

## SCIENCE 21 CURRICULUM MAP

### Grade Level: 6

#### Essential Questions for Grade Level:

- How do science and technology help us to live more productive lives?
- What challenges for our survival are presented by the advance of science and technology?

Unit/Timeframe	Unit Essential Questions	Unit Objectives	Concepts/Major Understandings	NYS Performance Indicators
<p>Unit 1: Investigating the Nature of Science &amp; Technology</p> <p>September – Mid-November</p>	<ul style="list-style-type: none"> <li>• How can we use the scientific method to find answers to problems?</li> <li>• What is a “fair test?”</li> <li>• How can models help us to predict the nature of objects and systems that we cannot see?</li> </ul>	<p><b>Students will be able to investigate the nature of science and technology.</b></p> <ol style="list-style-type: none"> <li>1. Be able to summarize the steps of the scientific method.</li> <li>2. Be able to engage in the process of science that includes observing, questioning, predicting, hypothesizing, conducting investigations, analyzing data and communicating their findings in a variety of ways.</li> <li>3. Be able to define and describe what variables are (controlled, manipulated, dependent).</li> <li>4. Be able to design a controlled study and use that model for an investigation.</li> <li>5. Be able to develop and carry out a controlled study.</li> <li>6. Be able to design and build both pictorial and physical models of the black box and think tube.</li> <li>7. Be able to redesign and rebuild pictorial and physical models during an investigation.</li> </ol>	<ul style="list-style-type: none"> <li>• Solving a problem through engineering design involves asking questions, using group discussions for brainstorming and generating ideas, investigating ideas by constructing and modifying models and designs, and testing a design or product to find the best solution.</li> <li>• The process of scientific inquiry includes observing natural phenomena, conducting controlled experiments to test hypotheses, gathering evidence and analyzing data, constructing explanations, using models, and presenting the findings to others.</li> <li>• In a controlled experiment, the effect of changes in the manipulated variable (independent variable) on another variable (dependent variable) is measured. The investigator must identify all the other possible variables that can affect the manipulated variable and design an experiment in which these are kept constant.</li> </ul>	<p>SI 2.1A SI 2.3A SI 2.3A SI 2.2 A-C SI2.2A-C ED 1.3A,B ED 1.4 A-B</p>

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<p>Unit 2: Investigating Energy</p> <p>December – Mid-January</p>	<ul style="list-style-type: none"> <li>• What are the forms of energy and where are they found in our daily lives?</li> <li>• How is energy used, and when it is used how does it interact with matter and change from one form to another?</li> <li>• How do forces act upon one another and with matter?</li> <li>• How do magnetism and electricity interact with one another and with matter?</li> </ul>	<p><b>Students will be able to investigate energy and apply their knowledge of it to everyday life.</b></p> <ol style="list-style-type: none"> <li>1. Be able to differentiate between different forms of energy.</li> <li>2. Be able to demonstrate the law of conservation of energy through building a working model.</li> <li>3. Be able to investigate the properties of electricity, magnetism and electromagnetism.</li> </ol>	<ul style="list-style-type: none"> <li>• Solving a problem through engineering design involves asking questions, using group discussions for brainstorming and generating ideas, investigating ideas by constructing and modifying models and designs, and testing a design or product to find the best solution.</li> <li>• The process of scientific inquiry includes observing natural phenomena, conducting controlled experiments to test hypotheses, gathering evidence and analyzing data, constructing explanations, using models, and presenting the findings to others.</li> <li>• In a controlled experiment, the effect of changes in the manipulated variable (independent variable) on another variable (dependent variable) is measured. The investigator must identify all the other possible variables that can affect the manipulated variable and design an experiment in which these are kept constant.</li> </ul>	<p>PS 4.1B PS 4.1C,D PS 4.5A,B PS 5.2A-C</p>

