

# Hanover Township Public Schools

## Science Curriculum

### Grade 4

# Hanover Township Public Schools

## Science Curriculum

### Philosophy

The Hanover Township School District's science curriculum encourages students to use problem solving and inquiry based approaches to understand science and engineering principles. By combining traditional science concepts (physical science, chemistry, biology, earth, space and environmental sciences) and our students' unique abilities and applying these concepts through engineering and technology, students will learn to think globally while learning locally. This curriculum will follow a coherent progression of concepts that allows students to continually build on and revise their knowledge.

Through the New Generation Science Standards, the "... students, over multiple years of school, actively engage in **scientific and engineering practices** and apply **crosscutting concepts** to deepen their understanding of the **core ideas**...". The intertwining of these three dimensions will allow a deeper understanding of science and engineering concepts and promote better problem solving skills.

Collaborative, student-centered lessons and cooperative learning is essential. Students will use evidence as a basis for analysis of data and arguments. Emphasis is on the integration of knowledge from a variety of resources and effective communication of an understanding of this knowledge to meet the performance expectations.

Adapted from

*Framework for K-12 Science Education*. Natl Academy Pr, 2011. Print.

# Hanover Township Public Schools

## Science Curriculum

### Grade 4 Unit of Study: Pacing Guide and Scope & Sequence

#### Pacing Guide Unit 1: Water & Climate

<p><i>Unit of Study Essential Questions (Purpose of Unit of Study)</i></p>	<p><b><i>How does water affect living and nonliving things?</i></b></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. The crosscutting concepts of <i>patterns</i> and <i>cause and effect</i> are called out as organizing concepts. Students demonstrate grade-appropriate proficiency in <i>planning and carrying out investigations</i> and <i>constructing explanations</i>. Students are also expected to use these practices to demonstrate understanding of the core ideas.</p>
<p><b><i>Key Learning Objectives (CCSS)/(NJSL)</i></b></p>	<p><b>Generate and compare multiple solutions to reduce the impacts of natural earth processes and climate change on humans. <i>[Clarification statement: Examples of solutions could include designing on earthquake resistant building and improving monitoring of volcanic activity.]</i> <a href="#">(4-ESS3-2)</a></b></p> <p><b>Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water. <i>[Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.]</i> <a href="#">4-ESS2-1</a></b></p>
<p><b><i>Assessment (How the student will demonstrate knowledge)</i></b></p>	<p>Investigations, Developing and using models, Analyzing and interpreting data, Constructing explanations and designing solutions, Engaging an argument from evidence, Obtaining, evaluating, and communicating information, Asking questions and defining problems, &amp; Using mathematics and computational thinking</p>
<p><b><i>Suggested Length of Study and Dates</i></b></p>	<p>20 Days</p>

# Hanover Township Public Schools

## Science Curriculum

### Pacing Guide Unit 2: Environments

<b><i>Unit of Study Essential Questions (Purpose of Unit of Study)</i></b>	<b><i>Using their senses, how do animals react to their environment?</i></b>  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. The crosscutting concepts of <i>cause and effect</i> , <i>systems and system models</i> , and <i>structure and function</i> are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in <i>developing and using models</i> . Students are expected to use these practices to demonstrate understanding of the core ideas.
<b><i>Key Learning Objectives (CCSS)/(NJSLS)</i></b>	<b>Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. <i>[Clarification statement: Emphasis is on systems of information transfer.]</i> <a href="#">(4-LS1-2)</a></b>
<b><i>Assessment (How the student will demonstrate knowledge)</i></b>	Investigations, Developing and using models, Analyzing and interpreting data, Constructing explanations and designing solutions, Engaging an argument from evidence, Obtaining, evaluating, and communicating information, Asking questions and defining problems, & Using mathematics and computational thinking
<b><i>Suggested Length of Study and Dates</i></b>	15 Days

# Hanover Township Public Schools

## Science Curriculum

### Pacing Guide Unit 3: Animals

<p><i>Unit of Study</i> <i>Essential Questions</i> <i>(Purpose of Unit of Study)</i></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. The crosscutting concepts of <i>systems and system models</i> are called out as organizing concepts for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency <i>in engaging in argument from evidence</i>. Students are also expected to use this practice to demonstrate understanding of the core idea.</p>
<p><b><i>Key Learning Objectives</i></b> <i>(CCSS)/(NJSL)</i></p>	<p><b>Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. <i>[Clarification statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.]</i> (4-LS1-1)</b></p>
<p><b><i>Assessment</i></b> <i>(How the student will demonstrate knowledge)</i></p>	<p>Investigations, Developing and using models, Analyzing and interpreting data, Constructing explanations and designing solutions, Engaging an argument from evidence, Obtaining, evaluating, and communicating information, Asking questions and defining problems, &amp; Using mathematics and computational thinking</p>
<p><b><i>Suggested Length of Study and Dates</i></b></p>	<p>15 Days</p>

# Hanover Township Public Schools

## Science Curriculum

### Pacing Guide Unit 4: EIE

<b><i>Unit of Study</i></b> <b><i>Essential Questions</i></b> <b><i>(Purpose of Unit of Study)</i></b>	<b><i>How do electrical circuits transform energy?</i></b>  In this unit of study, fourth-grade students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents. Students also obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment. The crosscutting <i>concepts of cause and effect, energy and matter, and the interdependence of science, engineering, and technology, and influence of science, engineering, and technology on society and the natural world</i> are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in <i>planning and carrying out investigations and obtaining, evaluating, and communicating information</i> . Students are also expected to use these practices to demonstrate understanding of the core ideas.
<b><i>Key Learning Objectives</i></b> <b><i>(CCSS)/(NJSL)</i></b>	<b>Make observations to provide evidence that energy can be transferred from place to place by sun, light, heat, and electric currents.(4-PS3-2)</b>
<b><i>Assessment</i></b> <b><i>(How the student will demonstrate knowledge)</i></b>	Investigations, Developing and using models, Analyzing and interpreting data, Constructing explanations and designing solutions, Engaging an argument from evidence, Obtaining, evaluating, and communicating information, Asking questions and defining problems, & Using mathematics and computational thinking
<b><i>Suggested Length of Study and Dates</i></b>	25 Days

# Hanover Township Public Schools

## Science Curriculum

Grade: 4 Unit of Study: Unit : Water & Climate Curriculum

### Unit Summary

#### ***How does water affect living and nonliving things?***

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

### Student Learning Objectives:

# Hanover Township Public Schools

## Science Curriculum

**Generate and compare multiple solutions to reduce the impacts of natural earth processes on humans. *[Clarification statement: Examples of solutions could include designing on earthquake resistant building and improving monitoring of volcanic activity.]***  
**(4-ESS3-2)** Students will be able to . . .

<p>Investigation 1 - Water Observations</p> <ul style="list-style-type: none"> <li>• Compare the way water interacts with four different surfaces.</li> <li>• Compare the rates of different amounts of water flowing downhill.</li> <li>• Observe how water interacts with natural materials (ex.sponge)</li> </ul>	<p>Investigation 2 - Hot Water, Cold Water</p> <ul style="list-style-type: none"> <li>• Observe the properties of water as it is heated, cooled, and frozen.</li> <li>• Construct a water thermometer.</li> <li>• Compare the density of water at different temperatures.</li> </ul>	<p>Investigation 3 - Weather and Water</p> <ul style="list-style-type: none"> <li>• Observe and collect weather data</li> <li>• Compare weather data to meteorologists' forecasts and historical weather data</li> <li>• Explore the effects of environmental conditions and surface area on evaporation rates</li> </ul>	<p>Investigation 4 - Seasons and Climate</p> <ul style="list-style-type: none"> <li>• Organize and analyze local daily weather data</li> <li>• Recognize the difference between weather and climate</li> <li>• Analyze methods used to deal with natural hazards</li> </ul>	<p>Investigation 5- Waterworks</p> <ul style="list-style-type: none"> <li>• Compare water poured through two different earth materials: soil and gravel</li> <li>• Collect and evaluate soil to compare drainage rates</li> <li>• Construct a waterwheel and use it to lift objects</li> <li>• Analyze ways to conserve renewable natural resources</li> </ul>
--	--	---	---	--

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

Investigation 1- Water	Investigation 2 - Hot	Investigation 3 -	Investigation 4 -	Investigation 5-
------------------------	-----------------------	-------------------	-------------------	------------------

# Hanover Township Public Schools

## Science Curriculum

<b>Observations</b> Part 1 - Drops of Water Part 2- Water on a Slope Part 3- Soaking sponges Part 4- Water in Nature	<b>Water, Cold Water</b> Part 1- Measuring Temperature Part 2- Build a thermometer Part 3- Sinking and floating water Part 4- Water as ice Part 5- Ice Outdoors	<b>Weather and Water</b> Part 1-Measuring water Part 2- Evaporation Part 3- Surface Area Part 4- Evaporation locations Part 5- Condensation	<b>Seasons and Climate</b> Part 1- Seasonal weather Part 2-describing climate Part 3- Weather-related natural hazards	<b>Waterworks</b> Part 1- Water in Earth materials Part 2- Water in soil Part 3- Waterwheels
<b>Quick Links</b>				
<a href="#"><u>Discovery Education</u></a>	<a href="#"><u>BrainPOP</u></a>	<a href="#"><u>Pebble Go</u></a>		
<a href="#"><u>Nat Geo Kids</u></a>	<a href="http://www.fossweb.com"><u>www.fossweb.com</u></a>	<a href="http://www.IXL.com"><u>www.IXL.com</u></a>		

