

# Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

Grades (Primary) K-3



Carolina Biological Supply Company  
2700 York Road • Burlington NC 27215-3398  
800.227.1150 • [www.carolinacurriculum.com](http://www.carolinacurriculum.com)

**CAROLINA**  
*World-Class Support for Science & Math*

## Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

| Grade Range           | <i>STC PROGRAM™ and GEMS® Units</i>  |
|-----------------------|--|
| K-3                   | <ul style="list-style-type: none"> <li>• <b>Changes</b></li> <li>• <b>Electric Circuits</b></li> <li>• <b>The Life Cycle of Butterflies</b></li> <li>• <b>Organisms</b></li> <li>• <b>Rocks and Minerals</b></li> <li>• <b>Solids and Liquids</b></li> <li>• <b>Sound</b></li> <li>• <b>Weather</b></li> <li>• <b>GEMS: Space Science</b></li> </ul> |
| 4 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Animal Studies</b></li> <li>• <b>Motion and Design</b></li> <li>• <b>Land and Water</b></li> <li>• <b>GEMS: Hot Water and Warm Homes</b></li> </ul>  |
| 5 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Ecosystems</b></li> <li>• <b>Experiments with Plants</b></li> <li>• <b>GEMS: Messages From Space</b></li> </ul>  |
| 6 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Organisms–From Macro to Micro</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 7 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 8 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Light</b></li> <li>• <b>Organisms–From Macro to Micro</b></li> </ul>   |

The STC PROGRAM™ and GEMS® Units are recommended based on the Kentucky Program of Studies and the Core Contents for Assessment. Provided for each grade level, are the units that most strongly align with the content objectives. Other STC PROGRAM™ Units may also match objectives within each grade level. For more information about any STC PROGRAM™ unit or GEMS® unit, visit [www.carolinacurriculum.com](http://www.carolinacurriculum.com).

GEMS® Space Science is research-based 3-5 science curriculum that teach fundamental concepts in space science.

### Legend

To save paper, the curriculum location information in this document has been abbreviated as follows:

- Unit abbreviations = noted in parentheses in the chart above
- TG = Teacher's Guide
- S-Sec3 = Section 3 (containing a section on safety) in the STC® Teacher's Guide
- L01, L02, etc. = Lesson 1, Lesson 2, etc.
- Les01 = Lesson 1
- Act01=Activity 1
- p, pp = page, pages
- RB = STC BOOK™ (a science reading book included in some of the grades 3–5 STC® unit kits)
- SB = Student Book
- Exts = Extensions (found at the end of most lessons in the Teacher's Guide)
- App-A, App-B = Appendix A, Appendix B (found at the end of Section 4 in the Teacher's Guide)

**Big Idea: Structure and Transformation of Matter (Physical Science) Grade: End of Primary**

A basic understanding of matter is essential to the conceptual development of other big ideas in science. In the elementary years of conceptual development, students will be studying properties of matter and physical changes of matter at the macro level through direct observations, forming the foundation for subsequent learning. The use of models (and an understanding of their scales and limitations) is an effective means of learning about the structure of matter. Looking for patterns in properties is also critical to comparing and explaining differences in matter.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts   | Related Core Content for Assessment   |
|--|---|---|
| <p>SC-P-STM-U-1<br/>Students will understand that objects are made of one or more materials and investigating the properties of those materials helps in sorting and describing them.</p> <p><b>Changes</b><br/>TG: L01 (pp3-20)<br/>TG: L11 (pp103-110)</p> <p><b>Rocks and Minerals</b><br/>TG: L01-2 (pp3-18)<br/>TG: L13 (pp91-94)</p> <p><b>Solids and Liquids</b><br/>TG: L01-17 (pp3-140)</p> <p><b>Sound</b> - TG: L12.Exts (p88)</p> <p>SC-P-STM-U-2<br/>Students will understand that tools such as thermometers, magnifiers, rulers and balances can give more information about objects than</p> | <p>SC-P-STM-S-1<br/>Students will use senses to observe and describe properties of material objects (color, size, shape, texture, flexibility, magnetism)</p> <p><b>Changes</b><br/>TG: L01.Exts (pp10-11)</p> <p><b>Organisms</b><br/>TG: L02 (pp11-20)</p> <p><b>Rocks and Minerals</b><br/>TG: L11.Exts (p80)</p> <p><b>Solids and Liquids</b><br/>TG: L02-3 (pp11-28)<br/>TG: L05.Exts (pp43-45)<br/>TG: L06.Exts (pp51-52)<br/>TG: L07 (pp55-62)<br/>TG: L09 (pp69-80)<br/>TG: L11- (pp87-94)<br/>TG: L15 (pp121-130)</p> <p><b>Sound</b><br/>TG: L01.Exts (pp7-8)</p> | <p><b>SC-EP-1.1.1</b><br/><b>Students will classify material objects by their properties providing evidence to support their classifications.</b></p> <p><b>Objects are made of one or more materials such as paper, wood, and metal. Objects can be described by the properties of the materials from which they are made. Those properties and measurements of the objects can be used to separate or classify objects or materials.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Changes</b><br/>TG: L01.Exts (pp10-11)<br/>TG: L06.Exts (pp67-69)<br/>TG: L13.Exts (p123)<br/>TG: L14.Exts (p134)</p> <p><b>Rocks and Minerals</b><br/>TG: L10.Exts (pp73-74)</p> |

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| <p>can be obtained by just making observations.</p> <p><b>Electric Circuits</b><br/>TG: L01-17 (pp3-86)</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L01.Exts (p7)<br/>TG: L02-9 (pp11-62)<br/>TG: L11.Exts (pp71-73)<br/>TG: L12 (pp75-80)<br/>TG: L14 (pp85-88)</p> <p><b>Rocks and Minerals</b><br/>TG: L01-16 (pp3-126)</p> <p><b>Solids and Liquids</b><br/>TG: L11 (pp87-94)</p> <p><b>Sound</b><br/>TG: L01-14 (pp11-102)<br/>TG: L17 (pp117-118)</p> <p><b>Weather</b><br/>TG: App-A (pp151-152)<br/>TG: App-B (pp153-167)<br/>TG: L05-10 (pp43-100)</p> <p>SC-P-STM-U-3<br/>Students will understand that things can be done to materials to change some of their properties, but not all materials respond the same way to what is done to them.</p> <p><b>Changes</b><br/>TG: L01 (pp3-20)<br/>TG: L03-4 (pp31-52)<br/>TG: L12-17 (pp111-158)</p> | <p>TG: L03-5(pp27-56)</p> <p><b>Weather</b><br/>TG: L02 (pp11-24)</p> <p>SC-P-STM-S-2<br/>Students will use appropriate tools (e.g., balance, metric ruler, thermometer, graduated cylinder) to measure and record length, width, volume, temperature and mass of material objects and to answer questions about objects and materials</p> <p><b>Changes</b><br/>TG: L09.Exts (pp89-90)</p> <p><b>Electric Circuits</b><br/>TG: L01-17 (pp3-86)</p> <p><b>Rocks and Minerals</b><br/>TG: L01-16 (pp3-126)</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L12 (pp75-80)</p> <p><b>Solids and Liquids</b><br/>TG: L09.Exts (p73)<br/>TG: L11 (pp87-94)</p> <p><b>Sound</b><br/>TG: L01-14 (pp11-102)<br/>TG: L17 (pp117-118)</p> <p><b>Weather</b><br/>TG: App-A (pp151-152)<br/>TG: App-B (pp153-167)<br/>TG: L05-10 (pp43-100)<br/>TG: L12.Exts (pp116-117)</p> <p>SC-P-STM-S-5<br/>Students will observe and predict the properties of material objects</p> <p><b>Changes</b><br/>TG: L01 (pp3-20)<br/>TG: L11 (pp103-110)<br/>TG: L15 (pp137-146)</p> <p><b>Rocks and Minerals</b><br/>TG: L01-2 (pp3-18)<br/>TG: L13 (pp91-94)</p> <p><b>Solids and Liquids</b><br/>TG: L01-17 (pp3-140)</p> | <p><b>Solids and Liquids</b><br/>TG: L01.Exts (pp7-8)<br/>TG: L02-17 (pp11-140)</p> <p>SC-EP-1.1.2<br/><i>Students will understand that objects have many observable properties such as size, mass, shape, color, temperature, magnetism, and the ability to interact and/or to react with other substances. Some properties can be measured using tools such as metric rulers, balances, and thermometers.</i></p> <p><b>Solids and Liquids</b><br/>TG: L02-17 (pp11-140)</p> <p><b>Sound</b><br/>TG: L12.Exts (p88)</p> <p><b>Weather</b><br/>TG: App-A (pp151-152)<br/>TG: App-B (pp153-167)<br/>TG: L05-9 (pp43-90)</p> |
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|  | <p><b>Sound</b> - TG: L12.Exts (p88)<br/> TG: L01 (pp3-16)<br/> TG: L03-8 (pp27-86)</p>   |   |
| <p>SC-P-STM-U-4<br/> Students will understand that water can be a liquid, solid, or gas and can go back and forth from one form to another.</p>  | <p>SC-P-STM-S-3<br/> Students will investigate the physical properties of water as a solid, liquid and gas</p> <p>SC-P-STM-S-4<br/> Students will classify water and other matter using one or more physical properties</p>   | <p><b>SC-EP-1.1.3</b><br/> <b>Students will describe the properties of water as it occurs as a solid, liquid or gas.</b></p> <p><b>Matter (water) can exist in different states--solid, liquid and gas. Properties of those states of matter can be used to describe and classify them.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Changes</b><br/> TG: L02-3 (pp21-42)<br/> TG: L08 (pp79-84)<br/> <b>Weather</b><br/> TG: L10.Exts (p95)<br/> TG: L11 (pp101-112)</p> |
| <p>SC-P-STM-U-5<br/> Students will understand that in science, it is often helpful to work with a team and to share findings with others. All team members should reach their own individual conclusions, however, about what the findings mean.</p> | <p>SC-P-STM-S-6<br/> Students will work with others to investigate questions about properties of materials, documenting and communicating observations, designs, procedures and results</p> <p><b>Changes</b><br/> TG: L01 (pp3-20)<br/> TG: L11 (pp103-110)<br/> TG: L15 (pp137-146)<br/> <b>Rocks and Minerals</b><br/> TG: L01-2 (pp3-18)<br/> TG: L13 (pp91-94)<br/> <b>Solids and Liquids</b><br/> TG: L01-17 (pp3-140)<br/> <b>Sound</b><br/> TG: L01 (pp3-16)<br/> TG: L03-8 (pp27-86)</p> |   |

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| <p><b>Big Idea: Motion and Forces (Physical Science) Grade: End of Primary</b><br/> Whether observing airplanes, baseballs, planets, or people, the motion of all bodies is governed by the same basic rules. In the elementary years of conceptual development, students need multiple opportunities to experience, observe, and describe (in words and pictures) motion, including factors (e.g., pushing, pulling) that affect motion.</p> <p><b>Academic Expectations</b></p> <p><b>2.1</b> Students understand scientific ways of thinking and working and use those methods to solve real-life problems.</p> <p><b>2.2</b> Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.</p> <p><b>2.3</b> Students identify and analyze systems and the ways their components work together or affect each other.</p> |  |  |
| <p><b>Program of Studies: Understandings</b></p>  | <p><b>Program of Studies: Skills and Concepts</b></p>  | <p><b>Related Core Content for Assessment</b></p>  |
| <p>SC-P-MF-U-1<br/> Students will understand that things move in many different ways (e.g., fast and slow, back and forth, straight, zig zag, etc.).<br/> <b>Solids and Liquids</b><br/> TG: L03-4 (pp19-40)<br/> TG: L05.Exts (pp43-45)<br/> TG: L06.Exts (pp51-52)<br/> TG: L09 (pp69-80)</p> <p>SC-P-MF-U-3<br/> Students will understand that the position of an object can be described by locating it relative to another object or the background.</p> <p>SC-P-MF-U-2<br/> Students will understand that forces (pushes or pulls) can cause objects to start moving, go faster, slow down, or change the direction they are going.<br/> <b>Solids and Liquids</b><br/> TG: L03.Exts (pp22-23)<br/> TG: L04 (pp29-40)</p>   | <p>SC-P-MF-S-1<br/> Students will identify points of reference/reference objects in order to describe the position of objects</p> <p>SC-P-MF-S-2<br/> Students will observe and describe (e.g., using words, pictures, graphs) the change in position over time (motion) of an object<br/> <b>Solids and Liquids</b><br/> TG: L04 (pp29-40)</p> <p>SC-P-MF-S-3<br/> Students will make qualitative (e.g., hard, soft, fast, slow) descriptions of pushes/pulls and motion<br/> <b>Solids and Liquids</b><br/> TG: L03-4 (pp19-40)<br/> TG: L05.Exts (pp43-45)<br/> TG: L06.Exts (pp51-52)<br/> TG: L09 (pp69-80)</p> | <p><b>SC-EP-1.2.2</b><br/> <b>Students will describe the change in position over time (motion) of an object.</b><br/> <b>An object’s motion can be observed, described, compared and graphed by measuring its change in position over time.</b><br/> <b>DOK 2</b><br/> <b>Solids and Liquids</b><br/> TG: L04 (pp29-40)</p> <p><b>SC-EP-1.2.3</b><br/> <b>Students will describe the position and motion of objects and predict changes in position and motion as related to the strength of pushes and pulls.</b><br/> <b>The position and motion of objects can be changed by pushing or pulling, and can be explored in a variety of ways (such as rolling different objects down different ramps). The amount of change in position and motion is related to the strength of the</b></p> |

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|   | <p>SC-P-MF-S-4<br/>Students will use tools (e.g., timer, meter stick, balance) to collect data about the position and motion of objects in order to predict changes resulting from pushes and pulls</p> <p><b>Electric Circuits</b><br/>TG: L01-17 (pp3-86)</p> <p><b>Solids and Liquids</b><br/>TG: L03-4 (pp19-40)<br/>TG: L05.Exts (pp43-45)<br/>TG: L06.Exts (pp51-52)<br/>TG: L09 (pp69-80)</p> <p><b>Weather</b><br/>TG: App-A (pp151-152)</p> <p>SC-P-MF-S-8<br/>Students will ask questions about motion, magnetism and sound and use a variety of print and non-print sources to gather and synthesize information</p> <p><b>Solids and Liquids</b><br/>TG: L04 (pp29-40)<br/>TG: L07 (pp55-62)<br/>TG: L09 (pp69-80)</p> <p><b>Sound</b><br/>TG: L01-17 (pp11-118)</p> | <p><b>push or pull (force). The force with which a ball is hit illustrates this principle. By examining cause and effect relationships related to forces and motions, consequences of change can be predicted.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Solids and Liquids</b><br/>TG: L04 (pp29-40)</p> <p><i>SC-EP-1.2.4</i><br/><i>Students will understand that the position of an object can be described by locating it relative to another object or the background. The position can be described using phrases such as to the right, to the left, 50 cm from the other object.</i></p> |
| <p>SC-P-MF-U-4<br/>Students will understand that vibration is a type of motion that is responsible for making sound.</p> <p><b>Sound</b><br/>TG: L01-10 (pp11-72)<br/>TG: L12-17 (pp79-118)</p> | <p>SC-P-MF-S-5<br/>Students will explore differences in sounds (high and low pitch) produced by vibrations (e.g., making musical instruments that have moving parts that vibrate to produce sound)</p> <p><b>Sound</b><br/>TG: L03 (pp23-27)<br/>TG: L04.Exts (pp26-27)</p>  |   |

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|  | <p>TG: L05-6 (pp33-48)<br/> TG: L08.Exts (pp61-62)<br/> TG: L09-17 (pp63-118)</p> <p>SC-P-MF-S-8<br/> Students will ask questions about motion, magnetism and sound and use a variety of print and non-print sources to gather and synthesize information</p> <p><b>Solids and Liquids</b><br/> TG: L04 (pp29-40)<br/> TG: L07 (pp55-62)<br/> TG: L09 (pp69-80)</p> <p><b>Sound</b><br/> TG: L01-17 (pp11-118)</p>   |  |
| <p>SC-P-MF-U-5<br/> Students will understand that magnetism is a force that can make some things move without touching them.</p> | <p>SC-P-MF-S-6<br/> Students will observe interactions of magnets with other magnets and with other matter (e.g., magnets have a force that can make some things move without touching them; larger size of a magnet does not have to mean it has greater force) in order to make generalizations about the behavior of magnets</p> <p><b>Solids and Liquids</b><br/> TG: L07 (pp55-62)</p> <p><b>Rocks and Minerals</b><br/> TG: L11.Exts (p80)</p> <p>SC-P-MF-S-8<br/> Students will ask questions about motion, magnetism and sound and use a variety of print and non-print sources to gather and synthesize information</p> <p><b>Rocks and Minerals</b><br/> TG: L11 (pp79-84)</p> <p><b>Solids and Liquids</b><br/> TG: L04 (pp29-40)<br/> TG: L07 (pp55-62)<br/> TG: L09 (pp69-80)</p> | <p><b>SC-EP-1.2.1</b><br/> <b>Students will describe and make inferences about the interactions of magnets with other magnets and other matter (e.g., magnets can make some things move without touching them).</b></p> <p><b>Magnets have observable properties that allow them to attract and repel each other and attract certain kinds of other materials (e.g., iron). Based on the knowledge of the basic properties of magnets, predictions can be made and conclusions drawn about their interactions with other common objects.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Rocks and Minerals</b><br/> TG: L11 (pp79-84)</p> <p><b>Solids and Liquids</b><br/> TG: L07 (pp55-62)<br/> TG: L09 (pp69-80)</p> |

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|   | <p><b>Sound</b><br/>TG: L01-17 (pp11-118)</p>  |  |
| <p>SC-P-MF-U-6<br/>Students will understand that discovering patterns through investigation/observation allows predictions, based on that evidence, to be made about future events.</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L01 (pp3-10)<br/>TG: L04 (pp23-28)<br/>TG: L08 (pp47-52)<br/>TG: L11-12 (pp69-80)</p> | <p>SC-P-MF-S-7<br/>Students will use standard units of measurement (e.g., meters, inches, seconds) during investigations to evaluate/compare results</p> <p>SC-P-MF-S-8<br/>Students will ask questions about motion, magnetism and sound and use a variety of print and non-print sources to gather and synthesize information</p> <p><b>Solids and Liquids</b><br/>TG: L04 (pp29-40)<br/>TG: L07 (pp55-62)<br/>TG: L09 (pp69-80)</p> <p><b>Sound</b><br/>TG: L01-17 (pp11-118)</p> |  |

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**Big Idea: Grade: The Earth and the Universe (Earth/Space Science) Grade: End of Primary**  
The Earth system is in a constant state of change. These changes affect life on earth in many ways. Development of conceptual understandings

about processes that shape the Earth begin at the elementary level with understanding what Earth materials are and that change occurs. At the heart of elementary students' initial understanding of the Earth's place in the universe is direct observation of the Earth-sun-moon system. Students can derive important conceptual understandings about the system as they describe interactions resulting in shadows, moon phases, and day and night. The use of models and observance of patterns to explain common phenomena is essential to building a conceptual foundation and supporting ideas with evidence at all levels.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment   |
|--|--|---|
| <p>SC-P-EU-U-1<br/>Students will understand that people use a variety of earth materials for different purposes because of their different properties. All products that people use somehow come from the Earth.</p> | <p>SC-P-EU-S-1<br/>Students will use senses and scientific tools (e.g., hand lens/magnifier, metric ruler, balance, etc.) to observe, describe and classify earth materials (solid rocks, soils, water and air) using their physical properties<br/> <b>Rocks and Minerals</b><br/>           TG: L01-12 (pp3-90)<br/>           TG: L16.Exts (p117)<br/>           TG: L17 (pp127-128)<br/> <b>Weather</b><br/>           TG: L03 (pp25-32)<br/>           TG: L14 (pp129-134)</p> <p>SC-P-EU-S-2<br/>Students will explore how earth materials are used for certain things because of their properties</p> | <p><b>SC-EP-2.3.1</b><br/> <b>Students will describe earth materials (solid rocks, soils, water and gases of the atmosphere) using their properties.</b></p> <p><b>Earth materials include solid rocks and soils, water and the gases of the atmosphere. Minerals that make up rocks have properties of color, luster and hardness. Soils have properties of color, texture, the capacity to retain water and the ability to support plant growth. Water on Earth and in the atmosphere can be a solid, liquid or gas.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Rocks and Minerals</b><br/>           TG: L01-4 (pp3-34)<br/>           TG: L06-12 (pp43-90)<br/>           TG: L17 (pp127-128)</p> |
| <p>SC-P-EU-U-2<br/>Students will understand that some events in</p>  | <p>SC-P-EU-S-3<br/>Students will observe weather conditions and</p>  | <p><b>SC-EP-2.3.2</b><br/> <b>Students will describe patterns in weather</b></p>  |

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| <p>nature have a repeating pattern. Weather changes from day to day, but things such as temperature or precipitation tend to be similar (high, medium or low) in the same months every year.</p>   | <p>record weather data over time using appropriate tools (e.g., thermometer, wind vane, rain gauge, etc.)</p> <p><b>Electric Circuits</b><br/>RB: (pp56-59)<br/><b>Weather</b><br/>TG: L04-7 (pp33-70)<br/>TG: L10 (pp91-100)</p> <p>SC-P-EU-S-4<br/>Students will use weather data to describe weather conditions and make simple predictions based on patterns observed (e.g., daily, weekly, seasonal patterns)</p> <p><b>Weather</b><br/>TG: L15 (pp135-140)</p>                         | <p><b>and weather data in order to make simple predictions based on those patterns discovered.</b></p> <p><b>Weather changes from day to day and over seasons. Weather can be described using observations and measurable quantities such as temperature, wind direction, wind speed and precipitation. Simple predictions can be made by analyzing collected data for patterns.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Weather</b><br/>TG: L15 (pp135-140)<br/>TG: L17 (pp149-150)</p>  |
| <p>SC-P-EU-U-3<br/>Students will understand that the sun, moon and stars appear to move slowly across the sky at different speeds and we can see patterns in their movement with careful observation.</p> <p><b>GEMS:</b> Space Science-Unit 3</p> <p>SC-P-EU-U-4<br/>Students will understand that the sun can only be seen in the daytime. The moon can sometimes be seen during the day and sometimes be seen at night and its shape changes in a predictable pattern.</p> <p><b>GEMS:</b> Space Science-Unit 4</p> <p>SC-P-EU-U-5<br/>Students will understand that observable</p> | <p>SC-P-EU-S-5<br/>Students will observe the locations and real or apparent movements of the sun and the moon</p> <p><b>GEMS:</b> Space Science-Unit 3</p> <p>SC-P-EU-S-6<br/>Students will investigate evidence of interaction between the sun and the Earth (e.g., shadows, position of sun relative to horizon) to support inferences about movements in the Earth/Sun system</p> <p><b>GEMS:</b> Space Science-Unit 3</p> <p>SC-P-EU-S-7<br/>Students will communicate observations,</p> | <p><b>SC-EP-2.3.3</b><br/><b>Students will describe the properties, locations and real or apparent movements of objects in the sky (Sun, moon).</b></p> <p><b>Objects in the sky have properties, locations and real or apparent movements that can be observed and described. Observational data, patterns, and models should be used to describe real or apparent movements.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>GEMS:</b> Space Science-Unit 3</p> <p><b>SC-EP-2.3.4</b><br/><b>Students will describe the movement of the</b></p> |

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| <p>interactions of the sun, moon and the Earth can be used to identify the apparent pattern of their movement.</p> <p><b>GEMS:</b> Space Science-Unit 3</p> | <p>investigations and conclusions orally and with written words, charts and diagrams</p> <p><b>Electric Circuits</b><br/> TG: L04 (pp21-24)<br/> TG: L17 (pp85-86)</p> <p><b>The Life Cycle of Butterflies</b><br/> TG: L12-13 (pp75-84)<br/> S - TG: L03.Exts (pp32-33)<br/> S - TG: L09 (pp87-96)<br/> S - TG: L15-17 (pp149-172)</p> <p><b>Organisms</b><br/> TG: L03-7 (pp21-86)<br/> TG: L08.Exts (p94)<br/> TG: L09 (pp97-104)<br/> TG: L11 (pp119-126)<br/> TG: L12 (pp127-134)<br/> TG: L15 (pp155-168)</p> <p><b>Rocks and Minerals</b><br/> TG: L15-16 (pp103-126)</p> <p><b>Solids and Liquids</b><br/> TG: L01 (pp3-10)<br/> TG: L17 (pp137-140)</p> <p><b>Sound</b><br/> TG: L01.Exts (pp7-8)<br/> TG: L03 (pp23-27)<br/> TG: L07 (pp49-56)<br/> TG: L09 (pp63-66)<br/> TG: L11-13 (pp73-90)</p> <p><b>Weather</b><br/> TG: L01-13 (pp3-128)<br/> TG: L15-17(pp135-150)</p> | <p><b>sun in the sky using evidence of interactions of the sun with the earth (e.g., shadows, position of sun relative to horizon) to identify patterns of movement.</b></p> <p><b>Changes in movement of objects in the sky have patterns that can be observed and described. The Sun appears to move across the sky in the same way every day, but the Sun’s apparent path changes slowly over seasons. Recognizing relationships between movements of objects and resulting phenomena, such as shadows, provides information that can be used to make predictions and draw conclusions about those movements.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>GEMS:</b> Space Science-Unit 3</p> <p><i>SC-EP-2.3.5</i><br/> <i>Students will understand that the moon moves across the sky on a daily basis much like the Sun. The observable shape of the moon can be described as it changes from day to day in a cycle that lasts about a month.</i></p> <p><b>GEMS:</b> Space Science-Unit 3</p> |
| <p>SC-P-EU-U-6<br/> Students will understand raising questions</p>  | <p>SC-P-EU-S-1<br/> Students will use senses and scientific tools</p>  |  |

