

# Ware Public Schools

## SCIENCE CURRICULUM - Grades 5-7

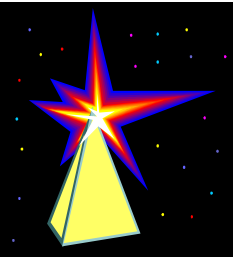
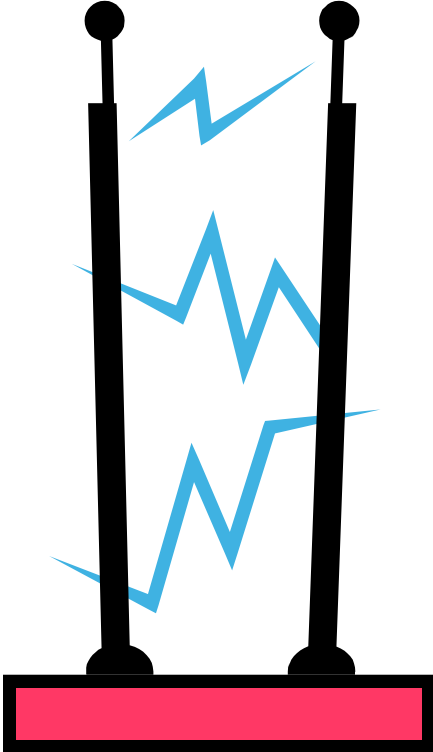
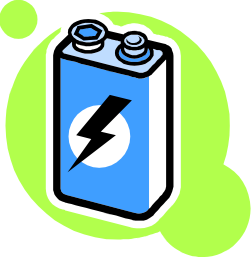

### SUBJECT MATTER: Science and Technology/Engineering

*Grade: 5*

| Unit/Theme | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                                                 | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Methods of Assessment                                                                                                                                                     | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Framework Strand/s & Standard/s                                                              |
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| Systems    | <p><b>Energy, Work, and Machines</b></p> <p>Properties of Energy – including its forms, ability to change form, and its effects</p> <p>Friction</p> <p>Simple Machines</p> <p><u>Guiding Questions</u></p> <ol style="list-style-type: none"> <li>1. What are some different forms of energy?</li> <li>2. How can energy be changed to other forms?</li> <li>3. What are work and friction?</li> <li>4. How do ramps</li> </ol> | <ol style="list-style-type: none"> <li>1. Use a variety of materials to accomplish a design task based on specific properties.</li> <li>2. Use appropriate materials and tools to construct a prototype safely.</li> <li>3. Identify tools and simple machines used for a specific purpose.</li> <li>4. Know the differences between simple and complex machines</li> <li>5. Identify problems that reflect the need for shelter, storage, or convenience.</li> <li>6. Identify the different ways a problem can be represented.</li> <li>7. Identify the relevant design features for building a prototype of a solution to a problem.</li> <li>8. Identify that natural and mechanical systems are designed to serve similar purposes.</li> </ol> | <p>Pre-Assessment</p> <p>Class Participation and Discussion</p> <p>Science Folder/3 ring Binder</p> <p>Investigations</p> <p>Paragraph Writing</p> <p>Summary Writing</p> | <p><b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b></p> <ul style="list-style-type: none"> <li>• Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> <p>Silver Burdett Ginn Science<br/>Silver Burdett Ginn Science<br/>Discovery Works, Grade 5</p> <p>Transparencies</p> <p>Graphic Organizers</p> <p>Literature</p> <p>Internet</p> <p>Investigation Kits with</p> | <p>Technology/Engineering, <u>Grades 3-5</u></p> <p>1.1, 1.2, 1.3<br/>2.1, 2.2, 2.3, 2.4</p> |

| Unit/Theme | Content and Essential Questions                                                                    | Skills | Methods of Assessment                                                                                                                           | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Framework Strand/s & Standard/s |
|------------|----------------------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
|            | <p>help us do work?</p> <p>5. What are levers and pulleys?</p> <p>6. What is a wheel and axle?</p> |        | <p>Written Quizzes</p> <p>Unit/Chapter Tests</p> <p>Unit Project</p> <p>Develop Teacher/Student Rubrics for group work and written reports.</p> | <p>appropriate tools and materials</p> <p>The Franklin Institute Resources for Science Learning<br/> <a href="http://www.fi.edu/qa97/spotlight3/spotlight3.html">http://www.fi.edu/qa97/spotlight3/spotlight3.html</a></p> <p>Energy Kid's Page<br/> <a href="http://www.eia.doe.gov/kids/energyfacts/index.html">http://www.eia.doe.gov/kids/energyfacts/index.html</a></p> <p>Edheads Activate Your Mind Simple Machines<br/> <a href="http://www.eia.doe.gov/kids/energyfacts/index.html">http://www.eia.doe.gov/kids/energyfacts/index.html</a></p> <p>Simple Machines Webquest<br/> <a href="http://outreach.rice.edu/~dgabby/science/simp_mach/">http://outreach.rice.edu/~dgabby/science/simp_mach/</a></p> <p>5<sup>th</sup> Grade Energy<br/> <a href="http://www.solpass.org/science5.htm">http://www.solpass.org/science5.htm</a></p> |                                 |