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<b><i>Investigation 1: Water Observations</i></b> <i>What happens when water falls on different surfaces?</i> <i>How does water move on a slope?</i>  <i>How much water can a dry sponge soak up?</i> <i>What happens outdoors when rain falls on natural materials?</i>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>• Water forms beads on waterproof materials and soaks into absorbent materials.</li><li>• Water moves downhill. The angle of the slope and the amount of water affect flow.</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>• Developing and using models</li><li>• Planning and carrying out investigations</li><li>• Analyzing and interpreting data</li><li>• Constructing explanations and designing solutions</li><li>• Engaging in argument from evidence</li><li>• Obtaining, evaluating, and communicating information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<b>Investigation 2:</b> <i>How can you measure temperature accurately?</i> <i>What happens to water when it gets hot? cold?</i> <i>What happens when hot or cold water is put into room-temperature water?</i> <i>How does water change when it gets really cold?</i> <i>Where should an animal go to stay warm or to stay cool?</i>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>• Temperature is a measure of how hot matter is.</li><li>• Water expands when heated and contracts when cooled.</li><li>• A material that floats in water is less dense than the water; a material that sinks is more dense.</li><li>• Cold water is more dense than warm water.</li><li>• Water expands when it freezes; ice is less dense than liquid water.</li><li>• Ice melts when heated; water freezes when cooled.</li></ul>	<ul style="list-style-type: none"><li>• Asking questions and defining problems</li><li>• Developing and using models</li><li>• Planning and carrying out investigations</li><li>• Analyzing and interpreting data</li><li>• Constructing explanations and designing solutions</li><li>• Engaging in argument from evidence</li><li>• Obtaining, evaluating, and communicating information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<b>Investigation 3:</b> <i>What does the weather forecast tell us?</i> <i>What happens to wet paper towels overnight?</i> <i>How does surface area affect evaporation?</i> <i>What else affects how fast water evaporates?</i> <i>What causes moisture to form on the side of a cup?</i>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>• Weather is measured using observations and tools such as thermometers, wind vanes, and rain gauges.</li><li>• Evaporation is the process by which liquid (water) changes into gas (water vapor).</li><li>• High temperatures, greater surface area, and moving air (wind) increase the rate of evaporation.</li><li>• Condensation is the process by which gas (water vapor) changes into liquid water; it occurs on a cool surface.</li><li>• Evaporation and condensation contribute to the movement of water through the water cycle.</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>• Asking questions and defining problems</li><li>• Developing and using models</li><li>• Planning and carrying out investigations</li><li>• Analyzing and interpreting data</li><li>• Using mathematics and computational thinking</li><li>• Constructing explanations and designing solutions</li><li>• Engaging in arguments from evidence</li><li>• Obtaining, evaluating, and communicating information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<p><b>Investigation 4:</b></p> <p><i>What are typical weather conditions in our region?</i></p> <p><i>How do we describe different climates?</i></p> <p><i>How do people deal with natural hazards such as floods?</i></p>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>• Typical weather in a region often varies with seasons. High and low temperatures and amount of precipitation are the main ways to describe seasonal weather changes.</li><li>• The Sun's energy drives weather.</li><li>• Weather data in tables and in graphic displays, may show patterns over time.</li><li>• Climate is the average or typical weather that can be expected to occur in a region, based on long term observation and data analysis.</li><li>• Weather-related natural hazards include tornadoes, hailstorms, blizzards, lightning, floods, and drought.</li><li>• People often modify their homes and their way of life to deal with floods.</li><li>• Wetland protection and restoration is one way to prevent floods.</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>• Analyzing and interpreting data</li><li>• Constructing explanations and designing solutions</li><li>• Obtaining, evaluating, and communicating information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<p><b>Investigation 5:</b></p> <p><i>What happens when water is mixed with other earth materials?</i></p> <p><i>Do soils in the schoolyard drain water at the same rate?</i></p> <p><i>What is needed to make a waterwheel system function well?</i></p>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>• Soil is rock particles mixed with organic material called humus.</li><li>• Soils retain more water than rock particles alone.</li><li>• Water drains more easily through some earth materials than through others.</li><li>• The energy of flowing water can be used to do work; waterwheels are machines powered by flowing water.</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>• Asking questions and defining problems</li><li>• Planning and carrying out investigations</li><li>• Analyzing and interpreting data</li><li>• Constructing explanations and designing solutions</li><li>• Engaging in argument from evidence</li><li>• Obtaining, evaluating, and communication information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

### What It Looks Like in the Classroom

In this unit of study, students learn that water is the most important substance on Earth. Water dominates the surface of our planet, changes the face of the land, and defines life. Weather is driven by the Sun and involves the movement of water over the earth through evaporation, condensation, precipitation, and runoff—the water cycle. Climate is determined in part by the amount of precipitation in a region and by temperature fluctuations. Human societies depend on water, and new technologies are being engineered to conserve and protect this natural resource, to provide for the needs of people around the world.

Students are provided with experiences to explore the properties of water, the water cycle and weather, interactions between water and other earth materials, and how humans use water as a natural resource. Students engage in science and engineering practices in the context of water, weather, and climate and explore the crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; and systems and system models. They are introduced to the nature of science, how science affects everyday life, and the influence of engineering, technology, and science on society and the natural world.

In the first portion of this unit, students will investigate the properties of water and how water interacts with four different surfaces. After observing water flowing downhill, students will compare the rates of different amounts. Students will explore how sponges interact with water to soak up spills and compare it to how water interacts with other natural materials. Students will also observe water as it is heated, cooled, and frozen. Using a water thermometer that they have constructed, students will measure the temperature while comparing the density of water at different temperatures.

Through observations and measurement, students will learn that warm water is less dense than cool water, and that ice is less dense than liquid water. Students will use this knowledge to consider the question: Where should an animal go to stay warm or to stay cool? They will explore the effects of environmental conditions and surface area on rates of evaporation. Students will set up condensation chambers and consider how evaporation and condensation contribute to the water cycle. Students will identify cause and effect relationships from their observations of the properties of water. Working in groups to organize and analyze local daily weather data for 4 months of the previous year will lead students to understand the difference between weather (condition of the atmosphere now) and climate (typical weather that can be expected to occur in a region).

Working in groups to organize and analyze local daily weather data for 4 months of the previous year will lead students to understand the difference between weather (condition of the atmosphere now) and climate (typical weather that can be expected to occur in a region). While conducting research through media, students are introduced to ways that people manage the problems associated with floods.

# Hanover Township Public Schools

## Science Curriculum

### Connecting with English Language Arts/Literacy and Mathematics

#### ***English Language Arts/Literacy***

- To support integration of the language arts standards in this unit, students can read content-specific texts to deepen their understanding of the cause-and-effect relationships within earth systems. As they read, students should take notes, which can be used to help them understand and explain how earth processes affect the world around them. They should ask questions, such as,
  - ❑ “How can water, ice, wind, and vegetation change the land?”
  - ❑ “What happens to water when it gets cold?”
  - ❑ “What happens when rains falls on natural materials?”
- As they attempt to answer these questions, students can cite evidence from observations and from texts to support their thinking. In addition, students can conduct short research projects that will help them gather additional evidence to support explanations. During collaborative group work, students will brainstorm and discuss ideas for materials to build a waterwheel. Throughout this unit, students should collect and record data in science journals and analyze the data to identify patterns of change.

#### ***Mathematics***

- To support integration of the Mathematics standards into this unit, students are expected to use mathematics when analyzing quantitative data to identify patterns, explain cause-and-effect relationships, and make predictions. Students need opportunities to measure earth materials using tools, such as balances and graduated cylinders. Students should also be required to solve problems involving measurement and data. Students should also be able to use a thermometer to measure temperature in degrees Celsius.

## Hanover Township Public Schools

### Science Curriculum

#### Modifications

*(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: [All Standards, All Students/Case Studies](#) for vignettes and explanations of the modifications.)*

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as google classroom, experts from the community helping with a project, journal articles, and biographies).
- 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).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principles ([http://www.cast.org/our-work/about-udl.html#.VXmoXcfD\\_UA](http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)).
- Use of Chromebooks

# Hanover Township Public Schools

## Science Curriculum

### Research on Student Learning

N/A

### Prior Learning

#### **Grade 2 Unit 4: The Earth's Land and Water**

- Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.
- Maps show where things are located. One can map the shapes and kinds of land and water in any area.

#### **Grade 2 Unit 5: Changes to Earth's Land**

- Wind and water can change the shape of the land.

# Hanover Township Public Schools

## Science Curriculum

### Future Learning

#### Grade 5 Unit 4: Water on Earth

- Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

#### Grade 5 Unit 5: Earth Systems

- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

### Connections to Other Units

In the unit, **Waves and Information**, 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.

# Hanover Township Public Schools

## Science Curriculum

### Sample of Open Education Resources

***Water Cycle Overview***- This site from the Department of Atmospheric Sciences (DAS) at the University of Illinois at Urbana-Champaign includes a nice animation of the water cycle including various processes such as evaporation and condensation along with maps and photographs to illustrate them.

[ww2010.atmos.uiuc.edu](http://ww2010.atmos.uiuc.edu)

***Investigating Water by Delta Education***- Teaches students about the properties of water, including freezing, melting, and evaporation.

***Water as a Gas; Water as a Liquid; Water as a Solid*** by Helen Frost- Simple text presents facts about water in its solid, liquid, and gas state, its properties, and its uses.