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| <p>about the Earth and the Universe and seeking answers to some of them (by careful observation and/or investigation) is what science is all about.</p> <p><b>Weather</b><br/> TG: L02 (pp11-24)<br/> TG: L07.Exts (p67)</p> | <p>(e.g., hand lens/magnifier, metric ruler, balance, etc.) to observe, describe and classify earth materials (solid rocks, soils, water and air) using their physical properties</p> <p><b>Weather</b><br/> TG: L03 (pp25-32)<br/> TG: L14 (pp129-134)</p> <p>SC-P-EU-S-6<br/> Students will investigate evidence of interaction between the sun and the Earth (e.g., shadows, position of sun relative to horizon) to support inferences about movements in the Earth/Sun system</p> <p><b>GEMS: Space Science-Unit 3</b><br/> SC-P-EU-S-7<br/> Students will communicate observations, investigations and conclusions orally and with written words, charts and diagrams</p> <p><b>Organisms</b><br/> TG: L03-7 (pp21-86)<br/> TG: L08.Exts (p94)<br/> TG: L09 (pp97-104)<br/> TG: L11 (pp119-126)<br/> TG: L12 (pp127-134)<br/> TG: L15 (pp155-168)</p> <p><b>Solids and Liquids</b><br/> TG: L01 (pp3-10)<br/> TG: L17 (pp137-140)</p> <p><b>Weather</b><br/> TG: L01-13 (pp3-128)<br/> TG: L15-17(pp135-150)</p> |  |
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**Big Idea: Unity and Diversity (Biological Science) Grade: End of Primary**

All matter is comprised of the same basic elements, goes through the same kinds of energy transformations, and uses the same kinds of forces to move. Living organisms are no exception. Elementary students begin to observe the macroscopic features of organisms in order to make comparisons and classifications based upon likenesses and differences. Looking for patterns in the appearance and behavior of an organism leads to the notion that offspring are much like the parents, but not exactly alike. Emphasis at every level should be placed upon the understanding that while every living thing is composed of similar small constituents that combine in predictable ways, it is the subtle variations within these small building blocks that account for both the likenesses and differences in form and function that create the diversity of life.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment   |
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| <p>SC-P-UD-U-1<br/>Students will understand that most living things need water, food and air, while nonliving things can continue to exist without any requirements.</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L10 (pp63-68)</p> <p><b>Organisms</b><br/>TG: L01 (pp3-10)<br/>TG: L15-17 (pp155-182)</p> <p>Sound<br/>TG: L01-10 (pp3-108)<br/>TG: L13 (pp125-138)</p> | <p>SC-P-UD-S-1<br/>Students will describe the basic needs of organisms and explain how these survival needs can be met only in certain environments</p> <p><b>Organisms</b><br/>TG: L03 (pp21-36)<br/>TG: L04 (pp36-52)<br/>TG: L06-10 (pp65-118)<br/>TG: L13 (pp135-148)<br/>TG: L15-16 (pp155-178)<br/>TG: L10.Exts (p95)</p> <p>SC-P-UD-S-7<br/>Students will ask questions that can be investigated, plan and conduct 'fair tests,' and communicate (e.g., write, draw, speak, multi-media) findings to others</p> | <p><b>SC-EP-3.4.1</b><br/><b>Students will explain the basic needs of organisms.</b></p> <p><b>Organisms have basic needs. For example, animals need air, water and food; plants need air, water, nutrients and light. Organisms can survive only in environments in which their needs can be met.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L02-3 (pp11-22)<br/>TG: L05-8 (pp29-52)<br/>TG: L10-12 (pp63-80)<br/>TG: L15-16 (pp89-96)</p> <p><b>Organisms</b><br/>TG: L03-4 (pp21-52)<br/>TG: L06-10 (pp65-118)<br/>TG: L13 (pp135-148)<br/>TG: L15-16 (pp155-178)</p> <p><b>Weather</b><br/>TG: L10.Exts (p95)</p> |

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|   |  | <p><i>SC-EP-3.4.2</i><br/> <i>Students will understand that things in the environment are classified as living, nonliving and once living. Living things differ from nonliving things. Organisms are classified into groups by using various characteristics (e.g., body coverings, body structures).</i></p> <p><b>The Life Cycle of Butterflies</b><br/> TG: L02 (pp11-18)<br/> TG: L10 (pp63-68)<br/> TG: L14-15 (pp85-94)</p> <p><b>Organisms</b><br/> TG: L01 (pp3-10)<br/> TG: L02.Exts (pp15-16)<br/> TG: L05.Exts (p59)<br/> TG: L15-17 (pp155-182)</p>  |
| <p>SC-P-UD-U-2<br/> Students will understand that plants and animals have features that help them live in different environments.</p> <p><b>Electric Circuits</b><br/> RB: (pp11-12)<br/> RB: (pp47-49)</p> <p><b>The Life Cycle of Butterflies</b><br/> TG: App-B (pp101-110)<br/> TG: L01-11 (pp3-74)<br/> TG: L13-16 (pp81-96)<br/> S - TG: L10 (pp97-108)<br/> S - TG: L16.Exts (pp164-166)</p> <p><b>Organisms</b><br/> TG: L07-10 (pp75-118)<br/> TG: L13-15 (pp135-168)<br/> TG: L17 (pp179-182)</p> <p><b>Sound</b><br/> TG: L04.Exts (pp26-27)<br/> TG: L14.Exts (p98)</p> <p><b>Weather</b><br/> TG: L10.Exts (p95)</p> | <p>SC-P-UD-S-1<br/> Students will describe the basic needs of organisms and explain how these survival needs can be met only in certain environments</p> <p><b>The Life Cycle of Butterflies</b><br/> TG: L02-3 (pp11-22)<br/> TG: L05-8 (pp29-52)<br/> TG: L10-12 (pp63-80)<br/> TG: L15-16 (pp89-96)</p> <p><b>Organisms</b><br/> TG: L03 (pp21-36)<br/> TG: L04 (pp36-52)<br/> TG: L06-10 (pp65-118)<br/> TG: L13 (pp135-148)<br/> TG: L15-16 (pp155-178)<br/> TG: L10.Exts (p95)</p> <p><b>Weather</b><br/> TG: L10.Exts (p95)</p> | <p><b>SC-EP-3.4.3</b><br/> <b>Students will describe the basic structures and related functions of plants and animals that contribute to growth, reproduction and survival.</b></p> <p><b>Each plant or animal has observable structures that serve different functions in growth, survival and reproduction. For example, humans have distinct body structures for walking, holding, seeing and talking. These observable structures should be explored to sort, classify, compare and describe organisms.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Electric Circuits</b><br/> RB: (pp11-12)<br/> RB: (pp47-49)</p> <p><b>The Life Cycle of Butterflies</b><br/> TG: App-B (pp101-110)<br/> TG: L01-11 (pp3-74)<br/> TG: L13-16 (pp81-96)</p> |

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|  | <p>SC-P-UD-S-2<br/>Students will identify the characteristics that define a habitat</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L01-3 (pp3-22)<br/>TG: L12 (pp75-80)</p> <p><b>Organisms</b><br/>TG: L04 (pp36-52)<br/>TG: L11-12 (pp119-134)</p> <p>SC-P-UD-S-3<br/>Students will investigate adaptations that enable animals and plants to grow, reproduce and survive (e.g., movements, body coverings, method of reproduction)</p> <p><b>Weather</b><br/>TG: L10.Exts (p95)</p> <p><b>GEMS: Terrarium Habitats</b><br/>TG: Act03-(pp23-48)</p> <p>SC-P-UD-S-4<br/>Students will analyze structures of plants and animals to make inferences about the types of environments for which they are suited</p> <p><b>Electric Circuits</b><br/>RB: (pp11-12)<br/>RB: (pp47-49)</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: App-B (pp101-110)<br/>TG: L01-11 (pp3-74)<br/>TG: L13 -16(pp81-96)</p> <p>Soils<br/>TG: L10 (pp97-108)<br/>TG: L16.Exts (pp164-166)</p> <p><b>Organisms</b><br/>TG: L07-10 (pp75-118)<br/>TG: L13-15 (pp135-168)<br/>TG: L17 (pp179-182)</p> <p><b>Sound</b><br/>TG: L04.Exts (pp26-27)<br/>TG: L14.Exts (p98)</p> | <p><b>Organisms</b><br/>TG: L07-10 (pp75-118)<br/>TG: L13-15 (pp135-168)<br/>TG: L17 (pp179-182)</p> <p><b>Sound</b><br/>TG: L14.Exts (p98)</p> <p>Soils<br/>TG: L10 (pp97-108)<br/>TG: L16.Exts (pp164-166)</p> |
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|  | <p>SC-P-UD-S-7<br/>Students will ask questions that can be investigated, plan and conduct 'fair tests,' and communicate (e.g., write, draw, speak, multi-media) findings to others</p>   |   |
| <p>SC-P-UD-U-3<br/>Students will understand that some animals are alike in the way they look and in the things they do, and others are very different from one another.</p> <p><b>Organisms</b><br/>TG: L12.Exts (p131)<br/>TG: L13.Exts (pp139-140)</p> <p>SC-P-UD-U-4<br/>Students will understand that the offspring all living things are very much like their parents, but not exactly alike.</p> | <p>SC-P-UD-S-5<br/>Students will use scientific tools (e.g., hand lens/magnifier, metric ruler, balance) to observe and make comparisons of organisms; and to classify organisms using one or more of their external characteristics (e.g., body coverings, body structures)</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L01.Exts (p7)<br/>TG: L02 (pp11-18)<br/>TG: L10 (pp63-68)<br/>TG: L11.Exts (pp71-73)<br/>TG: L14-15 (pp85-94)<br/>TG: L15 (pp89-94)</p> <p><b>Organisms</b><br/>TG: L01 (pp3-10)<br/>TG: L02.Exts (pp15-16)<br/>TG: L05.Exts (p59)<br/>TG: L17 (pp179-182)</p> <p><b>Rocks and Minerals</b><br/>TG: L01.Exts (p9)</p> <p><b>Weather</b><br/>TG: L07.Exts (p67)</p> <p>SC-P-UD-S-6<br/>Students will analyze and compare a variety of plant and animal life cycles in order to uncover patterns of growth, development, reproduction and death of an organism</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: App-A (pp97-100)<br/>TG: App-B (pp101-110)<br/>TG: L01-9 (pp3-62)<br/>TG: L11-16 (pp69-96)</p> <p><b>Organisms</b><br/>TG: L03 (pp21-36)</p> | <p><b>SC-EP-3.4.4</b><br/><b>Students will describe a variety of plant and animal life cycles to understand patterns of the growth, development, reproduction and death of an organism.</b></p> <p><b>Plants and animals have life cycles that include the beginning of life, growth and development, reproduction and death. The details of a life cycle are different for different organisms. Observations of different life cycles should be made in order to identify patterns and recognize similarities and differences.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>The Life Cycle of Butterflies</b><br/>TG: App-A (pp97-100)<br/>TG: App-B (pp101-110)<br/>TG: L01-16 (pp3-96)</p> <p><b>Organisms</b><br/>TG: L03 (pp21-36)<br/>TG: L06 (pp65-74)<br/>TG: L10.Exts (p115)<br/>TG: L11-13 (pp119-148)<br/>TG: L16 (pp169-178)<br/>TG: L17 (pp179-182)</p> <p><b>Weather</b><br/>TG: L10.Exts (p95)</p> |

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|  | <p>TG: L06 (pp65-74)<br/> TG: L10.Exts (p115)<br/> TG: L11-13 (pp119-148)<br/> TG: L16 (pp169-178)<br/> TG: L17 (pp179-182)<br/> <b>Weather</b><br/> TG: L10.Exts (p95)<br/> SC-P-UD-S-7<br/> Students will ask questions that can be investigated, plan and conduct 'fair tests,' and communicate (e.g., write, draw, speak, multi-media) findings to others<br/> <b>GEMS: Aquatic Habitats</b><br/> TG: Act05 (pp61-70)</p>   |  |
| <p>SC-P-UD-U-5<br/> Students will understand that organisms may not be able to survive if some of their parts are missing.<br/> <b>Electric Circuits</b><br/> RB: (pp11-12)<br/> RB: (pp47-49)<br/> <b>The Life Cycle of Butterflies</b><br/> TG: App-B (pp101-110)<br/> TG: L01-11 (pp3-74)<br/> TG: L13-16 (pp81-96)<br/> <b>Organisms</b><br/> TG: L07-10 (pp75-118)<br/> TG: L13-15 (pp135-168)<br/> TG: L17 (pp179-182)<br/> <b>Sound</b><br/> TG: L04.Exts (pp26-27)<br/> TG: L14.Exts (p98)</p> | <p>SC-P-UD-S-3<br/> Students will investigate adaptations that enable animals and plants to grow, reproduce and survive (e.g., movements, body coverings, method of reproduction)<br/> <b>Weather</b><br/> TG: L10.Exts (p95)<br/> <b>GEMS: Terrarium Habitats</b><br/> TG: Act03-5pp23-48)<br/> <br/> SC-P-UD-S-4<br/> Students will analyze structures of plants and animals to make inferences about the types of environments for which they are suited<br/> <b>Organisms</b><br/> TG: L07-10 (pp75-118)<br/> TG: L13-15 (pp135-168)<br/> TG: L17 (pp179-182)<br/> SC-P-UD-S-7<br/> Students will ask questions that can be investigated, plan and conduct 'fair tests,' and communicate (e.g., write, draw, speak, multi-media) findings to others</p> |  |

**Big Idea: Biological Change (Biological Science) Grade: End of Primary**

The only thing certain is that everything changes. Elementary students build a foundational knowledge of change by observing slow and fast changes caused by nature in their own environment, noting changes that humans and other organisms cause in their environment, and observing fossils found in or near their environment.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.6 Students understand how living and nonliving things change over time and the factors that influence the changes.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts   | Related Core Content for Assessment   |
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| <p>SC-P-BC-U-1<br/>Students will understand that fossils found in Earth materials indicate that organisms and environmental conditions may have been different in the past.</p> | <p>SC-P-BC-S-1<br/>Students will identify and describe evidence of organisms that no longer exist (fossils)</p> <p>SC-P-BC-S-2<br/>Students will examine fossils/representations of fossils and make comparisons between organisms that lived long ago and organisms of today (e.g., compare a fern to a fossil of a fern-like plant)</p> <p>SC-P-BC-S-3<br/>Students will make inferences about the basic environments represented by fossils found in earth materials (e.g., fossils of fish skeletons represent an aquatic environment)</p> <p>SC-P-BC-S-5<br/>Students will compare fossils, plants and animals from similar environments in different geographic locations</p> | <p><b>SC-EP-3.5.1</b><br/><b>Students will describe fossils as evidence of organisms that lived long ago, some of which may be similar to others that are alive today.</b></p> <p><b>Fossils found in Earth materials provide evidence about organisms that lived long ago and the nature of the environment at that time. Representations of fossils provide the basis for describing and drawing conclusions about the organisms and basic environments represented by them.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |

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| <p>SC-P-BC-U-2<br/>Students will understand that living things are found almost everywhere on our planet, but organisms living in one place may be different from those found somewhere else.</p> <p><b>Organisms</b><br/>TG: L12.Exts (p131)<br/>TG: L13.Exts (pp139-140)</p>  | <p>SC-P-BC-S-5<br/>Students will compare fossils, plants and animals from similar environments in different geographic locations</p>  |  |
| <p>SC-P-BC-U-3<br/>Students will understand that some changes are so slow or so fast that they are hard to see.</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L05 (pp29-34)</p> <p>SC-P-BC-U-4<br/>Students will understand that things change in some ways and stay the same in some ways.</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L05 (pp29-34)</p> | <p>SC-P-BC-S-4<br/>Students will investigate and describe occurrences in the environment that illustrate change (e.g., erosion, earthquakes, weather phenomena, human intrusion)</p> <p>SC-P-BC-S-6<br/>Students will describe in words, pictures and/or measurements, changes that occur quickly (e.g., puddles forming from rain, cutting hair, burning paper) and changes that occur more slowly (e.g., hair growing, water evaporating in an open container, growing in height), noting the factors that influence the change</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L05 (pp29-34)</p> |  |

**Big Idea: Energy Transformations (Unifying Concepts) Grade: End of Primary**

Energy transformations are inherent in almost every system in the universe—from tangible examples at the elementary level, such as heat production in simple earth and physical systems to more abstract ideas beginning at middle school, such as those transformations involved in the growth, dying and decay of living systems. The use of models to illustrate the often invisible and abstract notions of energy transfer will aid in conceptualization, especially as students move from the macroscopic level of observation and evidence (primarily elementary school) to the microscopic interactions at the atomic level (middle and high school levels).

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts  | Related Core Content for Assessment |
|---|--|-------------------------------------|
| <p>SC-P-ET-U-1<br/>Students will understand that energy makes things move, grow or work. Everything that changes uses energy to make those changes happen. Sometimes evidence of these changes can be seen, but not always.</p> <p><b>Electric Circuits</b><br/>TG: L01-17 (pp3-86)</p> | <p>SC-P-ET-S-1<br/>Students will identify examples and sources of energy</p> <p>SC-P-ET-S-2<br/>Students will create or interpret sketches, diagrams, 3-dimensional constructions and concept maps as models that can be used to represent things that can be seen, cannot be seen, or cannot be seen easily or in their entirety</p> <p><b>Changes</b><br/>TG: L01-2 (pp3-30)<br/>TG: L05 (pp53-62)<br/>TG: L06.Exts (pp67-69)<br/>TG: L07-17 (pp71-158)</p> <p><b>Electric Circuits</b><br/>TG: L02-16 (pp7-84)</p> <p><b>Organisms</b><br/>TG: L02 (pp11-20)<br/>TG: L03.Exts (pp29-30)<br/>TG: L13-15 (pp135-168)<br/>TG: L16.Exts (pp172-173)</p> |                                     |

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|  | <p><b>Rocks and Minerals</b><br/>TG: L03 (pp19-26)</p> <p><b>Solids and Liquids</b><br/>TG: L01 (pp3-10)<br/>TG: L05.Exts (pp43-45)<br/>TG: L06.Exts (pp51-52)<br/>TG: L10.Exts (p85)<br/>TG: L12 (pp95-100)<br/>TG: L16.Exts (pp135-136)<br/>TG: L17 (pp137-140)</p> <p><b>Sound</b><br/>TG: L04-8 (pp28-62)<br/>TG: L11 (pp73-78)<br/>TG: L13-14 (pp85-102)<br/>TG: L17 (pp117-118)</p> <p><b>Weather</b><br/>TG: App-B (pp153-167)<br/>TG: L01-2 (pp3-24)<br/>TG: L04 (pp33-42)<br/>TG: L06-8 (pp55-82)<br/>TG: L10 (pp91-100)<br/>TG: L12 (pp113-122)<br/>TG: L14 (pp129-134)<br/>TG: L15.Exts (p137)<br/>TG: L16 (pp141-148)</p> |  |
| <p>SC-P-ET-U-2<br/>Students will understand that almost all kinds of food that animals eat can be traced back to plants. Food chains/webs are useful models of these relationships.</p> <p><b>GEMS: Aquatic Habitats</b><br/>TG: Act04 (pp45-59)<br/>TG: Act05 (pp61-70)<br/>TG: Act03 (pp23-31)</p> | <p>SC-P-ET-S-3<br/>Students will observe, illustrate and explain basic relationships of plants and animals in an ecosystem (e.g., use simple food chains and webs to explain how plants and animals get food/energy to live and grow)</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L02.Exts (pp14-15)<br/>TG: L10 (pp63-68)</p> <p><b>Organisms</b><br/>TG: L04.Exts (pp43-45)<br/>TG: L11-12 (pp119-134)<br/>TG: L14.Exts (pp152-153)</p>   | <p><b>SC-EP-4.6.1</b><br/><b>Students will describe basic relationships of plants and animals in an ecosystem (food chains).</b></p> <p><b>Plants make their own food. All animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants. Basic relationships and connections between organisms in food chains can be used to discover patterns within ecosystems.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L02.Exts (pp14-15)</p> |

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|  | <p>SC-P-ET-S-7<br/>Students will explore a variety of models (e.g., food chains, webs, circuit diagrams) to infer whether the representation is complete or only part of the actual event/object</p> <p><b>Weather</b><br/>TG: L06 (pp55-62)<br/><b>GEMS: Buzzing A Hive</b><br/>TG: Exts (p67)<br/>TG: Les01-3pp5-37)</p> | <p>TG: L10 (pp63-68)<br/><b>Organisms</b><br/>TG: L04.Exts (pp43-45)<br/>TG: L11 (pp119-126)<br/>TG: L12 (pp127-134)<br/>TG: L14.Exts (pp152-153)</p>   |
| <p>SC-P-ET-U-3<br/>Students will understand that the sun warms the air, land and water, and lights the Earth.</p> <p><b>Electric Circuits</b><br/>RB: (pp17-21)</p>  | <p>SC-P-ET-S-4<br/>Students will observe and describe evidence of the sun providing light and heat to the Earth</p> <p><b>Electric Circuits</b><br/>RB: (pp17-21)</p>  | <p><b>SC-EP-4.6.2</b><br/><b>Students will describe evidence of the sun providing light and heat to the Earth.</b></p> <p><b>Simple observations and investigations begin to reveal that the Sun provides the light and heat necessary to maintain the temperature of Earth. Based on those experiences, the conclusion can be drawn that the Sun's light and heat are necessary to sustain life on Earth.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Electric Circuits</b><br/>RB: (pp17-21)</p> |
| <p>SC-P-ET-U-4<br/>Students will understand that light can be observed to determine how it travels and how it interacts with different materials (e.g. reflects, is absorbed, passes through).</p> <p><b>Rocks and Minerals</b><br/>TG: L08 (pp57-62)<br/>TG: L09 (pp63-70)<br/><b>Weather</b><br/>TG: L09-10 (pp83-100)</p> | <p>SC-P-ET-S-6<br/>Students will investigate light traveling in a straight line until striking an object by observing the shapes of the shadows that are produced</p> <p><b>GEMS: Space Science-Unit 3</b></p>   | <p><b>SC-EP-4.6.4</b><br/><b>Students will describe light as traveling in a straight line until it strikes an object.</b></p> <p><b>Light can be observed and described as it travels in a straight line until it strikes an object.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Electric Circuits</b><br/>RB: (pp39-41)<br/><b>Weather</b><br/>TG: L09 (pp83-90)</p>  |

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| <p>SC-P-ET-U-5<br/>Students will understand that electricity can only flow when it has a closed path (circuit) to follow. Closed electric circuits can produce light and sound.</p> <p><b>Electric Circuits</b><br/>RB: (pp13-16)<br/>RB: (pp29-33)<br/>RB: (pp39-44)<br/>TG: L01-17 (pp3-86)</p> | <p>SC-P-ET-S-5<br/>Students will demonstrate open and closed circuits using batteries, bulbs and wires and analyze models of basic electrical circuits in order to determine whether a simple circuit is open or closed</p> <p><b>Electric Circuits</b><br/>RB: (pp13-16)<br/>RB: (pp29-33)<br/>RB: (pp39-44)<br/>TG: L0117 (pp3-86)</p> <p>SC-P-ET-S-7<br/>Students will explore a variety of models (e.g., food chains, webs, circuit diagrams) to infer whether the representation is complete or only part of the actual event/object</p> <p><b>Electric Circuits</b><br/>TG: L02-16 (pp7-84)<br/><b>Weather</b><br/>TG: L06 (pp55-62)</p> | <p><b>SC-EP-4.6.3</b><br/><b>Students will analyze models of basic electrical circuits using batteries, bulbs and wires, in order to determine whether a simple circuit is open or closed.</b></p> <p><b>Electricity in circuits can produce light. Describing and comparing models demonstrates basic understanding of circuits.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Electric Circuits</b><br/>RB: (pp13-16)<br/>RB: (pp29-33)<br/>RB: (pp39-44)<br/>TG: L01-17(pp3-86)</p> |
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**Big Idea: Interdependence (Unifying Concepts) Grade: End of Primary**