| Unit/Theme    | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Methods of Assessment                                                                                                                                                                                                                                                         | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Framework Strand/s & Standard/s                                                                                                                                                                        |
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| <b>Models</b> | <p><b>Light and Sound</b><br/>           Properties of Light<br/>           Lenses and their Uses<br/>           Color<br/>           Properties of Sound<br/>           Sense of Hearing<br/>           Controlling, Recording, and Transmitting Sound</p> <p><u>Guiding Questions</u></p> <ol style="list-style-type: none"> <li>1. What is light, and where does it come from?</li> <li>2. How does light travel?</li> <li>3. How does light behave?</li> <li>4. How do lenses help control light?</li> <li>5. How are lenses used in telescopes and microscopes?</li> <li>6. How are light and color related?</li> <li>7. What is sound?</li> <li>8. How does</li> </ol> | <ol style="list-style-type: none"> <li>1. Identify the basic forms of energy (light, sound, heat, electrical, and magnetic).</li> <li>2. Recognize that energy is the ability to cause motion or create change.</li> <li>3. Give examples of how energy can be transferred from one form to another.</li> <li>4. Recognize that electricity in circuits requires a complete loop through which an electrical current can pass, and that electricity can produce light, heat, and sound.</li> <li>5. Identify and classify objects and materials that conduct electricity and objects and materials that are insulators of electricity.</li> <li>6. Explain how electromagnets can be made, and give examples of how they can be used.</li> <li>7. Recognize that sound is produced by vibrating objects and requires a medium through which to travel.</li> <li>8. Relate the rate of vibration to the pitch of the sound.</li> <li>9. Recognize that light travels in a straight line until it strikes an object or travels from one medium to another, and that light can be reflected, refracted, and absorbed.</li> </ol> | <p>Pre-Assessment</p> <p>Class Participation and Discussion</p> <p>Science Folder/3 ring Binder</p> <p>Investigations</p> <p>Paragraph Writing</p> <p>Summary Writing</p> <p>Written Quizzes</p> <p>Unit/Chapter Tests</p> <p>Unit Project</p> <p>Develop Teacher/Student</p> | <p><b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b></p> <ul style="list-style-type: none"> <li>• Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> <p>Silver Burdett Ginn Science Discovery Works, Grade 5</p> <p>Investigation Kits with appropriate tools and materials<br/>           e.g., design and construct a candle wheel that demonstrates how heat can cause a propeller to spin.<br/>           e.g., design and build a simple roller coaster for a marble or toy car to demonstrate how energy changes from one form to another.</p> <p>The Phenomenon of Sound<br/> <a href="http://school.discovery.com/lessonplans/programs/soundwaves/">http://school.discovery.com/lessonplans/programs/soundwaves/</a></p> | <p>Physical Sciences (Chemistry and Physics), <u>Grades 3–5</u><br/>           Forms of Energy 4, 5<br/>           Electrical Energy 6, 7, 8</p> <p>Sound Energy 11<br/>           Light Energy 12</p> |

| Unit/Theme | Content and Essential Questions                                                                                                                                                                                                                                                                        | Skills                                                                              | Methods of Assessment                              | Teacher Resources & Notes                                                                                                                                                                                                                                                                               | Framework Strand/s & Standard/s |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
|            | <p>matter affect how sound travels?</p> <p>9. How do high sounds differ from low sounds?</p> <p>10. How can you control sound?</p> <p>11. How do people hear?</p> <p>12. How is sound transmitted and recorded?</p>  |  | <p>Rubric for group works and written reports.</p> | <p>5<sup>th</sup> Grade Sound<br/> <a href="http://www.solpass.org/science/5.htm">http://www.solpass.org/science/5.htm</a></p>   |                                 |

| Unit/Theme | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Methods of Assessment                                                                                                                                                                                                                                                  | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Framework Strand/s & Standard/s                                                                                                                    |
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| Scale      | <p><b>The Solar System and Beyond</b><br/>           The Night Sky<br/>           How Astronomers Learn about Space<br/>           Stars and Galaxies<br/>           Survival in Space</p> <p><u>Guiding Questions</u></p> <ol style="list-style-type: none"> <li>1. What can you see in the night sky?</li> <li>2. How do astronomers learn about space?</li> <li>3. What is the solar system made of?</li> <li>4. How do the planets differ?</li> <li>5. What are the stars and how do they differ?</li> <li>6. How far away are the stars?</li> <li>7. What is the life cycle of a star?</li> <li>8. What are the galaxies and how do they</li> </ol> | <ol style="list-style-type: none"> <li>1. Recognize that the earth is part of a system called the “solar system” that includes the sun (a star), planets, and many moons.</li> <li>2. Identify the earth as the third planet from the sun in our solar system.</li> <li>3. Recognize that the earth revolves around (orbits) the sun in a year’s time and that the earth rotates on its axis once approximately every 24 hours.</li> <li>4. Make connections between the rotation of the earth and day/night, and the apparent movement of the sun, moon, and stars across the sky.</li> <li>5. Describe the changes that occur in the observable shape of the moon over the course of a month.</li> </ol> | Pre-Assessment<br><br>Class Participation and Discussion<br><br>Science Folder/3 ring Binder<br><br>Investigations<br><br>Paragraph Writing<br><br>Summary Writing<br><br>Written Quizzes<br><br>Unit/Chapter Tests<br><br>Unit Project<br><br>Develop Teacher/Student | <p><b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b></p> <ul style="list-style-type: none"> <li>• Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> <p>Silver Burdett Ginn Science Discovery Works, Grade 5</p> <p>Investigation Kits with appropriate tools and materials</p> <p>NASA Education<br/> <a href="http://education.nasa.gov/home/index.html">http://education.nasa.gov/home/index.html</a></p> | <p>Earth and Space Science<br/> <u>Grades 3–5</u><br/>           Earth’s History 12</p> <p>Earth in the Solar System<br/>           13, 14, 15</p> |