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<p>Unit 3: Investigating Earth in Space</p> <p>Mid- January – March</p>	<ul style="list-style-type: none"> <li>• How do the components of our Solar System move and interact with one another?</li> <li>• What is the “reason for the seasons?”</li> <li>• How do the motions of Earth and our moon affect our lives?</li> <li>• What are the properties of light and how does it behave?</li> </ul>	<p><b>Students will be able to investigate meteorology and astronomy and apply their knowledge of them to everyday life.</b></p> <ol style="list-style-type: none"> <li>1. Be able to discuss and map on a timeline the significant events in the history of astronomy.</li> <li>2. Be able to describe and demonstrate the daily, seasonal and yearly changes that take place on Earth including day/night, time zones and seasons.</li> <li>3. Be able to identify, describe and compare the nine planets in the Solar System.</li> <li>4. Be able to demonstrate and apply the properties of concave and convex lenses to everyday life.</li> </ol>	<ul style="list-style-type: none"> <li>• Most objects in our solar system including planets, comets, and moons, follow a regular and cyclical pattern of motion. This explains such celestial phenomena as a day, a year, phases of the moon, and eclipses.</li> <li>• The relative motion of the Sun, the moon, the planets and the stars around the Earth is the result of the rotation of the Earth on its axis and its revolution around the Sun.</li> <li>• The Earth’s coordinate system of latitude and longitude is based on the Earth’s rotation and observations of the Sun and stars.</li> <li>• The Sun is the major source of energy for the Earth. Seasons are the result of the tilt of the Earth’s axis of rotation and the changing length of the day, which cause variations in the amount of the Sun’s energy hitting different areas on the surface of the Earth.</li> <li>• All the objects in our solar system are visible only by reflected light from the Sun. As the Moon orbits around the Earth, we see different views of the Moon’s sunlit side, which results in a cyclical pattern of phases.</li> <li>• A lens is a transparent object with a curved surface that refracts light and produces an image by focusing the light. Convex lenses are used in telescopes, as well as in magnifying lenses, cameras, microscopes. Telescopes collect and focus more light than the human eye can collect on its own and allows us to see objects in the universe that cannot be seen with the unaided eye.</li> </ul>	<p>PS 1.1A-C PS 1.1A-C PS 1.1 E-J PS 1.1 E-J</p>

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<p>Unit 4: Investigating the Environment</p> <p>April – June</p>	<ul style="list-style-type: none"> <li>• What are the components of an ecosystem and how do they interact with one another?</li> <li>• How does energy flow within an ecosystem?</li> <li>• Why is balance within an ecosystem essential for its sustainability?</li> <li>• How have human activities impacted upon the balance in the ecosystem in which we live?</li> <li>• What are some of the varying views regarding the impact of humans upon our ecosystem?</li> </ul>	<p><b>Students will be able to investigate ecosystems and human impact on the environment.</b></p> <ol style="list-style-type: none"> <li>1. Be able to identify the necessary components in an ecosystem, including the abiotic and biotic factors.</li> <li>2. Be able to demonstrate the various roles and functions of the food chain.</li> <li>3. Be able to identify human interactions in an ecosystem.</li> <li>4. Be able to differentiate acids and bases, using qualitative and quantitative methods.</li> <li>5. Be able to prepare for and participate in a debate on acid rain.</li> <li>6. Be able to determine and differentiate among solid waste treatment and disposal.</li> <li>7. Be able to identify and describe the factors that affect the growth of a common decomposer, bread mold.</li> <li>8. Be able to investigate recycling of plastics through reducing, reusing and recycling.</li> <li>9. Be able to explain landfill formation and solid waste management.</li> <li>10. Be able to identify and describe forms of pollution and pollution control.</li> </ol>	<ul style="list-style-type: none"> <li>• Food chains of producers, consumers and decomposers, have many alternate routes through which energy can flow in an ecosystem, creating integrated, complex food webs. An energy transfer pyramid shows the amount of energy that moves from one feeding level to another in a food web.</li> <li>• Population growth factors and population reduction factors for many organisms affect the dynamic balance in ecosystems. Biotic factors, which include all the living things in an ecosystem, can enhance the growth of a population or reduce its growth. Abiotic factors, which include all the non-living factors that affect living things, can enhance the growth of a population or reduce its growth.</li> <li>• Limiting factors, that prevent a population from continuing to increase, include limitations in food, water, and habitable space, the presence of predators and climate.</li> <li>• Human activities damage the environment in many ways – by draining wetlands, destroying wildlife habitats, expanding population into rural areas, decreasing species diversity, polluting water through waste disposal and polluting the air through incineration and the use of fossil fuels.</li> <li>• A pollutant is anything that can harm living organisms when too much of it is released into an ecosystem, creating an unfavorable abiotic environment. Pollution can affect the stability of an ecosystem, killing wildlife and causing human health problems. It is important for humans to reduce, reuse, and recycle to minimize environmental deterioration.</li> </ul>	<p>LE 5.1E LE 6.1A-C LE 7.2 A-C LE 5.1 A-G LE 7.2 A-E LE 4.1A LE 4.1A,B SI 2.3 A-C PS 4.1 A PS 4.1A-C</p>