tell us about the past?</i></p> <p>In this unit of study, students develop understandings of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation.</p> <p><b>Prior Learning: Grade 2 Unit 4: The Earth's Land and Water</b></p> <ul style="list-style-type: none"> <li>· Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.</li> <li>· Maps show where things are located. One can map the shapes and kinds of land and water in any area.</li> </ul> <p><b>Grade 2 Unit 5: Changes to Earth's Land</b></p> <p>Wind and water can change the shape of the land.</p> <p>Summary:<br/> <i>Is it possible to engineer ways to protect humans from natural Earth?</i></p> <p>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 <b>and climate change</b> have on humans. In order to describe patterns of Earth's features, students analyze and interpret data from maps.</p> <p><b>Prior Learning: Grade 2 Unit 4: The Earth's Land and Water</b></p> <ul style="list-style-type: none"> <li>· Maps show where things are located. One can map the shapes and kinds of land and water in any area.</li> <li>· Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.</li> </ul> |                   |

| Essential Questions/Enduring Understandings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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| <p>How can evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation be observed or measured?</p> <ul style="list-style-type: none"> <li>• Cause-and-effect relationships are routinely identified, tested, and used to explain change.</li> <li>• Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.</li> <li>• Rainfall helps to shape the land and affects the types of living things found in a region.</li> <li>• Living things affect the physical characteristics of their regions.</li> </ul> <p>What can rock formations tell us about the past?</p> <ul style="list-style-type: none"> <li>• Science assumes consistent patterns in natural systems.</li> <li>• Patterns can be used as evidence to support an explanation.</li> <li>• Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes.</li> <li>• The presence and location of certain fossil types indicate the order in which rock layers were formed.</li> </ul> <p>What can maps tell us about the features of the world?</p> <ul style="list-style-type: none"> <li>• Patterns can be used as evidence to support an explanation.</li> <li>• Maps can help locate the different land and water features of Earth.</li> </ul> |

## Middletown Township Public Schools - 4th Grade Science Curriculum

- 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.

In what ways can the impacts of natural Earth processes on humans be reduced?

- Cause-and-effect relationships are routinely identified, tested, and used to explain change.
- Engineers improve existing technologies or develop new ones to increase benefits, decrease known risks, and meet societal demands.
- A variety of hazards result from natural processes (e.g., earthquakes, floods, tsunamis, volcanic eruptions).
- Humans cannot eliminate the hazards, but they can take steps to reduce their impacts.
- 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 to a problem 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.
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.
- Earth's surface is part of a system in which water, wind, ice, living organisms, and gravity interact. Changes in one part of the system affect other parts over time, including impacts on human communities

### NJSLS for Unit

#### Science:

4-ESS2-1: Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

4-ESS1-1: Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features.

4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes **and climate change** have on humans\*

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.

#### ELA:

- Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS1-1) **W.4.7**
- 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-ESS2-1), (4-ESS1-1) **W.4.8**
- Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS1-1) **W.4.9**

#### Mathematics

- Reason abstractly and quantitatively. (4-ESS2-1), (4-ESS1-1) **MP.2**
- Model with mathematics. (4-ESS2-1), (4-ESS1-1) **MP.4**
- Use appropriate tools strategically. (4-ESS2-1) **MP.5**

## Middletown Township Public Schools - 4th Grade Science Curriculum

- 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-ESS2-1), (4-ESS1-1) **4.MD.A.1**
- 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.MD.A.2**

### NJSLS - Career Readiness, Life Literacies, and Key Skills

9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).

9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7)

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

### Computer Science and Design Thinking

8.2.5.ED.1: Explain the functions of a system and its subsystems.

8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.

8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.

8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).

8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process.

8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process.

| Student Learning Outcomes                                                                                                                                                                                                                                                                                                       | Student Learning Activities and Assessments Aligned to Student Learning Outcome(s)                                                                                                                                                                                                                                                                                                                                                                                                        | District Approved Materials/Resources                                                                                                                                                                                                                                     |
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| <p>Students who understand the concepts can:</p> <ul style="list-style-type: none"> <li>● Identify, test, and use cause-and-effect relationships in order to explain change.</li> <li>● Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.</li> </ul> | <ol style="list-style-type: none"> <li>1. <b>Introduction Video: What is Science?</b> <ol style="list-style-type: none"> <li>a. <b>Back to School Activity: Saving Fred (Fun STEM activity)</b></li> </ol> </li> <li>2. <u>Lesson 1 → Volcanoes and Pattern's of Earth's Features</u>: In this lesson, students explore the past and present pattern of where volcanoes exist on the earth. In the activity, Mapping Volcanoes, students plot volcano locations on a world map</li> </ol> | <ul style="list-style-type: none"> <li>● <a href="#">Generation Genius Video/Lesson: What is Science</a> <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional)</li> <li>○ Assessment Included</li> </ul> </li> </ul> |