| Unit/Theme                  | Content and Essential Questions                                                                                                                                                                                                                                                          | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Methods of Assessment                                                                                                                                      | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                   | Framework Strand/s & Standard/s                                                                               |
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|                             | differ?<br>9. What is it like to travel in space?<br>10. How do humans survive in space?<br>11. Is there other life in the universe?                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Rubrics for group work and written reports.                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                               |
| <b>Constancy and Change</b> | <b>The Solid Earth</b><br>Properties and Uses of Minerals and Rocks<br>The Rock Cycle<br>Earth's Structure<br>Fossils as Clues to the Age of Rocks<br>The Formation of Mountains<br>Faults<br><br><u>Guiding Questions</u><br>1. What is a mineral?<br>2. How can you identify minerals? | 1. Give a simple explanation of what a mineral is and some examples, e.g., quartz and mica. what a mineral is.<br>2. Identify the Physical Properties of minerals ( <i>hardness, color, luster, cleavage, and streak</i> ).<br>3. Explain how minerals can be tested for the different physical properties.<br>4. Identify the three categories of rocks ( <i>metamorphic, igneous, and sedimentary</i> ) based on how they are formed.<br>5. Describe the processes that create the three categories of rocks.<br>6. Identify the usefulness of rocks.<br>7. Describe how rocks change over time.<br>8. Describe how fossils are used to help identify the age of rocks.<br>9. Give examples of how the Earth's surface changes due to slow processes such as erosion | Pre-Assessment<br><br>Class Participation and Discussion<br><br>Science Folder/3 ring Binder<br><br>Investigations<br><br>Paragraph Writing<br><br>Summary | <b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b> <ul style="list-style-type: none"> <li>Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> Silver Burdett Ginn Science Discovery Works, Grade 5<br><br>Investigation Kits with appropriate tools and materials<br>Moh's Scale of Hardness | Earth and Space Science, <u>Grades 3–5</u><br>Rocks and their Properties<br>1, 2, 3<br><br>Earth's History 12 |

| Unit/Theme | Content and Essential Questions                                                                                                                                                                                                                                                                                                  | Skills                                                                                       | Methods of Assessment                                                                                                                                   | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Framework Strand/s & Standard/s |
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|            | 3. What are minerals used for?<br>4. How are rocks classified?<br>5. How do the properties of rocks make them useful?<br>6. How do rocks change over time?<br>7. What is Earth's structure?<br>8. How can fossils help tell us how old a rock is?<br>9. How do rocks bend?<br>10. What is a fault and how can it make mountains? | and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes. | Writing<br><br>Written Quizzes<br><br>Unit/Chapter Tests<br><br>Unit Project<br><br>Develop Teacher/Student Rubrics for group work and written reports. | Earth Floor: Cycles<br><a href="http://www.cotf.edu/ete/module/mse/earthsysflr/cycles.html">http://www.cotf.edu/ete/module/mse/earthsysflr/cycles.html</a><br><br>The Rock Cycle<br><a href="http://www.minsocam.org/MSA/K12/rkcycle/rkcycleindex.html">http://www.minsocam.org/MSA/K12/rkcycle/rkcycleindex.html</a><br><br>Interactive Rock Cycle Animation<br><a href="http://www.classzone.com/book/earth_science/terc/content/investigations/es0602/es0602page02.cfm">http://www.classzone.com/book/earth_science/terc/content/investigations/es0602/es0602page02.cfm</a><br><br>Rock and the Rock Cycle<br><a href="http://www.windows.ucar.edu/tour/link=/earth/geology/rocks_intro.html">http://www.windows.ucar.edu/tour/link=/earth/geology/rocks_intro.html</a> |                                 |