It is not difficult for students to grasp the general notion that species depend on one another and on the environment for survival. But their awareness must be supported by knowledge of the kinds of relationships that exist among organisms, the kinds of physical conditions that organisms must cope with, the kinds of environments created by the interaction of organisms with one another and their physical surroundings, and the complexity of such systems. Elementary learners need to become acquainted with ecosystems that are easily observable to them by beginning to study the habitats of many types of local organisms. Students begin to investigate the survival needs of different organisms and how the environment affects optimum conditions for survival.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts   | Related Core Content for Assessment  |
|---|---|--|
| <p>SC-P-I-U-1<br/>Students will understand that the world has many different environments. Distinct environments support the lives of different types of organisms.</p> <p><b>Organisms</b><br/>TG: L12.Exts (p131)</p> | <p>SC-P-I-S-1<br/>Students will identify the characteristics of an ecosystem</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L02.Exts (pp14-15)</p> <p><b>Organisms</b><br/>TG: L04.Exts (pp43-45)<br/>TG: L11.Exts (pp122-123)<br/>TG: L12.Exts (p131)</p> <p>SC-P-I-S-2<br/>Students will observe, document and explain how organisms depend on their environments</p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L10 (pp63-68)</p> <p><b>Organisms</b><br/>TG: L11-12 (pp119-134)<br/>TG: L14.Exts (pp152-153)</p> <p>SC-P-I-S-3<br/>Students will describe and explain how the environment can be affected by the organisms living there</p> | <p><b>SC-EP-4.7.1</b><br/><b>Students will describe the cause and effect relationships existing between organisms and their environments.</b></p> <p><b>The world has many different environments. Organisms require an environment in which their needs can be met. When the environment changes some plants and animals survive and reproduce and others die or move to new locations.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>The Life Cycle of Butterflies</b><br/>TG: L10 (pp63-68)</p> <p><b>Organisms</b><br/>TG: L04.Exts (pp43-45)<br/>TG: L11-12 (pp119-134)<br/>TG: L14.Exts (pp152-153)</p> |

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|  | <p><b>The Life Cycle of Butterflies</b><br/> TG: L10 (pp63-68)<br/> <b>Organisms</b><br/> TG: L04.Exts (pp43-45)<br/> TG: L11-12 (pp119-134)<br/> TG: L14.Exts (pp152-153)</p> <p>SC-P-I-S-5<br/> Students will ask questions that can be explored using a variety of appropriate print and non-print resources (e.g., why certain plants can not survive in a particular area; why some animals are endangered or extinct; why some areas are 'protected')</p>   |   |
| <p>SC-P-I-U-2<br/> Students will understand that when the environment changes, some plants and animals survive and reproduce, and others die or move to new locations.</p> | <p>SC-P-I-S-4<br/> Students will describe how changes in an environment might affect plants' and animals' ability to survive</p> <p><b>Electric Circuits</b><br/> RB: (pp47-49)<br/> <b>The Life Cycle of Butterflies</b><br/> TG: L01-16 (pp3-96)<br/> <b>Weather</b><br/> TG: L10.Exts (p95)</p> <p>SC-P-I-S-5<br/> Students will ask questions that can be explored using a variety of appropriate print and non-print resources (e.g., why certain plants can not survive in a particular area; why some animals are endangered or extinct; why some areas are 'protected')</p> | <p><b>SC-EP-4.7.1</b><br/> <b>Students will describe the cause and effect relationships existing between organisms and their environments.</b></p> <p><b>The world has many different environments. Organisms require an environment in which their needs can be met. When the environment changes some plants and animals survive and reproduce and others die or move to new locations.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>The Life Cycle of Butterflies</b><br/> TG: L10 (pp63-68)<br/> <b>Organisms</b><br/> TG: L04.Exts (pp43-45)<br/> TG: L11-12 (pp119-134)<br/> TG: L14.Exts (pp152-153)</p> |

# Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

Grade 4



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## Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

| Grade Range           | <i>STC PROGRAM™ and GEMS® Units</i>  |
|-----------------------|--|
| K-3                   | <ul style="list-style-type: none"> <li>• <b>Changes</b></li> <li>• <b>Electric Circuits</b></li> <li>• <b>The Life Cycle of Butterflies</b></li> <li>• <b>Organisms</b></li> <li>• <b>Rocks and Minerals</b></li> <li>• <b>Solids and Liquids</b></li> <li>• <b>Sound</b></li> <li>• <b>Weather</b></li> <li>• <b>GEMS: Space Science</b></li> </ul> |
| 4 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Animal Studies</b></li> <li>• <b>Motion and Design</b></li> <li>• <b>Land and Water</b></li> <li>• <b>GEMS: Hot Water and Warm Homes</b></li> </ul>  |
| 5 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Ecosystems</b></li> <li>• <b>Experiments with Plants</b></li> <li>• <b>GEMS: Messages From Space</b></li> </ul>  |
| 6 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Organisms—From Macro to Micro</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 7 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 8 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Light</b></li> <li>• <b>Organisms—From Macro to Micro</b></li> </ul>   |

The STC PROGRAM™ and GEMS® Units in this chart are recommended based on the Kentucky Program of Studies and the Core Contents for Assessment. Provided for each grade level, are the units that most strongly align with the content objectives. Other STC PROGRAM™ Units may also match objectives within each grade level. For more information about any STC PROGRAM™ unit or GEMS® unit, visit [www.carolinacurriculum.com](http://www.carolinacurriculum.com).

GEMS® Space Science is research-based 3-5 science curriculum that teach fundamental concepts in space science.

### Legend

To save paper, the curriculum location information in this document has been abbreviated as follows:

- Unit abbreviations = noted in parentheses in the chart above
- TG = Teacher's Guide
- S-Sec3 = Section 3 (containing a section on safety) in the STC® Teacher's Guide
- L01, L02, etc. = Lesson 1, Lesson 2, etc.
- Les01 = Lesson 1
- Act01=Activity 1
- p, pp = page, pages
- RB = STC BOOK™ (a science reading book included in some of the grades 3–5 STC® unit kits)
- SB = Student Book
- Exts = Extensions (found at the end of most lessons in the Teacher's Guide)
- App-A, App-B = Appendix A, Appendix B (found at the

end of Section 4 in the Teacher’s Guide)

| <b>Big Idea: Structure and Transformation of Matter (Physical Science) Grade: Fourth</b><br>A basic understanding of matter is essential to the conceptual development of other big ideas in science. In the elementary years of conceptual development, students will be studying properties of matter and physical changes of matter at the macro level through direct observations, forming the foundation for subsequent learning. The use of models (and an understanding of their scales and limitations) is an effective means of learning about the structure of matter. Looking for patterns in properties is also critical to comparing and explaining differences in matter. |  |   |
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| <b>Academic Expectations</b><br><b>2.1</b> Students understand scientific ways of thinking and working and use those methods to solve real-life problems.<br><b>2.2</b> Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.<br><b>2.4</b> Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.   |  |   |
| Program of Studies: Understandings  | Program of Studies: Skills and Concepts  | Related Core Content for Assessment   |
| SC-4-STM-U-1<br>Students will understand that things can be done to materials to change some of their properties, but not all materials respond the same way to what is done to them.<br><b>Land and Water</b><br>TG: L05.Exts (p56)<br><br>SC-4-STM-U-2<br>Students will understand that when a new material is made by combining two or more materials the new material often has properties that are different from the original materials.<br><b>Land and Water</b><br>TG: L05.Exts (p56)<br><br>SC-4-STM-U-3<br>Students will understand that properties of materials may change if the materials become hotter or colder.   | SC-4-STM-S-1<br>Students will identify matter as solids, liquids and gases<br><br>SC-4-STM-S-2<br>Students will gather information including temperature, magnetism, hardness and mass using appropriate tools to identify physical properties of matter<br><b>Motion and Design</b><br>TG: L04 (pp35-46)<br><b>Hot Water and Warm Homes</b><br>TG: Ses02 (pp13-16)<br>TG: Ses04 (pp33-37)<br><br>SC-4-STM-S-4<br>Students will conduct tests, compare data and draw conclusions about physical properties of matter including states of matter, conduction and buoyancy<br><br>SC-4-STM-S-5<br>Students will predict and describe patterns of properties in matter, such as how materials will interact with each other and how they can be | <b>SC-04-1.1.1</b><br><b>Students will explain how matter, including water, can be changed from one state to another.</b><br><br><b>Materials can exist in different states--solid, liquid and gas. Some common materials, such as water, can be changed from one state to another by heating or cooling. Resulting cause and effect relationships should be explored, described and predicted.</b><br><br><b>DOK 3</b> |

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|   | <p>changed</p> <p>SC-4-STM-S-6<br/>Students will investigate student-generated questions about the properties of matter and uses of matter with particular properties<br/>Students will design and build objects that require different properties of materials</p>   |  |
| <p>SC-4-STM-U-4<br/>Students will understand that if water is turned into ice and then the ice is allowed to melt, the amount of water is the same as it was before freezing. When liquid water “disappears” it is not really gone, it has turned into a gas (vapor).</p> | <p>SC-4-STM-S-3<br/>Students will investigate and describe how the physical properties of water change as heat energy is added or removed</p>   |  |
| <p>SC-4-STM-U-5<br/>Students will understand that scientists pay more attention to claims about how something works when the claims are backed up with evidence that can be confirmed.</p>  | <p>SC-4-STM-S-8<br/>Students will write clear descriptions of their designs and experiments, present their findings (when appropriate) in tables and graphs (designed by the students)<br/><b>Motion and Design</b><br/>TG: L04 (pp35-46)</p> <p>SC-4-STM-S-9<br/>Students will analyze the designs and investigations of themselves and others to see if following the same procedures would produce similar results and conclusions (scientific validity)</p> |  |

**Big Idea: Motion and Forces (Physical Science) Grade: Fourth**

Whether observing airplanes, baseballs, planets, or people, the motion of all bodies is governed by the same basic rules. In the elementary years of conceptual development, students need multiple opportunities to experience, observe, and describe (in words and pictures) motion, including factors (e.g., pushing, pulling) that affect motion.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts   | Related Core Content for Assessment  |
|--|---|--|
| <p>SC-4-MF-U-1<br/>Students will understand that an object’s motion can be described as its change in position over time and can be represented in a variety of ways.</p> <p><b>Motion and Design</b><br/>TG: L03-5 (pp25-56)<br/>TG: L07.Exts (pp68-69)<br/>TG: L08 -13(pp73-124)<br/>TG: L15 (pp139-144)<br/>TG: L17 (pp153-156)</p> <p>SC-4-MF-U-2<br/>Students will understand that forces (pushes and pulls) cause changes in the direction or speed of something moving; the greater the force on an object, the greater its change in motion.</p> <p><b>Motion and Design</b><br/>TG: L04-5 (pp35-56)</p> | <p>SC-4-MF-S-1<br/>Students will measure and record changes (using appropriate charts, graphs) in the position and motion of an object to which a force has been applied</p> <p><b>Land and Water</b><br/>TG: L07 (pp75-84)<br/>TG: L13 (pp143-152)</p> <p><b>Motion and Design</b><br/>TG: L03-5 (pp25-56)<br/>TG: L07 -9(pp65-90)<br/>TG: L15-16 (pp139-152)</p> <p>SC-4-MF-S-2<br/>Students will make inferences about the size of forces or the change in motion produced by various forces</p> <p><b>Motion and Design</b><br/>TG: L04-5 (pp35-56)</p> | <p><b>SC-04-1.2.1</b><br/><b>Students will interpret or represent data related to an object’s straight-line motion in order to make inferences and predictions of changes in position and/or time.</b></p> <p><b>An object’s motion can be described by measuring its change in position over time such as rolling different objects (e.g., spheres, toy cars) down a ramp. Collecting and representing data related to an object’s motion provides the opportunity to make comparisons and draw conclusions.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Land and Water</b><br/>TG: L07 (pp75-84)<br/>TG: L13 (pp143-152)</p> <p><b>Motion and Design</b><br/>TG: L03-5 (pp25-56)<br/>TG: L07-13 (pp65-124)<br/>TG: L15-17 (pp139-156)</p> |

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|  | <p>SC-4-MF-S-4<br/>Students will use tools and resources, such as stopwatches, sonic rangers, microscopes, computer simulations/animations and video clips, to observe motions that are hard to see or quantify and compare the usefulness/limitations of such tools</p> <p><b>Land and Water</b><br/>TG: L05-6 (pp51-74)</p> <p>SC-4-MF-S-5<br/>Students will answer student-generated questions through investigative and non-investigative processes about what affects motion and sound using information from a variety of print and non-print sources</p> <p><b>Motion and Design</b><br/>TG: L03-5 (pp25-56)<br/>TG: L07.Exts (pp68-69)<br/>TG: L08-13 (pp73-124)<br/>TG: L15 (pp139-144)<br/>TG: L17 (pp153-156)</p> | <p><b>SC-04-1.2.2</b><br/><b>Students will infer causes and effects of pushes and pulls (forces) on objects based on representations or interpretations of straight-line movement/motion in charts, graphs, and qualitative comparisons.</b></p> <p><b>The position and motion of objects can be changed by pushing or pulling. The amount of change is related to the force (defined as the strength of the push or pull) and the mass of the object(s) used. The force with which a ball is hit illustrates this principle. Cause and effect relationships, along with predicted consequences related to the strength of pushes and pulls (force) on an object's position and motion should be explored and qualitatively compared.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Motion and Design</b><br/>TG: L03-13 (pp25-124)<br/>TG: L15 (pp139-144)<br/>TG: L17 (pp153-156)</p> |
| <p>SC-4-MF-U-3<br/>Students will understand that sound is produced by the vibration of matter, and the rate of vibration affects the pitch of the sound.</p> | <p>SC-4-MF-S-3<br/>Students will investigate how the rate of vibration of an object changes the pitch (high-low) of the sound it produces</p>  | <p><b>SC-04-1.2.3</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>● <b>explain that sound is a result of vibrations, a type of motion;</b></li> <li>● <b>describe pitch (high, low) as a difference in sounds that are produced and relate that to the rate of vibration.</b></li> </ul> <p><b>Vibration is a type of motion that can be observed, described, measured and compared. Sound is produced by vibrating objects. The pitch of the sound can be varied by changing the rate of vibration. The relationship between rates of vibration and produced sounds can be described and graphed.</b></p>  |

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| <p>SC-4-MF-U-4<br/>Students will understand that things vary greatly in their motion. Some things move so fast they cannot be seen, while others are so slow that we cannot see that they are moving at all. Technology enables people to observe these fast or slow movements.</p> <p>SC-4-MF-U-5<br/>Students will understand that recording and representing information about the motion of objects in a variety of ways makes that data useful in supporting explanations, even long after it was originally collected.</p> <p style="text-align: center;"><b>Motion and Design</b><br/> TG: L04 (pp35-46)<br/> TG: L05 (pp47-56)<br/> TG: L07 (pp65-72)<br/> TG: L10 (pp91-100)<br/> TG: L12 (pp109-116)<br/> TG: L15 (pp139-144)<br/> TG: L16 (pp145-152)</p> | <p>SC-4-MF-S-4<br/>Students will use tools and resources, such as stopwatches, sonic rangers, microscopes, computer simulations/animations and video clips, to observe motions that are hard to see or quantify and compare the usefulness/limitations of such tools</p> <p>SC-4-MF-S-5<br/>Students will answer student-generated questions through investigative and non-investigative processes about what affects motion and sound using information from a variety of print and non-print sources</p> | <p><b>SC-04-1.2.1</b><br/> <b>Students will interpret or represent data related to an object’s straight-line motion in order to make inferences and predictions of changes in position and/or time.</b></p> <p><b>An object’s motion can be described by measuring its change in position over time such as rolling different objects (e.g., spheres, toy cars) down a ramp. Collecting and representing data related to an object’s motion provides the opportunity to make comparisons and draw conclusions.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p style="text-align: center;"><b>Land and Water</b><br/> TG: L07 (pp75-84)<br/> TG: L13 (pp143-152)<br/> <b>Motion and Design</b><br/> TG: L03-5 (pp25-56)<br/> TG: L07-13 (pp65-124)<br/> TG: L15-17 (pp139-156)</p> <p><b>SC-04-1.2.2</b><br/> <b>Students will infer causes and effects of pushes and pulls (forces) on objects based on representations or interpretations of straight-line movement/motion in charts, graphs, and qualitative comparisons.</b></p> <p><b>The position and motion of objects can be changed by pushing or pulling. The amount of change is related to the force (defined as the strength of the push or pull) and the mass of the object(s) used. The force with which a ball is hit illustrates this principle. Cause and effect relationships, along with predicted consequences related to the strength of pushes and pulls (force) on an object’s position and motion should be</b></p> |

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|  |  | <p>explored and qualitatively compared.</p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Motion and Design</b><br/>TG: L03-13 (pp25-124)<br/>TG: L15 (pp139-144)<br/>TG: L17 (pp153-156)</p> |
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**Big Idea: Grade: The Earth and the Universe (Earth/Space Science) Grade: Fourth**

The Earth system is in a constant state of change. These changes affect life on earth in many ways. Development of conceptual understandings about processes that shape the Earth begin at the elementary level with understanding what Earth materials are and that change occurs. At the heart of elementary students' initial understanding of the Earth's place in the universe is direct observation of the Earth-sun-moon system. Students can derive important conceptual understandings about the system as they describe interactions resulting in shadows, moon phases, and day and night. The use of models and observance of patterns to explain common phenomena is essential to building a conceptual foundation and supporting ideas with evidence at all levels.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment  |
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| <p>SC-4-EU-U-1<br/>Students will understand that classifying Earth materials according to their properties allows decisions to be made about their usefulness for various purposes.</p> <p style="text-align: center;"><b>Land and Water</b><br/>TG: L05 (pp25-28)</p> | <p>SC-4-EU-S-1<br/>Students will use the properties of earth materials to make and support decisions about using them for different purposes (e.g., growing plants, building materials, fuel)</p> <p style="text-align: center;"><b>Land and Water</b><br/>TG: L15 (pp79-80)</p> | <p><b>SC-04-2.3.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• <b>classify earth materials by the ways that they are used;</b></li> <li>• <b>explain how their properties make them useful for different purposes.</b></li> </ul> <p><b>Earth materials provide many of the resources humans use. The varied materials have different physical properties that can be used to describe, separate, sort and classify them. Inferences about the unique properties of the earth materials yield ideas about their usefulness. For example, some are useful as building materials (e.g., stone, clay, marble), some as sources of fuel (e.g., petroleum, natural gas), or some for growing the plants we use as food.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p style="text-align: center;"><b>Land and Water</b><br/>TG: L05 (pp25-28)<br/>TG: L15 (pp79-80)</p> |

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| <p>SC-4-EU-U-2<br/>Students will understand that weather data can be organized and represented in ways that reveal patterns needed for making predictions about the future, but the weather is so complex that it cannot always be predicted beyond being more or less likely to occur.</p>  | <p>SC-4-EU-S-2<br/>Students will analyze weather data to make predictions about future weather</p> <p>SC-4-EU-S-3<br/>Students will assess the accuracy of weather predictions and the evidence used to support the predictions made by each other and meteorologists</p>  | <p><b>SC-04-2.3.3</b><br/><b>Students will make generalizations and/or predictions about weather changes from day to day and over seasons based on weather data.</b></p> <p><b>Weather changes from day to day and over seasons. Weather can be described by observations and measurable quantities such as temperature, wind direction, wind speed and precipitation. Data can be displayed and used to make predictions.</b></p> <p style="text-align: right;"><b>DOK 3</b></p>  |
| <p>SC-4-EU-U-3<br/>Students will understand that the surface of the Earth is always changing through both fast and slow processes. These changes may be steady, repetitive or irregular. Careful analysis of data from past events allows the prediction of expected consequences when similar events happen again.</p> <p style="text-align: center;"><b>Land and Water</b><br/>RB: (pp10-14)<br/>RB: (pp36-38)<br/>TG: L03-7 (pp29-84)<br/>TG: L09-15 (pp99-172)</p> | <p>SC-4-EU-S-4<br/>Students will describe and compare the processes, factors involved and consequences of slow changes to earth's surface (e.g., erosion and weathering)</p> <p style="text-align: center;"><b>Land and Water</b><br/>RB: (pp36-38)<br/>TG: L03-7 (pp29-84)<br/>TG: L09.Exts (p103)<br/>TG: L10-15 (pp109-172)</p> <p>SC-4-EU-S-5<br/>Students will describe and compare contributing factors and consequences of fast changes to earth's surface (e.g., landslides, earthquakes, floods)</p> <p style="text-align: center;"><b>Land and Water</b><br/>RB: (pp12-14)</p> | <p><b>SC-04-2.3.2</b><br/><b>Students will describe and explain consequences of changes to the surface of the Earth, including some common fast changes (e.g., landslides, volcanic eruptions, earthquakes), and some common slow changes (e.g., erosion, weathering).</b></p> <p><b>The surface of the Earth changes. Some changes are due to slow processes such as erosion or weathering. Some changes are due to rapid processes such as landslides, volcanic eruptions and earthquakes. Analyzing the changes to identify cause and effect relationships helps to define and understand the consequences.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p style="text-align: center;"><b>Land and Water</b><br/>RB: (pp10-14)<br/>RB: (pp36-38)<br/>TG: L03-16 (pp29-182)</p> |

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| <p>SC-4-EU-U-4<br/>Students will understand that a variety of models of the sun, earth, moon system are needed to explain the observed patterns of their relative motions, since people are not able to see from the outside how this system is constructed.</p> <p><b>Land and Water</b><br/>TG: L02-4 (pp11-50)<br/>TG: L09-11 (pp99-128)<br/>TG: L12.Exts (pp132-133)<br/>TG: L15.Exts (p167)<br/>TG: L16 (pp173-182)</p> <p><b>Hot Water and Warm Homes</b><br/>TG: Ses01-2 (pp7-16)<br/>TG: Ses04 (pp33-37)</p> <p>SC-4-EU-U-5<br/>Students will understand that a model of something can never be exactly like the real thing, but can be used to learn something about the real thing.</p> <p><b>Land and Water</b><br/>TG: L02 (pp11-50)<br/>TG: L09-11 (pp99-128)<br/>TG: L12.Exts (pp132-133)<br/>TG: L15.Exts (p167)<br/>TG: L16 (pp173-182)</p> <p><b>Hot Water and Warm Homes</b><br/>TG: Ses01-2 (pp7-16)<br/>TG: Ses04 (pp33-37)</p> | <p>SC-4-EU-S-6<br/>Students will explore, design and evaluate a number of models (e.g., physical, analogous, conceptual) of Earth-Sun and Earth-Sun-Moon systems for benefits, limitations and accuracy (e.g., scale, proportional relationships)</p> <p><b>Land and Water</b><br/>TG: L02-4 (pp11-50)<br/>TG: L09-11 (pp99-128)<br/>TG: L12.Exts (pp132-133)<br/>TG: L15.Exts (p167)<br/>TG: L16 (pp173-182)</p> <p><b>Hot Water and Warm Homes</b><br/>TG: Ses01-2 (pp7-16)<br/>TG: Ses04 (pp33-37)</p> <p>SC-4-EU-S-7<br/>Students will analyze and interpret information from a variety of sources (e.g., print based, models, video) to construct reasonable explanations from direct and indirect evidence</p> <p><b>Land and Water</b><br/>TG: L01 (pp3-10)<br/>TG: L05.Exts (p56)<br/>TG: L07.Exts (p79)<br/>TG: L17 (pp182-186)</p> <p><b>Hot Water and Warm Homes</b><br/>TG: Ses01-3 (pp7-31)<br/>TG: Ses05 (pp39-41)</p> | <p><b>SC-04-2.3.4</b><br/><b>Students will identify patterns, recognize relationships and draw conclusions about the Earth-Sun system by interpreting a variety of representations/models (e.g., diagrams, sundials, distance of sun above horizon) of the sun’s apparent movement in the sky.</b></p> <p><b>Changes in movement of objects in the sky have patterns that can be observed, described and modeled. The Sun appears to move across the sky in the same way every day, but the Sun’s apparent path changes slowly over seasons. Data collected can be used to identify patterns, recognize relationships and draw conclusions about the Earth and Sun system.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><i>SC-04-2.3.5</i><br/><i>Students will understand that the moon moves across the sky on a daily basis much like the Sun. The observable shape of the moon can be described as it changes from day to day in a cycle that lasts about a month.</i></p> |
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**Big Idea: Unity and Diversity (Biological Science) Grade: Fourth**

All matter is comprised of the same basic elements, goes through the same kinds of energy transformations, and uses the same kinds of forces to move. Living organisms are no exception. Elementary students begin to observe the macroscopic features of organisms in order to make comparisons and classifications based upon likenesses and differences. Looking for patterns in the appearance and behavior of an organism leads to the notion that offspring are much like the parents, but not exactly alike. Emphasis at every level should be placed upon the understanding that while every living thing is composed of similar small constituents that combine in predictable ways, it is the subtle variations within these small building blocks that account for both the likenesses and differences in form and function that create the diversity of life.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.