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| <ul style="list-style-type: none"> <li>● Make observations and/or measurements to produce evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</li> <li>● <i>(Note: Assessment is limited to a single form of weathering or erosion.)</i></li> <li>● Examples of variables to test could include:             <ul style="list-style-type: none"> <li>○ Angle of slope in the downhill movement of water</li> <li>○ Amount of vegetation</li> <li>○ Speed of the wind</li> <li>○ Relative rate of deposition</li> <li>○ Cycles of freezing and thawing of water</li> <li>○ Cycles of heating and cooling</li> <li>○ Volume of water flow</li> </ul> </li> <li>● Support explanations using patterns as evidence.</li> <li>● Identify the evidence that supports particular points in an explanation.</li> <li>● Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.</li> <li>● <i>(Note: 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.)</i></li> <li>● Examples of evidence from patterns:             <ul style="list-style-type: none"> <li>○ Rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time.</li> <li>○ A canyon with different rock layers in the walls and a river in the bottom, indicating that over</li> </ul> </li> </ul> | <p>and look for patterns. Students analyze these maps to discover that volcanoes form a “Ring of Fire” around the Pacific Ocean.</p> <ol style="list-style-type: none"> <li>3. <u>Lesson 2→Volcanoes and Rock Cycle:</u> In this lesson, students will investigate how differences in lava types explain differences in the shape and eruption patterns among volcanoes. In the activity, Bubble Trouble, students compare two different types of "lava" -- thin and thick. They use this information to figure out why volcanoes have different shapes and how the type of lava explains why some volcanoes explode.</li> <li>4. <u>Lesson 3→Weathering and Erosion:</u> In this lesson, students will explore how solid rock breaks apart into smaller pieces through a process called weathering (including root-wedging and ice-wedging). In the activity, Sugar Shake, students use sugar cubes as a model for rocks. They perform an experiment with this model to understand the process of weathering and how this process explains why rocks at the tops of mountains are jagged, while those at the bottom are rounded.</li> <li>5. <u>Generation Genius Tectonic Plates:</u> Students will provide evidence for continental drift using cutouts of continents and observing patterns of fossils found on different continents. Students will learn about how the Earth's surface is cracked into large pieces called tectonic plates. Tectonic plates slowly move, creating mountains, islands and even re-arranging continents. Scientists can track the history of the plate movements by analyzing fossils and rock layers.</li> <li>6. <u>Lesson 4→Sedimentary Rock and Fossils:</u> In this lesson, students gather evidence to describe how environments on Earth have changed over time. Students explore how the process of sedimentary rock formation preserves a record of those past environments. In the activity, Canyon Explorer,</li> </ol> | <ul style="list-style-type: none"> <li>● Mystery Science: The Birth of Rocks Unit (Earth’s Features and Processes): <u>Lesson 1→ Volcanoes and Pattern’s of Earth’s Features</u></li> <li>● Mystery Science: The Birth of Rocks Unit (Earth’s Features and Processes): <u>Lesson 2→Volcanoes and Rock Cycle</u></li> <li>● Mystery Science: The Birth of Rocks Unit (Earth’s Features and Processes): <u>Lesson 3→Weathering and Erosion</u></li> <li>● <u>Generation Genius Video/Lesson: Weathering and Erosion</u> <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional)</li> <li>○ Assessment Included</li> </ul> </li> <li>● Mystery Science: The Birth of Rocks Unit (Earth’s Features and Processes): <u>Lesson 4→Sedimentary Rock and Fossils</u></li> <li>● <u>Generation Genius Video/Lesson: Tectonic Plates</u> <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional)</li> <li>○ Assessment Included</li> </ul> </li> <li>● Fossil project from Stemsscopes:             <ul style="list-style-type: none"> <li>○ Material needed: 4 colors of modeling clay, rice crispy cereal, pretzel sticks, shells for imprints, plastic dinosaurs.</li> <li>○ Worksheet: <u><a href="#">Fossil 4 layer project .pdf</a></u></li> </ul> </li> <li>● <u>Generation Genius Video/Lesson: Earth’s Landscapes</u></li> <li>● Video of how fossils are formed: <u><a href="https://youtu.be/xQBkawjFVIA">https://youtu.be/xQBkawjFVIA</a></u></li> </ul> |
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## Middletown Township Public Schools - 4th Grade Science Curriculum

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| <p>time a river cut</p> <ul style="list-style-type: none"> <li>• Support an explanation using patterns as evidence.</li> <li>• Analyze and interpret data to make sense of phenomena using logical reasoning.</li> <li>• Analyze and interpret data from maps to describe patterns of Earth's features.</li> <li>• Maps: <ul style="list-style-type: none"> <li>○ Topographic of Earth's land and Earth's ocean floor</li> <li>○ Locations of mountains, of continental boundaries, and of volcanoes and earthquakes</li> </ul> </li> <li>• Identify and test cause-and-effect relationships in order to explain change.</li> <li>• Generate multiple solutions to a problem and compare them based on how well they meet the criteria and constraints of the design solution.</li> <li>• Define a design problem related to reducing the impacts of natural Earth processes. Students will design, test, compare, and revise multiple solutions, using evidence from investigations to evaluate effectiveness. (Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.)</li> <li>• Examples of solutions: <ul style="list-style-type: none"> <li>○ Designing an earthquake-resistant building</li> <li>○ Improving monitoring of volcanic activity</li> <li>○ Generate multiple possible solutions to a problem and compare them based on how well each is likely to meet the criteria and constraints of the problem.</li> </ul> </li> <li>• Plan and conduct an investigation</li> </ul> | <p>students observe fossils found within a model canyon. The characteristics of those fossils provide evidence to support the explanation that the landscape has changed numerous times.</p> <ol style="list-style-type: none"> <li>7. Stemsopes Fossil Project: <ol style="list-style-type: none"> <li>a. Students will create layers of fossils with modeling clay.</li> </ol> </li> <li>8. <u>Lesson 5→ Erosion, Natural Hazards, and Engineering</u>: In this lesson, students will learn about the types, causes, and dangers of landslides. In the activity, Slide City, students are faced with the engineering problems of protecting a house from a landslide and preventing a landslide from happening. They use a brainstorming technique to design creative solutions.</li> </ol> <p>Assessments:</p> <ul style="list-style-type: none"> <li>• Alternative <ul style="list-style-type: none"> <li>○ Kahoot</li> <li>○ Long term projects</li> </ul> </li> <li>• Benchmark: <ul style="list-style-type: none"> <li>○ Generation Genius Assessments</li> </ul> </li> <li>• Summative: <ul style="list-style-type: none"> <li>○ Quizzes: multiple choice and/or short answer</li> <li>○ Mystery Science Unit Assessments: multiple choice with short answer and data analysis</li> <li>○ Laboratory Based Exercises</li> </ul> </li> <li>• Formative: <ul style="list-style-type: none"> <li>○ Classwork and Homework</li> <li>○ Teacher Observation</li> <li>○ Group and individual lab activities</li> <li>○ Laboratory Based Exercises</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>○ Fossil projects: Materials needed: one individual package of model magic and a plastic dinosaur skeleton and a plastic dinosaur (you can get at dollar store)</li> <li>○  Sample Fossil Model.png</li> <li>• Mystery Science: The Birth of Rocks Unit (Earth's Features and Processes): <u>Lesson 5→ Erosion, Natural Hazards, and Engineering</u></li> </ul> <p><u>Assessments for Mystery Science:</u><br/>Assessments for Mystery Science can be found on each Unit's page under Unit Resources. There are Assessments for each lesson or a Unit Assessment. Choose what works best for you and your class.</p> <p><u>Assessments for Generation Genius:</u><br/>Each lesson has an assessment that can be used as a Google Form, Online Quiz Game, Quiz PDF, and/or Exit Ticket.</p> <p style="text-align: center;"><a href="#"><u>Suggested Supplies for Each Unit</u></a></p> |
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Middletown Township Public Schools - **4th Grade Science Curriculum**