**SUBJECT MATTER: Science and Technology/Engineering**

**Grade: 6**

| Unit/Theme                | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Methods of Assessment                                                                                                                                                                                                                   | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Framework Strand/s & Standard/s                                                                                                                                               |
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| <b>The Changing Earth</b> | <p><b>Energy in the Earth System</b><br/> <b>Earth Processes and Cycles</b><br/>                     Pangaea<br/>                     Moving Plates<br/>                     Volcanoes<br/>                     Making Mountains and Soil<br/>                     Erosion and Deposition<br/>                     Geologic Time<br/> <u>Guiding Questions</u></p> <ol style="list-style-type: none"> <li>Do continents really drift apart?</li> <li>What do locations of volcanoes and earthquakes tell us?</li> <li>What does the sea floor tell us about plate tectonics?</li> <li>Why do tectonic plates move?</li> <li>How does motion of tectonic plates</li> </ol> | <ol style="list-style-type: none"> <li>Recognize, interpret, and be able to create models of the earth’s common physical features in various mapping representations, including contour maps.</li> <li>Explain and give examples of how physical evidence, such as fossils and surface features of glaciation, supports theories that the earth has evolved over geologic time.</li> <li>Describe the layers of the earth, including the lithosphere, the hot convecting mantle, and the dense metallic core.</li> <li>Differentiate among radiation, conduction, and convection transfer heat through the earth’s system.</li> <li>Explain the relationship among the energy provided by the sun, the global patterns of atmospheric movement, and the temperature differences among the water, land, and atmosphere.</li> <li>Describe how the movement of the earth’s crustal plates causes both slow changes in the earth’s surface (<i>e.g., formation of mountains and ocean basins</i>) and rapid ones (<i>e.g., volcanic eruptions and earthquakes</i>)</li> <li>Describe and give examples of ways in which the earth’s surface is built up and torn</li> </ol> | Pre-Assessment<br><br>Class Participation and Discussion<br><br>Science Folder/3 ring Binder<br><br>Investigations<br><br>Paragraph Writing<br><br>Summary Writing<br><br>Written Quizzes<br><br>Unit/Chapter Tests<br><br>Unit Project | <p><b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b></p> <ul style="list-style-type: none"> <li>Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> <p>Silver Burdett Ginn Science Discovery Works, Grade 6</p> <p>Investigation Kits with appropriate tools and materials</p> <p>Transparencies</p> <p>Classroom Science Safety Rules</p> <p>Graphic Organizers</p> <p>Literature</p> <p>Internet</p> <p>Metric Measurement Charts</p> | Earth and Space Science, <u>Grades 6-8</u><br><br>Mapping the Earth 1<br><br>Earth’s Structure 2<br><br>Heat Transfer in the Earth System 3, 4<br><br>Earth’s History 5, 6, 7 |



| Unit/Theme | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Skills                                                                                                        | Methods of Assessment                                                      | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Framework Strand/s & Standard/s |
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|            | <p>build mountains?</p> <p>6. What causes earthquakes and how can they be compared?</p> <p>7. What happens to earth's crust during an earthquake?</p> <p>8. Where do volcanoes occur, and how are they classified?</p> <p>9. How do volcanic eruptions affect earth?</p> <p>10. In what other places can volcanoes occur?</p> <p>11. When do scientists use writing during the scientific method?</p> <p>12. What type of writing would scientists use to describe the steps they took to perform an</p> | <p>down by natural processes, including deposition of sediments, rock formation, erosion, and weathering.</p> | <p>Develop Teacher/Student Rubric for group works and written reports.</p> | <p>Plate Tectonics<br/> <a href="http://msnucleus.org/membership/html/k-6/pt/pdf/pt6pt.pdf">http://msnucleus.org/membership/html/k-6/pt/pdf/pt6pt.pdf</a></p> <p>Volcano World<br/> <a href="http://volcano.und.edu/">http://volcano.und.edu/</a></p> <p>Marco Polo Lesson Plans<br/> <a href="http://www.marcopolosearch.org/MPSearch/Basic_Search.asp">http://www.marcopolosearch.org/MPSearch/Basic_Search.asp</a></p> <p>NASA Education<br/> <a href="http://education.nasa.gov/home/index.html">http://education.nasa.gov/home/index.html</a></p> <p>GEMS Great Explorations in Math and Science<br/>           Convection: A Current Event</p> |                                 |