# Hanover Township Public Schools

## Science Curriculum

### Teacher Professional Learning Resources

#### **Using FOSS - Water and Climate (Grade 4)**

[www.fossweb.com](http://www.fossweb.com)

Use Teacher Tablet Companion to navigate website

#### **Science Instruction Companion from the Danielson model**

<http://www.nj.gov/education/aps/cccs/science/ScienceInstructionCompanion>

#### **Stem Teaching Tools**

<http://stemteachingtools.org/tools>

#### **National Science Teacher Association**

[NSTA: Homepage](http://www.nsta.org)

#### **PebbleGo**

[www.pebblego.com](http://www.pebblego.com)

# Hanover Township Public Schools

## Science Curriculum

Appendix A: NGSS and Foundations for the Unit		
<p>Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water. <i>[Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.]</i> <a href="#">4-ESS2-1</a></p>		
<p>Generate and compare multiple solutions to reduce the impacts of natural earth processes and climate change on humans. <i>[Clarification statement: Examples of solutions could include designing on earthquake resistant building and improving monitoring of volcanic activity.]</i> <a href="#">(4-ESS3-2)</a></p>		
<p>The performance expectations above were developed using the following elements from the NRC document <a href="#">A Framework for K-12 Science Education</a>:</p>		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1)</li> <li>Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the designing solution. (4-ESS3-2)</li> </ul>	<p><b>ESS2.A: Earth Materials and Systems</b></p> <ul style="list-style-type: none"> <li>Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)</li> </ul> <p><b>ESS2.E: Biogeology</b></p> <ul style="list-style-type: none"> <li>Living things affect the physical characteristics of their regions. (4-ESS2-1)</li> </ul> <p><b>ESS3.B: Natural Hazards</b></p> <ul style="list-style-type: none"> <li>A variety of hazards result from natural processes and climate change (e.g. earthquakes., tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2)</li> </ul>	<p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1) (4-ESS3-2)</li> </ul> <p>-----</p> <p><b>Connections to Engineering, Technology, and Applications of Science</b></p> <p><b>Influence of Science, Engineering, and Technology on Society and the Natural World</b></p> <ul style="list-style-type: none"> <li>Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2)</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

	<p><b>ETS1.B: Designing Solutions to Engineering Problems</b></p> <ul style="list-style-type: none"><li>• Testing a solution involves investigating how well it performs under a range of likely conditions.</li></ul>	
--	--	--

# Hanover Township Public Schools

## Science Curriculum

English Language Arts	Mathematics
<p>Conduct short research projects that build knowledge through investigation of different aspects of a topic. <b>W.4.7</b> (4-ESS2-1)</p> <p>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. <b>W.4.8</b> (4-ESS2-1)</p> <p>Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. <b>RI.4.1</b> (4.ESS3-2)</p> <p>Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. <b>RI.4.9</b> (4.ESS3-2)</p>	<p>Reason abstractly and quantitatively. <b>MP.2</b> (4.ESS2-1, 4.ESS3-2)</p> <p>Model with mathematics. <b>MP.4</b> (4.ESS2-1, 4.ESS3-2)</p> <p>Use appropriate tools strategically. <b>MP.5</b> (4.ESS2-1)</p> <p>Know relative sizes of measurement units within one system of units, including km,m, cm; kg and g; lb and oz; l and mL; hr, min, adn 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. <b>4.MD.A.1</b> (4-ESS2-1)</p> <p>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. <b>4.MD.A.2</b> (4.ESS2-1)</p> <p>Interpret a multiplication equation as a comparison, e.g., interpret <math>35 = 5 \times 7</math> 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. <b>4.OA.A.1</b> (4.ESS3-2)</p>

# Hanover Township Public Schools

## Science Curriculum

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

Integration of Career Readiness, Life Literacies, and Key Skills. Evidence must include explicit citations of Standards 9.1 Personal Finance, 9.2 Career Awareness, Exploration, Preparation and Training, and 9.4 Life Literacies and Key Skills. The citations for each unit must include links to the standards for NJSLS CLKS (Career, Life, Key Skills).

<https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf>

### NJSLS – Career Readiness, Life Literacies, and Key Skills (21<sup>st</sup> Century Themes and Skills)

<p><b>Personal Finance Literacy 9.1</b></p> <p>Standard 9.1 Personal Financial Literacy: This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers</p> <p><a href="https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf</a></p> <p>PAGES 22-20</p>	<p><b>Career Awareness Exploration Preparedness and Training 9.2</b></p> <p>Career Awareness, Exploration, Preparation and Training. This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements</p> <p><a href="https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf</a></p> <p>PAGES 37-40</p>	<p><b>Life Literacies and Key Skills 9.4</b></p> <p>Life Literacies and Key Skills. This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy</p> <p><a href="https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf</a></p> <p>PAGES 43-52</p>
<p>9.1.5.FP.4: Explain the role of spending money and how it affects wellbeing and happiness (e.g., "happy money," experiences over things, donating to causes, anticipation, etc.).</p> <p>• 9.1.5.RMI.2: Justify reasons to have insurance.</p>	<p>• 9.2.5.CAP.9: Justify reasons to have insurance.</p>	<p>• 9.4.5.Cl.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).</p> <p>• 9.4.5.Cl.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).</p> <p>9.4.5.Cl.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2,</p>

# Hanover Township Public Schools

## Science Curriculum

		<p>1.5.5.CR1a).</p> <p>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).</p>
--	--	---

# Hanover Township Public Schools

## Science Curriculum

### Accommodations and Modifications

#### Science – Accommodations and Modifications

Special Education Students	English Language Learners	At-Risk Students	Gifted and Talented Students	Students with 504s
<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Pre Teach vocabulary</li> <li>● Provide flashcards with key science terminology</li> <li>● Use manipulatives and visual representation to examine concepts</li> <li>● Utilize mnemonic tricks to improve memory</li> <li>● Use manipulatives</li> </ul>	<ul style="list-style-type: none"> <li>● Create a word wall</li> <li>● Utilize native language translation (peer, online assistive technology, translation device, bilingual dictionary)</li> <li>● Preteach vocabulary</li> <li>● Use graphic organizers or other visual model</li> <li>● Use manipulatives to visualize concept</li> <li>● Highlight key vocabulary-chart or vocabulary bank</li> <li>● Use nonverbal responses (thumbs up/down)</li> <li>● Use sentence frames</li> <li>● Design questions for different proficiency levels</li> </ul>	<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Work within group or partners. Self-select partners ahead of time to choose positive role model.</li> <li>● Repeat and practice Model skills / techniques to be mastered.</li> <li>● Use metacognitive work</li> </ul>	<ul style="list-style-type: none"> <li>● Structure the learning around explaining or solving a social or community-based issue.</li> <li>● Use project-based science learning to connect science with observable phenomena</li> <li>● Collaborate with after-school programs to extend learning opportunities.</li> <li>● Interdisciplinary and problem-based assignments with planned scope and sequence</li> <li>● Advance,</li> </ul>	<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Preteach vocabulary</li> <li>● Use manipulatives and visual representation to examine concepts</li> <li>● Use mnemonic tricks to improve memory</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

<p>to visualize concept</p> <ul style="list-style-type: none"> <li>● Highlight key vocabulary-chart or vocabulary bank</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Use of scribe</li> <li>● Adaptive computer to type assignments</li> <li>● Adjustable lab tables and lab equipment within reach</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Captioned videos</li> <li>● Preferred seating</li> <li>● Tactile drawings, graphs, and three-dimensional models,</li> <li>● Large print handouts, lab signs, and equipment</li> </ul>	<ul style="list-style-type: none"> <li>● Utilize partners and partner talk</li> <li>● Break down large assignments into smaller tasks</li> <li>● Utilize “Can Do” Descriptors <a href="https://wida.wisc.edu/teach/can-do/descriptors">https://wida.wisc.edu/teach/can-do/descriptors</a></li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration reviews</li> </ul>	<ul style="list-style-type: none"> <li>● Extend time to complete class work</li> <li>● Provide copy of class notes</li> <li>● Utilize preferential seating to be mutually determined by the student and teacher</li> <li>● Allow student to use a computer to complete assignments.</li> <li>● Use manipulatives to examine concepts</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> </ul>	<p>accelerated, or compacted content</p> <ul style="list-style-type: none"> <li>● Abstract and advanced higher-level thinking</li> <li>● Allowance for individual student interests</li> <li>● Assignments geared to development in areas of affect, creativity, cognition, and research skills</li> <li>● Complex, in-depth assignments</li> <li>● Diverse enrichment that broadens learning</li> <li>● Variety in types of resources</li> <li>● Community involvement</li> <li>● Cultural diversity</li> <li>● Internship, mentorship, and other forms of apprenticeship</li> </ul>	<p>lab assignments</p> <ul style="list-style-type: none"> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration reviews</li> </ul>
--	--	---	---	--

# Hanover Township Public Schools

## Science Curriculum

<p>labels</p> <ul style="list-style-type: none"><li>• Computer equipped to enlarge screen characters and images</li><li>• LED projection microscopes</li><li>• Audio, braille or electronic notes, handouts, and texts</li><li>• Braille signs &amp; equipment labels</li><li>• Raised-line drawings, clay models, 3-D triangles and spheres for geometric shapes</li><li>• Verbal descriptions of visual aids</li><li>• Auditory lab warning signs</li><li>• Adaptive lab equipment</li><li>• Computer with optical character reader and voice output</li><li>• Interpreter or real time captioning</li><li>• Demonstration reviews</li><li>• Visual warning system for lab emergencies</li></ul>	<ul style="list-style-type: none"><li>• Computer with optical character reader and voice output</li><li>• Interpreter or real time captioning</li><li>• Demonstration reviews</li></ul>	<ul style="list-style-type: none"><li>• Interpreter or real time captioning</li><li>• Demonstration reviews</li></ul>		
--	---	---	--	--

# Hanover Township Public Schools

## Science Curriculum

Grade: 4 Unit of Study: Unit :Environments Curriculum

Unit Summary	
<p><b><i>Using their senses, how do animals react to their environment?</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. The crosscutting concepts of <i>cause and effect</i>, <i>systems and system models</i>, and <i>structure and function</i> are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in <i>developing and using models</i>. Students are expected to use these practices to demonstrate understanding of the core ideas.</p>	
Student Learning Objectives	
<p><b>Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. <i>[Clarification statement: Emphasis is on systems of information transfer.]</i> <a href="#">(4-LS1-2)</a></b></p> <p>Students will be able to . . .</p>	
<p><b>Investigation 1 - Environmental Factors</b></p> <ul style="list-style-type: none"> <li>● Observe and describe the living and nonliving components in terrestrial environments</li> <li>● Observe life cycles of mealworms over time</li> <li>● Investigate how isopods respond to environmental factors</li> <li>● Analyze small animals’ structures that live in leaf-litters</li> </ul>	<p><b>Investigation 2 - Ecosystems</b></p> <ul style="list-style-type: none"> <li>● Monitor environmental factors in the system</li> <li>● Gain knowledge about producers, consumers, and decomposers in food chains and food webs</li> <li>● Gain knowledge on how food affects a population's home range</li> </ul>
<p><b>Investigation 1- Environmental Factors</b></p> <p>Part 1: Observing Mealworms                      Part 2: Designing Isopod Environment                      Part 3: Leaf-Litter Critters</p>	<p><b>Investigation 2 - Ecosystems</b></p> <p>Part 1: Designing an Aquarium                      Part 2: Food Chains and Food Webs                      Part 3: Population Simulation                      Part 4: Sound Off</p>