| <b>Program of Studies: Understandings</b>  | <b>Program of Studies: Skills and Concepts</b>  | <b>Related Core Content for Assessment</b>   |
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| <p>SC-4-UD-U-1<br/>Students will understand that things in the environment are classified as living, nonliving and once living.<br/><b>Animal Studies</b><br/>TG: L02 (pp11-20)</p> <p>SC-4-UD-U-2<br/>Students will understand that characteristics of living things can be used to sort them into various groups: the characteristics chosen to establish the grouping depend on the reason for the grouping.<br/><b>Animal Studies</b><br/>RB: (pp26-29)<br/>TG: L01-3 (pp3-36)<br/>TG: L17 (pp169-172)</p> | <p>SC-4-UD-S-1<br/>Students will compare the concepts of living, once living and nonliving<br/><b>Animal Studies</b><br/>TG: L02 (pp11-20)</p> <p>SC-4-UD-S-2<br/>Students will analyze the structures and related functions of a variety of plants and animals in order to establish classification schemes<br/><b>Animal Studies</b><br/>RB: (pp26-29)<br/>TG: L01-3 (pp3-36)<br/>TG: L17 (pp169-172)</p> | <p><i>SC-04-3.4.2</i><br/><i>Students will understand that things in the environment are classified as living, nonliving and once living. Living things differ from nonliving things. Organisms are classified into groups by using various characteristics (e.g., body coverings, body structures).</i><br/><b>Animal Studies</b><br/>TG: L02 (pp11-20)</p> |

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| <p>SC-4-UD-U-3<br/>Students will understand that organisms have different structures that are used for different functions. Observations of the structures of a certain organism can be used to predict how that organism functions or where it might live.</p> <p><b>Animal Studies</b><br/>RB: (pp06-08)<br/>RB: (pp16-19)<br/>TG: L03-6 (pp21-74)<br/>TG: L08 (pp87-96)<br/>TG: L13.Exts (p138)<br/>TG: L14-15 (pp143-164)<br/>TG: L16.Exts (p167)</p> <p><b>Land and Water</b><br/>TG: L14.Exts (p156)</p> <p><b>Motion and Design</b><br/>RB: (pp07-09)<br/>RB: (pp14-17)</p> | <p>SC-4-UD-S-2<br/>Students will analyze the structures and related functions of a variety of plants and animals in order to establish classification schemes</p> <p><b>Animal Studies</b><br/>RB: (pp26-29)<br/>TG: L01-3 (pp3-36)<br/>TG: L17 (pp169-172)</p> <p>SC-4-UD-S-5<br/>Students will answer student-generated questions about the diversity of living things using information from a variety of print and non-print sources</p> <p><b>Animal Studies</b><br/>RB: (pp06-08)<br/>RB: (pp35-37)<br/>RB: (pp45-49)<br/>TG: L01 (pp3-10)<br/>TG: L17 (pp169-172)</p> | <p><b>SC-04-3.4.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• compare the different structures and functions of plants and animals that contribute to the growth, survival and reproduction of the organisms;</li> <li>• make inferences about the relationship between structure and function in organisms.</li> </ul> <p><b>Each plant or animal has structures that serve different functions in growth, survival and reproduction. For example, humans have distinct body structures for walking, holding, seeing and talking. Evidence about the relationship between structure and function should be used to make inferences and draw conclusions.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Animal Studies</b><br/>RB: (pp06-08)<br/>RB: (pp16-19)<br/>TG: L03-6 (pp21-74)<br/>TG: L08 (pp87-96)<br/>TG: L13.Exts (p138)<br/>TG: L14-15 (pp143-164)<br/>TG: L16.Exts (p167)</p> <p><b>Land and Water</b><br/>TG: L14.Exts (p156)</p> <p><b>Motion and Design</b><br/>RB: (pp07-09)</p> |
| <p>SC-4-UD-U-4<br/>Students will understand that offspring resemble their parents because the parents have a reliable way to transfer information to the next generation.</p> <p><b>Animal Studies</b><br/>TG: L11.Exts (p119)<br/>TG: L13.Exts (p138)</p>   | <p>SC-4-UD-S-4<br/>Students will identify, observe and compare some characteristics of organisms that are passed from the parents (e.g., color of flower petals) and others that are learned from interactions with the environment (e.g., learning to ride a bike)</p> <p><b>Animal Studies</b></p>   | <p><b>SC-04-3.4.4</b><br/><b>Students will identify some characteristics of organisms that are inherited from the parents and others that are learned from interactions with the environment.</b></p> <p><b>Observations of plants and animals yield the conclusion that organisms closely</b></p>   |

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| <p>SC-4-UD-U-5<br/> Students will understand that some likenesses between parents and offspring are inherited (e.g. eye color) and some likenesses are learned (e.g. speech patterns in people).</p> <p><b>Animal Studies</b><br/> RB: (pp16-19)<br/> RB: (pp22-25)<br/> RB: (pp40-42)<br/> RB: (pp53-61)<br/> TG: L10.Exts (p110)<br/> TG: L11.Exts (p119)<br/> TG: L13.Exts (p138)</p> | <p>RB: (pp16-19)<br/> RB: (pp22-25)<br/> RB: (pp40-42)<br/> RB: (pp53-61)<br/> TG: L10.Exts (p110)<br/> TG: L11.Exts (p119)<br/> TG: L13.Exts (p138)</p> <p>SC-4-UD-S-5<br/> Students will answer student-generated questions about the diversity of living things using information from a variety of print and non-print sources</p> <p><b>Animal Studies</b><br/> RB: (pp06-08)<br/> RB: (pp35-37)<br/> RB: (pp45-49)<br/> TG: L01 (pp3-10)<br/> TG: L17 (pp169-172)</p> | <p>resemble their parents at some time in their life cycle. Some characteristics (e.g., the color of flowers, the number of appendages) are passed to offspring. Other characteristics are learned from interactions with the environment, such as the ability to ride a bicycle, and these cannot be passed on to the next generation. Data related to inherited versus learned characteristics can be used to draw conclusions about various groups of organisms.</p> <p style="text-align: right;"><b>DOK 2</b></p> |
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| <p>SC-4-UD-U-6<br/>Students will understand that all living things are produced from other living things. They grow and then eventually die. Before they die most living things create offspring, allowing their kind to continue.</p> <p><b>Animal Studies</b><br/>RB: (pp06-08)<br/>RB: (pp12-15)<br/>RB: (pp35-39)<br/>TG: L04.Exts (pp41-42)<br/>TG: L07.Exts (pp79-80)<br/>TG: L09.Exts (pp101-102)</p> | <p>SC-4-UD-S-3<br/>Students will investigate and compare life cycles, especially reproductive characteristics (e.g., gestational periods, germination rates, number of offspring) and life expectancies of plants and animals to make inferences and/or draw conclusions about their populations</p> <p><b>Animal Studies</b><br/>RB: (pp12-15)<br/>RB: (pp40-42)</p> <p>SC-4-UD-S-5<br/>Students will answer student-generated questions about the diversity of living things using information from a variety of print and non-print sources</p> <p><b>Animal Studies</b><br/>RB: (pp06-08)<br/>RB: (pp35-37)<br/>RB: (pp45-49)<br/>TG: L01 (pp3-10)<br/>TG: L17 (pp169-172)</p> | <p><b>SC-04-3.4.3</b><br/><b>Students will compare a variety of life cycles of plants and animals in order to classify and make inferences about an organism.</b></p> <p><b>Plants and animals have life cycles that include the beginning of life, growth and development, reproduction and death. The details of a life cycle are different for different organisms. Models of organisms' life cycles should be used to classify and make inferences about an organism.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Animal Studies</b><br/>RB: (pp06-08)<br/>RB: (pp12-15)<br/>RB: (pp35-39)<br/>TG: L04.Exts (pp41-42)<br/>TG: L07.Exts (pp79-80)<br/>TG: L09.Exts (pp101-102)</p> |
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**Big Idea: Biological Change (Biological Science) Grade: Fourth**

The only thing certain is that everything changes. Elementary students build a foundational knowledge of change by observing slow and fast changes caused by nature in their own environment, noting changes that humans and other organisms cause in their environment, and observing fossils found in or near their environment.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.6 Students understand how living and nonliving things change over time and the factors that influence the changes.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment   |
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| <p>SC-4-BC-U-1<br/>Students will understand that the structures and characteristics of fossils provide information about the nature of an organism, the environmental conditions where/when it lived and how it is related to organisms still alive today.</p> | <p>SC-4-BC-S-1<br/>Students will examine fossils and representations of fossils to make comparisons among organisms that lived long ago and organisms of today and draw conclusions about the nature of the organisms and basic environments represented by fossils</p> <p>SC-4-BC-S-2<br/>Students will describe reasons why some differences in organisms give individuals an advantage in surviving and reproducing<br/><b>Animal Studies</b><br/>RB: (pp45-49)</p> <p>SC-4-BC-S-3<br/>Students will answer student-generated questions about how/why organisms and the environment have changed over time using information from a variety of print and non-print sources to support claims/provide evidence for conclusions</p> | <p><b>SC-04-3.5.1</b><br/><b>Students will use representations of fossils to:</b></p> <ul style="list-style-type: none"><li>● draw conclusions about the nature of the organisms and the basic environments that existed at the time;</li><li>● make inferences about the relationships to organisms that are alive today.</li></ul> <p><b>Fossils found in Earth materials provide evidence about organisms that lived long ago and the nature of the environment at that time. Representations of fossils provide the basis for describing and drawing conclusions about the organisms and basic environments represented by them.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |

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| <p>SC-4-BC-U-2<br/>Students will understand that scientists ask many questions about the world around them, but not all of their questions can be investigated in a scientific way. Part of the job of a scientist is to focus only on questions that can be scientifically tested.</p> <p><b>Animal Studies</b><br/>TG: L01.Exts (p6)</p> <p>SC-4-BC-U-3<br/>Students will understand that scientists pay more attention to claims when they are supported with evidence that can be confirmed through scientific investigation.</p> | <p>SC-4-BC-S-4<br/>Students will analyze claims and information based on the credibility of the source and ability to confirm with multiple sources</p> |  |
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**Big Idea: Energy Transformations (Unifying Concepts) Grade: Fourth**

Energy transformations are inherent in almost every system in the universe—from tangible examples at the elementary level, such as heat production in simple earth and physical systems to more abstract ideas beginning at middle school, such as those transformations involved in the growth, dying and decay of living systems. The use of models to illustrate the often invisible and abstract notions of energy transfer will aid in conceptualization, especially as students move from the macroscopic level of observation and evidence (primarily elementary school) to the microscopic interactions at the atomic level (middle and high school levels).

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| <b>Program of Studies: Understandings</b>  | <b>Program of Studies: Skills and Concepts</b>  | <b>Related Core Content for Assessment</b>  |
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| <p>SC-4-ET-U-1<br/>Students will understand that ecosystems are defined by the relationships that occur within them. These relationships can be determined through observation of the organisms and their environment.</p> <p><b>Animal Studies</b><br/>RB: (pp06-08)<br/>TG: L01-17 (pp3-172)</p> | <p>SC-4-ET-S-1<br/>Students will observe/construct, analyze patterns and explain basic relationships of plants and animals in an ecosystem (e.g., food webs)</p> <p><b>Animal Studies</b><br/>RB: (pp06-11)<br/>RB: (pp16-19)<br/>TG: L01-17 (pp3-172)</p> <p>SC-4-ET-S-2<br/>Students will analyze food webs in order to draw conclusions about the relationship between the sun’s heat and light and sustaining most life on Earth</p> <p><b>Animal Studies</b><br/>RB: (pp09-11)</p> | <p><b>SC-04-4.6.1</b><br/><b>Students will analyze patterns and make generalizations about the basic relationships of plants and animals in an ecosystem (food chain).</b></p> <p><b>Plants make their own food. All animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants. Basic relationships and connections between organisms in food chains, including the flow of energy, can be used to discover patterns within ecosystems.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Animal Studies</b><br/>RB: (pp09-11)</p> |

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| <p>SC-4-ET-U-2<br/>Students will understand that light and heat from the sun are essential to sustaining most life on earth. Plants change energy from the sun's light into energy that is used as food by the plant.</p>  | <p>SC-4-ET-S-2<br/>Students will analyze food webs in order to draw conclusions about the relationship between the sun's heat and light and sustaining most life on Earth<br/><b>Animal Studies</b><br/>RB: (pp09-11)</p>  | <p><b>SC-04-4.6.2</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• <b>analyze data/evidence of the Sun providing light and heat to earth;</b></li> <li>• <b>use data/evidence to substantiate the conclusion that the Sun's light and heat are necessary to sustaining life on Earth.</b></li> </ul> <p><b>Simple observations, experiments and data collection begin to reveal that the Sun provides the light and heat necessary to maintain the temperature of Earth. Evidence collected and analyzed should be used to substantiate the conclusion that the sun's light and heat are necessary to sustain life on Earth.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p style="text-align: center;"><b>Hot Water and Warm Homes</b><br/>TG: Ses03-4 (pp19-37)</p> |
| <p>SC-4-ET-U-3<br/>Students will understand that electrical energy can be used for a variety of purposes. Many electrical systems share some common features, including a source of energy, a closed conducting path and a device that performs a function by utilizing that energy.</p> | <p>SC-4-ET-S-3<br/>Students will demonstrate open and closed circuits, and series and parallel circuits using batteries, bulbs and wires; analyze models of a variety of electrical circuits in order to predict changes to the systems</p> <p>SC-4-ET-S-6<br/>Students will design and conduct investigations/experiments to compare properties of conducting and non-conducting materials (both heat and electrical), documenting and communicating (speak, draw, write, demonstrate) observations, designs, procedures and results of scientific investigations</p> | <p><b>SC-04-4.6.3</b><br/><b>Students will evaluate a variety of models/representations of electrical circuits (open, closed, series and/or parallel) to:</b></p> <ul style="list-style-type: none"> <li>• <b>make predictions related to changes in the system;</b></li> <li>• <b>compare the properties of conducting and non-conducting materials.</b></li> </ul> <p><b>Electricity in circuits can produce light, heat and sound. Electrical circuits require a complete conducting path through which an electrical current can pass. Analysis of a variety of circuit models creates an opportunity to make predictions about circuits, as well as to demonstrate an</b></p>   |

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|  | <p>SC-4-ET-S-9<br/>Students will answer student-generated questions about forms of energy (e.g., heat, light, sound, magnetic effects) using information from a variety of print and non-print sources</p>  | <p>understanding of the concepts of open and closed circuits and basic conducting and non-conducting materials. <span style="float: right;">DOK 3</span></p>  |
| <p>SC-4-ET-U-4<br/>Students will understand that light interacts with different kinds of matter in different ways and those interactions can be predicted based on the type of matter involved.</p>  | <p>SC-4-ET-S-7<br/>Students will represent the path of light as it interacts with a variety of surfaces (reflecting, refracting, absorbing)</p> <p>SC-4-ET-S-8<br/>Students will make predictions/inferences about the behavior of light as it interacts with materials of differing properties</p> <p>SC-4-ET-S-9<br/>Students will answer student-generated questions about forms of energy (e.g., heat, light, sound, magnetic effects) using information from a variety of print and non-print sources</p> <p style="text-align: center;"><b>Motion and Design</b><br/>TG: L06 (pp57-64)<br/>TG: L11-12 (pp101-116)</p> | <p><b>SC-04-4.6.4</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• analyze models/representations of light in order to generalize about the behavior of light.</li> <li>• represent the path of light as it interacts with a variety of surfaces (reflecting, refracting, absorbing).</li> </ul> <p>Light can be observed as traveling in a straight line until it strikes an object. Light can be reflected by a shiny object (e.g., mirror, spoon), refracted by a lens (e.g., magnifying glass, eyeglasses) or absorbed by an object (e.g., dark surface). Questions posed about the behavior and interaction of light with a variety of surfaces, can be explored through investigations using simple equipment. <span style="float: right;">DOK 3</span></p> |
| <p>SC-4-ET-U-5<br/>Students will understand that heat is a form of energy that results when another form of energy is transformed. Heat flows through different materials at different rates, and it naturally flows from warmer areas to cooler ones.</p> | <p>SC-4-ET-S-4<br/>Students will identify events/situations that result in some energy being transformed into heat (e.g., rubbing hands together, lighting a bulb, running a car engine)</p> <p style="text-align: center;"><b>Motion and Design</b><br/>RB: (pp23-28)<br/>TG: L06-8 (pp57-80)<br/>TG: L10-13 (pp91-124)<br/>TG: L15 (pp139-144)</p>  | <p><b>SC-04-4.6.5</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• identify ways that heat can be produced (e.g. burning, rubbing) and properties of materials that conduct heat better than others;</li> <li>• describe the movement of heat between objects.</li> </ul> <p>Heat can be produced in many ways such as burning or rubbing. Heat moves from a</p>  |

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|  | <p>SC-4-ET-S-5<br/>Students will identify and compare how heat is transferred through different materials in order to make predictions and draw conclusions about the heat conductivity of materials (e.g., compare the 'hotness' of wooden spoons, metal spoons, plastic spoons when exposed to higher temperatures)</p> <p>SC-4-ET-S-6<br/>Students will design and conduct investigations/experiments to compare properties of conducting and non-conducting materials (both heat and electrical), documenting and communicating (speak, draw, write, demonstrate) observations, designs, procedures and results of scientific investigations</p> <p>SC-4-ET-S-9<br/>Students will answer student-generated questions about forms of energy (e.g., heat, light, sound, magnetic effects) using information from a variety of print and non-print sources</p> | <p><b>warmer object to a cooler one by contact (conduction) or at a distance. Some materials absorb and conduct heat better than others. Simple investigations can illustrate that metal objects conduct heat better than wooden objects.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p style="text-align: center;"><b>Hot Water and Warm Homes</b><br/>TG: Ses04 (pp33-37)</p>   |
| <p>SC-4-ET-U-6<br/>Students will understand that seeing how a model works after changes are made to it may suggest how the real thing would work if the same thing were done to it.</p> <p><b>Land and Water</b><br/>TG: L02-4 (pp11-50)<br/>TG: L09 (pp99-108)<br/>TG: L10 (pp109-118)<br/>TG: L12 (pp129-142)<br/><b>Hot Water and Warm Homes</b><br/>TG: Ses01 (pp7-11)</p> | <p>SC-4-ET-S-1<br/>Students will observe/construct, analyze patterns and explain basic relationships of plants and animals in an ecosystem (e.g., food webs)</p> <p>SC-4-ET-S-2<br/>Students will analyze food webs in order to draw conclusions about the relationship between the sun's heat and light and sustaining most life on Earth</p> <p>SC-4-ET-S-3<br/>Students will demonstrate open and closed circuits, and series and parallel circuits using batteries, bulbs and wires; analyze models of a</p>  | <p><b>SC-04-4.6.3</b><br/><b>Students will evaluate a variety of models/representations of electrical circuits (open, closed, series and/or parallel) to:</b></p> <ul style="list-style-type: none"> <li>● <b>make predictions related to changes in the system;</b></li> <li>● <b>compare the properties of conducting and non-conducting materials.</b></li> </ul> <p><b>Electricity in circuits can produce light, heat and sound. Electrical circuits require a complete conducting path through which an electrical current can pass. Analysis of a variety of circuit models creates an opportunity to make predictions about</b></p> |

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|  | <p>variety of electrical circuits in order to predict changes to the systems</p> <p>SC-4-ET-S-7<br/>Students will represent the path of light as it interacts with a variety of surfaces (reflecting, refracting, absorbing)</p> | <p><b>circuits, as well as to demonstrate an understanding of the concepts of open and closed circuits and basic conducting and non-conducting materials.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>SC-04-4.6.4</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• analyze models/representations of light in order to generalize about the behavior of light.</li> <li>• represent the path of light as it interacts with a variety of surfaces (reflecting, refracting, absorbing).</li> </ul> <p><b>Light can be observed as traveling in a straight line until it strikes an object. Light can be reflected by a shiny object (e.g., mirror, spoon), refracted by a lens (e.g., magnifying glass, eyeglasses) or absorbed by an object (e.g., dark surface). Questions posed about the behavior and interaction of light with a variety of surfaces, can be explored through investigations using simple equipment.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |
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**Big Idea: Interdependence (Unifying Concepts) Grade: Fourth**

It is not difficult for students to grasp the general notion that species depend on one another and on the environment for survival. But their awareness must be supported by knowledge of the kinds of relationships that exist among organisms, the kinds of physical conditions that organisms must cope with, the kinds of environments created by the interaction of organisms with one another and their physical surroundings, and the complexity of such systems. Elementary learners need to become acquainted with ecosystems that are easily observable to them by beginning to study the habitats of many types of local organisms. Students begin to investigate the survival needs of different organisms and how the environment affects optimum conditions for survival.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts  | Related Core Content for Assessment  |
|---|--|--|
| <p>SC-4-I-U-1<br/>Students will understand that all living things depend on their environment and other organisms within it for their survival. Certain patterns of behavior or physical features may help an organism survive in some environments yet perish in others.<br/><b>Animal Studies</b><br/>RB: (pp45-49)</p> <p>SC-4-I-U-2<br/>Students will understand that environmental relationships extend beyond food (e.g. shelter, seed transport).<br/><b>Animal Studies</b><br/>TG: L01-17 (pp3-172)</p> | <p>SC-4-I-S-1<br/>Students will observe, document and explain the cause and effect relationships existing between organisms and their environments<br/><b>Animal Studies</b><br/>TG: L01-17 (pp3-172)</p> <p>SC-4-I-S-2<br/>Students will use evidence and observations to make predictions/draw conclusions about how changes in the environment affect the plants' and animals' ability to survive<br/><b>Animal Studies</b><br/>RB: (pp06-11)<br/>RB: (pp16-19)<br/>RB: (pp30-32)<br/>RB: (pp40-42)<br/>RB: (pp45-49)<br/>TG: L11.Exts (p119)<br/>TG: L13.Exts (p138)<br/>TG: L14.Exts (p145)<br/>TG: L16.Exts (p167)</p> | <p><b>SC-04-4.7.1</b><br/><b>Students will make predictions and/or inferences based on patterns of evidence related to the survival and reproductive success of organisms in particular environments.</b></p> <p><b>The world has many different environments. Distinct environments support the lives of different types of organisms. When the environment changes some plants and animals survive and reproduce and others die or move to new locations. Examples of environmental changes resulting in either increase or decrease in numbers of a particular organism should be explored in order to discover patterns and resulting cause and effect relationships between organisms and their environments (e.g., structures and behaviors that make an organism suited to a particular environment).</b></p> |

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|  | <p><b>Motion and Design</b><br/>RB: (pp14-17)</p> <p>SC-4-I-S-6<br/>Students will use evidence (obtained through investigative and/or non investigative research) to support or defend positions on real world environmental problems</p>   | <p><b>Connections and conclusions should be made based on the data.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Animal Studies</b><br/>RB: (pp06-11)<br/>RB: (pp16-19)<br/>RB: (pp30-32)<br/>RB: (pp40-42)<br/>RB: (pp45-49)<br/>TG: L11.Exts (p119)<br/>TG: L13.Exts (p138)<br/>TG: L14.Exts (p145)<br/>TG: L16.Exts (p167)</p> <p><b>Motion and Design</b><br/>RB: (pp14-17)</p>   |
| <p>SC-4-I-U-3<br/>Students will understand that people impact their environment in both beneficial and harmful ways. Some of these impacts can be predicted, while others cannot.</p> <p><b>Animal Studies</b><br/>RB: (pp09-11)<br/>TG: L03.Exts (p32)</p> <p><b>Land and Water</b><br/>TG: L14 (pp153-162)</p> <p>SC-4-I-U-4<br/>Students will understand that beneficial and harmful are relative terms: any single action can be both beneficial and harmful to different organisms in an ecosystem.</p> <p><b>Animal Studies</b><br/>RB: (pp09-11)<br/>RB: (pp40-42)<br/>TG: L01-17 (pp3-172)</p> | <p>SC-4-I-S-3<br/>Students will observe, document and describe human interactions that impact the local environment</p> <p><b>Animal Studies</b><br/>RB: (pp09-11)<br/>RB: (pp40-42)</p> <p><b>Land and Water</b><br/>TG: L14 (pp153-162)</p> <p>SC-4-I-S-4<br/>Students will describe and provide examples of how beneficial and harmful are relative terms</p> <p><b>Animal Studies</b><br/>RB: (pp09-11)<br/>RB: (pp40-42)</p> <p>SC-4-I-S-5<br/>Students will evaluate the consequences of changes caused by humans or other organisms, and propose solutions to real life situations/dilemmas</p> <p>SC-4-I-S-6<br/>Students will use evidence (obtained through</p> | <p><b>SC-04-4.7.2</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• describe human interactions in the environment where they live;</li> <li>• classify the interactions as beneficial or harmful to the environment using data/evidence to support conclusions.</li> </ul> <p><b>All organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms; other changes are beneficial (e.g., dams benefit some aquatic organisms but are detrimental to others). By evaluating the consequences of change using cause and effect relationships, solutions to real life situations/dilemmas can be proposed.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Animal Studies</b><br/>RB: (pp09-11)<br/><b>Land and Water</b><br/>TG: L14 (pp153-162)</p> |

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|  | investigative and/or non investigative research) to support or defend positions on real world environmental problems |  |
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# Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

## Grade 5



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## Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

| Grade Range           | <i>STC PROGRAM™ and GEMS® Units</i>  |
|-----------------------|--|
| K-3                   | <ul style="list-style-type: none"> <li>• <b>Changes</b></li> <li>• <b>Electric Circuits</b></li> <li>• <b>The Life Cycle of Butterflies</b></li> <li>• <b>Organisms</b></li> <li>• <b>Rocks and Minerals</b></li> <li>• <b>Solids and Liquids</b></li> <li>• <b>Sound</b></li> <li>• <b>Weather</b></li> <li>• <b>GEMS: Space Science</b></li> </ul> |
| 4 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Animal Studies</b></li> <li>• <b>Motion and Design</b></li> <li>• <b>Land and Water</b></li> <li>• <b>GEMS: Hot Water and Warm Homes</b></li> </ul>  |
| 5 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Ecosystems</b></li> <li>• <b>Experiments with Plants</b></li> <li>• <b>GEMS: Messages From Space</b></li> </ul>  |
| 6 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Organisms–From Macro to Micro</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 7 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 8 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Light</b></li> <li>• <b>Organisms–From Macro to Micro</b></li> </ul>   |

The STC PROGRAM™ and GEMS® Units are recommended based on the Kentucky Program of Studies and the Core Contents for Assessment. Provided for each grade level, are the units that most strongly align with the content objectives. Other STC PROGRAM™ Units may also match objectives within each grade level. For more information about any STC PROGRAM™ unit or GEMS® unit, visit [www.carolinacurriculum.com](http://www.carolinacurriculum.com).