| Unit/Theme              | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                     | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Methods of Assessment                                                                                                                                                                                               | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Framework Strand/s & Standard/s                                                                                                                                             |
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|                         | experiment?                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                             |
| <b>The Solar System</b> | Solar System<br>Gravity<br>Solar and Lunar Eclipses<br>Revolution/Rotation<br>Galaxies<br>Conduction, Convection, and Radiation<br><br><u>Guiding Questions</u><br>1. How do we learn about the planets?<br>2. What causes the moon to change appearance?<br>3. What is astronomy?<br>4. How do we get information from space?<br>5. How do we know earth is rotating?<br>6. What are standard time | 1. Recognize that gravity is a force that pulls all things on and near the earth toward the center of the earth.<br>2. Understand that gravity plays a major role in the formation of the planets, stars, and solar system and in determining their motions.<br>3. Describe lunar and solar eclipses, the observed moon phases, and tides. Relate them to the relative positions of the earth, moon, and sun.<br>4. Compare and contrast properties and conditions of objects in the solar system ( <i>i.e., sun, planets, and moons</i> ) to those on Earth ( <i>i.e., gravitational force, distance from the sun, speed, movement, temperature, and atmospheric conditions</i> ).<br>5. Explain how the tilt of the earth and its revolution around the sun result in an uneven heating of the earth, which in turn causes the seasons.<br>6. Recognize that the universe contains many billions of galaxies, and that each galaxy contains many billions of stars.<br>7. Differentiate among conduction, convection, and radiation in a thermal | Pre-Assessment<br><br>Class Participation and Discussion<br><br>Science Folder/3 ring Binder<br><br>Investigations<br><br>Paragraph Writing<br><br>Summary Writing<br><br>Written Quizzes<br><br>Unit/Chapter Tests | <b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b> <ul style="list-style-type: none"> <li>Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> Silver Burdett Ginn Science Discovery Works, Grade 6<br><br>Investigation Kits with appropriate tools and materials<br><br>Marco Polo Lesson Plans <a href="http://www.marcopolosearch.org/MPSearch/Basic_Search.asp">http://www.marcopolosearch.org/MPSearch/Basic_Search.asp</a><br><br><u>The Big Bang and the History of the Universe</u><br>by Cristina Wilsdon | Earth and Space Science, <u>Grades 6-8</u><br>The Earth in the Solar System<br>8, 9, 10, 11, 12<br><br>Energy and Power Technologies- Thermal Systems<br>4.1, 4.2, 4.3, 4.4 |

| Unit/Theme    | Content and Essential Questions                                                                                                                                                                                                                                                | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Methods of Assessment                                                                                              | Teacher Resources & Notes                                                                                                                                                                                                                                      | Framework Strand/s & Standard/s                                                                                                                                             |
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|               | zones?<br>7. Why are there seasons?<br>8. What causes the moon to change appearance?<br>9. What are eclipses?<br>10. Why do planets seem to move?<br>11. How are the planets arranged?<br>12. Are stars at different distances from Earth?<br>13. How are galaxies classified? | system ( <i>e.g., heating and cooling a house, cooking</i> ).<br>8. Give examples of how conduction, convection, and radiation are considered in the selection of materials for buildings and in the design of a heating system.<br>9. Explain how environmental conditions such as wind, solar angle, and temperature influence the design of buildings.<br>10. Identify and explain alternatives to nonrenewable energies ( <i>e.g., wind and solar energy conversion systems</i> ). | Unit Project<br><br>Develop Teacher/Student Rubric for group works and written reports.                            |                                                                                                                                                                                                                                                                |                                                                                                                                                                             |
| <b>Matter</b> | Elements, Compounds, and Mixtures<br>Properties and Changes of Matter <ul style="list-style-type: none"> <li>• Physical Properties of Matter</li> <li>• Elements and Atoms</li> <li>• Chemical</li> </ul>                                                                      | 1. Differentiate between weight and mass, recognizing that weight is the amount of gravitational pull on an object.<br>2. Differentiate between volume and mass.<br>3. Define density.<br>4. Recognize that the measurement of volume and mass requires understanding of the sensitivity of measurement tools ( <i>e.g., rulers, graduated cylinders, balances</i> ) and knowledge and appropriate use of significant digits.                                                          | Pre-Assessment<br><br>Class Participation and Discussion<br><br>Science Folder/3 ring Binder<br><br>Investigations | <b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b> <ul style="list-style-type: none"> <li>• Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> | Physical Sciences <u>Chemistry</u><br><br>Properties of Matter 1, 2, 3, 4<br><br>Elements, Compounds and Mixtures; Atomic Structure and Nuclear Chemistry 5, 6, 7, 8, 9, 10 |

| Unit/Theme | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Methods of Assessment                                                                                                                                                                           | Teacher Resources & Notes                                                                                                                                                                                                                                                                     | Framework Strand/s & Standard/s                                                         |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
|            | <p>Changes<br/>Heat Energy</p> <ul style="list-style-type: none"> <li>• Temperature and Heat</li> <li>• How Heat Affects Matter</li> <li>• Sources of Energy</li> </ul> <p><u>Guiding Questions</u></p> <ol style="list-style-type: none"> <li>1. How can you describe matter?</li> <li>2. What makes up matter?</li> <li>3. How does energy affect matter?</li> <li>4. How can matter be classified?</li> <li>5. What is a mixture?</li> <li>6. What are liquid mixtures like?</li> <li>7. How can matter change?</li> <li>8. What are acids and bases?</li> <li>9. What do chemists do?</li> </ol> | <ol style="list-style-type: none"> <li>5. Explain and give examples of how mass is conserved in a closed system.</li> <li>6. Recognize that there are more than 100 elements that combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.</li> <li>7. Differentiate between an atom (the smallest unit of an element that maintains the characteristics of that element) and a molecule (<i>the smallest unit of a compound that maintains the characteristics of that compound</i>).</li> <li>8. Give basic examples of elements and compounds.</li> <li>9. Differentiate between mixtures and pure substances.</li> <li>10. Recognize that a substance (<i>element or compound</i>) has a melting point and a boiling point, both of which are independent of the amount of the sample.</li> <li>11. Differentiate between physical changes and chemical changes.</li> <li>12. Explain and give examples of how the motion of an object can be described by its position, direction of motion, and speed.</li> <li>13. Graph and interpret distance vs. time graphs for constant speed.</li> <li>14. Differentiate between potential and kinetic energy.</li> </ol> | <p>Paragraph Writing</p> <p>Summary Writing</p> <p>Written Quizzes</p> <p>Unit/Chapter Tests</p> <p>Unit Project</p> <p>Develop Teacher/Student Rubric for group works and written reports.</p> | <p>Silver Burdett Ginn Science Discovery Works, Grade 6</p> <p>Investigation Kits with appropriate tools and materials</p> <p>Marco Polo Lesson Plans<br/><a href="http://www.marcopolosearch.org/MPSearch/Basic_Search.asp">http://www.marcopolosearch.org/MPSearch/Basic_Search.asp</a></p> | <p>Motion of Objects 11, 12</p> <p>Forms of Energy 13</p> <p>Heat Energy 14, 15, 16</p> |