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| <p>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.</p> <ul style="list-style-type: none"><li>● 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.</li></ul> |  |  |
| <p><b>Suggested Materials Needed for this Unit:</b><br/>Sand<br/>Small Rocks<br/>Baking Trays<br/><b>Sugar Cubes</b><br/><b>Small containers with lids</b></p>                                                                                                                                                                                                                           |  |  |

| Unit 2 -Structure and Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Duration:10 days |
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| <p>Summary:</p> <p><b><i>How do the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction.</i></b></p> <p>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.</p> <p><b>Prior Learning: Grade 1 Unit 3: Mimicking Organisms to Solve Problems</b></p> <ul style="list-style-type: none"> <li>· All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.</li> <li>· Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.</li> </ul> |                  |
| Essential Questions/Enduring Understandings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |
| <p><b>How do internal and external parts of plants and animals help them to survive, grow, behave, and reproduce?·</b></p> <ul style="list-style-type: none"> <li>● A system can be described in terms of its components and their interactions.</li> <li>● Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |
| NJSLs for Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |
| <p><b>Science:</b><br/>4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</p> <p><b>ELA:</b><br/>Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1) <b>W.4.1</b></p> <p><b>Math:</b><br/>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) <b>4.G.A.3</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |

Middletown Township Public Schools - 4th Grade Science Curriculum

| Student Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Student Learning Activities and Assessments Aligned to Student Learning Outcome(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | District Approved Materials/Resources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <p>Students who understand the concepts are able to:</p> <ul style="list-style-type: none"> <li>• Develop and use models to describe how internal and external structures of organisms function together as a system to support survival, growth, behavior, and reproduction.</li> <li>• Construct evidence-based arguments (claim, evidence, reasoning) explaining how specific structures support organism survival, and revise explanations when new evidence is introduced.</li> <li>• Construct an argument to support the claim that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</li> <li>• (Assessment is limited to macroscopic structures within plant and animal systems.)</li> <li>• Examples of structures could include: <ul style="list-style-type: none"> <li>○ Thorns, Stems, Roots, Colored petals</li> <li>○ Heart, Stomach, Lung, Brain, Skin</li> </ul> </li> <li>• Students will analyze patterns in structure-function relationships across multiple organisms to identify similarities and differences.</li> </ul> | <ul style="list-style-type: none"> <li>• <a href="#">Generation Genius Video/Lesson: Structure and Function</a>: In this activity, students will learn that all plants &amp; animals have structures that help them survive. Each structure has a specific function. Animal structures may appear similar or different depending on where they live.</li> <li>• <a href="#">Generation Genius Video/Lesson: Animal and Plant Adaptations</a>: In this lesson, students will learn how animals adapt to their environment. Animals adapt to protect themselves. Adaptations also help animals obtain food.</li> <li>• <a href="#">Lesson 1→ Muscles and Skeleton</a>: In this lesson, students discover the mechanism by which their muscles control their bones to move their bodies. In the activity, Robot Finger, students construct a model of a human finger and observe how pulling on a string (a model for tendons) causes it to bend at the joints.</li> </ul> <p>Assessments:</p> <ul style="list-style-type: none"> <li>• Alternative <ul style="list-style-type: none"> <li>○ Kahoot</li> <li>○ Long term projects</li> </ul> </li> <li>• Benchmark: <ul style="list-style-type: none"> <li>○ Generation Genius Assessments</li> </ul> </li> <li>• Summative: <ul style="list-style-type: none"> <li>○ Quizzes: multiple choice and/or short answer</li> <li>○ Mystery Science Unit Assessments: multiple choice with short answer and data analysis</li> <li>○ Laboratory Based Exercises</li> </ul> </li> <li>• Formative: <ul style="list-style-type: none"> <li>○ Classwork and Homework</li> <li>○ Teacher Observation</li> <li>○ Group and individual lab activities</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• <a href="#">Generation Genius Video/Lesson: Structure and Function</a> <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional)</li> <li>○ Assessment Included</li> </ul> </li> <li>• <a href="#">Generation Genius Video/Lesson: Animal and Plant Adaptations</a> <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional)</li> <li>○ Assessment Included</li> </ul> </li> <li>• Mystery Science: Human Machine (Human Body, Vision and Brain): <a href="#">Lesson 1→ Muscles and Skeleton</a></li> </ul> <p><u>Assessments for Mystery Science:</u><br/>Assessments for Mystery Science can be found on each Unit's page under Unit Resources. There are Assessments for each lesson or a Unit Assessment. Choose what works best for you and your class.</p> <p><u>Assessments for Generation Genius:</u><br/>Each lesson has an assessment that can be used as a Google Form, Online Quiz Game, Quiz PDF, and/or Exit Ticket.</p> <p align="center"><a href="#">Suggested Supplies for Each Unit</a></p> |

Middletown Township Public Schools - **4th Grade Science Curriculum**

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|  | ○ Laboratory Based Exercises |  |
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| Unit 3 - How Organisms Process Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Duration: 10 days |
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| <p>Summary:</p> <p><b><i>How do animals use their perceptions and memories to make decisions?</i></b></p> <p>In this unit of study, students are expected to develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. By developing a model, they describe that an object can be seen when light reflected from its surface enters the eye.</p> <p><b>Prior Learning: Grade 1 Unit 4: Light and Sound</b></p> <ul style="list-style-type: none"> <li>· Objects can be seen if light is available to illuminate them or if they give off their own light.</li> <li>· Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam.</li> </ul> |                   |
| Essential Questions/Enduring Understandings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   |
| <p>How do animals receive and process different types of information from their environment in order to respond appropriately?</p> <ul style="list-style-type: none"> <li>• A system can be described in terms of its components and its interactions.</li> <li>• Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain.</li> <li>• Animals are able to use their perceptions and memories to guide their actions.</li> </ul> <p>What happens when light from an object enters the eye?</p> <ul style="list-style-type: none"> <li>• Cause-and-effect relationships are routinely identified.</li> <li>• An object can be seen when light reflected from its surface enters the eyes.</li> </ul>                                                                                                                                                               |                   |
| NJSLS for Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |
| <p><b>Science:</b></p> <p>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.</p> <p>4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.</p> <p><b>ELA:</b></p> <ul style="list-style-type: none"> <li>· Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2),(4-LS4-2)</li> </ul> <p><b>SL.4.5</b></p>                                                                                                                                                                                                                                                                                                                          |                   |