GEMS® Space Science is research-based 3-5 science curriculum that teach fundamental concepts in space science.

### Legend

To save paper, the curriculum location information in this document has been abbreviated as follows:

- Unit abbreviations = noted in parentheses in the chart above
- TG = Teacher's Guide
- S-Sec3 = Section 3 (containing a section on safety) in the STC® Teacher's Guide
- L01, L02, etc. = Lesson 1, Lesson 2, etc.
- Les01 = Lesson 1
- Act01=Activity 1
- p, pp = page, pages
- RB = STC BOOK™ (a science reading book included in some of the grades 3–5 STC® unit kits)
- SB = Student Book
- Exts = Extensions (found at the end of most lessons in the Teacher's Guide)
- App-A, App-B = Appendix A, Appendix B (found at the end of Section 4 in the Teacher's Guide)

**Big Idea: Structure and Transformation of Matter (Physical Science) Grade: Fifth**

A basic understanding of matter is essential to the conceptual development of other big ideas in science. In the elementary years of conceptual development, students will be studying properties of matter and physical changes of matter at the macro level through direct observations, forming the foundation for subsequent learning. The use of models (and an understanding of their scales and limitations) is an effective means of learning about the structure of matter. Looking for patterns in properties is also critical to comparing and explaining differences in matter.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts   | Related Core Content for Assessment   |
|--|---|---|
| <p>SC-5-STM-U-1<br/>Students will understand that a substance has its own set of properties which allows it to be distinguished from other substances.</p> <p><b>Ecosystems</b><br/>TG: L10.Exts (p103)</p> <p>SC-5-STM-U-2<br/>Students will understand that the physical properties of a substance do not change regardless of how much or how little of the substance there is.</p> <p>SC-5-STM-U-3<br/>Students will understand that many kinds of changes in the properties of substances occur faster when the temperature is higher.</p> <p>SC-5-STM-U-4<br/>Students will understand that when individual substances are combined, the total weight is equal to the sum of the individual weights.</p> | <p>SC-5-STM-S-1<br/>Students will use appropriate tools (e.g., balance, thermometer, graduated cylinder) and observations to describe physical properties of substances (e.g., boiling point, solubility, density) and to classify materials</p> <p><b>Experiment With Plants</b><br/>TG: L12 (pp91-100)</p> <p>SC-5-STM-S-2<br/>Students will work individually and with others to design and conduct fair tests to safely investigate properties of matter, such as boiling point, density, and solubility</p> <p><b>Microworlds</b><br/>TG: Sec4.L01.Exts (p6)</p> <p>SC-5-STM-S-4<br/>Students will utilize student-generated questions about the properties of matter to drive inquiry-based learning experiences</p> <p><b>Ecosystems</b><br/>TG: L10.Exts (p103)</p> | <p><b>SC-05-1.1.1</b><br/><b>Students will describe the physical properties of substances (e.g., boiling point, solubility, density).</b></p> <p><b>A substance has characteristic physical properties (e.g., boiling point, solubility) that are independent of the amount of the sample.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> |

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| <p>SC-5-STM-U-5<br/>Students will understand that results of investigations are seldom exactly the same, but if the results vary widely, then it is necessary to figure out why they differ.</p> | <p>SC-5-STM-S-3<br/>Students will keep accurate records of investigations (procedures, data) in order to support or dispute conclusions</p> |  |
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**Big Idea: Motion and Forces (Physical Science) Grade: Fifth**

Whether observing airplanes, baseballs, planets, or people, the motion of all bodies is governed by the same basic rules. In the elementary years of conceptual development, students need multiple opportunities to experience, observe, and describe (in words and pictures) motion, including factors (pushing and pulling) that affect motion.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment  |
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| <p>SC-5-MF-U-1<br/>Students will understand that predictions and/or inferences about the direction or speed of an object can be made by interpreting graphs, charts or descriptions of the objects motion.</p>   | <p>SC-5-MF-S-2<br/>Students will create and interpret graphical representations in order to make inferences and draw conclusions about the motion of an object.</p>  | <p><b>SC-05-1.2.1</b><br/><b>Students will interpret data in order to make qualitative (e.g., fast, slow, forward, backward) and quantitative descriptions and predictions about the straight-line motion of an object.</b></p> <p><b>The motion of an object can be described by its relative position, direction of motion, and speed. That motion can be measured and represented on a graph.</b></p> <p style="text-align: right;">DOK 3</p> |
| <p>SC-5-MF-U-2<br/>Students will understand that the more mass an object has, the less effect a given force will have.</p> <p>SC-5-MF-U-3<br/>Students will understand that forces are pushes and pulls that may be invisible (e.g., gravity, magnetism) or visible (e.g., friction, collisions).</p> <p>SC-5-MF-U-4<br/>Students will understand that some comparisons may not be 'fair' because some</p> | <p>SC-5-MF-S-1<br/>Students will use observations and appropriate tools (e.g., timer, meter stick, balance, spring scale) to explore the relationship between force and mass</p> <p>SC-5-MF-S-3<br/>Students will design and conduct experiments to examine the effects of variables on the straight line motion of objects. Analyze, review, and critique each other's experiments</p> <p>SC-5-MF-S-4<br/>Students will predict, and support with</p> | <p>SC-05-1.2.2<br/><i>Students should understand that forces are pushes and pulls, and that these pushes and pulls may be invisible (e.g., gravity, magnetism) or visible (e.g., friction, collisions).</i></p>  |

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| conditions (e.g. mass, force, speed, friction) might not be the same. | evidence/justification, changes in the motion of an object related to its mass or the amount of force acting on it |  |
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**Big Idea: Grade: The Earth and the Universe (Earth/Space Science) Grade: Fifth**

The Earth system is in a constant state of change. These changes affect life on earth in many ways. Development of conceptual understandings about processes that shape the Earth begin at the elementary level with understanding what Earth materials are and that change occurs. At the heart of elementary students' initial understanding of the Earth's place in the universe is direct observation of the Earth-sun-moon system. Students can derive important conceptual understandings about the system as they describe interactions resulting in shadows, moon phases, and day and night. The use of models and observance of patterns to explain common phenomena is essential to building a conceptual foundation and supporting ideas with evidence at all levels.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts  | Related Core Content for Assessment  |
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| <p>SC-5-EU-U-1<br/>Students will understand that the earth's water supply has existed since the formation of the planet and is constantly cycled from the ocean to the atmosphere, allowing the same water to be endlessly reused without the creation of new water.</p> <p>SC-5-EU-U-2<br/>Students will understand that water is a powerful solvent that dissolves earth materials, allowing them to impact the ocean system as water is cycled into it.</p> <p><b>Ecosystems</b><br/>TG: L11.Exts (p114)</p> | <p>SC-5-EU-S-1<br/>Students will investigate how water can change forms yet still be conserved in the water cycle</p> <p>SC-5-EU-S-2<br/>Students will create/analyze/explain representations that illustrate the circulation of water (evaporation and condensation) from the surface of the Earth, through the crust, oceans, and atmosphere (water cycle)</p> <p>SC-5-EU-S-4<br/>Students will explore the concept of watersheds and identify factors that impact them, including results of interactions of water with earth materials (e.g., dissolving minerals, moving minerals and gases)<br/><b>Experiment With Plants</b><br/>RB: (pp20-21)</p> <p>SC-5-EU-S-8<br/>Students will explain why scale models are important tools for understanding a number of phenomena (e.g., solar system, watersheds,</p> | <p><b>SC-05-2.3.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>● describe the circulation of water (evaporation and condensation) from the surface of the Earth, through the crust, oceans, and atmosphere (water cycle);</li> <li>● explain how matter is conserved in this cycle.</li> </ul> <p><b>Water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the water cycle.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>SC-05-2.3.2</b><br/><b>Students will explain interactions of water with Earth materials and results of those interactions (e.g., dissolving minerals, moving minerals and gases).</b></p> <p><b>Water dissolves minerals and gases and may carry them to the oceans.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |

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|   | <p>earth's atmosphere) but are not always easy to construct or require trade-offs in other aspects of the model (e.g. distance vs. size)</p>  | <p><b>Experiments with Plants</b><br/>RB: (pp20-21)</p>   |
| <p>SC-5-EU-U-3<br/>Students will understand that the earth is surrounded by a blanket of air called the atmosphere that is essential to life because of some of the gasses it contains.</p> <p>SC-5-EU-U-4<br/>Students will understand that air is free to move from place to place all across the planet and this movement causes global weather patterns. Observing air movements helps scientists explain both global and local weather patterns.</p> | <p>SC-5-EU-S-3<br/>Students will compare weather and climate and the describe factors that influence each<br/><b>Ecosystems</b><br/>RB: (pp26-27)</p> <p>SC-5-EU-S-5<br/>Students will describe the makeup of the Earth's atmosphere and analyze atmospheric data to explain real life phenomena (e.g., pressurized cabins in airplanes, mountain-climber's need for oxygen)</p> <p>SC-5-EU-S-8<br/>Students will explain why scale models are important tools for understanding a number of phenomena (e.g., solar system, watersheds, earth's atmosphere) but are not always easy to construct or require trade-offs in other aspects of the model (e.g. distance vs. size)<br/><b>GEMS: Messages From Space</b><br/>TG: Act03 (pp46-87)<br/>TG: Act05 (pp96-123)</p> | <p><b>SC-05-2.3.3</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• describe Earth's atmosphere as a relatively thin blanket of air consisting of a mixture of nitrogen, oxygen, and trace gases, including water vapor;</li> <li>• analyze atmospheric data in order to draw conclusions about real life phenomena related to atmospheric changes and conditions.</li> </ul> <p><b>Earth is surrounded by a relatively thin blanket of air called the atmosphere. The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations. Conclusions based on the interpretation of atmospheric data can be used to explain real life phenomena (e.g., pressurized cabins in airplanes, mountain-climber's need for oxygen).</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>SC-05-2.3.4</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• analyze global patterns of atmospheric movement;</li> <li>• explain the basic relationships of patterns of atmospheric movement to local weather.</li> </ul> <p><b>Global patterns of atmospheric movement can be observed and/or analyzed by interpreting patterns within data. Atmospheric movements influence local weather. Oceans have a major effect on</b></p> |

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|  |   | <p>climate, because water in the oceans holds a large amount of heat. Related data can be used to predict change in weather and climate.</p> <p style="text-align: right;"><b>DOK 3</b></p>  |
| <p>SC-5-EU-U-5<br/>Students will understand that observations, models and diagrams of the solar system illustrate the position and relationship of the earth, sun, and moon within the larger system of planets and other celestial bodies. Even though they are all parts of the same system, a comparison of their properties reveals great differences among celestial bodies.</p> <p><b>GEMS: Messages From Space</b><br/>TG: Act02 (pp27-45)<br/>TG: Act03 (pp46-87)<br/>TG: Act05 (pp96-123)</p> <p>SC-5-EU-U-6<br/>Students will understand that technology extends the ability of people to understand the universe. Most tools of today are different than those of the past, but may also be modifications of much older tools.</p> <p><b>GEMS: Messages From Space</b><br/>TG: Act01 (pp6-25)</p> | <p>SC-5-EU-S-6<br/>Students will use a variety of models and graphic representations to obtain and organize data in order to compare the major components of our solar system</p> <p><b>GEMS: Messages From Space</b><br/>TG: Act02 (pp27-45)<br/>TG: Act03 (pp46-87)<br/>TG: Act05 (pp96-123)</p> <p>SC-5-EU-S-7<br/>Students will explore the development of and types of technology useful for learning about the atmosphere and our solar system</p> <p><b>GEMS: Messages From Space</b><br/>TG: Act01 (pp6-25)</p> <p>SC-5-EU-S-8<br/>Students will explain why scale models are important tools for understanding a number of phenomena (e.g., solar system, watersheds, earth's atmosphere) but are not always easy to construct or require trade-offs in other aspects of the model (e.g. distance vs. size)</p> <p><b>GEMS: Messages From Space</b><br/>TG: Act03 (pp46-87)<br/>TG: Act05 (pp96-123)</p> | <p><b>SC-05-2.3.5</b><br/><b>Students will compare components of our solar system, including using models/representations that illustrate the system and resulting interactions.</b></p> <p><b>Earth is the third planet from the Sun in a system that includes the moon, the Sun, eight other planets and their moons, and smaller objects. The Sun, an average star, is the central and largest body in the solar system. Models/diagrams provide understanding of scale within the solar system.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> |

**Big Idea: Unity and Diversity (Biological Science) Grade: Fifth**

All matter is comprised of the same basic elements, goes through the same kinds of energy transformations, and uses the same kinds of forces to move. Living organisms are no exception. Elementary students begin to observe the macroscopic features of organisms in order to make comparisons and classifications based upon likenesses and differences. Looking for patterns in the appearance and behavior of an organism leads to the notion that offspring are much like the parents, but not exactly alike. Emphasis at every level should be placed upon the understanding that while every living thing is composed of similar small constituents that combine in predictable ways, it is the subtle variations within these small building blocks that account for both the likenesses and differences in form and function that create the diversity of life.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts   | Related Core Content for Assessment  |
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| <p>SC-5-UD-U-1<br/>Students will understand that animals and plants have a great variety of body plans and internal structures that contribute to their being able to meet their needs.</p> <p><b>Experiment With Plants</b><br/>RB: (pp07-13)<br/>RB: (pp26-33)<br/>TG: L01-L2 (pp9-30)<br/>TG: L05-7 (pp51-70)<br/>TG: L09 (pp75-80)<br/>TG: L12-14 (pp91-114)<br/>TG: L15.Exts (p117)<br/>TG: L16 (pp123-128)<br/>RB: (pp54-61)<br/><b>Microworlds</b><br/>RB: (pp31-33)<br/>RB: (pp37-43)<br/>RB: (pp46-47)<br/>RB: (pp58-61)<br/>TG: L13.Exts (p74)</p> | <p>SC-5-UD-S-1<br/>Students will use observations and models to describe and compare internal and external structures of plants and animals and their corresponding functions</p> <p><b>Experiment With Plants</b><br/>RB: (pp07-13)<br/>RB: (pp26-33)<br/>TG: L01-L2 (pp9-30)<br/>TG: L05-7 (pp51-70)<br/>TG: L09 (pp75-80)<br/>TG: L12-14 (pp91-114)<br/>TG: L15.Exts (p117)<br/>TG: L16 (pp123-128)<br/><b>Microworlds</b><br/>RB: (pp31-33)<br/>RB: (pp40-43)<br/>RB: (pp58-61)</p> | <p><b>SC-05-3.4.1</b><br/><b>Students will describe and compare living systems to understand the complementary nature of structure and function.</b></p> <p><b>Observations and comparisons of living systems at all levels of organization illustrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, tissues, organs, organ systems, organisms (e.g., bacteria, protists, fungi, plants, animals), and ecosystems. Examining the relationship between structure and function provides a basis for comparisons and classification schemes.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Experiments with Plants</b><br/>RB: (pp07-13)<br/>RB: (pp30-33)<br/>TG: L01-2 (pp9-30)<br/>TG: L05-7 (pp51-70)<br/>TG: L09 (pp75-80)<br/>TG: L12-16 (pp91-128)</p> |

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|  |  | <p><b>Microworlds</b><br/> RB: (pp31-33)<br/> RB: (pp37-43)<br/> RB: (pp46-47)<br/> RB: (pp58-61)<br/> TG: L11-16 (pp61-86)</p>  |
| <p>SC-5-UD-U-2<br/> Students will understand that organisms are composed of a variety of sub-systems that have essential functions. Organisms function with a minimum of superfluous parts because their structures are precisely suited to their essential functions.</p> <p><b>Microworlds</b><br/> RB: (pp37-43)<br/> RB: (pp46-47)<br/> TG: L13.Exts (p74)</p> <p>SC-5-UD-U-3<br/> Students will understand that microscopes make it possible to see that living things are made mostly of cells. Some organism's cells vary greatly in appearance and perform very different roles in the organism.</p> <p><b>Experiment With Plants</b><br/> TG: L06 (pp57-64)<br/> <b>Ecosystems</b><br/> TG: L06.Exts (pp64-65)<br/> <b>Microworlds</b><br/> RB: (pp07-25)<br/> RB: (pp28-43)<br/> RB: (pp46-61)<br/> TG: L03.Exts (p18)<br/> TG: L05-16 (pp25-86)</p> | <p>SC-5-UD-S-2<br/> Students will identify and describe systems and subsystems essential to an organism's survival</p> <p><b>Experiment With Plants</b><br/> RB: (pp07-10)<br/> TG: L04 (pp39-50)<br/> TG: L08-L9 (pp71-80)<br/> TG: L13-15 (pp101-122)<br/> <b>Ecosystems</b><br/> RB: (pp31-34)</p> <p>SC-5-UD-S-3<br/> Students will use observations and models (conceptual, analogical, physical) to identify major structures of cells and their corresponding functions</p> <p>SC-5-UD-S-4<br/> Students will use scientific tools (e.g., microscopes) to observe and make comparisons of unicellular and multi-cellular organisms</p> <p><b>Microworlds</b><br/> RB: (pp28-30)<br/> TG: L12.Exts (pp69-70)<br/> TG: L13.Exts (p74)<br/> TG: L15-16 (pp79-86)</p> | <p>SC-05-3.4.3<br/> <i>Students should understand that <u>all</u> organisms are composed of cells, the fundamental unit of life. Most organisms are single cells; other organisms, including plants and animals are multicellular.</i></p> <p><b>Microworlds</b><br/> RB: (pp28-30)<br/> TG: L11-16 (pp61-86)</p> <p><b>SC-05-3.4.2</b><br/> <b>Students will explain the essential functions of cells necessary to sustain life.</b></p> <p><b>Cells carry on the many functions needed to sustain life. Models of cells, both physical and analogical, promote understanding of their structures and functions. Cells grow and divide, thereby producing more cells. This requires that they take in nutrients, which provide energy for the work that cells do and make the materials that a cell needs.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Microworlds</b><br/> TG: L11-16 (pp61-86)</p> |

**Big Idea: Biological Change (Biological Science) Grade: Fifth**

The only thing certain is that everything changes. Elementary students build a foundational knowledge of change by observing slow and fast changes caused by nature in their own environment, noting changes that humans and other organisms cause in their environment, and observing fossils found in or near their environment.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.6 Students understand how living and nonliving things change over time and the factors that influence the changes.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment  |
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| <p>SC-5-BC-U-1<br/>Students will understand that the gradual changes in organisms that have occurred over time are only accurately represented using a geologic time scale dating back to the formation of the earth.</p>  | <p>SC-5-BC-S-1<br/>Students will analyze various geologic time scale representations</p>   |  |
| <p>SC-5-BC-U-2<br/>Students will understand that sometimes differences in organisms give individuals an advantage in surviving and reproducing. Over many generations these adaptations have led to a wide variety of types of organisms.</p> <p>SC-5-BC-U-3<br/>Students will understand that successful organisms must be able to maintain the basic functions of life in response to normal environmental fluctuations (e.g. day/night, seasonal temperature changes, precipitation). However, an organism that has an advantage in a specific environment may not be able to survive if the environment changes too drastically.</p> | <p>SC-5-BC-S-2<br/>Students will investigate and describe adaptations of various organisms to their environments through observations as well as print and non-print based resources<br/><b>Experiment With Plants</b><br/>RB: (pp07-13)<br/>RB: (pp20-21)<br/>RB: (pp26-33)<br/>TG: L04 (pp39-50)<br/>TG: L07 (pp65-70)<br/>TG: L15.Exts (p117)<br/><b>Ecosystems</b><br/>RB: (pp11-13)</p> <p>SC-5-BC-S-3<br/>Students will Investigate ways that organisms cope with fluctuations (e.g. temperature, precipitation, change in food sources) in their environments</p> | <p><b>SC-05-3.5.1</b><br/><b>Students will describe cause and effect relationships between enhanced survival/reproductive success and particular biological adaptations (e.g., changes in structures, behaviors, and/or physiology) to generalize about the diversity of species.</b></p> <p><b>Biological change over time accounts for the diversity of species developed through gradual processes over many generations. Examining cause and effect relationships between enhanced survival/reproductive success and biological adaptations (e.g., changes in structures, behaviors, and/or physiology), based on evidence gathered, creates the basis for explaining diversity</b></p> <p style="text-align: right;"><b>DOK 2</b></p> |

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|  | <p><b>Experiment With Plants</b><br/> RB: (pp07-13)<br/> RB: (pp20-21)<br/> RB: (pp26-33)<br/> TG: L04 (pp39-50)<br/> TG: L07 (pp65-70)<br/> TG: L15.Exts (p117)</p> <p><b>Ecosystems</b><br/> RB: (pp11-13)</p> <p>SC-5-BC-S-4<br/> Students will propose explanations regarding adaptations of populations to environments citing evidence/data to support conclusions</p> | <p><b>Experiments with Plants</b><br/> RB: (pp30-33)<br/> RB: (pp44-46)<br/> RB: (pp57-59)</p> <p>SC-05-3.5.2<br/> <i>Students should understand that all organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.</i></p> <p><b>Microworlds</b><br/> TG: L13 (pp71-74)</p> |
| <p>SC-5-BC-U-4<br/> Students will understand that scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments. The question being investigated determines the form of the investigation used.</p> <p><b>Ecosystems</b><br/> RB: (pp43-44)<br/> TG: L10 (pp99-110)</p> <p><b>Microworlds</b><br/> TG: L09.Exts (p53)</p> | <p>SC-5-BC-S-5<br/> Students will compare procedures used (e.g., experiments, investigative and non-investigative research, observations) to find information/collect data about the diversity of organisms that exist or have existed on Earth</p> <p><b>Experiment With Plants</b><br/> RB: (pp30-33)<br/> RB: (pp44-46)<br/> RB: (pp57-59)</p>                            |   |

**Big Idea: Energy Transformations (Unifying Concepts) Grade: Fifth**

Energy transformations are inherent in almost every system in the universe—from tangible examples at the elementary level, such as heat production in simple earth and physical systems to more abstract ideas beginning at middle school, such as those transformations involved in the growth, dying and decay of living systems. The use of models to illustrate the often invisible and abstract notions of energy transfer will aid in conceptualization, especially as students move from the macroscopic level of observation and evidence (primarily elementary school) to the microscopic interactions at the atomic level (middle and high school levels).