| Unit/Theme                                                   | Content and Essential Questions                                                                                                                                                                                                                                                      | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Methods of Assessment                                                                                                                       | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                           | Framework Strand/s & Standard/s                                                                                                                                                                                                               |
|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                              |                                                                                                                                                                                                                                                                                      | 15. Identify situations where kinetic energy is transformed into potential energy and vice versa.<br>16. Recognize that heat is a form of energy and that temperature change results from adding or taking away heat from a system.<br>17. Explain the effect of heat on particle motion through a description of what happens to particles during a change in phase.<br>18. Give examples of how heat moves in predictable ways, moving from warmer objects to cooler ones until they reach equilibrium.                                                                                                                                                                     |                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                               |
| <b>Force and Motion</b><br><br><b>Technology/Engineering</b> | Energy, Work, and Machines<br>Speed and Distance<br>Forces and Motion<br>Acceleration and Momentum<br><br><u>Guiding Questions</u><br>1. How do you describe motion?<br>2. How do you measure speed?<br>3. How do you describe changes in motion?<br>4. How can the force of gravity | 1. Explain and give examples of how the motion of an object can be described by its position, direction of motion, and speed.<br>2. Graph and interpret distance vs. time graphs for constant speed.<br>3. Differentiate between potential and kinetic energy.<br>4. Identify situations where kinetic energy is transformed into potential energy and vice versa.<br>5. Given a design task, identify appropriate materials ( <i>e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives</i> ) based on specific properties and characteristics ( <i>e.g., strength, hardness, and flexibility</i> ).<br>6. Identify and explain appropriate measuring | Pre-Assessment<br><br>Class Participation and Discussion<br><br>Science Folder/3 ring Binder<br><br>Investigations<br><br>Paragraph Writing | <b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b> <ul style="list-style-type: none"> <li>Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul><br>Silver Burdett Ginn Science Discovery Works, Grade 6<br><br>Investigation Kits with appropriate tools and materials | Physical Sciences (Chemistry and Physics), Grades 6-8<br><br>Motion of Objects 11, 12<br><br>Forms of Energy 13<br><br>Technology/Engineering, Grades 6-8<br><br>1. Materials, Tools, and Machines 1.1, 1.2, 1.3<br><br>2. Engineering Design |

| Unit/Theme | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Methods of Assessment                                                                                                                                                                                                       | Teacher Resources & Notes                                                                | Framework Strand/s & Standard/s     |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------|
|            | <p>be measured?</p> <p>5. Do all objects fall at the same rate?</p> <p>6. How does air change the rate at which an object falls?</p> <p>7. How are objects at rest and objects in motion alike?</p> <p>8. How do forces affect motion?</p> <p>9. How does friction affect the motion of objects?</p> <p>10. What property do all moving objects share?</p> <p>11. How do actions cause reactions?</p> <p>12. How are action-reaction forces used?</p> <p>13. How do heavy things fly?</p> <p>14. How do rockets use action-reaction forces?</p> <p>15. How do things</p> | <p>tools, hand tools, and power tools used to hold, lift, carry, fasten, and separate, and explain their safe and proper use.</p> <p>7. Identify and explain the safe and proper use of measuring tools, hand tools, and machines (<i>e.g., band saw, drill press, sander, hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners</i>) needed to construct a prototype of an engineering design.1.5 1.3 Use a free-body force diagram to show forces acting on a system consisting of a pair of interacting objects. For a diagram with only co-linear forces, determine the net force acting on a system and between the objects.</p> <p>8. Identify and explain the engineering properties of materials used in structures (<i>e.g., elasticity, plasticity, R value, density, strength</i>).</p> <p>9. Distinguish among tension, compression, shear, and torsion, and explain how they relate to the selection of materials in structures.</p> <p>10. Explain Bernoulli’s principle and its effect on structures such as buildings and bridges.</p> <p>11. Calculate the resultant force(s) for a combination of live loads and dead loads.</p> <p>12. Identify and demonstrate the safe and proper use of common hand tools, power</p> | <p>Summary Writing</p> <p>Written Quizzes</p> <p>Unit/Chapter Tests</p> <p>Unit Project e.g., Design a catapult that will toss a marshmallow</p> <p>Develop Teacher/Student Rubric for group works and written reports.</p> | <p>Graphing materials</p> <p>Calculators/Stop Watches</p> <p>Marco Polo Lesson Plans</p> | <p>2.1, 2.2, 2.3, 2.4, 2.5, 2.6</p> |