# Hanover Township Public Schools

## Science Curriculum

Quick Links		
<a href="#">Discovery Education</a>	<a href="#">BrainPOP</a>	<a href="https://www.ixl.com/science/">https://www.ixl.com/science/</a>
<a href="#">Nat Geo Kids</a>	<a href="http://www.fossweb.com">www.fossweb.com</a>	<a href="#">Pebble Go</a>
Unit Sequence		
<p><b>Investigation 1: Environmental Factors</b></p> <p><i>How do mealworm structures and behaviors help them grow and survive?</i></p> <p><i>What moisture conditions do isopods prefer?</i></p> <p><i>What light conditions do isopods prefer?</i></p> <p><i>What are the characteristics of animals living in the leaf-litter environment?</i></p>		
Concepts	Formative Assessment	
<ul style="list-style-type: none"> <li>• An environment is everything living and nonliving that surrounds and influences an organism.</li> <li>• A relationship exists between environmental factors and how well organisms grow.</li> <li>• Animals have structures and behaviors that function to support survival, growth, and reproduction.</li> <li>• Every organism has a set of preferred environmental conditions.</li> </ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"> <li>• Asking questions</li> <li>• Developing and using models</li> <li>• Planning and carrying out investigations</li> <li>• Analyzing and interpreting data</li> <li>• Constructing explanations</li> </ul>	

# Hanover Township Public Schools

## Science Curriculum

	<ul style="list-style-type: none"><li>● Engaging in argument from evidence</li><li>● Obtaining, evaluating, and communicating information</li></ul>
--	---

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<b>Investigation 2: Ecosystems</b> <i>What are the environmental factors in an aquatic system?</i> <i>What are the roles of organisms in a food chain?</i> <i>How does food affect a population in its home range?</i> <i>How do animals use their sense of hearing?</i>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>• Aquatic environments include living and nonliving factors (water and temperature).</li><li>• An ecosystem is the interactions of organisms with one another and with the nonliving environment.</li><li>• Organisms interact in feeding relationships in ecosystems (food chains and food webs).</li><li>• Producers make their own food, which is also used by animals (consumers); decomposers eat dead plant and animal materials and recycle the nutrients in the system; organisms may compete for resources in an ecosystem.</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>• Developing and using models</li><li>• Planning and carrying out investigations</li><li>• Analyzing and interpreting data</li><li>• Constructing explanations</li><li>• Engaging in argument from evidence</li><li>• Obtaining, evaluating, and communicating information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

### **What It Looks Like in the Classroom**

In this unit, students will explore the study of the structures and behaviors of organisms and the relationships between one organism and its environment builds knowledge of all organisms. With this knowledge comes an awareness of limits. Such knowledge is important because humans can change environments. The Environments Module has four investigations that focus on the concepts that organisms have structures and behaviors, including sensory receptors, that serve functions in growth, survival and reproduction, and living organisms depend on one another and on their environment for their survival and the survival of populations. In this unit, students will concentrate on the first two investigations.

Students gain experiences that will contribute to the understanding of crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; energy and matter; structure and function; and stability and change.

In the first investigation, students will observe the structures of mealworms and isopods. By setting up and observing a mealworm environment, students will discover how mealworms respond to different temperatures. By setting up an isopod environment, students will explore how isopods respond to environmental factors. Students will make arguments about how these structures and behaviors help the animals to grow and survive. Students should determine that every organism has a set of preferred environmental conditions.

In the second investigation, students will set up a freshwater aquarium with different kinds of fish, plants, and other organisms. Observing the feeding interactions among the populations will give students an understanding of producers, consumers, and decomposers in food chains and food webs. Students will conduct an outdoor simulation to learn about how food affects a population's home range.

Students are expected to describe how animals receive information from their environment through their sensory system and use the information to guide their actions. Sense receptors are specialized for particular kinds of information, which may then be processed by the animal's brain.

# Hanover Township Public Schools

## Science Curriculum

### Connecting with English Language Arts/Literacy and Mathematics

#### **English Language Arts/Literacy**

- To support integration of the language arts standards in this unit, students can read content-specific texts to deepen their understanding of the cause-and-effect relationships between structures and survival. As they read, students should take notes, which can be used to help them understand and explain how animals process information to grow, survive, and reproduce. They should ask questions, such as,
  - ❑ “How do animals’ structures and behaviors help them grow and survive?”
  - ❑ “How do animals use their sensory system to receive information and guide their actions?”
- As they attempt to answer these questions, students can cite evidence from observations and from texts to support their thinking. In addition, students can conduct short research projects that will help them gather additional evidence to support explanations. During collaborative group work, students consider how variation among individuals contributes to survival of a population. Throughout this unit, students should collect and record data in science journals and analyze the data to identify patterns of change.

#### **Mathematics**

- To support integration of the Mathematics standards into this unit, students are expected to use mathematics when analyzing quantitative data to identify patterns, explain cause-and-effect relationships, and make predictions. Students should also be required to solve problems involving measurement and data.

### Modifications

*(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: [All Standards, All Students/Case Studies for vignettes and explanations of the modifications.](#))*

- Structure lessons around questions that are authentic, relate to students’ interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as google classroom, experts from the community helping with a project, journal articles, and biographies).
- 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).

# Hanover Township Public Schools

## Science Curriculum

- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principles ([http://www.cast.org/our-work/about-udl.html#.VXmoXcfD\\_UA](http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)).
- Use of Chromebooks

### Research on Student Learning

“The focus in the early elementary grades should be on establishing the primary association of organisms with their environments, followed by the development in the upper elementary grades of ideas about dependence on various aspects of the environment and the structures and behaviors that help organisms survive in that environment” (NRC 1996).

### Prior Learning

#### Grade 3 Unit 4: Traits

- Organisms have different inherited traits
- Environment affects the traits that an organism develops

### Future Learning

#### Grade 5 Unit 3: Energy and Matter in Ecosystems

- Plants get the materials they need for growth chiefly from air and water
- The movement of matter among plants, animals, decomposers, and the environment, and they can explain that energy in animals’ food was once from the sun.

# Hanover Township Public Schools

## Science Curriculum

### Connections to Other Units

In **Unit 3, Structures and Functions**, students will construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

### Sample of Open Education Resources

**'Brine Shrimp and Ecology of Great Salt Lake'** - More information about the life cycle of brine shrimp and the commercial brine shrimp industry.

[ut.water.usgs.gov](http://ut.water.usgs.gov)

**FOSS Web**- Online resources (Nonfiction and fiction books, websites, and regional websites)

[www.fossweb.com](http://www.fossweb.com)

### Teacher Professional Learning Resources

**Using FOSS - Environments (Grade 4)**

[www.fossweb.com](http://www.fossweb.com)

Use Teacher Tablet Companion to navigate website

**Science Instruction Companion from the Danielson model**

<http://www.nj.gov/education/aps/cccs/science/ScienceInstructionCompanion>

**Stem Teaching Tools**

<http://stemteachingtools.org/tools>

**National Science Teacher Association**

<http://www.nsta.org>

# Hanover Township Public Schools

## Science Curriculum

Appendix A: NGSS and Foundations for the Unit		
<p>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. <i>[Clarification statement: Emphasis is on systems of information transfer.]</i> <a href="#">(4-LS1-2)</a></p>		
<p>The performance expectations above were developed using the following elements from the NRC document <a href="#">A Framework for K-12 Science Education</a>:</p>		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Engaging in Argument from Evidence</b></p> <ul style="list-style-type: none"> <li>Use a model to test interaction concerning the functioning of a natural system <a href="#">(4-LS1-2)</a></li> </ul>	<p><b>LS1.D: Information Processing</b></p> <ul style="list-style-type: none"> <li>Different sense receptors are specialized for particular kinds of information, which may then be processed by an animal’s brains. Animals are able to use their perceptions and memories to guide their actions. <a href="#">(4-LS1-2)</a></li> </ul>	<p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>A system can be described in terms of its components and their interactions. <a href="#">(4-LS1-2)</a></li> </ul>
English Language Arts	Mathematics	
<p>Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. SL.4.5 <a href="#">(4-LS1-2)</a></p>	<p>N/A</p>	

# Hanover Township Public Schools

## Science Curriculum

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

Integration of Career Readiness, Life Literacies, and Key Skills. Evidence must include explicit citations of Standards 9.1 Personal Finance, 9.2 Career Awareness, Exploration, Preparation and Training, and 9.4 Life Literacies and Key Skills. The citations for each unit must include links to the standards for NJSLS CLKS (Career, Life, Key Skills).

<https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf>

### NJSLS – Career Readiness, Life Literacies, and Key Skills (21<sup>st</sup> Century Themes and Skills)

<p><b>Personal Finance Literacy 9.1</b></p> <p>Standard 9.1 Personal Financial Literacy: This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers</p> <p><a href="https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf</a></p> <p>PAGES 22-20</p>	<p><b>Career Awareness Exploration Preparedness and Training 9.2</b></p> <p>Career Awareness, Exploration, Preparation and Training. This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements</p> <p><a href="https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf</a></p> <p>PAGES 37-40</p>	<p><b>Life Literacies and Key Skills 9.4</b></p> <p>Life Literacies and Key Skills. This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy</p> <p><a href="https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf</a></p> <p>PAGES 43-52</p>
<p>9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.</p> <p>9.1.5. EG.4: Describe how an individual's financial decisions affect society and contribute to the overall economy.</p>	<ul style="list-style-type: none"> <li>• 9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.</li> <li>• 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements</li> <li>9.2.8.CAP.8: Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.</li> <li>• 9.2.8.CAP.9: Analyze how a variety of activities related to</li> </ul>	<p>9.4.5.Cl.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).</p> <p>9.4.5.Cl.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).</p> <ul style="list-style-type: none"> <li>• 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).</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

	<p>career preparation (e.g., volunteering, apprenticeships, structured learning experiences, dual enrollment, job search, scholarships) impacts postsecondary options.</p>	
--	--	--