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

**Program of Studies: Understandings**

SC-5-ET-U-1  
Students will understand that energy can have many different forms and be contained in many different substances. Evidence of energy transfer may be observed in a wide variety of systems.  
**Ecosystems**  
TG: L01 (pp3-12)

**Program of Studies: Skills and Concepts**

SC-5-ET-S-1  
Students will classify energy phenomena (e.g., heat/thermal energy, electrical energy, energy of position) as kinetic or potential and use observations and evidence to describe the transfer of energy occurring in simple systems

**Related Core Content for Assessment**

**SC-05-4.6.1**  
**Students will:**

- **classify energy phenomena as kinetic or potential;**
- **describe the transfer of energy occurring in simple systems or related data.**

**Energy can be classified as kinetic or potential. Energy is a property of many substances and energy can be found in several different forms. For example, chemical energy as found in food we eat or in the gasoline we burn in our car. Heat, light (solar), sound, electrical energy and the energy associated with motion (called kinetic energy) are examples of other forms of energy. Objects can have energy simply by virtue of their position, called potential energy. Energy is transferred in many ways. Analyzing simple systems can provide the basis for describing the transfer of energy occurring within the system.**

**DOK 2**

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|   |   | <p><i>SC-05-4.6.5</i><br/> <i>Students should understand that heat energy moves in predictable ways, flowing from warmer objects to cooler ones, until both objects reach the same temperature. By examining cause and effect relationships, consequences of heat movement and conduction can be predicted and inferred.</i></p>  |
| <p><b>SC-5-ET-U-2</b><br/> Students will understand that energy from the sun flows through space to reach the earth. Solar energy provides the driving force for many of the changes that happen on the Earth's surface.</p>        | <p><b>SC-5-ET-S-2</b><br/> Students will describe solar energy and how it impacts physical and biological systems on Earth</p> <p><b>Ecosystems</b><br/> TG: L01 (pp3-12)</p>   | <p><i>SC-05-4.6.2</i><br/> <i>Students should understand that the Sun is a major source of energy for changes on Earth's surface. The Sun loses energy by emitting light. A tiny fraction of that light reaches Earth, transferring energy from the Sun to Earth</i></p>  |
| <p><b>SC-5-ET-U-3</b><br/> Students will understand that electrical circuits transfer energy and can produce heat, light, sound, and magnetic effects. They can be used for different purposes by rearranging their components.</p> | <p><b>SC-5-ET-S-3</b><br/> Students will design and conduct investigations/experiments to determine the effects of altering variables within electrical circuits and to draw conclusions about the transfer of energy (e.g., heat, light, sound, and magnetic effects ) within a system</p> | <p><b>SC-05-4.6.3</b><br/> <b>Students will:</b></p> <ul style="list-style-type: none"> <li>● <b>draw conclusions about the transfer of energy within models/representations of electrical circuits as evidenced by the heat, light, sound, and magnetic effects that are produced;</b></li> <li>● <b>describe changes within the system that would affect the transfer of energy.</b></li> </ul> <p><b>Electrical circuits provide a means of transferring electrical energy. This transfer can be observed and described as heat, light, sound, and magnetic effects are produced. Models and diagrams can be used to support conclusions and predict consequences of change within an electrical circuit.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |
| <p><b>SC-5-ET-U-4</b><br/> Students will understand that light interacts with matter in predictable ways that can be discovered through investigations.</p>   | <p><b>SC-5-ET-S-4</b><br/> Students will design and conduct investigations/experiments to identify predictable patterns of interaction between</p>  | <p><b>SC-05-4.6.4</b><br/> <b>Students will identify predictable patterns and make generalizations about light and matter interactions using data/evidence.</b></p>   |

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|   | <p>light and matter (e.g. some materials are more reflective, different liquids refract differently, effects of multiple or differing light sources)</p>   | <p><b>Light energy interacts with matter by transmission (including refraction), absorption, or scattering (including reflection). Questions related to these phenomena should drive the design of simple investigations that will yield evidence of the predictable patterns associated with these interactions.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p style="text-align: center;"><b>Microworlds</b><br/>TG: L12.Exts (pp69-70)</p> |
| <p>SC-5-ET-U-5<br/>Students will understand that in a closed system, warm objects will cool and cool objects will warm until they are all the same temperature.</p>   | <p>SC-5-ET-S-1<br/>Students will classify energy phenomena (e.g., heat/thermal energy, electrical energy, energy of position) as kinetic or potential and use observations and evidence to describe the transfer of energy occurring in simple systems</p>   | <p><i>SC-05-4.6.5<br/>Students should understand that heat energy moves in predictable ways, flowing from warmer objects to cooler ones, until both objects reach the same temperature. By examining cause and effect relationships, consequences of heat movement and conduction can be predicted and inferred.</i></p>  |
| <p>SC-5-ET-U-6<br/>Students will understand that if the results of an investigation are unexpected, it is good to make new observations. If those observations continue to be unexpected, different ideas should be considered to explain the results.<br/><b>Experiment With Plants</b><br/>TG: L14.Exts (pp109-110)</p> | <p>SC-5-ET-S-3<br/>Students will design and conduct investigations/experiments to determine the effects of altering variables within electrical circuits and to draw conclusions about the transfer of energy (e.g., heat, light, sound, and magnetic effects ) within a system</p> <p>SC-5-ET-S-4<br/>Students will design and conduct investigations/experiments to identify predictable patterns of interaction between light and matter (e.g. some materials are more reflective, different liquids refract differently, effects of multiple or differing light sources)</p> |   |

**Big Idea: Interdependence (Unifying Concepts) Grade: Fifth**

It is not difficult for students to grasp the general notion that species depend on one another and on the environment for survival. But their awareness must be supported by knowledge of the kinds of relationships that exist among organisms, the kinds of physical conditions that organisms must cope with, the kinds of environments created by the interaction of organisms with one another and their physical surroundings, and the complexity of such systems. Elementary learners need to become acquainted with ecosystems that are easily observable to them by beginning to study the habitats of many types of local organisms. Students begin to investigate the survival needs of different organisms and how the environment affects optimum conditions for survival.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts   | Related Core Content for Assessment   |
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| <p>SC-5-I-U-1<br/>Students will understand that within every ecosystem are populations of organisms that serve specific functions. Changes to any population may affect the other populations in that ecosystem.</p> <p style="text-align: center;"><b>Ecosystems</b><br/>RB: (pp28-30)</p> <p>SC-5-I-U-2<br/>Students will understand that all of the populations that interact with each other in an ecosystem form a specific community, but there may be multiple communities within the same ecosystem.</p> | <p>SC-5-I-S-1<br/>Students will define the concepts of population and community and identify examples of populations and communities within various ecosystems</p> <p style="text-align: center;"><b>Ecosystems</b><br/>RB: (pp14-19)<br/>TG: L03-4 (pp25-52)<br/>TG: L07 (pp75-82)<br/>TG: L12 (pp117-124)</p> <p>SC-5-I-S-2<br/>Students will identify the role/function a population of organisms has in a particular community/ecosystem (e.g., producers, consumers, decomposers)</p> <p>SC-5-I-S-3<br/>Students will explore the cause/effect relationship of altering a particular population of organisms within an ecosystem using data/evidence collected through research and/or simulations (e.g., role-play games, computer-based simulations)</p> | <p><b>SC-05-4.7.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• describe and categorize populations of organisms according to the function they serve in an ecosystem (e.g., producers, consumers, decomposers);</li> <li>• draw conclusions about the effects of changes to populations in an ecosystem.</li> </ul> <p><b>Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some microorganisms are producers because they make their own food. All animals, including humans, are consumers, and obtain their food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem. Using data gained from observing interacting</b></p> |

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|   | <p><b>Ecosystems</b><br/>RB: (pp28-30)</p>  | <p><b>components within an ecosystem, the effects of changes can be predicted.</b> <b>DOK 3</b></p> <p><b>Ecosystems</b><br/>RB: (pp07-23)<br/>RB: (pp26-37)<br/>RB: (pp49-51)</p> <p><i>SC-05-4.7.2</i><br/><i>Students should understand that a population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.</i></p> <p><b>Experiments with Plants</b><br/>RB: (pp24-25)</p> <p><b>Ecosystems</b><br/>RB: (pp07-23)<br/>RB: (pp26-37)<br/>RB: (pp40-51)<br/>RB: (pp54-61)<br/>TG: L01-2 (pp3-24)<br/>G: L04-15 (pp39-164)</p> |
| <p>SC-5-I-U-3<br/>Students will understand that matter and energy flow along multiple paths within a community. Complex models depicting this interdependence make these relationships easier to visualize and comprehend.</p> <p><b>Ecosystems</b><br/>RB: (pp14-16)<br/>TG: L07 (pp75-82)</p> | <p>SC-5-I-S-4<br/>Students will analyze, create and describe visual representations of ecosystems and the interactions occurring within them. Compare and critique pre-existing and student-constructed representations for accuracy, identifying strengths and limitations, insisting on the use of evidence to support decisions</p> <p><b>Experiment With Plants</b><br/>RB: (pp24-25)<br/>RB: (pp30-33)<br/>TG: L02.Exts (p24)<br/>TG: L06 (pp57-64)<br/>TG: L07 (pp65-70)</p> <p><b>Ecosystems</b><br/>RB: (pp07-23)</p> |   |

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|  | RB: (pp26-37)<br>RB: (pp43-51)<br>RB: (pp54-61)<br>TG: L01-7 (pp3-82)<br>TG: L12 (pp117-124)<br>TG: L17 (pp169-171)<br><b>Microworlds</b><br>TG: L12.Exts (pp69-70) |  |
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# Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

Grade 6



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*World-Class Support for Science & Math*

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## Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

| Grade Range                 | <b>STC PROGRAM™ and GEMS® Units</b>   |
|-----------------------------|---|
| <b>K-3</b>                  | <ul style="list-style-type: none"> <li>• <i>Changes</i></li> <li>• <i>Electric Circuits</i></li> <li>• <i>The Life Cycle of Butterflies</i></li> <li>• <i>Organisms</i></li> <li>• <i>Rocks and Minerals</i></li> <li>• <i>Solids and Liquids</i></li> <li>• <i>Sound</i></li> <li>• <i>Weather</i></li> <li>• <i>GEMS: Space Science</i></li> <li>• <i>Animal Studies</i></li> </ul> |
| <b>4<sup>th</sup> Grade</b> | <ul style="list-style-type: none"> <li>• <i>Motion and Design</i></li> <li>• <i>Land and Water</i></li> <li>• <i>GEMS: Hot Water and Warm Homes</i></li> </ul>  |
| <b>5<sup>th</sup> Grade</b> | <ul style="list-style-type: none"> <li>• <i>Ecosystems</i></li> <li>• <i>Experiments with Plants</i></li> <li>• <i>GEMS: Messages From Space</i></li> <li>• <i>Energy, Machines, and Motion</i></li> </ul>  |
| <b>6<sup>th</sup> Grade</b> | <ul style="list-style-type: none"> <li>• <i>Earth in Space</i></li> <li>• <i>Organisms—From Macro to Micro</i></li> <li>• <i>Properties of Matter</i></li> <li>• <i>Catastrophic Events</i></li> </ul>  |
| <b>7<sup>th</sup> Grade</b> | <ul style="list-style-type: none"> <li>• <i>Earth in Space</i></li> <li>• <i>Energy, Machines, and Motion</i></li> <li>• <i>Properties of Matter</i></li> <li>• <i>Catastrophic Events</i></li> </ul>   |
| <b>8<sup>th</sup> Grade</b> | <ul style="list-style-type: none"> <li>• <i>Light</i></li> <li>• <i>Organisms—From Macro to Micro</i></li> </ul>  |

The STC PROGRAM™ and GEMS® Units are recommended based on the Kentucky Program of Studies and the Core Contents for Assessment. Provided for each grade level, are the units that most strongly align with the content objectives. Other STC PROGRAM™ Units may also match objectives within each grade level. For more information about any STC PROGRAM™ unit or GEMS® unit, visit [www.carolinacurriculum.com](http://www.carolinacurriculum.com).

GEMS® Space Science is research-based 3-5 science curriculum that teach fundamental concepts in space science.

### Legend

To save paper, the curriculum location information in this document has been abbreviated as follows:

- Unit abbreviations = noted in parentheses in the chart above
- TG = Teacher's Guide
- S-Sec3 = Section 3 (containing a section on safety) in the STC® Teacher's Guide
- L01, L02, etc. = Lesson 1, Lesson 2, etc.
- Les01 = Lesson 1
- Act01=Activity 1
- p, pp = page, pages
- RB = STC BOOK™ (a science reading book included in some of the grades 3–5 STC® unit kits)
- SB = Student Book
- Exts = Extensions (found at the end of most lessons in the Teacher's Guide)
- App-A, App-B = Appendix A, Appendix B (found at the end of Section 4 in the Teacher's Guide)

**Big Idea: Structure and Transformation of Matter (Physical Science) Grade 6**

A basic understanding of matter is essential to the conceptual development of other big ideas in science. During the middle years, physical and chemical changes in matter are observed, and students begin to relate these changes to the smaller constituents of matter—namely, atoms and molecules. The use of models (and an understanding of their scales and limitations) is an effective means of learning about the structure of matter. Looking for patterns in properties is also critical to comparing and explaining differences in matter.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.
- 2.5** Students understand that under certain conditions nature tends to remain the same or move toward a balance.

| <b>Program of Studies: Understandings</b>  | <b>Program of Studies: Skills and Concepts</b>   | <b>Related Core Content for Assessment</b>   |
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| SC-6-STM-U-1<br>Students will understand that all matter is composed of parts that are too small to be seen without magnification.<br><b>Properties of Matter</b><br>TG: L21.Exts (p251) | SC-6-STM-S-1<br>Students will use hand lenses and microscopes to investigate substances composed of particles too small to be seen without magnification<br><b>Energy Machines and Motion</b><br>SG: L01 (pp2-11)<br>TG: L01 (pp3-22)<br><b>Organisms-From Macro to Micro</b><br>SG: L04 (pp38-45)<br>SG: L07 (pp82-93)<br>SG: L11-12 (pp132-155)<br>TG: L04 (pp49-56)<br>TG: L07 (pp105-130)<br>TG: L11 (pp185-200) | <b>SC-M6 1.1.1</b><br><b>Students will explain how or why mixtures can be separated using physical properties.</b><br><br><b>A mixture of substances often can be separated into the original substances by using one or more of its characteristic physical properties.</b><br><br><div style="text-align: right;"><b>DOK 2</b></div> <b>Properties of Matter</b><br>SG: L15 (pp122-129)<br>SG: L17 (pp140-149)<br>TG: L15 (pp161-168)<br>TG: L17 (pp179-192) |
| SC-6-STM-U-2<br>Students will understand that no matter how substances within a closed system interact with one another, or how they combine or  | SC-6-STM-S-2<br>Students will use observations and evidence to describe and verify chemical changes in matter.   | <b>SC-M6 1.1.1</b><br><b>Students will explain how or why mixtures can be separated using physical properties.</b>   |

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| <p>break apart, the total weight of the system remains the same.</p> <p><b>Properties of Matter</b><br/>         SG: L08 (pp74-77)<br/>         SG: L14 (pp116-121)<br/>         SG: L25 (pp224-229)<br/>         TG: L08 (pp91-100)<br/>         TG: L14 (pp153-160)<br/>         TG: L25 (pp303-312)</p>  | <p><b>Properties of Matter</b><br/>         SG: L06 (pp56-63)<br/>         SG: L18 (pp150-161)<br/>         SG: L20 (pp170-185)<br/>         SG: L24 (pp218-223)<br/>         TG: L06 (pp65-78)<br/>         TG: L18 (pp193-208)<br/>         TG: L20 (pp227-240)<br/>         TG: L22.Exts (p270)<br/>         TG: L24 (pp295-302)</p> <p>SC-6-STM-S-4<br/>         Students will distinguish between mixtures and compounds</p> <p><b>Properties of Matter</b><br/>         SG: L06 (pp56-63)<br/>         SG: L18 (pp150-161)<br/>         SG: L20-22 (pp170-207)<br/>         SG: L24 (pp218-223)<br/>         TG: L06 (pp65-78)<br/>         TG: L18 (pp193-208)<br/>         TG: L20-22 (pp227-274)<br/>         TG: L23.Exts (p284)<br/>         TG: L24 (pp295-302)</p> | <p><b>Properties of Matter</b><br/>         SG: L15 (pp122-129)<br/>         SG: L17 (pp140-149)<br/>         TG: L15 (pp161-168)<br/>         TG: L17 (pp179-192)</p> <p><b>A mixture of substances often can be separated into the original substances by using one or more of its characteristic physical properties.</b></p> <p style="text-align: right;"><b>DOK 2</b></p>  |
| <p>SC-6-STM-U-3<br/>         Students will understand that chemical changes result in the formation of a substance that has different properties than the original substance.</p> <p><b>Properties of Matter</b><br/>         SG: L06 (pp56-63)<br/>         SG: L18 (pp150-161)<br/>         SG: L20 (pp170-185)<br/>         SG: L24 (pp218-223)<br/>         TG: L06 (pp65-78)<br/>         TG: L18 (pp193-208)<br/>         TG: L20 (pp227-240)<br/>         TG: L22.Exts (p270)<br/>         TG: L24 (pp295-302)</p> | <p>SC-6-STM-S-2<br/>         Students will use observations and evidence to describe and verify chemical changes in matter.</p> <p><b>Properties of Matter</b><br/>         SG: L06 (pp56-63)<br/>         SG: L18 (pp150-161)<br/>         SG: L20 (pp170-185)<br/>         SG: L24 (pp218-223)<br/>         TG: L06 (pp65-78)<br/>         TG: L18 (pp193-208)<br/>         TG: L20 (pp227-240)<br/>         TG: L22.Exts (p270)<br/>         TG: L24 (pp295-302)</p> <p>SC-6-STM-S-3</p>   | <p><b>SC-06-1.1.2</b><br/> <b>Students will identify and describe evidence of chemical and physical changes in matter.</b></p> <p><b>In chemical reactions, the total mass is conserved. Substances are often classified into groups if they react in similar ways. The patterns that allow classification can be used to infer or understand real life applications for those substances.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Properties of Matter</b><br/>         SG: L06 (pp56-63)<br/>         SG: L18 (pp150-161)<br/>         SG: L20 (pp170-185)<br/>         SG: L24 (pp218-223)</p> |

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|  | <p>Students will classify changes in substances as physical or chemical changes</p> <p><b>Properties of Matter</b><br/>         SG: L06 (pp56-63)<br/>         SG: L18 (pp150-161)<br/>         SG: L20 (pp170-185)<br/>         SG: L24 (pp218-223)<br/>         TG: L06 (pp65-78)<br/>         TG: L17.Exts (p185)<br/>         TG: L18 (pp193-208)<br/>         TG: L20 (pp227-240)<br/>         TG: L22.Exts (p270)<br/>         TG: L24 (pp295-302)</p>  | <p>TG: L06 (pp65-78)<br/>         TG: L17.Exts (p185)<br/>         TG: L18 (pp193-208)<br/>         TG: L20 (pp227-240)<br/>         TG: L22.Exts (p270)<br/>         TG: L24 (pp295-302)</p>  |
| <p>SC-6-STM-U-4<br/>         Students will understand that not all substances that are mixed together will chemically combine. Because of this, physical properties can be used to separate mixtures.</p> <p><b>Properties of Matter</b><br/>         SG: L15 (pp122-129)<br/>         SG: L17 (pp140-149)<br/>         TG: L15 (pp161-168)<br/>         TG: L17 (pp179-192)</p> | <p>SC-6-STM-S-5<br/>         Students will explain how or why mixtures can be separated using physical properties, and investigate strategies for separating mixtures</p> <p><b>Properties of Matter</b><br/>         SG: L15 (pp122-129)<br/>         SG: L17 (pp140-149)<br/>         TG: L15 (pp161-168)<br/>         TG: L17 (pp179-192)</p> <p>SC-6-STM-S-6<br/>         Students will explore the feasibility of various procedures for separating mixtures, taking into account constraints such as availability and properties of materials, safety, economic and ethical issues</p> <p><b>Properties of Matter</b><br/>         SG: L15 (pp122-129)<br/>         SG: L17 (pp140-149)<br/>         TG: L15 (pp161-168)<br/>         TG: L17 (pp179-192)</p> | <p><b>SC-06-1.1.2</b><br/> <b>Students will identify and describe evidence of chemical and physical changes in matter.</b></p> <p><b>In chemical reactions, the total mass is conserved. Substances are often classified into groups if they react in similar ways. The patterns that allow classification can be used to infer or understand real life applications for those substances.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Properties of Matter</b><br/>         SG: L06 (pp56-63)<br/>         SG: L18 (pp150-161)<br/>         SG: L20 (pp170-185)<br/>         SG: L24 (pp218-223)<br/>         TG: L06 (pp65-78)<br/>         TG: L17.Exts (p185)<br/>         TG: L18 (pp193-208)<br/>         TG: L20 (pp227-240)<br/>         TG: L22.Exts (p270)<br/>         TG: L24 (pp295-302)</p> |

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| <p>SC-6-STM-U-5<br/>Students will understand that new ideas in science sometimes spring from unexpected findings, and they usually lead to new investigations.</p> | <p>SC-6-STM-S-7<br/>Students will investigate how important scientific advances have resulted from unexpected observations or experimental results</p> <p><b>Energy Machines and Motion</b><br/>SG: L02 (pp12-19)<br/>SG: L07 (pp62-71)<br/>SG: L15 (pp140-147)</p> <p><b>Earth in Space</b><br/>SG: L10 (pp130-145)<br/>SG: L20-21 (pp324-310)<br/>TG: L04 (pp37-52)<br/>TG: L10 (pp147-158)<br/>TG: L20-21 (pp293-3108)</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L19 (pp216-235)</p> <p><b>Properties of Matter</b><br/>SG: L09 (pp78-83)<br/>SG: L11 (pp98-105)<br/>SG: L15 (pp122-129)<br/>SG: L19 (pp162-167)<br/>SG: L21-23 (pp186-217)<br/>SG: L25 (pp224-229)</p> <p>SC-6-STM-S-8<br/>Students will plan, present and support information from investigations using a variety of modes</p> <p><b>Energy Machines and Motion</b><br/>SG: L12 (pp108-119)<br/>SG: L17 (pp164-173)<br/>SG: L22 (pp226-236)<br/>TG: L04.Exts (pp41-42)<br/>TG: L06 (pp59-74)<br/>TG: L08.Exts (pp92-93)<br/>TG: L09.Exts (p105)<br/>TG: L12-13 (pp147-166)</p> |  |

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|  | <p>TG: L15.Exts (pp180-181)<br/> TG: L17 (pp203-216)<br/> TG: L22 (pp247-254)<br/> <b>Earth in Space</b><br/> SG: L22 (pp340-343)<br/> TG: L02.Exts (pp18-19)<br/> TG: L19.Exts (p292)<br/> TG: L22 (pp311-326)<br/> <b>Organisms-From Macro to Micro</b><br/> TG: L04.Exts (pp53-54)<br/> TG: L06.Exts (pp89-91)<br/> TG: L07.Exts (pp118-119)<br/> TG: L11.Exts (pp192-193)<br/> TG: L14.Exts (p247)<br/> TG: L15.Exts (p260)<br/> TG: L17.Exts (pp287-288)<br/> TG: L18.Exts (pp299-300)<br/> TG: L19.Exts (pp317-318)<br/> <b>Properties of Matter</b><br/> SG: L02 (pp14-23)<br/> SG: L10 (pp86-97)<br/> SG: L16 (pp130-139)<br/> SG: L24 (pp218-223)<br/> TG: L02 (pp15-26)<br/> TG: L10 (pp113-124)<br/> TG: L16 (pp169-178)<br/> TG: L17.Exts (p185)<br/> TG: L21.Exts (p251)<br/> TG: L24 (pp295-302)<br/> TG: L25.Exts (pp307-30)</p> |  |
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**Big Idea: Motion and Forces (Physical Science) Grade 6**

Whether observing airplanes, baseballs, planets, or people, the motion of all bodies is governed by the same basic rules. At the middle level, qualitative descriptions of the relationship between forces and motion will provide the foundation for quantitative applications of Newton's Laws.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.

| <b>Program of Studies: Understandings</b>   | <b>Program of Studies: Skills and Concepts</b>   | <b>Related Core Content for Assessment</b>   |
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| <p>SC-6-MF-U-1<br/>Students will understand that friction is a force that turns the energy of motion into heat, causing moving objects to eventually slow or stop unless additional force (energy) is added.</p> <p><b>Energy Machines and Motion</b><br/>           SG: L06 (pp48-61)<br/>           SG: L11 (pp100-107)<br/>           SG: L20-21 (pp200-225)<br/>           TG: L01.Exts (p14)<br/>           TG: L06 (pp59-74)<br/>           TG: L08.Exts (pp92-93)<br/>           TG: L11 (pp131-146)<br/>           TG: L20-21 (pp235-246)</p> | <p>SC-6-MF-S-1<br/>Students will use observations and appropriate tools (e.g., timer, meter stick, balance, spring scale) to document the position and motion of objects</p> <p>SC-6-MF-S-3<br/>Students will observe real-life phenomena to discover the effects of friction on moving objects and mechanical systems</p> <p><b>Energy Machines and Motion</b><br/>           SG: L06 (pp48-61)<br/>           SG: L11 (pp100-107)<br/>           SG: L14 (pp130-139)<br/>           SG: L16 (pp148-161)<br/>           SG: L18 (pp174-187)<br/>           SG: L20-21 (pp200-225)<br/>           TG: L01.Exts (p14)<br/>           TG: L06 (pp59-74)<br/>           TG: L08.Exts (pp92-93)<br/>           TG: L11 (pp131-146)<br/>           TG: L14 (pp167-176)<br/>           TG: L15.Exts (pp180-181)<br/>           TG: L16 (pp185-202)</p> <p>SC-6-MF-S-4<br/>Students will represent the motion of objects and their response to unbalanced forces in a variety of ways</p> | <p><b>SC-06-1.2.1</b><br/><b>Students will describe friction and make inferences about its effects on the motion of an object.</b></p> <p><b>When an unbalanced force (friction) acts on an object, the change in speed or direction depends on the size and direction of the force.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Energy, Machines, and Motion</b><br/>           SG: L06 (pp48-61)<br/>           SG: L11 (pp100-107)<br/>           SG: L20-21 (pp200-225)<br/>           TG: L01.Exts (p14)<br/>           TG: L06 (pp59-74)<br/>           TG: L08.Exts (pp92-93)<br/>           TG: L11 (pp131-146)<br/>           TG: L20-21 (pp235-246)</p> |