**Math:**

Model with mathematics. (4-PS4-2) **MP.4**

- 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.1**

**NJSLS - Career Readiness, Life Literacies, and Key Skills**

- 9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).
- 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7)
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
- 9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).
- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

| Student Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Student Learning Activities and Assessments Aligned to Student Learning Outcome(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | District Approved Materials/Resources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| <p>Students who understand the concepts are able to:</p> <ul style="list-style-type: none"> <li>• Develop and use models to describe how organisms receive, process, and respond to information as interacting systems involving sensory structures, the brain, and behavioral responses.</li> <li>• Use a model to test interactions concerning the functioning of a natural system.</li> <li>• 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. (Emphasis is on systems of information transfer.)</li> <li>• Use cause-and-effect relationships</li> </ul> | <ul style="list-style-type: none"> <li>• <u>Lesson 2→ Light, Eyes, &amp; Vision:</u> In this lesson, students discover the basics of how their eyes work, and figure out some of the causes of vision problems. In the activity, Eye Model, students develop a working model of a human eye. They use a magnifying lens as a model of the cornea to explore how the structure of this lens is related to the function of our eyes.</li> <li>• <u>Lesson 3→ Structure and Function of Eyes:</u> In this lesson, students delve further into the workings of the eye, exploring the function of their iris and pupil. In the activity, Pupil Card, students add a smaller pupil to the eye model that they created in the previous lesson. Then they observe how the changing size of the pupil controls how much light enters the eye.</li> <li>• <u>Lesson 4→ Brain, Nerves, &amp; Information Processing:</u> In this lesson, students explore the brain's role in receiving information from the</li> </ul> | <ul style="list-style-type: none"> <li>• Mystery Science: Human Machine (Human Body, Vision and Brain): <u>Lesson 2→ Light, Eyes, &amp; Vision</u></li> <li>• <a href="#">Generation Genius: Light Reflection and Vision</a> <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional)</li> <li>○ Assessment Included</li> </ul> </li> <li>• Mystery Science: Human Machine (Human Body, Vision and Brain): <u>Lesson 3→ Structure and Function of Eyes</u></li> <li>• Mystery Science: Human Machine (Human Body, Vision and Brain): <u>Lesson 4→ Brain, Nerves, &amp; Information Processing</u></li> <li>• <a href="#">Generation Genius Video/Lesson: Brain Processing of Senses</a></li> </ul> |

## Middletown Township Public Schools - 4th Grade Science Curriculum

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| <p>to explain how changes in stimuli result in changes in behavior.</p> <ul style="list-style-type: none"> <li>• Develop models to: describe phenomena and to describe that light reflecting from objects &amp; entering the eye allows objects to be seen.</li> <li>• Students will revise models of the eye and nervous system based on evidence collected during investigations.</li> <li>• Students will construct explanations describing how light interacts with objects and enters the eye to enable vision</li> </ul> | <p>senses, processing that information, and controlling the muscles to enable movement. In the activity, Think Fast!, students test their reflexes with two very quick experiments and one more involved activity. They learn about how we process information in our brains and then respond to that information in different ways.</p> <ul style="list-style-type: none"> <li>• <a href="#">Generation Genius Video/Lesson: Brain Processing of Senses</a>: Students will learn: Information collected through senses is processed in the brain. Information travels to and from the brain through the nervous system. Animals use sensory information to guide their actions and help them survive.</li> <li>• Senses/Smell Activities: 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.</li> </ul> <p>Assessments:</p> <ul style="list-style-type: none"> <li>• Alternative <ul style="list-style-type: none"> <li>○ Kahoot</li> <li>○ Long term projects</li> </ul> </li> <li>• Benchmark: <ul style="list-style-type: none"> <li>○ Generation Genius Assessments</li> </ul> </li> <li>• Summative: <ul style="list-style-type: none"> <li>○ Quizzes: multiple choice and/or short answer</li> <li>○ Mystery Science Unit Assessments: multiple choice with short answer and data analysis</li> <li>○ Laboratory Based Exercises</li> </ul> </li> <li>• Formative: <ul style="list-style-type: none"> <li>○ Classwork and Homework</li> <li>○ Teacher Observation</li> <li>○ Group and individual lab activities</li> <li>○ Laboratory Based Exercises</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional)</li> <li>○ Assessment Included</li> </ul> <p><a href="#">Suggested Supplies for Each Unit</a></p> <p>Animal Adaptations Digital Library:<br/> <a href="https://docs.google.com/presentation/d/1nJl4-acil-iQMbsCinHj0XJRfZg2Fz3E9OusoBNq4104/edit#slide=id.p">https://docs.google.com/presentation/d/1nJl4-acil-iQMbsCinHj0XJRfZg2Fz3E9OusoBNq4104/edit#slide=id.p</a></p> <p>Wild Kratt Suit maker game:<br/> Create power suit:<br/> <a href="https://pbskids.org/wildkratts/games/avivas-power-suit-maker">https://pbskids.org/wildkratts/games/avivas-power-suit-maker</a></p> <p>Criteria slide:<br/> <a href="https://docs.google.com/presentation/d/1mcy1xSTjwPBCNLxiD-ShagL74fzglpa-ScOaicV5cXU/edit#slide=id.gab4b2677fb_0_2">https://docs.google.com/presentation/d/1mcy1xSTjwPBCNLxiD-ShagL74fzglpa-ScOaicV5cXU/edit#slide=id.gab4b2677fb_0_2</a></p> <p>Smell activity:<br/> Materials:<br/> 6 small plastic containers/with lids<br/> Cotton balls<br/> 6 different liquid scents such as vanilla extract, orange extract, and other flavors or scents.</p> <p>Activity page:<br/> <a href="https://drive.google.com/file/d/1idQaEUafZRO6Q8Awb7T8zIZrCRBK-2IY/view?usp=share_link">https://drive.google.com/file/d/1idQaEUafZRO6Q8Awb7T8zIZrCRBK-2IY/view?usp=share_link</a></p> |
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| Unit 4 - Transfer of Energy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Duration: 15 days |
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| <p>Summary:</p> <p><i>Where do we get the energy we need for modern life?</i></p> <p>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.</p> <p><b>Prior Learning:</b> There are no disciplinary core ideas that are considered prior learning for the concepts in this unit of study.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   |
| Essential Questions/Enduring Understandings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |
| <p>How is energy transferred?</p> <ul style="list-style-type: none"> <li>• Energy can be transferred in various ways and between objects.</li> <li>• Energy can be moved from place to place through sound, light, or electric currents.</li> <li>• Energy is present whenever there are moving objects, sound, light, or heat.</li> <li>• Light also transfers energy from place to place. · Energy can also be transferred from place to place by electric currents; the currents may have been produced to begin with by transforming the energy of motion into electrical energy.</li> </ul> <p>From what natural resources are energy and fuels derived? In what ways does the human use of natural resources affect the environment?</p> <ul style="list-style-type: none"> <li>• Cause-and-effect relationships are routinely identified and used to explain change.</li> <li>• Knowledge of relevant scientific concepts and research findings is important in engineering.</li> <li>• Over time, people's needs and wants change, as do their demands for new and improved technologies.</li> <li>• Energy and fuels that humans use are derived from natural sources.</li> <li>• The use of energy and fuels from natural sources affects the environment in multiple ways.</li> <li>• Some resources are renewable over time, and others are not.</li> </ul> |                   |
| NJSLs for Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |
| <p><b>Science:</b></p> <p>4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p> <p>4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</p> <p><b>ELA:</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |

## Middletown Township Public Schools - 4th Grade Science Curriculum

- Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2),(4-ESS3-1) **W.4.7**
- Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-2),(4-ESS3-1) **W.4.8**
- Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS3-1) **W.4.9**

### **Math:**

- Reason abstractly and quantitatively. (4-ESS3-1) **MP.2**
- Model with mathematics. (4-ESS3-1) **MP.4**
- Interpret a multiplication equation as a comparison, e.g., interpret  $35 = 5 \times 7$  as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-1) **4.OA.A.1**

### **NJSLS - Career Readiness, Life Literacies, and Key Skills**

- 9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).
- 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7)
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
- 9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).
- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

| Student Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                             | Student Learning Activities and Assessments Aligned to Student Learning Outcome(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | District Approved Materials/Resources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| <p>Students who understand the concepts are able to:</p> <ul style="list-style-type: none"> <li>● Make observations to produce data that can serve as the basis for evidence for an explanation of a phenomenon or for a test of a design solution.</li> <li>● Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</li> <li>● Identify cause-and-effect</li> </ul> | <ul style="list-style-type: none"> <li>● <u>Lesson 1 → Speed and Energy</u>: In this lesson, students learn that we use the energy from food to make our bodies move just like cars use the energy from gasoline to move. In the activity, Twist-o-matic Tester, students build paper models of an amusement park ride called the Twist-o-Matic. The ride stores energy in rubber bands and spins around when the energy is released. Students compare the speed of the spins when they use a thin rubber band versus a thick rubber band.</li> <li>● <u>Lesson 2 → Collisions &amp; Energy Transfer</u>: In this lesson, students explore how energy can be stored</li> </ul> | <ul style="list-style-type: none"> <li>● Mystery Science: Energizing Everything (Energy, Energy Transfer, &amp; Electricity): <u>Lesson 1 → Speed and Energy</u></li> <li>● Mystery Science: Energizing Everything (Energy, Energy Transfer, &amp; Electricity): <u>Lesson 2 → Collisions &amp; Energy Transfer</u></li> <li>● <u>Generation Genius Video/Lesson: Collisions</u> <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional)</li> <li>○ Assessment Included</li> </ul> </li> </ul> |