# Hanover Township Public Schools

## Science Curriculum

### Accommodations and Modifications

#### Science – Accommodations and Modifications

Special Education Students	English Language Learners	At-Risk Students	Gifted and Talented Students	Students with 504s
<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Pre Teach vocabulary</li> <li>● Provide flashcards with key science terminology</li> <li>● Use manipulatives and visual representation to examine concepts</li> <li>● Utilize mnemonic tricks to improve memory</li> <li>● Use manipulatives to visualize concept</li> <li>● Highlight key vocabulary-chart or</li> </ul>	<ul style="list-style-type: none"> <li>● Create a word wall</li> <li>● Utilize native language translation (peer, online assistive technology, translation device, bilingual dictionary)</li> <li>● Preteach vocabulary</li> <li>● Use graphic organizers or other visual model</li> <li>● Use manipulatives to visualize concept</li> <li>● Highlight key vocabulary-chart or vocabulary bank</li> <li>● Use nonverbal responses (thumbs up/down)</li> <li>● Use sentence frames</li> <li>● Design questions for different proficiency levels</li> <li>● Utilize partners and partner talk</li> <li>● Break down large</li> </ul>	<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Work within group or partners. Self-select partners ahead of time to choose positive role model.</li> <li>● Repeat and practice Model skills / techniques to be mastered.</li> <li>● Use metacognitive work</li> <li>● Extend time to complete class work</li> <li>● Provide copy of</li> </ul>	<ul style="list-style-type: none"> <li>● Structure the learning around explaining or solving a social or community-based issue.</li> <li>● Use project-based science learning to connect science with observable phenomena</li> <li>● Collaborate with after-school programs to extend learning opportunities.</li> <li>● Interdisciplinary and problem-based assignments with planned scope and sequence</li> <li>● Advance, accelerated, or compacted content</li> </ul>	<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Preteach vocabulary</li> <li>● Use manipulatives and visual representation to examine concepts</li> <li>● Use mnemonic tricks to improve memory</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

<p>vocabulary bank</p> <ul style="list-style-type: none"> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Use of scribe</li> <li>● Adaptive computer to type assignments</li> <li>● Adjustable lab tables and lab equipment within reach</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Captioned videos</li> <li>● Preferred seating</li> <li>● Tactile drawings, graphs, and three-dimensional models,</li> <li>● Large print handouts, lab signs, and equipment labels</li> <li>● Computer equipped to enlarge screen</li> </ul>	<p>assignments into smaller tasks</p> <ul style="list-style-type: none"> <li>● Utilize “Can Do” Descriptors <a href="https://wida.wisc.edu/teach/can-do/descriptors">https://wida.wisc.edu/teach/can-do/descriptors</a></li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration reviews</li> <li>● Computer with optical character reader and voice</li> </ul>	<p>class notes</p> <ul style="list-style-type: none"> <li>● Utilize preferential seating to be mutually determined by the student and teacher</li> <li>● Allow student to use a computer to complete assignments.</li> <li>● Use manipulatives to examine concepts</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>● Abstract and advanced higher-level thinking</li> <li>● Allowance for individual student interests</li> <li>● Assignments geared to development in areas of affect, creativity, cognition, and research skills</li> <li>● Complex, in-depth assignments</li> <li>● Diverse enrichment that broadens learning</li> <li>● Variety in types of resources</li> <li>● Community involvement</li> <li>● Cultural diversity</li> <li>● Internship, mentorship, and other forms of apprenticeship</li> </ul>	<p>facilitate communication, web-based materials &amp; assignments</p> <ul style="list-style-type: none"> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration reviews</li> </ul>
--	--	---	--	---

# Hanover Township Public Schools

## Science Curriculum

<p>characters and images</p> <ul style="list-style-type: none"><li>• LED projection microscopes</li><li>• Audio, braille or electronic notes, handouts, and texts</li><li>• Braille signs &amp; equipment labels</li><li>• Raised-line drawings, clay models, 3-D triangles and spheres for geometric shapes</li><li>• Verbal descriptions of visual aids</li><li>• Auditory lab warning signs</li><li>• Adaptive lab equipment</li><li>• Computer with optical character reader and voice output</li><li>• Interpreter or real time captioning</li><li>• Demonstration reviews</li><li>• Visual warning system for lab emergencies</li></ul>	<p>output</p> <ul style="list-style-type: none"><li>• Interpreter or real time captioning</li><li>• Demonstration reviews</li></ul>	<p>reviews</p>		
---	---	----------------	--	--

# Hanover Township Public Schools

## Science Curriculum

Grade: 4 Unit of Study: Unit : Animals Curriculum

Unit Summary	
<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. The crosscutting concepts of <i>systems and system models</i> are called out as organizing concepts for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency <i>in engaging in argument from evidence</i>. Students are also expected to use this practice to demonstrate understanding of the core idea.</p>	
Student Learning Objectives	
<p><b>Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] (4-LS1-1)</b></p> <p>Students will be able to . . .</p>	
<p><b>Investigation 3 - Brine Shrimp Hatching</b></p> <ul style="list-style-type: none"> <li>● Determine which of four salt concentrations produces maximum growth</li> <li>● Explore how variation among individuals contributes to survival of a population</li> </ul>	<p><b>Investigation 4 - Range of Tolerance</b></p> <ul style="list-style-type: none"> <li>● Determine the range of tolerance of water for germination of four kinds of seeds</li> <li>● Examine local plants by mapping schoolyard plants</li> <li>● Relate plant distribution to environmental factors</li> <li>● Examine plant adaptations</li> </ul>
<p><b>Investigation 3 - Brine Shrimp Hatching</b></p> <p>Part 1: Setting Up the Experiment            Part 2: Determining Range of Tolerance            Part 3: Determining Viability Part 4: Variation in a Population</p>	<p><b>Investigation 4 - Range of Tolerance</b></p> <p>Part 1: Water or Salt Tolerance and Plants            Part 2: Plant Patterns            Part 3: Plant Adaptations</p>

# Hanover Township Public Schools

## Science Curriculum

Quick Links		
<a href="#">Discovery Education</a>	<a href="#">Pebble Go</a>	<a href="http://www.fossweb.com">www.fossweb.com</a>
<a href="#">Nat Geo Kids</a>	<a href="#">BrainPOP</a>	<a href="https://www.ixl.com/science/">https://www.ixl.com/science/</a>

Unit Sequence
<p><b><i>Investigation 3: Brine Shrimp Hatching</i></b></p> <p><i>How can we find out if salinity affects brine shrimp hatching?</i></p> <p><i>How does salinity affect the hatching of brine shrimp eggs?</i></p> <p><i>Does changing the environment allow the brine shrimp eggs to hatch?</i></p> <p><i>What are some benefits of having variation within a population?</i></p>

# Hanover Township Public Schools

## Science Curriculum

Concepts	Formative Assessment
<ul style="list-style-type: none"><li>● Organisms have ranges of tolerance for environmental factors; there are optimum conditions that produce maximum growth.</li><li>● Brine shrimp eggs can hatch in a range of salt concentrations, but more hatch in environments with optimum salt concentration.</li><li>● When environments change, some organisms survive and reproduce; others move; some die.</li><li>● Individuals of the same kind differ in their characteristics; differences may give individuals an advantage in surviving and reproducing.</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>● Developing and using models</li><li>● Planning and carrying out investigations</li><li>● Analyzing and interpreting data</li><li>● Using mathematics and computational thinking</li><li>● Constructing explanations</li><li>● Engaging in arguments from evidence</li><li>● Obtaining, evaluating, and communicating information</li></ul>

Unit Sequence
<p><b><i>Investigation 4: Range of Tolerance</i></b></p> <p><i>How much water is needed for early growth of different kinds of plants?</i></p> <p><i>What is the salt tolerance of several common farm crops?</i></p> <p><i>How does mapping the plants in the schoolyard help us to investigate environmental factors?</i></p> <p><i>What are some examples of plant adaptations?</i></p>

# Hanover Township Public Schools

## Science Curriculum

Concepts	Formative Assessment
<ul style="list-style-type: none"><li>● Organisms have ranges of tolerance for environmental factors; there are optimum conditions that produce maximum growth.</li><li>● Adaptations are structures and behaviors of an organism that help it survive and reproduce.</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>● Planning and carrying out investigations</li><li>● Analyzing and interpreting data</li><li>● Constructing explanations</li><li>● Engaging in arguments from evidence</li><li>● Obtaining, evaluating, and communicating information</li></ul>
What It Looks Like in the Classroom	
<p>In this unit, students will explore the study of the structures and behaviors of organisms and the relationships between one organism and its environment builds knowledge of all organisms. With this knowledge comes an awareness of limits. Such knowledge is important because humans can change environments. The Environments Module has four investigations that focus on the concepts that organisms have structures and behaviors, including sensory receptors, that serve functions in growth, survival and reproduction, and living organisms depend on one another and on their environment for their survival and the survival of populations. In this unit, students will concentrate on Investigations 3 and 4.</p> <p>Students gain experiences that will contribute to the understanding of crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; energy and matter; structure and function; and stability and change.</p> <p>Students will conduct a controlled experiment to determine how conditions affect an animal’s growth. Students will change the environment of brine shrimp to determine their range of tolerance and optimum conditions for hatching. Students will gain an understanding that brine shrimp eggs can hatch in a range of salt concentrations, but more hatch in environments with optimum salt concentration.</p> <p>In the final investigation, students will set up and monitor experiments to determine the range of tolerance of water for germination of four kinds of seeds: corn, pea, barley, and radish. Testing the effect of salinity on these seeds will help students construct an argument that organisms have ranges of tolerance for environmental factors. An understanding about how adaptations are structures and behaviors of an organism that help it survive and reproduce will be established as students study local plans.</p>	

# Hanover Township Public Schools

## Science Curriculum

### Connecting with English Language Arts/Literacy and Mathematics

#### **English Language Arts/Literacy**

- To support integration of the language arts standards in this unit, students can read content-specific texts to deepen their understanding of the cause-and-effect relationships between structures and survival. As they read, students should take notes, which can be used to help them understand and explain how animals process information to grow, survive, and reproduce. They should ask questions, such as,
  - ❑ “How do conditions affect an animal’s growth?”
  - ❑ “How do adaptations and structures help an animal to survive and reproduce?”
- As they attempt to answer these questions, students can cite evidence from observations and from texts to support their thinking. In addition, students can conduct short research projects that will help them gather additional evidence to support explanations. During collaborative group work, students consider how variation among individuals contributes to survival of a population. Throughout this unit, students should collect and record data in science journals and analyze the data to identify patterns of change.