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| <p>SC-6-MF-U-2<br/>Students will understand that when any force acts on an object, the change in speed or direction depends on the size and direction of the force.</p> <p><b>Energy Machines and Motion</b><br/>SG: L06 (pp48-61)<br/>SG: L18 (pp174-187)<br/>SG: L19 (pp188-199)<br/>SG: L21 (pp214-225)<br/>TG: L01.Exts (p14)<br/>TG: L06.Exts (pp68-69)<br/>TG: L18 (pp217-228)<br/>TG: L19 (pp229-234)<br/>TG: L21 (pp239-246)</p> <p><b>Earth in Space</b><br/>SG: L15 (pp216-243)<br/>TG: L15-16 (pp221-268)</p> | <p>SC-6-MF-S-1<br/>Students will use observations and appropriate tools (e.g., timer, meter stick, balance, spring scale) to document the position and motion of objects</p> <p>SC-6-MF-S-2<br/>Students will use graphical and observational data to make inferences, predictions and draw conclusions about the motion of an object as related to the mass or force involved</p> <p><b>Energy Machines and Motion</b><br/>SG: L21 (pp214-225)<br/>TG: L18.Exts (p224)</p> <p><b>Earth in Space</b><br/>TG: L15 (pp221-244)</p> <p>SC-6-MF-S-4<br/>Students will represent the motion of objects and their response to unbalanced forces in a variety of ways</p> | <p><b>SC-06-1.2.1</b><br/><b>Students will describe friction and make inferences about it's effects on the motion of an object.</b></p> <p><b>When an unbalanced force (friction) acts on an object, the change in speed or direction depends on the size and direction of the force.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Energy, Machines, and Motion</b><br/>SG: L06 (pp48-61)<br/>SG: L11 (pp100-107)<br/>SG: L20-21 (pp200-225)<br/>TG: L01.Exts (p14)<br/>TG: L06 (pp59-74)<br/>TG: L08.Exts (pp92-93)<br/>TG: L11 (pp131-146)<br/>TG: L20-21 (pp235-246)</p> |
| <p>SC-6-MF-U-3<br/>Students will understand that mechanical systems must be designed to take forces such as friction into account. Friction and/or the heat produced by it can have significant effects on the system.</p> <p><b>Energy Machines and Motion</b><br/>SG: L14 (pp130-139)<br/>SG: L16 (pp148-161)<br/>SG: L18 (pp174-187)<br/>TG: L14 (pp167-176)<br/>TG: L15.Exts (pp180-181)<br/>TG: L16 (pp185-202)</p>   | <p>SC-6-MF-S-3<br/>Students will observe real-life phenomena to discover the effects of friction on moving objects and mechanical systems</p> <p><b>Energy Machines and Motion</b><br/>SG: L06 (pp48-61)<br/>SG: L11 (pp100-107)<br/>SG: L14 (pp130-139)<br/>SG: L16 (pp148-161)<br/>SG: L18 (pp174-187)<br/>SG: L20-21 (pp200-225)<br/>TG: L01.Exts (p14)<br/>TG: L06 (pp59-74)<br/>TG: L08.Exts (pp92-93)<br/>TG: L11 (pp131-146)<br/>TG: L14 (pp167-176)<br/>TG: L15.Exts (pp180-181)<br/>TG: L16 (pp185-202)</p>   | <p><b>SC-06-1.2.1</b><br/><b>Students will describe friction and make inferences about it's effects on the motion of an object.</b></p> <p><b>When an unbalanced force (friction) acts on an object, the change in speed or direction depends on the size and direction of the force.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Energy, Machines, and Motion</b><br/>SG: L06 (pp48-61)<br/>SG: L11 (pp100-107)<br/>SG: L20-21 (pp200-225)<br/>TG: L01.Exts (p14)<br/>TG: L06 (pp59-74)<br/>TG: L08.Exts (pp92-93)<br/>TG: L11 (pp131-146)<br/>TG: L20-21 (pp235-246)</p> |

**Big Idea: The Earth and the Universe (Earth/Space Science) Grade 6**

The Earth system is in a constant state of change. These changes affect life on Earth in many ways. Development of conceptual understandings about processes that shape the Earth begin at the elementary level with understanding what Earth materials are and that change occurs. At the middle level, students investigate how these changes occur. An understanding of systems and their interacting components will enable students to evaluate supporting theories of Earth changes. The use of models and observance of patterns to explain common phenomena is essential to building a conceptual foundation and supporting ideas with evidence at all levels. In middle school, students begin to look beyond what can be directly observed as they explore the Earth-sun-moon system, as well as the rest of our solar system, employing the concept of scale within their models. Patterns play an important role as students seek to develop a conceptual understanding of gravity in their world and in the universe.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.5 Students understand that under certain conditions nature tends to remain the same or move toward a balance.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts   | Related Core Content for Assessment   |
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| <p>SC-6-EU-U-1<br/>Students will understand that regular and predictable movements of the sun, moon and Earth are responsible for many observed phenomena on Earth, (e.g. day/night, year, moon phases, eclipses). The regular patterns of these phenomena can be predicted using data or models.</p> <p><b>Earth in Space</b><br/>SG: L02-8 (pp12-121)<br/>SG: L16 (pp244-265)<br/>TG: L02-8 (pp11-120)<br/>TG: L16 (pp245-268)</p> | <p>SC-6-EU-S-2<br/>Students will investigate, create and identify the limitations of models which can be used to substantiate and predict the actual results (e.g. moon phases, seasons, eclipses) of the interactions of the sun, moon and Earth</p> <p><b>Earth in Space</b><br/>SG: L02-7 (pp12-101)<br/>SG: L09 (pp122-127)<br/>SG: L11-14 (pp146-219)<br/>SG: L16 (pp244-265)<br/>SG: L18 (pp290-311)<br/>TG: L01.Exts (p10)<br/>TG: L02-9 (pp11-146)<br/>TG: L11-14 (pp159-220)<br/>TG: L16 (pp245-268)<br/>TG: L17.Exts (pp275-276)<br/>TG: L18 (pp277-286)</p> <p><b>Organisms-From Macro to Micro</b><br/>TG: L10.Exts (pp175-176)</p> | <p><b>SC-06-2.3.1</b><br/><b>Students will explain and predict phenomena (e.g., day, year, moon phases, eclipses) based on models/representations or data related to the motion of objects in the solar system (e.g., earth, sun, moon). Observations and investigations of patterns indicate that most objects in the solar system are in regular and predictable motion. Evaluation of this data explains such phenomena as the day, the year, phases of the moon and eclipses.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Earth in Space</b><br/>SG: L01-3 (pp2-199)<br/>SG: L15-22 (pp216-343)<br/>TG: L01-22 (pp3-326)</p> |

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| <p>SC-6-EU-U-2<br/>Students will understand that the total amount of material that makes the solid Earth is relatively constant (excluding impacts), even though rocks and minerals often change properties through a variety of processes that transform them (rock cycle).</p> <p><b>Properties of Matter</b><br/>TG: L05.Exts (p56)</p>   | <p>SC-6-EU-S-1<br/>Students will use observations, models and evidence to explain the cause and effect relationships in the rock cycle and to make predictions about constantly changing Earth materials</p>   | <p><b>SC-06-2.3.2</b><br/><b>Students will explain cause and effect relationships in the Rock cycle.</b></p> <p><b>Materials found in the lithosphere and mantle are changed in a continuous process called the rock cycle, which can be investigated using a variety of models. Cause and effect relationships should be explored in order to draw conclusions and make evidence-based predictions of the continually changing materials.</b></p> <p style="text-align: right;"><b>DOK 2</b></p>   |
| <p>SC-6-EU-U-3<br/>Students will understand that the Earth’s surface is not uniform due to a number of constructive and destructive forces that constantly reshape it. The past effects of these processes can be inferred, and the data these inferences are based upon can also be used to predict future changes.</p> <p><b>Properties of Matter</b><br/>TG: L05.Exts (p56)</p> | <p>SC-6-EU-S-3<br/>Students will investigate constructive and destructive forces at work on the Earth’s surface and the landforms that result from them</p>  | <p><b>SC-06-2.3.3 Students will compare constructive and destructive forces on Earth in order to make predictions about the nature of landforms.</b></p> <p><b>Landforms are a result of a combination of constructive and destructive forces. Collection and analysis of data indicates that constructive forces include crustal deformation, faulting, volcanic eruption and deposition of sediment, while destructive forces include weathering and erosion.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p style="text-align: center;"><b>Earth in Space</b><br/>SG: L13 (pp174-199)<br/>TG: L13 (pp197-208)</p> |
| <p>SC-6-EU-U-4<br/>Students will understand that complex systems like the Earth or solar system are difficult to comprehend or explain without depending on averages and ranges of data. Technology is essential for helping to collect and analyze this data.</p> <p><b>Energy Machines and Motion</b><br/>SG: L16 (pp148-161)</p>  | <p>SC-6-EU-S-4<br/>Students will research how scientists organize data from complex systems and also how technology enables/enhances scientific research and data analysis</p> <p><b>Energy Machines and Motion</b><br/>SG: L16 (pp148-161)<br/>TG: L16 (pp185-202)</p> <p><b>Earth in Space</b></p> |   |

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| <p>TG: L16 (pp185-202)</p> <p><b>Earth in Space</b></p> <p>SG: L02-14 (pp12-215)</p> <p>SG: L16 (pp244-265)</p> <p>SG: L18 (pp290-311)</p> <p>SG: L22 (pp340-343)</p> <p>TG: L01.Exts (p10)</p> <p>TG: L02-9 (pp11-146)</p> <p>TG: L11-14 (pp159-220)</p> <p>TG: L16 (pp245-268)</p> <p>TG: L17.Exts (pp275-276)</p> <p>TG: L18 (pp277-286)</p> <p>TG: L20.Exts (p297)</p> <p>TG: L21.Exts (p310)</p> <p>TG: L22 (pp311-326)</p> <p><b>Properties of Matter</b></p> <p>TG: L06.Exts (p74)</p> | <p>SG: L03 (pp22-41)</p> <p>SG: L07-9 (pp88-127)</p> <p>SG: L14 (pp200-215)</p> <p>SG: L16 (pp244-265)</p> <p>SG: L22 (pp340-343)</p> <p>TG: L03 (pp21-36)</p> <p>TG: L07-9 (pp83-146)</p> <p>TG: L14 (pp209-220)</p> <p>TG: L16 (pp245-268)</p> <p>TG: L20.Exts (p297)</p> <p>TG: L21.Exts (p310)</p> <p>TG: L22 (pp311-326)</p> |  |
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**Big Idea: Unity and Diversity (Biological Science) Grade 6**

All matter is comprised of the same basic elements, goes through the same kinds of energy transformations, and uses the same kinds of forces to move. Living organisms are no exception. In middle school, students begin to compare, contrast, and classify the microscopic features of organisms—the cells, as well as investigate reproduction as the essential process to the continuation of all species. Expected patterns of genetic traits are predicted.

Distinctions are made between learned behaviors and inherited traits. Emphasis at every level should be placed upon the understanding that while every living thing is composed of similar small constituents that combine in predictable ways, it is the subtle variations within these small building blocks that account for both the likenesses and differences in form and function that create the diversity of life.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.
- 2.5** Students understand that under certain conditions nature tends to remain the same or move toward a balance.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment  |
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| <p>SC-6-UD-U-1<br/>Students will understand that cells are the fundamental units that perform the basic functions needed to sustain life. Some organisms contain only a single cell, while others may have many millions of specialized cells grouped together in cooperative systems with specific functions (tissues and/or organs).</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L07 (pp82-93)<br/>SG: L11 (pp132-145)<br/>TG: L07 (pp105-130)<br/>TG: L11 (pp185-200)<br/>TG: L12.Exts (p207)</p> | <p>SC-6-UD-S-1<br/>Students will obtain information from observations, models and other sources to explain the functions of cells necessary to sustain life</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L07-8 (pp82-105)<br/>TG: L07-8 (pp105-150)<br/>TG: L15.Exts (p260)</p> <p>SC-6-UD-S-2<br/>Students will use scientific tools (e.g., microscope) to observe and describe unicellular and multi-cellular organisms and the specialized cells they contain</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L11 (pp132-145)<br/>TG: L11 (pp185-200)<br/>TG: L12.Exts (p207)</p> <p>SC-6-UD-S-3<br/>Students will describe and represent (e.g. construct a chart, diagram, or graphic</p> | <p><b>SC-06-3.4.1</b><br/><b>Students will describe the relationship between cells, tissues and organs in order to explain their function in multicellular organisms.</b></p> <p><b>Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form tissues. Different tissues are, in turn, grouped together to form larger functional units called organs. Examination of cells, tissues and organs reveals that each type has a distinct structure and set of functions that serve the organism.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |

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|   | organizer) relationships between and among levels of organization for structure and function, including cells, tissues, organs, organ systems, organisms (e.g., bacteria, protists, fungi, plants, animals) and ecosystems   |  |
| <p>SC-6-UD-U-2<br/>Students will understand that every cell within an organism contains all of the information needed to completely replicate that organism, regardless of the function that cell performs.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L08-9 (pp96-119)<br/>SG: L19 (pp216-235)<br/>TG: L03.Exts (p41)<br/>TG: L08-9 (pp131-166)<br/>TG: L19 (pp303-330)</p>   | <p>SC-6-UD-S-5<br/>Students will investigate the relative influence of heredity and experience on the behavior of organisms</p> <p><b>Organisms-From Macro to Micro</b><br/>TG: L02.Exts (p25)<br/>TG: L06.Exts (pp89-91)<br/>TG: L16.Exts (p273)<br/>TG: L17.Exts (pp287-288)</p> <p>SC-6-UD-S-6<br/>Students will identify and describe the cellular structures that allow for replication/reproduction</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L08-9 (pp96-119)<br/>SG: L19 (pp216-235)<br/>TG: L08-9 (pp131-166)<br/>TG: L19 (pp303-330)</p> | <p><b>SC-06-3.4.1</b><br/><b>Students will describe the relationship between cells, tissues and organs in order to explain their function in multicellular organisms.</b></p> <p><b>Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form tissues. Different tissues are, in turn, grouped together to form larger functional units called organs. Examination of cells, tissues and organs reveals that each type has a distinct structure and set of functions that serve the organism.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |
| <p>SC-6-UD-U-3<br/>Students will understand that although plants and animals exhibit a great variety in body structures that contribute to their survival and reproduction, the basic way that individual cells function is similar in all living organisms.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L07-8 (pp82-105)<br/>TG: L07-8 (pp105-150)<br/>TG: L15.Exts (p260)</p> | <p>SC-6-UD-S-1<br/>Students will obtain information from observations, models and other sources to explain the functions of cells necessary to sustain life</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L07-8 (pp82-105)<br/>TG: L07-8 (pp105-150)<br/>TG: L15.Exts (p260)</p>   | <p><b>SC-06-3.4.1</b><br/><b>Students will describe the relationship between cells, tissues and organs in order to explain their function in multicellular organisms.</b></p> <p><b>Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form tissues. Different tissues are, in turn, grouped together to form larger functional units called organs. Examination of cells,</b></p>   |

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|  |  | <p>tissues and organs reveals that each type has a distinct structure and set of functions that serve the organism.</p> <p style="text-align: right;"><b>DOK 3</b></p>  |
| <p>SC-6-UD-U-4<br/>Students will understand that the behavior of an organism can be influenced by both heredity and experiences. The relative influence of these factors can be inferred by careful observation/data collection over a period of time.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L02 (pp12-27)<br/>SG: L06 (pp64-81)<br/>TG: L02 (pp15-32)<br/>TG: L06 (pp73-104)<br/>TG: L16.Exts (p273)<br/>TG: L17.Exts (pp287-288)</p> | <p>SC-6-UD-S-4<br/>Students will design and conduct scientific investigations to make inferences about factors influencing the behavior of organisms, and compare the results with those of investigations done by others</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L02 (pp12-27)<br/>SG: L06 (pp64-81)<br/>TG: L02 (pp15-32)<br/>TG: L06 (pp73-104)<br/>TG: L16.Exts (p273)<br/>TG: L17.Exts (pp287-288)</p> <p>SC-6-UD-S-5<br/>Students will investigate the relative influence of heredity and experience on the behavior of organisms</p> <p><b>Organisms-From Macro to Micro</b><br/>TG: L02.Exts (p25)<br/>TG: L06.Exts (pp89-91)<br/>TG: L16.Exts (p273)<br/>TG: L17.Exts (pp287-288)</p> | <p><b>SC-06-3.4.2</b><br/><b>Students will make inferences about the factors influencing behavior based on data/evidence of various organism's behaviors.</b></p> <p><b>Behavior is one kind of response an organism may make to an internal or environmental stimulus. Observations of organisms, data collection/analysis, support generalizations/conclusions that a behavioral response is a set of actions determined in part by heredity and in part from experience. A behavioral response requires coordination and communication at many levels including cells, organ systems and organisms.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Organisms-From Macro to Micro-</b><br/>SG: L02 (pp12-27)<br/>SG: L06 (pp64-81)<br/>TG: L02 (pp15-32)<br/>TG: L06 (pp73-104)</p> |
| <p>SC-6-UD-U-5<br/>Students will understand that the great diversity of life is a result of many factors, both internal and external to organisms.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L02 (pp12-27)<br/>SG: L04 (pp38-45)</p> <p>SC-6-UD-U-6<br/>Students will understand that even the most different of organisms are fundamentally more</p>  | <p>SC-6-UD-S-3<br/>Students will describe and represent (e.g. construct a chart, diagram, or graphic organizer) relationships between and among levels of organization for structure and function, including cells, tissues, organs, organ systems, organisms (e.g., bacteria, protists, fungi, plants, animals) and ecosystems</p> <p>SC-6-UD-S-7<br/>Students will classify organisms into simple</p>  | <p><b>SC-06-3.4.1</b><br/><b>Students will describe the relationship between cells, tissues and organs in order to explain their function in multicellular organisms.</b></p> <p><b>Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form tissues. Different tissues are, in turn, grouped together to form larger functional</b></p>   |

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| <p>alike than different. Their seemingly great differences conceal the great similarities apparent at the cellular level.</p> <p><b>Earth in Space</b><br/> TG: L07.Exts (pp92-93)</p> <p><b>Organisms-From Macro to Micro</b><br/> SG: L01 (pp2-11)<br/> SG: L03 (pp28-37)<br/> SG: L05-6 (pp46-81)<br/> SG: L09-11 (pp106-145)<br/> SG: L13-14 (pp158-179)<br/> SG: L16-18 (pp188-215)<br/> TG: L01 (pp3-14)<br/> TG: L02.Exts (p25)<br/> TG: L03 (pp33-48)<br/> TG: L05-6 (pp57-104)<br/> TG: L09-11 (pp151-200)<br/> TG: L13-14 (pp219-236)<br/> TG: L14 (pp237-252)<br/> TG: L16-18 (pp267-302)</p> | <p>categories and discuss the limitations of classification systems</p> <p><b>Organisms-From Macro to Micro</b><br/> SG: L01 (pp2-11)<br/> SG: L20 (pp236-243)<br/> TG: L20 (pp331-350)</p>   | <p><b>units called organs. Examination of cells, tissues and organs reveals that each type has a distinct structure and set of functions that serve the organism.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>SC-06-3.4.2</b><br/> <b>Students will make inferences about the factors influencing behavior based on data/evidence of various organism’s behaviors.</b></p> <p><b>Behavior is one kind of response an organism may make to an internal or environmental stimulus. Observations of organisms, data collection/analysis, support generalizations/conclusions that a behavioral response is a set of actions determined in part by heredity and in part from experience. A behavioral response requires coordination and communication at many levels including cells, organ systems and organisms.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Organisms-From Macro to Micro-</b><br/> SG: L02 (pp12-27)<br/> SG: L06 (pp64-81)<br/> TG: L02 (pp15-32)<br/> TG: L06 (pp73-104)</p> |
| <p>SC-6-UD-U-7<br/> Students will understand that classification systems do not exist in nature, but are created by scientists to describe the vast diversity of organisms, frame research questions and suggest relationships among living things.</p> <p><b>Organisms-From Macro to Micro</b><br/> SG: L01 (pp2-11)<br/> SG: L20 (pp236-243)<br/> TG: L20 (pp331-350)</p>  | <p>SC-6-UD-S-7<br/> Students will classify organisms into simple categories and discuss the limitations of classification systems</p> <p><b>Organisms-From Macro to Micro</b><br/> SG: L01 (pp2-11)<br/> SG: L20 (pp236-243)<br/> TG: L20 (pp331-350)</p> |   |

**Big Idea: Biological Change (Biological Science) Grade 6**

The only thing certain is that everything changes. At the middle school level, students study relationships among populations and ecosystems that contribute to the success or demise of a specific population or species. Students construct basic explanations that can account for the great diversity among organisms.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.5** Students understand that under certain conditions nature tends to remain the same or move toward a balance.
- 2.6** Students understand how living and nonliving things change over time and the factors that influence the changes.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts   | Related Core Content for Assessment  |
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| <p>SC-6-BC-U-1<br/>Students will understand that small differences between parents and offspring result in future generations that are very different from their ancestors.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L13 (pp158-171)<br/>TG: L13 (pp219-236)</p>  | <p>SC-6-BC-S-1<br/>Students will investigate how small differences between parents and offspring can accumulate over time, eventually resulting in a wide variety of types of organisms with different characteristics from their different ancestors</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L13 (pp158-171)<br/>TG: L13 (pp219-236)</p> | <p><b>SC-06-3.5.1</b><br/><b>Students will explain that biological change over time accounts for the diversity of species developed through gradual processes over many generations.</b></p> <p><b>Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> |
| <p>SC-6-BC-U-2<br/>Students will understand that sensing and controlling internal processes in response to the external environment are essential for an organism's survival, regardless of how simple or complex it is.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L17 (pp194-203)<br/>TG: L17 (pp281-292)</p> | <p>SC-6-BC-S-2<br/>Students will explain how various organisms sense (e.g. hunger, fatigue, temperature awareness) and control their internal environments (e.g. fat metabolism, adrenaline release, perspiration) and how this contributes to their survival</p>   | <p>SC-06-3.5.2<br/><i>Students will understand that regulation of an organism's internal environment involves sensing the internal environment and changing physiological activities to keep conditions within the range required to survive. Maintaining a stable internal environment is essential for an organism's survival.</i></p>   |

SC-6-BC-U-3

Students will understand that scientists vary widely in what they study and how they do their work. While there is no fixed set of steps they follow, the basic process of science involves collecting relevant evidence, logical reasoning and the use of imaginative thinking in constructing explanations for what they observe.

SC-6-BC-S-3

Students will identify current research topics in biological sciences and identify the means/processes scientists are using to generate data about them

**Organisms-From Macro to Micro**

TG: L19.Exts (pp317-318)

SC-6-BC-S-4

Students will explain how the basic ideas of scientific investigation remain the same regardless of the field of study

SC-6-BC-S-5

Students will generate questions about the diversity of species, then collect information from a variety of sources to formulate explanations supported by scientific evidence

**Organisms-From Macro to Micro**

SG: L02 (pp12-27)

SG: L04 (pp38-45)

SG: L13 (pp158-171)

TG: L13 (pp219-236)

TG: L19.Exts (pp317-318)

**Big Idea: Energy Transformations (Unifying Concepts) Grade 6**

Energy transformations are inherent in almost every system in the universe—from tangible examples at the elementary level, such as heat production in simple Earth and physical systems to more abstract ideas beginning at middle school, such as those transformations involved in the growth, dying and decay of living systems. The use of models to illustrate the often invisible and abstract notions of energy transfer will aid in conceptualization, especially as students move from the macroscopic level of observation and evidence (primarily elementary school) to the microscopic interactions at the atomic level (middle and high school levels).