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| <p>relationships in order to explain change.</p> <ul style="list-style-type: none"> <li>● Obtain and combine information from books and other reliable media to explain phenomena.</li> <li>● Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</li> <li>● Examples of renewable energy resources could include: <ul style="list-style-type: none"> <li>○ Wind energy,</li> <li>○ Water behind dams, and Sunlight.</li> </ul> </li> <li>● Examples of nonrenewable energy resources are: <ul style="list-style-type: none"> <li>○ Fossil fuels,</li> <li>○ Fissile materials</li> </ul> </li> <li>● Examples of environmental effects could include: <ul style="list-style-type: none"> <li>○ Loss of habitat due to dams</li> <li>○ Loss of habitat due to surface mining</li> <li>○ Air pollution from burning of fossil fuels.</li> </ul> </li> <li>● Evaluate evidence of how human use of energy resources affects Earth systems, including environmental and climate-related impacts.</li> </ul> | <p>as height. In the activity, Bumper Coasters (Part I), students build paper roller coasters. Students release marbles down the roller coaster track to understand height energy and energy transfer.</p> <ul style="list-style-type: none"> <li>● <a href="#">Generation Genius Video/Lesson: Collisions</a>: Students explore the science behind the energy of moving objects. For this activity students need to be able to understand that the further up a ramp a marble is released, the faster it will move</li> <li>● <a href="#">Generation Genius Video/Lesson: Energy Transfer</a>: Students explore the transfer of energy from place to place and form to form. They observe examples of energy transfer between light, heat, electrical, motion, and sound. Students have the opportunity to apply their understanding of energy transfer by building a solar oven.</li> <li>● <a href="#">Lesson 3→ Energy Transfer &amp; Engineering</a>: In this lesson, students will explore how high the hills of a roller coaster can be. In the activity, Bumper Coasters (Part II), students add hills to the Bumper Coaster they built in Lesson 2 and experiment to build a deeper understanding of hills and energy.</li> <li>● <a href="#">Lesson 4→ Energy Transfer and Engineering</a>: In this lesson, students construct an explanation of how energy is stored, released, and transferred in chain reactions, such as falling dominoes. In the activity, Build a Chain Reaction (Part I), students are presented with an engineering design challenge to create their own chain reaction machine--a project they will continue in Lesson 5. Students experiment with a “Chain-Reaction Starter Kit.” This kit includes a lever and a ramp, which serve as the first two steps of a chain-reaction machine.</li> <li>● <a href="#">Lesson 5→ Energy Transfer and Engineering</a> <i>*if you have time, otherwise skip*</i> In this lesson, students learn about storing, releasing, and transferring energy. In the activity, Build a Chain</li> </ul> | <ul style="list-style-type: none"> <li>● <a href="#">Generation Genius Video/Lesson: Energy Transfer</a> <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional) <ul style="list-style-type: none"> <li>■ This is a fun activity with a SOLAR s’mores cooker.</li> </ul> </li> <li>○ Assessment Included</li> </ul> </li> <li>● Mystery Science: Energizing Everything (Energy, Energy Transfer, &amp; Electricity): <a href="#">Lesson 3→ Energy Transfer &amp; Engineering</a></li> <li>● Mystery Science: Energizing Everything (Energy, Energy Transfer, &amp; Electricity): <a href="#">Lesson 4→ Energy Transfer and Engineering</a></li> <li>● Mystery Science: Energizing Everything (Energy, Energy Transfer, &amp; Electricity): <a href="#">Lesson 5→ Energy Transfer and Engineering</a> <ul style="list-style-type: none"> <li>○ <i>*if you have time, otherwise skip*</i></li> </ul> </li> <li>● Mystery Science: Energizing Everything (Energy, Energy Transfer, &amp; Electricity): <a href="#">Lesson 6→ Electrical Energy</a></li> <li>● Mystery Science: Energizing Everything (Energy, Energy Transfer, &amp; Electricity): <a href="#">Lesson 7→ Heat Energy and Transfer</a></li> <li>● Mystery Science: Energizing Everything (Energy, Energy Transfer, &amp; Electricity): <a href="#">Lesson 8→ Renewable Energy and Natural Resources</a> <ul style="list-style-type: none"> <li>○ <i>Choose this or Generation Genius, no need to do both.</i></li> </ul> </li> </ul> <p><i>Bells an Whistles activity</i></p> |
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|  | <p>Reaction (Part II), students complete the chain-reaction machine they started building in the previous lesson.</p> <ul style="list-style-type: none"> <li>• <u>Lesson 6→ Electrical Energy:</u> In this lesson, students are introduced to electricity as a form of energy. In the activity, Build a Flashlight, students investigate how electrical energy requires a circuit and make their own mini flashlights from LEDs, button batteries, and strips of aluminum foil. Along the way, they'll learn about the anatomy of a battery, begin to see how circuits work, and discover how handy an on-off switch can be.</li> <li>• <u>Lesson 7→ Heat Energy and Transfer:</u> In this lesson, students explore how heat is another form of energy that can make things go. In the activity, Heat Spinner, students first make a paper Heat Spinner and observe how air can create movement. Then, students use their Heat Spinners to experiment with a heat source (an incandescent bulb) and discover how heat energy can make the spinner move in different ways.</li> <li>• <u>Lesson 8→ Renewabable Energy and Natural Resoures (Choose this or Generation Genius):</u> In this lesson, students analyze the advantages and disadvantages of different sources of energy, including burnable fuels and alternative (renewable) energies. In the activity, Power this Town, students obtain and combine information about wind energy, solar energy, and water energy. They use this information to determine the best alternative energy sources for a town called Boulderville.</li> <li>• <u>Generation Genius Video/Lesson: Renewable and Non-Renewable Resources:</u> Students will discuss and analyze the types of fuel that are used to generate energy. In teams, students will design, build and present a renewable energy device. The class will list the pros and cons of non-renewable and renewable energy and discuss how and where</li> </ul> | <p><a href="https://docs.google.com/presentation/d/1fQW3AltGkli7gwti85koHMxw5gc0r5W89rEBkLWG2gQ/e/dit#slide=id.g214b37a68c2_1_4">https://docs.google.com/presentation/d/1fQW3AltGkli7gwti85koHMxw5gc0r5W89rEBkLWG2gQ/e/dit#slide=id.g214b37a68c2_1_4</a></p> <ul style="list-style-type: none"> <li>• <u>Generation Genius Video/Lesson: Renewable and Non-Renewable Resources</u> <ul style="list-style-type: none"> <li>○ <i>Choose this or Mystery Science, no need to do both.</i></li> <li>○ Video and Discussion Questions</li> <li>○ DIY Acitvity (optional)</li> <li>○ Assessment Included</li> </ul> </li> </ul> <p><u>*Note: Many of these lessons can be used for Unit 5 and 6 and cover many of the same standards.</u></p> <p><u><a href="#">Suggested Supplies for Each Unit</a></u></p> |
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Middletown Township Public Schools - **4th Grade Science Curriculum**

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|  | <p>renewable energy can be found and used in today's society.</p> <p>Assessments:</p> <ul style="list-style-type: none"><li>● Alternative<ul style="list-style-type: none"><li>○ Kahoot</li><li>○ Long term projects</li></ul></li><li>● Benchmark:<ul style="list-style-type: none"><li>○ Generation Genius Assessments</li></ul></li><li>● Summative:<ul style="list-style-type: none"><li>○ Quizzes: multiple choice and/or short answer</li><li>○ Mystery Science Unit Assessments: multiple choice with short answer and data analysis</li><li>○ Laboratory Based Exercises</li></ul></li><li>● Formative:<ul style="list-style-type: none"><li>○ Classwork and Homework</li><li>○ Teacher Observation</li><li>○ Group and individual lab activities</li><li>○ Laboratory Based Exercises</li></ul></li></ul> |  |
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| Unit 5 - Forces and Motion and Engineering Design                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Duration: 15 days |
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| <p>Summary:</p> <p><i>What is the relationship between the speed of an object and the energy of that object?</i></p> <p>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.</p> <p><b>Prior Learning: Kindergarten Unit 1: Pushes and Pulls</b></p> <ul style="list-style-type: none"> <li>· When objects touch or collide, they push on one another and can change motion.</li> </ul> <p><b>Grade 3 Unit 2: Forces and Motion</b></p> <ul style="list-style-type: none"> <li>· Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (<i>Boundary: Qualitative and conceptual used at this level.</i>) · The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.)</li> </ul> |                   |

### Essential Questions/Enduring Understandings

What is the relationship between the speed of an object and its energy?

- Energy can be transferred in various ways and between objects.
- The faster a given object is moving, the more energy it possesses.