#### **Mathematics**

- To support integration of the Mathematics standards into this unit, students are expected to use mathematics when analyzing quantitative data to identify patterns, explain cause-and-effect relationships, and make predictions. Students should also be required to solve problems involving measurement and data.

### Modifications

*(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: [All Standards, All Students/Case Studies for vignettes and explanations of the modifications.](#))*

- Structure lessons around questions that are authentic, relate to students’ interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as google classroom, experts from the community helping with a project, journal articles, and biographies).
- 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).

# Hanover Township Public Schools

## Science Curriculum

- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principles ([http://www.cast.org/our-work/about-udl.html#.VXmoXcfD\\_UA](http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)).
- Use of Chromebooks

### Research on Student Learning

N/A

### Prior Learning

#### Grade 3 Unit 4: Traits

- Organisms have different inherited traits
- Environment affects the traits that an organism develops

### Future Learning

#### Grade 5 Unit 3: Energy and Matter in Ecosystems

- Plants get the materials they need for growth chiefly from air and water
- The movement of matter among plants, animals, decomposers, and the environment, and they can explain that energy in animals' food was once from the sun.

# Hanover Township Public Schools

## Science Curriculum

### Connections to Other Units

In **Unit 2, How Organisms Process Information**, students used 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.

### Sample of Open Education Resources

***Adaptations and Survivals***- Slideshows and videos on adaptations and survival of animals

<http://mrswarnerarlington.weebly.com/unit-4-adaptations--survival.html>

***Animal Senses: How Animals See, Hear, Taste, Smell and Feel (Animal Behavior)***- *Animal Senses reveals the extraordinary ways animals sense their environment. y-to-do experiments and activities show kids how to compare animal senses to their own. With stunning, realistic illustrations, this book from the Animal Behavior ies is an innovative approach to understanding animal life.*

***Collecting Data in Animal Investigations by Diana Noonan***- Move math skills up to the next level! Kid-friendly, real-life situations put math into action. By showing how we use math every day, teachers finally have an answer to the question, "But when will I ever use this?" Each book extends learning with graphic organizers and problem-solving activities.

***Schoolyard Ecology- Katharine Barrett, Carolyn Willard***-The schoolyard is an environment to be investigated. Many ecological, environmental, and life science concepts are explored. Students learn biological sampling techniques and develop their mapping and related mathematical skills. GEMS Guide

# Hanover Township Public Schools

## Science Curriculum

### Teacher Professional Learning Resources

#### **Using FOSS Environments (Grade 4)**

[www.fossweb.com](http://www.fossweb.com)

Use Teacher Tablet Companion to navigate website

#### **Science Instruction Companion from the Danielson model**

<http://www.nj.gov/education/aps/cccs/science/ScienceInstructionCompanion>

#### **Stem Teaching Tools**

<http://stemteachingtools.org/tools>

#### **National Science Teacher Association**

<http://www.nsta.org>

#### **PebbleGo**

[www.pebblego.com](http://www.pebblego.com)

#### **IXL**

<https://www.ixl.com/science/>

# Hanover Township Public Schools

## Science Curriculum

Appendix A: NGSS and Foundations for the Unit		
<p>Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. <i>[Clarification statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.]</i> (4-LS1-1)</p>		
<p>The performance expectations above were developed using the following elements from the NRC document <a href="#">A Framework for K-12 Science Education</a>:</p>		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Engaging in Argument from Evidence</b></p> <ul style="list-style-type: none"> <li>Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction <a href="#">(4-LS1-1)</a></li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Plants and animals both have internal and external structures that serve various functions in growth, survival, behavior, and reproduction. <a href="#">(4-LS1-1)</a></li> </ul>	<p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>A system can be described in terms of its components and their interactions. <a href="#">(4-LS1-1)</a></li> </ul>
English Language Arts	Mathematics	
<p>Write opinion pieces on topics or texts, supporting a point of view with reasons and information. <b>W.4.1</b> <a href="#">(4-LS1-1)</a></p>	<p>Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. <b>4.G.A.3</b> <a href="#">(4-LS1-1)</a></p>	

# Hanover Township Public Schools

## Science Curriculum

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

Integration of Career Readiness, Life Literacies, and Key Skills. Evidence must include explicit citations of Standards 9.1 Personal Finance, 9.2 Career Awareness, Exploration, Preparation and Training, and 9.4 Life Literacies and Key Skills. The citations for each unit must include links to the standards for NJSLS CLKS (Career, Life, Key Skills).

<https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf>

### NJSLS – Career Readiness, Life Literacies, and Key Skills (21<sup>st</sup> Century Themes and Skills)

<p><b>Personal Finance Literacy 9.1</b></p> <p>Standard 9.1 Personal Financial Literacy: This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers</p> <p><a href="https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf</a> PAGES 22-20</p>	<p><b>Career Awareness Exploration Preparedness and Training 9.2</b></p> <p>Career Awareness, Exploration, Preparation and Training. This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements</p> <p><a href="https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf</a> PAGES 37-40</p>	<p><b>Life Literacies and Key Skills 9.4</b></p> <p>Life Literacies and Key Skills. This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy</p> <p><a href="https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf</a> PAGES 43-52</p>
<p>9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors.</p> <p>9.1.5. EG.4: Describe how an individual's financial decisions affect society and contribute to the overall economy.</p>	<ul style="list-style-type: none"> <li>• 9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.</li> <li>• 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements</li> <li>9.2.8.CAP.8: Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.</li> <li>• 9.2.8.CAP.9: Analyze how a variety of activities related to career preparation (e.g., volunteering, apprenticeships, structured learning experiences, dual enrollment, job search, scholarships) impacts postsecondary options.</li> </ul>	<p>9.4.5.Cl.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).</p> <p>9.4.5.Cl.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).</p> <ul style="list-style-type: none"> <li>• 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).</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

### Accommodations and Modifications

#### Science – Accommodations and Modifications

Special Education Students	English Language Learners	At-Risk Students	Gifted and Talented Students	Students with 504s
<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Pre Teach vocabulary</li> <li>● Provide flashcards with key science terminology</li> <li>● Use manipulatives and visual representation to examine concepts</li> <li>● Utilize mnemonic tricks to improve memory</li> <li>● Use manipulatives to visualize concept</li> </ul>	<ul style="list-style-type: none"> <li>● Create a word wall</li> <li>● Utilize native language translation (peer, online assistive technology, translation device, bilingual dictionary)</li> <li>● Preteach vocabulary</li> <li>● Use graphic organizers or other visual model</li> <li>● Use manipulatives to visualize concept</li> <li>● Highlight key vocabulary-chart or vocabulary bank</li> <li>● Use nonverbal responses (thumbs up/down)</li> <li>● Use sentence frames</li> <li>● Design questions for different proficiency levels</li> <li>● Utilize partners and</li> </ul>	<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Work within group or partners. Self-select partners ahead of time to choose positive role model.</li> <li>● Repeat and practice Model skills / techniques to be mastered.</li> <li>● Use metacognitive work</li> <li>● Extend time to</li> </ul>	<ul style="list-style-type: none"> <li>● Structure the learning around explaining or solving a social or community-based issue.</li> <li>● Use project-based science learning to connect science with observable phenomena</li> <li>● Collaborate with after-school programs to extend learning opportunities.</li> <li>● Interdisciplinary and problem-based assignments with planned scope and sequence</li> <li>● Advance,</li> </ul>	<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Preteach vocabulary</li> <li>● Use manipulatives and visual representation to examine concepts</li> <li>● Use mnemonic tricks to improve memory</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

<ul style="list-style-type: none"> <li>● Highlight key vocabulary-chart or vocabulary bank</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Use of scribe</li> <li>● Adaptive computer to type assignments</li> <li>● Adjustable lab tables and lab equipment within reach</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Captioned videos</li> <li>● Preferred seating</li> <li>● Tactile drawings, graphs, and three-dimensional models,</li> <li>● Large print handouts, lab signs, and equipment labels</li> </ul>	<p>partner talk</p> <ul style="list-style-type: none"> <li>● Break down large assignments into smaller tasks</li> <li>● Utilize “Can Do” Descriptors <a href="https://wida.wisc.edu/teach/can-do/descriptors">https://wida.wisc.edu/teach/can-do/descriptors</a></li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration reviews</li> <li>● Computer with</li> </ul>	<p>complete class work</p> <ul style="list-style-type: none"> <li>● Provide copy of class notes</li> <li>● Utilize preferential seating to be mutually determined by the student and teacher</li> <li>● Allow student to use a computer to complete assignments.</li> <li>● Use manipulatives to examine concepts</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real</li> </ul>	<p>accelerated, or compacted content</p> <ul style="list-style-type: none"> <li>● Abstract and advanced higher-level thinking</li> <li>● Allowance for individual student interests</li> <li>● Assignments geared to development in areas of affect, creativity, cognition, and research skills</li> <li>● Complex, in-depth assignments</li> <li>● Diverse enrichment that broadens learning</li> <li>● Variety in types of resources</li> <li>● Community involvement</li> <li>● Cultural diversity</li> <li>● Internship, mentorship, and other forms of apprenticeship</li> </ul>	<ul style="list-style-type: none"> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration reviews</li> </ul>
---	--	---	---	---

# Hanover Township Public Schools

## Science Curriculum

<ul style="list-style-type: none"><li>● Computer equipped to enlarge screen characters and images</li><li>● LED projection microscopes</li><li>● Audio, braille or electronic notes, handouts, and texts</li><li>● Braille signs &amp; equipment labels</li><li>● Raised-line drawings, clay models, 3-D triangles and spheres for geometric shapes</li><li>● Verbal descriptions of visual aids</li><li>● Auditory lab warning signs</li><li>● Adaptive lab equipment</li><li>● Computer with optical character reader and voice output</li><li>● Interpreter or real time captioning</li><li>● Demonstration reviews</li><li>● Visual warning system for lab emergencies</li></ul>	<p>optical character reader and voice output</p> <ul style="list-style-type: none"><li>● Interpreter or real time captioning</li><li>● Demonstration reviews</li></ul>	<p>time captioning</p> <ul style="list-style-type: none"><li>● Demonstration reviews</li></ul>		
--	--	--	--	--

# Hanover Township Public Schools

## Science Curriculum

Grade: 4 Unit of Study: Unit : EIE Curriculum

### Unit Summary

#### *How do electrical circuits transform energy?*

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

### Student Learning Objectives

**Make observations to provide evidence that energy can be transferred from place to place by sun, light, heat, and electric currents.(4-PS3-2)**

Students will be able to . . .