| Unit/Theme | Content and Essential Questions | Skills                                                                                                                                                    | Methods of Assessment | Teacher Resources & Notes | Framework Strand/s & Standard/s |
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|            | float?                          | tools, and measurement devices used in construction.<br>13. Recognize the purposes of zoning laws and building codes in the design and use of structures. |                       |                           |                                 |


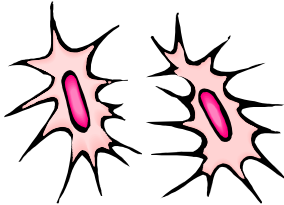



**SUBJECT MATTER: Science and Technology/Engineering**

**Grade: 7**


| Unit/Theme            | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                                                                        | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Methods of Assessment                                                                                                                                                     | Teacher Resources & Notes                                                                                                                                                                                                                                                                                                                                                                                                                           | Framework Strand/s & Standard/s                                                          |
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| <b>Classification</b> | Classification of Organisms                                                                                                                                                                                                                                                                                                                                                                                                                            | <ol style="list-style-type: none"> <li>1. Classify organisms into the currently recognized kingdoms according to characteristics that they share.</li> <li>2. Be familiar with organisms from each kingdom.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p>Preassessment</p> <p>Investigation/<br/>Activities</p>                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>Life Science (Biology), Grades 6-8</p> <p>Classification of Organisms 1</p>           |
| <b>Cells</b>          | <p>Structure and Function of Cells</p> <p>Basic Units of Life</p> <p>Chemical Reactions</p> <p>How Cells Do Their Jobs</p> <p>Plant and Animal Cells</p> <p><u>Guiding Questions</u></p> <ol style="list-style-type: none"> <li>1. What are living things made of?</li> <li>2. Do all cells look the same?</li> <li>3. Does the size of the organism tell you anything about the size of its cells?</li> <li>4. What holds a cell together?</li> </ol> | <ol style="list-style-type: none"> <li>1. Recognize that all organisms are composed of cells, and that many organisms are single-celled (unicellular), e.g., bacteria, yeast. In these single-celled organisms, one cell must carry out all of the basic functions of life.</li> <li>2. Compare and contrast plant and animal cells, including major organelles (<i>cell membrane, cell wall, nucleus, cytoplasm, chloroplasts, mitochondria, vacuoles</i>).</li> <li>3. Recognize that within cells, many of the basic functions of organisms (e.g., extracting energy from food and getting rid of waste) are carried out. The way in which cells function is similar in all living organisms.</li> </ol> | <p>Pre-Assessment</p> <p>Class Participation and Discussion</p> <p>Science Folder/3 ring Binder</p> <p>Investigations</p> <p>Paragraph Writing</p> <p>Summary Writing</p> | <p><b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b></p> <ul style="list-style-type: none"> <li>• Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> <p>Glencoe Science Interactions, Grade 7</p> <p>Investigation Kits with appropriate tools and materials</p> <p>Transparencies</p> <p>Graphic Organizers</p> <p>Literature</p> | <p>Life Science (Biology), Grades 6-8</p> <p>Structure and Function of Cells 2, 3, 4</p> |



| Unit/Theme                      | Content and Essential Questions                                                                                                                                                                                                                                                                                                                                                                                            | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Methods of Assessment                                                                                                                                      | Teacher Resources & Notes                                                                                                                                                                                                                                      | Framework Strand/s & Standard/s                                         |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
|                                 | 5. What's inside cells?<br>6. Where is the cell's command center located?<br>7. How do plant and animal cells differ?                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Written Quizzes<br><br>Unit/Chapter Tests<br><br>Unit Project<br><br>Develop Teacher/Student Rubric for group works and written reports.                   | Internet                                                                                                                                                                                                                                                       |                                                                         |
| <b>Systems of Living Things</b> | Multicellular organisms<br>Major systems of the body <ol style="list-style-type: none"> <li>1. Digestion</li> <li>2. Respiration</li> <li>3. Reproduction</li> <li>4. Circulation</li> <li>5. Excretion</li> <li>6. Muscles</li> </ol> <p><u>Guiding Questions</u></p> <ol style="list-style-type: none"> <li>1. How does your skeletal system work?</li> <li>2. What makes bones hard?</li> <li>3. Do you need</li> </ol> | <ol style="list-style-type: none"> <li>1. Describe the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms.</li> <li>2. Identify the general functions of the major systems of the human body (<i>digestion, respiration, reproduction, circulation, excretion, protection from disease, and movement, control, and coordination</i>) and describe ways that these systems interact with each other.</li> </ol>  <p style="text-align: center;">Bone Cell</p> | Pre-Assessment<br><br>Class Participation and Discussion<br><br>Science Folder/3 ring Binder<br><br>Investigations<br><br>Paragraph Writing<br><br>Summary | <b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b> <ul style="list-style-type: none"> <li>• Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> | Life Science (Biology), Grades 6-8<br><br>Systems of Living Things 5, 6 |