In what ways does energy change when objects collide?

- Energy can be transferred in various ways and between objects.
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents. · 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.
- When objects collide, the contact forces transfer energy so as to change the objects' motions.

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

- Science affects everyday life.
- Most scientists and engineers work in teams.
- Engineers improve existing technologies or develop new ones.
- 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.
- Energy can be transferred in various ways and between objects.

## Middletown Township Public Schools - 4th Grade Science Curriculum

- 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.
- The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use.
- 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.
- 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.
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

### NJSLS for Unit

#### Science:

4-PS3-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object.

4-PS3-3: Ask questions and predict outcomes about the changes in energy that occur when objects collide.

4-PS3-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.\*

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.

#### English Language Arts:

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.4.1

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.4.3

Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS3-1) RI.4.9

Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4-PS3-1) W.4.2

Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-3) W.4.7

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-PS3-3) W.4.8

Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-PS3-1) W.4.9

**NJSLS - Career Readiness, Life Literacies, and Key Skills**

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- 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7)
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
- 9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).
- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

**Computer Science and Design Thinking**

- 8.2.5.ED.1: Explain the functions of a system and its subsystems.
- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).
- 8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process.
- 8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process.

| Student Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Student Learning Activities and Assessments Aligned to Student Learning Outcome(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | District Approved Materials/Resources                                                                                                                                                                                                                                        |
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| <p>Students who understand the concepts are able to:</p> <ul style="list-style-type: none"> <li>Describe various ways that energy can be transferred between objects.</li> <li>Use evidence (e.g., measurements, observations, patterns) to construct an explanation.</li> <li>Use evidence to construct an explanation relating the speed of an object to the energy of that object.</li> <li>Describe the various ways that energy can be transferred between objects.</li> <li>Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect</li> </ul> | <ul style="list-style-type: none"> <li>This unit provides focused, repeated opportunities for students to apply scientific ideas about energy and motion through engineering design, emphasizing iterative testing, data analysis, and model revision.</li> <li>Brain Pop Forces: Students will learn what forces are and examples of force.</li> <li>Brain Pop: Kinetic Energy: Students will learn what kinetic energy is and examples of kinetic energy.</li> <li>Brain Pop Engineering: Students will learn about the engineering design process in.</li> </ul> <p>Assessments:</p> <ul style="list-style-type: none"> <li>Alternative</li> </ul> | <ul style="list-style-type: none"> <li><a href="#">Brainpop Video: Forces</a></li> <li><a href="#">Brainpop Video: Kinetic Energy</a></li> <li><a href="#">Brainpop: Engineering Design Process Video</a></li> </ul> <p><a href="#">Suggested Supplies for Each Unit</a></p> |

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| <ul style="list-style-type: none"> <li>relationships.</li> <li>● Ask questions and predict outcomes about the changes in energy that occur when objects collide. Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.</li> <li>● Describe the various ways that energy can be transferred between objects.</li> <li>● Apply scientific ideas to solve design problems.</li> <li>● Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. (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.)</li> <li>● Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound or passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.</li> <li>● 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.</li> <li>● Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.</li> <li>● Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem.</li> <li>● Generate and compare multiple possible</li> </ul> | <ul style="list-style-type: none"> <li>○ Kahoot</li> <li>○ Long term projects</li> <li>● Benchmark: <ul style="list-style-type: none"> <li>○ Generation Genius Assessments</li> </ul> </li> <li>● Summative: <ul style="list-style-type: none"> <li>○ Quizzes: multiple choice and/or short answer</li> <li>○ Mystery Science Unit Assessments: multiple choice with short answer and data analysis</li> <li>○ Laboratory Based Exercises</li> </ul> </li> <li>● Formative: <ul style="list-style-type: none"> <li>○ Classwork and Homework</li> <li>○ Teacher Observation</li> <li>○ Group and individual lab activities</li> <li>○ Laboratory Based Exercises</li> </ul> </li> </ul> |  |
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Middletown Township Public Schools - **4th Grade Science Curriculum**

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| <p>solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p> <ul style="list-style-type: none"><li>● 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.</li><li>● 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.</li></ul> |  |  |
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| Unit 6 - Waves and Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Duration: 15 days |
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| <p>Summary:<br/> <b>How can we use waves to gather and transmit information?</b></p> <p>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.</p> <p><b>Prior Learning: By the end of Grade 1, students know that:</b></p> <ul style="list-style-type: none"> <li>• People also use a variety of devices to communicate (send and receive information) over long distances.</li> </ul> <p><b>By the end of Grade 2, students know that:</b></p> <ul style="list-style-type: none"> <li>• A situation that people want to change or create can be approached as a problem to be solved through engineering.</li> <li>• Asking questions, making observations, and gathering information are helpful in thinking about problems.</li> <li>• Before beginning to design a solution it is important to clearly understand the problem.</li> <li>• Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.</li> <li>• Because there is always more than one possible solution to a problem, it is useful to compare and test designs.</li> </ul> <p><b>By the end of Grade 3, students know that:</b></p> <ul style="list-style-type: none"> <li>• Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.<br/> <i>(Boundary: Qualitative and conceptual, but not quantitative, addition of forces is used at this level).</i></li> <li>• The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. <i>(Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.).</i></li> </ul> |                   |
| Essential Questions/Enduring Understandings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                   |
| <p>What effect do waves have on an object? What effect does an object have on waves?</p> <ul style="list-style-type: none"> <li>• Science findings are based on recognizing patterns.</li> <li>• Similarities and differences in patterns can be used to sort and classify natural phenomena.</li> <li>• Waves, which are regular patterns of motion, can be made in water by disturbing the surface.</li> <li>• When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach.</li> <li>• Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks).</li> </ul> <p>Which team can design a way to use patterns to communicate with someone across the room?</p> <ul style="list-style-type: none"> <li>• Similarities and differences in patterns can be used to sort and classify designed products.</li> <li>• Knowledge of relevant scientific concepts and research findings is important in engineering.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |

- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.
- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—that is, convert it from digitized form to voice and vice versa.
- Different solutions need to be tested in order to determine which of them best solve the problem, given the criteria and the constraints.
- 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.

### NJSLS for Unit

#### Science:

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.

4-PS4-3: Generate and compare multiple solutions that use patterns to transfer information.

3-5-EST-1-2: 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.