<p><b>Technology in a Bag</b></p> <ul style="list-style-type: none"> <li>● Identify everyday objects made by people as technology</li> <li>● Identify that objects are designed as a solution to a problem</li> <li>● Identify engineers as the people who design objects</li> </ul>	<p><b>Lesson 1- A Reminder for Emily</b></p> <ul style="list-style-type: none"> <li>● Recognize the role of electrical engineers in designing and improving technology having to do with electricity</li> <li>● Identify how an understanding of electrical conductors, technology, and the field of</li> </ul>	<p><b>Lesson 2- It's Electric</b></p> <ul style="list-style-type: none"> <li>● Identify technologies that use electricity and explain how they use electricity to function</li> <li>● Identify the energy transformations that occur in electrical technologies</li> <li>● Recognize that energy is the ability to make change happen and</li> </ul>	<p><b>Lesson 3- Representing Circuits</b></p> <ul style="list-style-type: none"> <li>● Identify and distinguish between closed and open circuits using both schematic diagrams and actual circuit materials</li> <li>● Discuss and explain why standard symbol systems, like schematic diagrams are important</li> </ul>	<p><b>Lesson 4- Designing an Alarm Circuit</b></p> <ul style="list-style-type: none"> <li>● Identify the steps of the Engineering Design Process</li> <li>● Imagine ideas for an alarm circuit and select one idea to build and test</li> <li>● Draw a detailed plan of alarm circuit</li> <li>● Construct the alarm circuit and switch connection designed by</li> </ul>
--	---	--	--	---

# Hanover Township Public Schools

## Science Curriculum

	<p>electrical engineering can help inform a design</p> <ul style="list-style-type: none"> <li>• Discuss events in the story and identify how they represent steps in the Engineering Design Process</li> </ul>	<p>identify some examples of these changes</p>	<ul style="list-style-type: none"> <li>• Create schematic diagrams of circuits that include batteries, bulbs, wires, and open and closed switches</li> <li>• Build a simple series circuit from a schematic design</li> </ul>	<p>another group by following that group's plan</p> <ul style="list-style-type: none"> <li>• Test and analyze the success of alarm circuit designs</li> <li>• Brainstorm ways to improve designs</li> <li>• Implement some of the improvement ideas</li> </ul>
<p><b>Technology in a Bag</b>          Part 1- Discuss engineers and technology          Part 2- Explore mystery bag of objects          Part 3-Record findings          Part 4- Reflections</p>	<p><b>Lesson 1- A Reminder for Emily</b>          Part 1- Read the story aloud          Part 2-Discussion          Part 3-Trace steps of Engineering Design Process</p>	<p><b>Lesson 2- It's Electric</b>          Part 1-Scavenger Hunt          Part 2-Sort technologies          Part 3-Discussion</p>	<p><b>Lesson 3- Representing Circuits</b>          Part 1-Build closed series circuit          Part 2-Add switches          Part 3-Discussion</p>	<p><b>Lesson 4- Designing an Alarm Circuit</b>          Part 1-Design Challenge          Part 2-Group share          Part 3-Improvement ideas</p>

# Hanover Township Public Schools

## Science Curriculum

Quick Links		
<a href="#">Discovery Education</a>	<a href="#">Pebble Go</a>	<a href="http://www.fossweb.com">www.fossweb.com</a>
<a href="#">Nat Geo Kids</a>	<a href="#">BrainPOP</a>	<a href="https://www.ixl.com/science/">https://www.ixl.com/science/</a>

Unit Sequence	
<p><b><i>Introduction to Engineering: Technology in a Bag</i></b></p> <p><i>What are technologies and who designs them?</i></p>	
Concepts	Formative Assessment
<ul style="list-style-type: none"> <li>• Everyday objects made by people are technologies</li> <li>• A technology is designed to solve a problem</li> <li>• Engineers are people who design objects to solve problems</li> </ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"> <li>• Asking questions and defining problems</li> <li>• Developing and using models</li> <li>• Planning and carrying out investigations</li> <li>• Constructing explanations and designing solutions</li> <li>• Engaging in argument from evidence</li> <li>• Obtaining, evaluating, and communicating information</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<b>Lesson 1: A Reminder for Emily</b> <i>What is the role of an electrical engineer?</i> <i>What are the steps in the Engineering Design Process and how can you use them to help inform a design?</i>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>Some materials (conductors) conduct electricity and others (insulators) do not</li></ul>	<ul style="list-style-type: none"><li>Asking questions and defining problems</li><li>Developing and using models</li><li>Planning and carrying out investigations</li><li>Constructing explanations and designing solutions</li><li>Engaging in argument from evidence</li><li>Obtaining, evaluating, and communicating information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<p><b>Lesson 2: It's Electric!</b></p> <p><b><u>Guiding question:</u> How do the technologies that we use everyday use and transform electrical energy?</b></p> <p><i>What technologies use electricity?</i></p> <p><i>What energy transformations occur in electrical technologies?</i></p> <p><i>What is energy?</i></p>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>● Electricity is one form of energy</li><li>● Energy can be transformed</li><li>● Humans can harness electrical energy to do useful things</li><li>● Energy can be defined as what it takes to make a change happen</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>● Asking questions and defining problems</li><li>● Developing and using models</li><li>● Planning and carrying out investigations</li><li>● Analyzing and interpreting data</li><li>● Using mathematics and computational thinking</li><li>● Constructing explanations and designing solutions</li><li>● Engaging in arguments from evidence</li><li>● Obtaining, evaluating, and communicating information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<b>Lesson 3: Representing Circuits</b> <i>What is the difference between a closed and open circuit?</i> <i>Why are schematic diagrams important?</i> <i>How can we build a simple series circuit from a schematic diagram?</i>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>● A switch can be used to control when a circuit is closed (complete) and open (incomplete).</li><li>● A circuit must be closed in order for electricity (current) to move through it</li><li>● Schematic diagrams are used to plan circuits and communicate information about them</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>● Analyzing and interpreting data</li><li>● Constructing explanations and designing solutions</li><li>● Obtaining, evaluating, and communicating information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

Unit Sequence	
<b>Lesson 4: Designing an Alarm Circuit</b> <i>How can I use my knowledge of conductors, circuits, schematic diagrams, and the Engineering Design Process to design an alarm circuit that someone else can build?</i>	
Concepts	Formative Assessment
<ul style="list-style-type: none"><li>● Engineers use a series of steps, called the Engineering Design Process, to design solutions to problems.</li><li>● Electrical energy can be transformed into other forms of energy, including light, heat, motion, and sound.</li><li>● Short circuits occur when wires are connected to a battery without a bulb, buzzer, or other resistor in between.</li><li>● Electricity moves easily through some materials (conductors) and does not move easily through other materials (insulators).</li></ul>	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"><li>● Asking questions and defining problems</li><li>● Planning and carrying out investigations</li><li>● Analyzing and interpreting data</li><li>● Constructing explanations and designing solutions</li><li>● Engaging in argument from evidence</li><li>● Obtaining, evaluating, and communication information</li></ul>

# Hanover Township Public Schools

## Science Curriculum

### **What It Looks Like in the Classroom**

In this unit of study, students will begin to think like electrical engineers. Through hands-on-activities, the students will have reinforcement of science concepts including conductors and insulators, schematic diagrams, and circuits.

For the final engineering design challenge, students will plan, create, and improve their own alarm circuit.

Storybooks introduce each unit with the tale of a child somewhere around the world who solves a problem through engineering. The books will integrate literacy and social studies into the unit and illustrate for students the relevance of STEM subjects.

### **Connecting with English Language Arts/Literacy and Mathematics**

#### ***English Language Arts/Literacy***

- To support integration of the language arts standards in this unit, students can read storybooks that will introduce each unit. Each storybook is about a tale of a child somewhere around the world who solves a problem through engineering.

The storybooks will integrate literacy and have children pose questions such as:

- “How can we use electricity to solve this problem?”
- “What materials can we use to create a solution?”
- Throughout this unit, students should collect and record data in science journals and analyze the data to identify patterns of change.

#### ***Math Practices Embedded Throughout the Unit:***

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure

# Hanover Township Public Schools

## Science Curriculum

### Modifications

*(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: [All Standards, All Students/Case Studies for vignettes and explanations of the modifications.](#))*

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as google classroom, experts from the community helping with a project, journal articles, and biographies).
- 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).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principles ([http://www.cast.org/our-work/about-udl.html#.VXmoXcfD\\_UA](http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)).
- Use of Chromebooks

### Research on Student Learning

"Students think about what technology is and are introduced to the idea that engineers design technologies" (EIE 2016).

# Hanover Township Public Schools

## Science Curriculum

### Prior Learning

#### Grade 3 Unit 3: Electrical and Magnetic Forces

- Balanced and unbalanced forces on the motion of an object
- Cause-and-effect relationships of electrical or magnetic interactions to define a simple design problem that can be solved with magnets

### Future Learning

#### Grade 8 Unit 5: Relationships among Forms of Energy

- Conservation of energy.
- Objects that are moving have kinetic energy and that objects may also contain stored (potential) energy, depending on their relative positions.
- Difference between energy and temperature, and the relationship between forces and energy.

### Connections to Other Units

In the Unit, **Using Engineering Design with Force and Motion Systems**, students use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object. Students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents or from objects through collisions. They apply their understanding of energy to design, test, and refine a device that converts energy from one form to another.