| Unit/Theme          | Content and Essential Questions                                                                                                                                                       | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Methods of Assessment                                                                                                                                   | Teacher Resources & Notes                                                                                                                                                                                                                                                                            | Framework Strand/s & Standard/s                                                                                                                                        |
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|                     | joints?<br>4. What are the levers in your body?<br>5. How do you keep your balance?<br>6. How does information move through your nervous system?<br>7. What happens when you breathe? |  <p style="text-align: center;">Red Blood Cell</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Writing<br><br>Written Quizzes<br><br>Unit/Chapter Tests<br><br>Unit Project<br><br>Develop Teacher/Student Rubric for group works and written reports. |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                        |
| <b>Life Science</b> | Reproduction and Heredity<br>Evolution and Biodiversity<br><br><u>Guiding Questions</u><br>1.                                                                                         | <ol style="list-style-type: none"> <li>1. Recognize that every organism requires a set of instructions that specifies its traits. <i>(These instructions are stored in the organism's chromosomes. Heredity is the passage of these instructions from one generation to another).</i></li> <li>2. Recognize that hereditary information is contained in genes located in the chromosomes of each cell.</li> <li>3. Understand that a human cell contains about 30,000 different genes on 23 different chromosomes.</li> <li>4. Compare sexual reproduction (offspring inherit half of their genes from each parent)</li> </ol> | Pre-Assessment<br><br>Class Participation and Discussion<br><br>Science Folder/3 ring Binder<br><br>Investigations<br><br>Paragraph                     | <b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b> <ul style="list-style-type: none"> <li>• Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering programs.</li> </ul> Glencoe Science Interactions, Grade 7 | Life Science (Biology), Grades 6-8<br><br>Reproduction and Heredity 7, 8, 9<br><br>Evolution and Biodiversity 10, 11, 12<br><br>Living Things and Their Environment 13 |

| Unit/Theme          | Content and Essential Questions                                                                                      | Skills                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Methods of Assessment                                                                                                                                                                 | Teacher Resources & Notes                                                                                                                                                                                                                                   | Framework Strand/s & Standard/s                                                      |
|---------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                     |                                                                                                                      | <p>with asexual reproduction (offspring is an identical copy of the parent’s cell).</p> <ol style="list-style-type: none"> <li>5. Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.</li> <li>6. Recognize that evidence drawn from geology, fossils, and comparative anatomy provides the basis of the theory of evolution.</li> <li>7. Relate the extinction of species to a mismatch of adaptation and the environment.</li> <li>8. Give examples of ways in which organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.</li> </ol> | <p>Writing</p> <p>Summary Writing</p> <p>Written Quizzes</p> <p>Unit/Chapter Tests</p> <p>Unit Project</p> <p>Develop Teacher/Student Rubric for group works and written reports.</p> | <p>Investigation Kits with appropriate tools and materials</p>                                                                                                                                                                                              |                                                                                      |
| <b>Life Science</b> | <p>Energy and Living Things</p> <p><u>Guiding Questions</u></p> <ol style="list-style-type: none"> <li>1.</li> </ol> | <ol style="list-style-type: none"> <li>1. Explain the roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.</li> <li>2. Explain how dead plants and animals are broken down by other living organisms and how this process contributes to the system as a whole.</li> <li>3. Recognize that producers (plants that contain chlorophyll use the energy from</li> </ol>                                                                                                                                                                                                                                       | <p>Pre-Assessment</p> <p>Class Participation and Discussion</p> <p>Science Folder/3 ring Binder</p> <p>Investigations</p>                                                             | <p><b>Guiding Principles from the Massachusetts Science and Technology Frameworks</b></p> <ul style="list-style-type: none"> <li>• Articulates the ideals of teaching, learning, assessing, and administering science and technology/engineering</li> </ul> | <p>Life Science (Biology), Grades 6-8</p> <p>Energy and Living Things 14, 15, 16</p> |

| Unit/Theme | Content and Essential Questions | Skills                                                                                                                                                                                 | Methods of Assessment                                                                                                                                                                           | Teacher Resources & Notes                                                                                                    | Framework Strand/s & Standard/s |
|------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
|            |                                 | <p>sunlight to make sugars from carbon dioxide and water through a process called photosynthesis</p>  | <p>Paragraph Writing</p> <p>Summary Writing</p> <p>Written Quizzes</p> <p>Unit/Chapter Tests</p> <p>Unit Project</p> <p>Develop Teacher/Student Rubric for group works and written reports.</p> | <p>programs.</p> <p>Glencoe Science Interactions, Grade 7</p> <p>Investigation Kits with appropriate tools and materials</p> |                                 |