#### ELA:

· Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS4-3) **RI.4.9** · Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-1) **SL.4.5**

· 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.5.1**

· Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2) **RI.5.9**

· Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-3) **W.5.7**

· Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-3) **W.5.8**

· Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-3) **W.5.9**

#### Math:

· Reason abstractly and quantitatively.

(3-5-ETS1-2),(3-5-ETS1-3) **MP.2**

· Model with mathematics. (4-PS4-2),(3-5-ETS1-2),(3-5-ETS1-3) **MP.4**

· Use appropriate tools strategically. (3-5-ETS1-2),(3-5-ETS1-3) **MP.5**

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· Operations and Algebraic Thinking (3-ETS1-2) **3-5.OA** · 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.1**

### **NJSLS - Career Readiness, Life Literacies, and Key Skills**

9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).  
 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7)  
 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).  
 9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).  
 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.  
 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

### **Computer Science and Design Thinking**

8.2.5.ED.1: Explain the functions of a system and its subsystems.  
 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.  
 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.  
 8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints).  
 8.2.5.ED.5: Describe how specifications and limitations impact the engineering design process.  
 8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process.

| Student Learning Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Student Learning Activities and Assessments Aligned to Student Learning Outcome(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | District Approved Materials/Resources                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| <p>Students who understand the concepts can:</p> <ul style="list-style-type: none"> <li>Sort and classify natural phenomena using similarities and differences in patterns.</li> <li>Develop a model using an analogy, example, or abstract representation to describe a scientific principle.</li> <li>Develop a model (e.g., diagram, analogy, or physical model) of waves to describe patterns in terms of amplitude and wavelength, and that waves can cause objects to move.</li> </ul> | <ul style="list-style-type: none"> <li><a href="#">Generation Genius Lesson/Video: Wave Properties</a>: Students will understand how energy travels through transverse and longitudinal waves</li> <li><a href="#">Lesson 1→ Sound, Vibration, and Engineering</a>: In this lesson, students learn about the connection between sounds and vibration. In the activity, Paper Cup Telephone, students make telephones using cups and string. Students then modify the design of their telephones using different types of supplies to see if they can improve the sound quality.</li> </ul> | <ul style="list-style-type: none"> <li><a href="#">Generation Genius Lesson/Video: Wave Properties</a> <ul style="list-style-type: none"> <li>Video and Discussion Questions</li> <li>DIY Activity (optional)</li> <li>Assessment Included</li> </ul> </li> <li><a href="#">Brain Pop Video: Waves</a></li> <li>Mystery Science: Waves of Sound (Sounds, Waves, and Communication): <a href="#">Lesson 1→ Sound, Vibration, and Engineering</a></li> </ul> |

## Middletown Township Public Schools - 4th Grade Science Curriculum

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| <ul style="list-style-type: none"> <li>● Sort and classify designed products using similarities and differences in patterns.</li> <li>● Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.</li> <li>● 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.</li> <li>● Generate and compare multiple solutions that use patterns to transfer information.</li> <li>● Examples of solutions:             <ul style="list-style-type: none"> <li>○ Drums sending coded information through sound waves;</li> <li>○ Using a grid of ones and zeroes representing black and white to send information about a picture;</li> <li>○ Using Morse code to send text.</li> </ul> </li> <li>● Plan and conduct an investigation collaboratively to produce data that can serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.</li> <li>● 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.</li> </ul> | <ul style="list-style-type: none"> <li>● <u>Lesson 2→Sound and Vibrations:</u> In this lesson, students explore the role that air plays in enabling a sound vibration to travel. In the activity, Act Out a Sound, students do two short activities that explore sound vibrations. Students experiment with sound to understand how it moves through the air and then consider what would happen in an environment like space where there is no air.</li> <li>● <u>Lesson 3→Sound Waves, and Wavelengths:</u> In this lesson, students discover that sound is a wave. In the activity, Making Waves, students draw the waves that different sounds make using a virtual oscilloscope, a machine that shows images of sound waves. Then they vibrate a rope to make waves that look like the ones made by the oscilloscope.</li> <li>● <u>Generation Genius Video/Lesson: Information Transfer:</u> Students explore the science behind how devices like cellphones, tablets and computers transfer text, images and sound. Students delve into the history of information transfer by learning about Morse code as another example of using patterns to transfer messages. Students participate in hands-on experiences using both Morse code and patterns of zeros and ones to transfer information.</li> </ul> <p>Assessments:</p> <ul style="list-style-type: none"> <li>● Alternative             <ul style="list-style-type: none"> <li>○ Kahoot</li> <li>○ Long term projects</li> </ul> </li> <li>● Benchmark:             <ul style="list-style-type: none"> <li>○ Generation Genius Assessments</li> </ul> </li> <li>● Summative:             <ul style="list-style-type: none"> <li>○ Quizzes: multiple choice and/or short answer</li> <li>○ Mystery Science Unit Assessments: multiple choice with short answer and data analysis</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>● Mystery Science: Waves of Sound (Sounds, Waves, and Communication): <u>Lesson 2→Sound and Vibrations</u></li> <li>● Mystery Science: Waves of Sound (Sounds, Waves, and Communication): <u>Lesson 3→Sound Waves, and Wavelengths</u></li> <li>● <u>Generation Genius Video/Lesson: Information Transfer</u> <ul style="list-style-type: none"> <li>○ Video and Discussion Questions</li> <li>○ DIY Activity (optional)</li> <li>○ Assessment Included</li> </ul> </li> </ul> <p><u>Suggested Supplies for Each Unit</u></p> |
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## Middletown Township Public Schools - **4th Grade Science Curriculum**

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|  | <ul style="list-style-type: none"><li>○ Laboratory Based Exercises</li><li>● Formative:<ul style="list-style-type: none"><li>○ Classwork and Homework</li><li>○ Teacher Observation</li><li>○ Group and individual lab activities</li><li>○ Laboratory Based Exercises</li></ul></li></ul> |  |
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[Appendix](#)

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

**ML**

- Use visuals
- Introduce key vocabulary before lesson
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments

**Supports for Students With IEPs:**

- Allow extra time to complete assignments or tests
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or e-books
- 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

**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
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities

**Supports for Students With 504 Plans:**

- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Provide anchor charts with high frequency words and phonemic patterns