# Hanover Township Public Schools

## Science Curriculum

### Sample of Open Education Resources

***A Reminder for Emily - An Electrical Engineering Story- Museum of Science Engineering is Elementary Team***

***How Electricity Works-*** This article provides a detailed overview of electricity for adult readers.

<http://science.howstuffworks.com/electricity.htm>

***Energy Kids-*** Energy Kids is an interactive energy site featuring information about electrical energy alongside riddles and games. This site provides lots of detailed information about how we use electrical energy today and how we've use it throughout history.

<https://www.eia.gov/kids/index.cfm>

***EIE- Electricity- An Alarming Idea: Designing Alarm Circuits-*** List of online resources.

[https://www.eie.org/sites/default/files/resource/file/sci\\_ac.pdf](https://www.eie.org/sites/default/files/resource/file/sci_ac.pdf)

### Teacher Professional Learning Resources

**EIE- Engineering is Elementary**

<https://www.eie.org/>

**Science Instruction Companion from the Danielson model**

<http://www.nj.gov/education/aps/cccs/science/ScienceInstructionCompanion>

**Stem Teaching Tools**

<http://stemteachingtools.org/tools>

**National Science Teacher Association**

<http://www.nsta.org>

# Hanover Township Public Schools

## Science Curriculum

Appendix A: NGSS and Foundations for the Unit		
<p><b>Make observations to provide evidence that energy can be transferred from place to place by sun, light, heat, and electric currents.(4-PS3-2)</b></p>		
<p>The performance expectations above were developed using the following elements from the NRC document <a href="#">A Framework for K-12 Science Education</a>:</p>		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Make observations to provide evidence that energy can be transferred to place to place by sound, light, heat, and electric currents.(4-PS3-2)</li> </ul>	<p><b>PS3.A: Definitions of Energy</b></p> <ul style="list-style-type: none"> <li>The faster a given object is moving, the more energy it processes (4-PS3-1)</li> <li>Energy can be moved from place to place by moving objects or through sound,light,or electrical currents. (4-PS3-2)</li> </ul> <p><b>PS3.B: Conservation of Energy and Energy Transfer</b></p> <ul style="list-style-type: none"> <li>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. (4-PS3-2)</li> <li>Light also transfers energy from place to place. (4-PS3-2)</li> <li>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</li> </ul>	<p><b>Energy and Matter</b></p> <ul style="list-style-type: none"> <li>Energy can be transferred in various ways and between objects. (4-PS3-2)</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

	energy of motion into electrical energy. (4-PS3-2)	
--	--	--

# Hanover Township Public Schools

## Science Curriculum

English Language Arts	Mathematics
<p>Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. <b>RI.4.1</b> (4.ESS3-2)</p> <p>Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. <b>RI.4.9</b> (4.ESS3-2)</p>	<p>Reason abstractly and quantitatively. <b>MP.2</b> (4.ESS2-1, 4.ESS3-2)</p> <p>Model with mathematics. <b>MP.4</b> (4.ESS2-1, 4.ESS3-2)</p> <p>Use appropriate tools strategically. <b>MP.5</b> (4.ESS2-1)</p> <p>Interpret a multiplication equation as a comparison, e.g., interpret <math>35 = 5 \times 7</math> 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. <b>4.OA.A.1</b> (4.ESS3-2)</p>

# Hanover Township Public Schools

## Science Curriculum

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

Integration of Career Readiness, Life Literacies, and Key Skills. Evidence must include explicit citations of Standards 9.1 Personal Finance, 9.2 Career Awareness, Exploration, Preparation and Training, and 9.4 Life Literacies and Key Skills. The citations for each unit must include links to the standards for NJSLS CLKS (Career, Life, Key Skills).

<https://www.nj.gov/education/cccs/2020/2020%20NJSLS-CLKS.pdf>

### NJSLS – Career Readiness, Life Literacies, and Key Skills (21<sup>st</sup> Century Themes and Skills)

<p><b>Personal Finance Literacy 9.1</b></p> <p>Standard 9.1 Personal Financial Literacy: This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers</p> <p><a href="https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf</a></p> <p>PAGES 22-20</p>	<p><b>Career Awareness Exploration Preparedness and Training 9.2</b></p> <p>Career Awareness, Exploration, Preparation and Training. This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements</p> <p><a href="https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf</a></p> <p>PAGES 37-40</p>	<p><b>Life Literacies and Key Skills 9.4</b></p> <p>Life Literacies and Key Skills. This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy</p> <p><a href="https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf">https://www.nj.gov/education/cccs/2020/20%20NJSLS-CLKS.pdf</a></p> <p>PAGES 43-52</p>
<p>9.1.5.EG.3: Explain the impact of the economic system on one's personal financial goals.</p> <p>9.1.5. EG.4: Describe how an individual's financial decisions affect society and contribute to the overall economy.</p>	<ul style="list-style-type: none"> <li>• 9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.</li> <li>• 9.2.5.CAP.4: Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.</li> <li>9.2.5.CAP.7: Identify factors to consider before starting a business.</li> <li>9.2.5.CAP.8: Identify risks that individuals and households face.</li> <li>• 9.2.5.CAP.9: Justify reasons to have insurance.</li> </ul>	<ul style="list-style-type: none"> <li>• 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).</li> <li>• 9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process (e.g., W.4.7, 8.2.5.ED.6).</li> <li>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).</li> <li>9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

### Accommodations and Modifications

#### Science – Accommodations and Modifications

Special Education Students	English Language Learners	At-Risk Students	Gifted and Talented Students	Students with 504s
<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Pre Teach vocabulary</li> <li>● Provide flashcards with key science terminology</li> <li>● Use manipulatives and visual representation to examine concepts</li> <li>● Utilize mnemonic tricks to improve memory</li> <li>● Use manipulatives to visualize concept</li> <li>● Highlight key vocabulary-chart or</li> </ul>	<ul style="list-style-type: none"> <li>● Create a word wall</li> <li>● Utilize native language translation (peer, online assistive technology, translation device, bilingual dictionary)</li> <li>● Preteach vocabulary</li> <li>● Use graphic organizers or other visual model</li> <li>● Use manipulatives to visualize concept</li> <li>● Highlight key vocabulary-chart or vocabulary bank</li> <li>● Use nonverbal responses (thumbs up/down)</li> <li>● Use sentence frames</li> <li>● Design questions for different proficiency levels</li> <li>● Utilize partners and partner talk</li> <li>● Break down large</li> </ul>	<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Work within group or partners. Self-select partners ahead of time to choose positive role model.</li> <li>● Repeat and practice Model skills / techniques to be mastered.</li> <li>● Use metacognitive work</li> <li>● Extend time to complete class work</li> <li>● Provide copy of</li> </ul>	<ul style="list-style-type: none"> <li>● Structure the learning around explaining or solving a social or community-based issue.</li> <li>● Use project-based science learning to connect science with observable phenomena</li> <li>● Collaborate with after-school programs to extend learning opportunities.</li> <li>● Interdisciplinary and problem-based assignments with planned scope and sequence</li> <li>● Advance, accelerated, or compacted content</li> </ul>	<ul style="list-style-type: none"> <li>● Pair visual prompts with verbal presentations</li> <li>● Utilize use of lab or experiments to give visual representation of concept</li> <li>● Ask students to restate information, directions, and assignments.</li> <li>● Preteach vocabulary</li> <li>● Use manipulatives and visual representation to examine concepts</li> <li>● Use mnemonic tricks to improve memory</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to</li> </ul>

# Hanover Township Public Schools

## Science Curriculum

<p>vocabulary bank</p> <ul style="list-style-type: none"> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Use of scribe</li> <li>● Adaptive computer to type assignments</li> <li>● Adjustable lab tables and lab equipment within reach</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Captioned videos</li> <li>● Preferred seating</li> <li>● Tactile drawings, graphs, and three-dimensional models,</li> <li>● Large print handouts, lab signs, and equipment labels</li> <li>● Computer equipped to enlarge screen</li> </ul>	<p>assignments into smaller tasks</p> <ul style="list-style-type: none"> <li>● Utilize “Can Do” Descriptors <a href="https://wida.wisc.edu/teach/can-do/descriptors">https://wida.wisc.edu/teach/can-do/descriptors</a></li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration reviews</li> <li>● Computer with optical character reader and voice output</li> </ul>	<p>class notes</p> <ul style="list-style-type: none"> <li>● Utilize preferential seating to be mutually determined by the student and teacher</li> <li>● Allow student to use a computer to complete assignments.</li> <li>● Use manipulatives to examine concepts</li> <li>● Note taker or lab assistant</li> <li>● Group lab assignments</li> <li>● Additional time for lab assignments</li> <li>● Assignments in electronic format to facilitate communication, web-based materials &amp; assignments</li> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration</li> </ul>	<ul style="list-style-type: none"> <li>● Abstract and advanced higher-level thinking</li> <li>● Allowance for individual student interests</li> <li>● Assignments geared to development in areas of affect, creativity, cognition, and research skills</li> <li>● Complex, in-depth assignments</li> <li>● Diverse enrichment that broadens learning</li> <li>● Variety in types of resources</li> <li>● Community involvement</li> <li>● Cultural diversity</li> <li>● Internship, mentorship, and other forms of apprenticeship</li> </ul>	<p>facilitate communication, web-based materials &amp; assignments</p> <ul style="list-style-type: none"> <li>● Note takes, audio &amp; video recorded class sessions</li> <li>● Computer with optical character reader and voice output</li> <li>● Interpreter or real time captioning</li> <li>● Demonstration reviews</li> </ul>
--	---	---	--	---

# Hanover Township Public Schools

## Science Curriculum

<p>characters and images</p> <ul style="list-style-type: none"><li>• LED projection microscopes</li><li>• Audio, braille or electronic notes, handouts, and texts</li><li>• Braille signs &amp; equipment labels</li><li>• Raised-line drawings, clay models, 3-D triangles and spheres for geometric shapes</li><li>• Verbal descriptions of visual aids</li><li>• Auditory lab warning signs</li><li>• Adaptive lab equipment</li><li>• Computer with optical character reader and voice output</li><li>• Interpreter or real time captioning</li><li>• Demonstration reviews</li><li>• Visual warning system for lab emergencies</li></ul>	<ul style="list-style-type: none"><li>• Interpreter or real time captioning</li><li>• Demonstration reviews</li></ul>	<p>reviews</p>		
---	---	----------------	--	--