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts   | Related Core Content for Assessment   |
|---|---|---|
| <p>SC-6-ET-U-1<br/>Students will understand that oceans have a major effect on climate, because water in the oceans holds a large amount of heat.</p>   | <p>SC-6-ET-S-3<br/>Students will explain the cause and effect relationships between oceans and climate and describe the predictable patterns that result</p>                                      | <p><b>SC-06-4.6.1</b><br/><b>Students will describe or explain the cause and effect relationships between oceans and climate.</b></p> <p>Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.</p> <p style="text-align: right;"><b>DOK 2</b></p>  |
| <p>SC-6-ET-U-2<br/>Students will understand that several Earth systems and processes occur primarily because of the constant influx of solar energy.</p> <p><b>Earth in Space</b><br/>SG: L07 (pp88-101)<br/>TG: L07 (pp83-96)</p> <p><b>Organisms-From Macro to Micro</b><br/>TG: L18.Exts (pp299-300)</p> | <p>SC-6-ET-S-2<br/>Students will identify Earth processes influenced by energy from the sun (e.g. water cycle, nitrogen cycle, photosynthesis) and describe the sun’s role in those processes</p> | <p><b>SC-06-4.6.2</b><br/><b>Students will describe:</b></p> <ul style="list-style-type: none"> <li>● the effect of the Sun’s energy on the Earth system;</li> <li>● the connection/relationship between the Sun’s energy and seasons.</li> </ul> <p>The Sun is the major source of energy for Earth. The water cycle, winds, ocean currents and growth of plants are affected by the Sun’s energy. Seasons result from variations in the amount of the Sun’s energy hitting Earth’s surface.</p> |

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|  |   | <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Earth in Space</b><br/> SG: L04 (pp42-61)<br/> SG: L07 (pp88-101)<br/> TG: L04 (pp37-52)<br/> TG: L06.Exts (p81)<br/> TG: L07 (pp83-96)<br/> <b>Organisms-From Macro to Micro</b><br/> TG: L10.Exts (pp175-176)</p>   |
| <p>SC-6-ET-U-3<br/> Students will understand that seasons are a result of the interaction of the tilt of the Earth's axis relative to its orbital path.</p> <p><b>Earth in Space</b><br/> SG: L04 (pp42-61)<br/> TG: L04 (pp37-52)<br/> TG: L06.Exts (p81)<br/> <b>Organisms-From Macro to Micro</b><br/> TG: L10.Exts (pp175-176)</p> | <p>SC-6-ET-S-1<br/> Students will model and explain why some locations on Earth have seasons</p> <p><b>Earth in Space</b><br/> SG: L04 (pp42-61)<br/> TG: L04 (pp37-52)<br/> TG: L06.Exts (p81)<br/> <b>Organisms-From Macro to Micro</b><br/> TG: L10.Exts (pp175-176)</p> | <p><b>SC-06-4.6.2</b><br/> <b>Students will describe:</b></p> <ul style="list-style-type: none"> <li>● the effect of the Suns' energy on the Earth system;</li> <li>● the connection/relationship between the Sun's energy and seasons.</li> </ul> <p><b>The Sun is the major source of energy for Earth. The water cycle, winds, ocean currents and growth of plants are affected by the Sun's energy. Seasons result from variations in the amount of the Sun's energy hitting Earth's surface.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Earth in Space</b><br/> SG: L04 (pp42-61)<br/> SG: L07 (pp88-101)<br/> TG: L04 (pp37-52)<br/> TG: L06.Exts (p81)<br/> TG: L07 (pp83-96)<br/> <b>Organisms-From Macro to Micro</b><br/> TG: L10.Exts (pp175-176)</p> |
| <p>SC-6-ET-U-4<br/> Students will understand that energy, in the form of sunlight, is transformed by a chemical reaction in plant cells (photosynthesis) to form essential nutrients for the plant to live and grow.</p> <p><b>Organisms-From Macro to Micro</b><br/> SG: L07 (pp82-93)<br/> SG: L10 (pp120-131)</p>                   | <p>SC-6-ET-S-4<br/> Students will describe the role of photosynthesis in energy storage within plants</p> <p><b>Organisms-From Macro to Micro</b><br/> SG: L07 (pp82-93)<br/> SG: L10 (pp120-131)<br/> TG: L07 (pp105-130)<br/> TG: L10 (pp167-184)</p>                     | <p><b>SC-06-4.6.2</b><br/> <b>Students will describe:</b></p> <ul style="list-style-type: none"> <li>● the effect of the Suns' energy on the Earth system;</li> <li>● the connection/relationship between the Sun's energy and seasons.</li> </ul> <p><b>The Sun is the major source of energy for</b></p>   |

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| <p>TG: L07 (pp105-130)<br/>TG: L10 (pp167-184)</p>  |  | <p><b>Earth. The water cycle, winds, ocean currents and growth of plants are affected by the Sun's energy. Seasons result from variations in the amount of the Sun's energy hitting Earth's surface.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Earth in Space</b><br/>SG: L04 (pp42-61)<br/>SG: L07 (pp88-101)<br/>TG: L04 (pp37-52)<br/>TG: L06.Exts (p81)<br/>TG: L07 (pp83-96)</p> <p><b>Organisms-From Macro to Micro</b><br/>TG: L10.Exts (pp175-176)</p>  |
| <p>SC-6-ET-U-5<br/>Students will understand that inside a closed system, the temperature increases or decreases as heat energy is added or removed.</p> <p><b>Properties of Matter</b><br/>SG: L05-8 (pp38-77)<br/>SG: L13 (pp112-115)<br/>SG: L18 (pp150-161)<br/>TG: L05-8 (pp49-100)<br/>TG: L11.Exts (p132)<br/>TG: L13 (pp143-152)<br/>TG: L18 (pp193-208)<br/>TG: L22.Exts (p270)</p> | <p>SC-6-ET-S-5<br/>Students will experimentally investigate the relationship between temperature and heat transfer in closed systems</p> <p><b>Properties of Matter</b><br/>SG: L05 (pp38-55)<br/>TG: L05 (pp49-64)<br/>TG: L07.Exts (p86)<br/>TG: L13.Exts (p148)<br/>TG: L18.Exts (p201)</p> | <p>SC-06-4.6.3<br/><i>Students will understand that, on its own, heat travels only from higher temperature object/region to lower temperature object or region. Heat will continue to flow in this manner until the objects reach the same temperature. For example, a cup of hot water will continue to cool down until it comes to the same temperature as the surrounding area. Usually when heat is transferred to or from an object, the temperature changes. The temperature increases if heat is added and the temperature decreases if the heat is removed.</i></p> <p><b>Properties of Matter</b><br/>SG: L07 (pp64-73)<br/>TG: L07 (pp79-90)</p> |
| <p>SC-6-ET-U-6<br/>Students will understand that the Earth is a complex system of energy transformations, materials and processes. Understanding the whole requires first understanding individual subsystems and their interactions.</p> <p><b>Earth in Space</b><br/>SG: L02 (pp12-21)<br/>SG: L05 (pp62-73)</p>  | <p>SC-6-ET-S-1<br/>Students will model and explain why some locations on Earth have seasons</p> <p><b>Earth in Space</b><br/>SG: L04 (pp42-61)<br/>TG: L04 (pp37-52)<br/>TG: L06.Exts (p81)</p> <p><b>Organisms-From Macro to Micro</b><br/>TG: L10.Exts (pp175-176)</p>                       | <p><b>SC-06-4.6.1</b><br/><b>Students will describe or explain the cause and effect relationships between oceans and climate.</b></p> <p><b>Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.</b></p> <p style="text-align: right;"><b>DOK 2</b></p>  |

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| <p>SG: L15 (pp216-243)<br/> TG: L01 (pp3-10)<br/> TG: L06.Exts (p81)<br/> TG: L25.Exts (pp307-308)</p> | <p>SC-6-ET-S-2<br/> Students will identify Earth processes influenced by energy from the sun (e.g. water cycle, nitrogen cycle, photosynthesis) and describe the sun's role in those processes<br/> <b>Organisms-From Macro to Micro</b><br/> SG: L07 (pp82-93)<br/> SG: L10 (pp120-131)<br/> TG: L07 (pp105-130)<br/> TG: L10 (pp167-184)<br/> <b>Properties of Matter</b><br/> SG: L01 (pp2-13)</p> <p>SC-6-ET-S-3<br/> Students will explain the cause and effect relationships between oceans and climate and describe the predictable patterns that result</p> <p>SC-6-ET-S-4<br/> Students will describe the role of photosynthesis in energy storage within plants<br/> <b>Organisms-From Macro to Micro</b><br/> SG: L07 (pp82-93)<br/> SG: L10 (pp120-131)<br/> TG: L07 (pp105-130)<br/> TG: L10 (pp167-184)</p> <p>SC-6-ET-S-5<br/> Students will experimentally investigate the relationship between temperature and heat transfer in closed systems<br/> <b>Properties of Matter</b><br/> SG: L05 (pp38-55)<br/> TG: L05 (pp49-64)<br/> TG: L07.Exts (p86)<br/> TG: L13.Exts (p148)<br/> TG: L18.Exts (p201)</p> | <p><b>SC-06-4.6.2</b><br/> <b>Students will describe:</b></p> <ul style="list-style-type: none"> <li>• <b>the effect of the Sun's energy on the Earth system;</b></li> <li>• <b>the connection/relationship between the Sun's energy and seasons.</b></li> </ul> <p><b>The Sun is the major source of energy for Earth. The water cycle, winds, ocean currents and growth of plants are affected by the Sun's energy. Seasons result from variations in the amount of the Sun's energy hitting Earth's surface.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Earth in Space</b><br/> SG: L04 (pp42-61)<br/> SG: L07 (pp88-101)<br/> TG: L04 (pp37-52)<br/> TG: L06.Exts (p81)<br/> TG: L07 (pp83-96)<br/> <b>Organisms-From Macro to Micro</b><br/> TG: L10.Exts (pp175-176)</p> <p>SC-06-4.6.3<br/> <i>Students will understand that, on its own, heat travels only from higher temperature object/region to lower temperature object or region. Heat will continue to flow in this manner until the objects reach the same temperature. For example, a cup of hot water will continue to cool down until it comes to the same temperature as the surrounding area. Usually when heat is transferred to or from an object, the temperature changes. The temperature increases if heat is added and the temperature decreases if the heat is removed.</i></p> <p><b>Properties of Matter</b><br/> SG: L07 (pp64-73)<br/> TG: L07 (pp79-90)</p> |
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**Big Idea: Interdependence (Unifying Concepts) Grade 6**

It is not difficult for students to grasp the general notion that species depend on one another and on the environment for survival. But their awareness must be supported by knowledge of the kinds of relationships that exist among organisms, the kinds of physical conditions that organisms must cope with, the kinds of environments created by the interaction of organisms with one another and their physical surroundings, and the complexity of such systems. In middle school, students should be guided from specific examples of the interdependency of organisms to a more systematic view of the interactions that take place among organisms and their surroundings. Students growing understanding of systems in general will reinforce the concept of ecosystems. Stability and change in ecosystems can be considered in terms of variables such as population size, number and kinds of species, productivity, and the effect of human intervention.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts   | Related Core Content for Assessment   |
|---|---|---|
| <p>SC-6-I-U-1<br/>Students will understand that ecosystems are more than just the organisms they contain: geography, weather, climate and geologic factors also influence the interactions within an ecosystem.</p> <p style="text-align: center;"><b>Organisms-From Macro to Micro</b><br/>SG: L12-13 (pp146-171)<br/>TG: L12-13 (pp201-236)</p> <p>SC-6-I-U-2<br/>Students will understand that communities do not exist in isolation, but are globally interconnected by a number of Earth systems (e.g. ocean, atmosphere, lithosphere).</p> <p style="text-align: center;"><b>Earth in Space</b><br/>SG: L02 (pp12-21)<br/>SG: L05 (pp62-73)<br/>SG: L15 (pp216-243)<br/>TG: L01 (pp3-10)<br/>TG: L06.Exts (p81)</p> | <p>SC-6-I-S-1<br/>Students will describe and explore the biotic and abiotic factors that affect change in ecosystems</p> <p style="text-align: center;"><b>Organisms-From Macro to Micro</b><br/>SG: L12-13 (pp146-171)<br/>TG: L12-13 (pp201-236)</p> <p>SC-6-I-S-2<br/>Students will document and describe consequences of change in one or more abiotic factors on a population within an ecosystem</p> <p>SC-6-I-S-3<br/>Students will investigate how communities are interconnected, how they interact with different Earth systems, and represent these global connections/interactions in a variety of ways (e.g. writing, models, multi-media, claymation)</p> | <p><b>SC-06-4.7.1</b><br/><b>Students will describe the consequences of change in one or more abiotic factors on a population within an ecosystem.</b></p> <p><b>The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition).</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p style="text-align: center;"><b>Organisms-From Macro to Micro</b><br/>SG: L12-13 (pp146-171)<br/>TG: L12-13 (pp201-236)</p> |

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| <p>TG: L18 (pp277-286)<br/> <b>Properties of Matter</b><br/> TG: L25.Exts (pp307-308)</p>  | <p><b>Earth in Space</b><br/> SG: L02 (pp12-21)<br/> SG: L05 (pp62-73)<br/> SG: L15 (pp216-243)<br/> TG: L01 (pp3-10)<br/> TG: L06.Exts (p81)<br/> TG: L18 (pp277-286)<br/> <b>Properties of Matter</b><br/> TG: L25.Exts (pp307-308)</p>       |  |
| <p>SC-6-I-U-3<br/> Students will understand that science can sometimes be used to inform ethical decisions by identifying the likely consequences of an action, but cannot be used to establish if taking that action would be right or wrong.</p> | <p>SC-6-I-S-4<br/> Students will differentiate the usefulness of scientific research to predict the possible consequences of decisions about environmental issues from its limitations in making ethical/moral decisions about those issues</p> |  |

# Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

Grade 7



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## Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

| Grade Range           | <i>STC PROGRAM™ and GEMS®</i><br>Units   |
|-----------------------|--|
| K-3                   | <ul style="list-style-type: none"> <li>• <b>Changes</b></li> <li>• <b>Electric Circuits</b></li> <li>• <b>The Life Cycle of Butterflies</b></li> <li>• <b>Organisms</b></li> <li>• <b>Rocks and Minerals</b></li> <li>• <b>Solids and Liquids</b></li> <li>• <b>Sound</b></li> <li>• <b>Weather</b></li> <li>• <b>GEMS: Space Science</b></li> </ul> |
| 4 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Animal Studies</b></li> <li>• <b>Motion and Design</b></li> <li>• <b>Land and Water</b></li> <li>• <b>GEMS: Hot Water and Warm Homes</b></li> </ul>  |
| 5 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Ecosystems</b></li> <li>• <b>Experiments with Plants</b></li> <li>• <b>GEMS: Messages From Space</b></li> </ul>  |
| 6 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Organisms–From Macro to Micro</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 7 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 8 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Light</b></li> <li>• <b>Organisms–From Macro to Micro</b></li> </ul>   |

The STC PROGRAM™ and GEMS® Units are recommended based on the Kentucky Program of Studies and the Core Contents for Assessment. Provided for each grade level, are the units that most strongly align with the content objectives. Other STC PROGRAM™ Units may also match objectives within each grade level. For more information about any STC PROGRAM™ unit or GEMS® unit, visit [www.carolinacurriculum.com](http://www.carolinacurriculum.com).

GEMS® Space Science is research-based 3-5 science curriculum that teach fundamental concepts in space science.

### Legend

To save paper, the curriculum location information in this document has been abbreviated as follows:

- Unit abbreviations = noted in parentheses in the chart above
- TG = Teacher’s Guide
- S-Sec3 = Section 3 (containing a section on safety) in the STC® Teacher’s Guide
- L01, L02, etc. = Lesson 1, Lesson 2, etc.
- Les01 = Lesson 1
- Act01=Activity 1
- p, pp = page, pages
- RB = STC BOOK™ (a science reading book included in some of the grades 3–5 STC® unit kits)
- SB = Student Book
- Exts = Extensions (found at the end of most lessons in the Teacher’s Guide)
- App-A, App-B = Appendix A, Appendix B (found at the end of Section 4 in the Teacher’s Guide)

**Big Idea: Structure and Transformation of Matter (Physical Science) Grade 7**

A basic understanding of matter is essential to the conceptual development of other big ideas in science. During the middle years, physical and chemical changes in matter are observed, and students begin to relate these changes to the smaller constituents of matter—namely, atoms and molecules. The use of models (and an understanding of their scales and limitations) is an effective means of learning about the structure of matter. Looking for patterns in properties is also critical to comparing and explaining differences in matter.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.
- 2.5** Students understand that under certain conditions nature tends to remain the same or move toward a balance.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts  | Related Core Content for Assessment  |
|---|--|--|
| <p>SC-7-STM-U-1<br/>Students will understand that equal volumes of different substances usually have different weights.</p> <p><b>Catastrophic Events</b><br/>SG: L04 (pp42-53)<br/>TG: L04 (pp45-56)</p> <p><b>Properties of Matter</b><br/>SG: L01-5 (pp2-64)<br/>TG: L09 (pp101-112)<br/>TG: L14 (pp153-160)<br/>TG: L19 (pp209-226)<br/>TG: L26 (pp313-332)</p> | <p>SC-7-STM-S-1<br/>Students will compare the physical and chemical properties of a variety of substances, including examples of solids, liquids and gases</p> <p><b>Energy Machines and Motion</b><br/>SG: L02-3 (pp12-25)<br/>SG: L03 (pp20-25)<br/>TG: L02-3 (pp23-36)</p> <p><b>Properties of Matter</b> SG: L18-23 (pp150-217)</p> <p>SC-7-STM-S-3<br/>Students will distinguish between elements and compounds and classify them according to their properties</p> | <p><b>SC-07-1.1.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"><li>• <b>classify substances according to their chemical/reactive properties;</b></li><li>• <b>infer real life applications for substances based on chemical/reactive properties.</b></li></ul> <p><b>In chemical reactions, the total mass is conserved. Substances are often classified into groups if they react in similar ways. The patterns which allow classification, can be used to infer or understand real life applications for those substances.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Energy, Machines, and Motion</b><br/>SG: G - (pp237-239)<br/>SG: L01-22 (pp2-236)<br/>TG: L01-22 (pp2-236)</p> <p><b>Properties of Matter</b></p> |

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|   |  | SG: L18 (pp150-161)<br>SG: L20-23 (pp170-217)<br>TG: L18-23 (pp193-294)  |
| SC-7-STM-U-2<br>Students will understand that there are only 92 naturally occurring elements and all matter is made of some combination of them (compounds).<br><b>Properties of Matter</b><br>SG: L20-22 (pp170-207)<br>TG: L20-22 (pp227-274)<br>TG: L23.Exts (p284)  | SC-7-STM-S-2<br>Students will distinguish between elements and compounds and classify them according to their properties<br><b>Properties of Matter</b><br>SG: L20-22 (pp170-207)<br>TG: L20-22 (pp227-274)<br>TG: L23.Exts (p284)   | <b>SC-07-1.1.1</b><br><b>Students will:</b> <ul style="list-style-type: none"> <li>• <b>classify substances according to their chemical/reactive properties;</b></li> <li>• <b>infer real life applications for substances based on chemical/reactive properties.</b></li> </ul> <p><b>In chemical reactions, the total mass is conserved. Substances are often classified into groups if they react in similar ways. The patterns which allow classification can be used to infer or understand real life applications for those substances.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Energy, Machines, and Motion</b><br/>         SG: G - (pp237-239)<br/>         SG: L01-22 (pp2-236)<br/>         TG: L01-22 (pp2-236)<br/> <b>Properties of Matter</b><br/>         SG: L18 (pp150-161)<br/>         SG: L20-23 (pp170-217)<br/>         TG: L18-23 (pp193-294)</p> |
| SC-7-STM-U-3<br>Students will understand that elements, as well as compounds, can be classified according to their similar properties, including how they react with each other and how they may be used. The patterns, which allow classification, can be used to infer or understand real life applications for those substances.<br><b>Catastrophic Events</b> TG: L19.Exts (pp274-275)<br><b>Properties of Matter</b> | SC-7-STM-S-1<br>Students will compare the physical and chemical properties of a variety of substances, including examples of solids, liquids and gases<br><b>Energy Machines and Motion</b><br>SG: L02-3 (pp12-25)<br>SG: L03 (pp20-25)<br>TG: L02-3 (pp23-36)<br><b>Properties of Matter</b> SG: L18-23 (pp150-217) | <b>SC-07-1.1.2</b><br><b>Students will:</b> <ul style="list-style-type: none"> <li>• <b>classify elements and compounds according to their properties;</b></li> <li>• <b>compare properties of different combinations of elements.</b></li> </ul> <p><b>Observations of simple experiments illustrate that the atoms of chemical elements do not break down during normal</b></p>  |

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| <p>SG: L06 (pp56-63)<br/> SG: L12 (pp106-111)<br/> SG: L20-26 (pp170-235)<br/> TG: L06 (pp65-78)<br/> TG: L12 (pp135-142)<br/> TG: L16.Exts (p178)<br/> TG: L20-26 (pp227-332)</p>   | <p>SC-7-STM-S-4<br/> Students will observe reactions between substances that produce new substances very different from the reactants</p> <p><b>Catastrophic Events</b><br/> TG: L19.Exts (pp274-275)</p> <p><b>Properties of Matter</b><br/> SG: L06 (pp56-63)<br/> SG: L12 (pp106-111)<br/> SG: L20 (pp170-185)<br/> SG: L22-26 (pp198-235)<br/> TG: L06 (pp65-78)<br/> TG: L12 (pp135-142)<br/> TG: L16.Exts (p178)<br/> TG: L20 (pp227-240)<br/> TG: L22-26 (pp263-332)</p> | <p><b>laboratory reactions such as heating, exposure to electric currents, or reaction with acids. Elements combine in many ways to produce compounds. Common patterns emerge when comparing and contrasting the properties of compounds to the elements from which they are made. Understanding of these patterns allows for evidence-based predictions of new or different combinations of elements/compounds.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Properties of Matter</b><br/> SG: L20-22 (pp170-207)<br/> TG: L20-22 (pp227-274)<br/> TG: L23.Exts (p284)</p>   |
| <p>SC-7-STM-U-4<br/> Students will understand that many factors influence reaction rates, such as temperature, acidity and concentration.</p> <p><b>Catastrophic Events</b><br/> SG: L22 (pp240-251)<br/> TG: L22 (pp303-316)</p> <p><b>Properties of Matter</b><br/> SG: L23 (pp208-217)<br/> TG: L23 (pp275-294)</p> | <p>SC-7-STM-S-5<br/> Students will test factors that influence reaction rates</p> <p><b>Catastrophic Events</b><br/> SG: L22 (pp240-251)<br/> TG: L22 (pp303-316)</p> <p><b>Properties of Matter</b><br/> SG: L23 (pp208-217)<br/> TG: L23 (pp275-294)</p>  | <p><b>SC-07-1.1.1</b><br/> <b>Students will:</b></p> <ul style="list-style-type: none"> <li>• <b>classify substances according to their chemical/reactive properties;</b></li> <li>• <b>infer real life applications for substances based on chemical/reactive properties.</b></li> </ul> <p><b>In chemical reactions, the total mass is conserved. Substances are often classified into groups if they react in similar ways. The patterns which allow classification can be used to infer or understand real life applications for those substances.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Energy, Machines, and Motion</b><br/> SG: G - (pp237-239)<br/> SG: L01-22 (pp2-236)<br/> TG: L01-22 (pp2-236)</p> <p><b>Properties of Matter</b><br/> SG: L18 (pp150-161)<br/> SG: L20-23 (pp170-217)</p> |

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|  |   | TG: L18-23 (pp193-294) |
| <p>SC-7-STM-U-5<br/> Students will understand that investigations are conducted for different reasons, including to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories.</p> <p><b>Energy Machines and Motion</b><br/> SG: G - (pp237-239)<br/> SG: L01-22 (pp2-236)<br/> TG: L01-22 (pp3-254)</p> <p><b>Properties of Matter</b><br/> SG: L01-26 (pp2-235)<br/> TG: L01-26 (pp3-332)</p> | <p>SC-7-STM-S-6<br/> Students will explore real-life applications of a variety of elements and compounds and communicate findings in an authentic form (transactive writing, public speaking, multimedia presentations)</p> |                        |

**Big Idea: Motion and Forces (Physical Science) Grade 7**

Whether observing airplanes, baseballs, planets, or people, the motion of all bodies is governed by the same basic rules. At the middle level, qualitative descriptions of the relationship between forces and motion will provide the foundation for quantitative applications of Newton's Laws.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts  | Related Core Content for Assessment   |
|---|--|---|
| <p>SC-7-MF-U-1<br/>Students will understand that an object remains at rest or maintains a constant speed and direction of motion unless an unbalanced force acts on it (inertia).</p> <p><b>Catastrophic Events</b><br/>SG: L12 (pp134-153)<br/>TG: L12 (pp163-176)</p> <p><b>Energy Machines and Motion</b><br/>SG: L21 (pp214-225)<br/>TG: L18.Exts (p224)</p> <p><b>Earth in Space</b><br/>SG: L15 (pp216-243)<br/>TG: L15 (pp221-244)</p> <p>SC-7-MF-U-2<br/>Students will understand that forces acting against each other can be balanced, canceling each other out and having no net effect.</p> | <p>SC-7-MF-S-1<br/>Students will use appropriate tools and technology (e.g., timer, meter stick, balance, spring scale) to investigate the position, speed and motion of objects</p> <p><b>Catastrophic Events</b><br/>SG: L11-12 (pp120-153)<br/>SG: L15 (pp170-189)<br/>TG: L11-12 (pp149-176)<br/>TG: L15 (pp197-218)</p> <p><b>Energy Machines and Motion</b><br/>SG: L01 (pp2-11)<br/>SG: L05-13 (pp36-129)<br/>SG: L15-22 (pp140-236)<br/>TG: L01 (pp3-22)<br/>TG: L05-13 (pp47-166)<br/>TG: L15-22 (pp177-254)</p> <p><b>Earth in Space</b><br/>SG: L15 (pp216-243)<br/>TG: L15 (pp221-244)</p> <p><b>Properties of Matter</b><br/>SG: L04 (pp30-37)<br/>SG: L08-9 (pp74-83)<br/>SG: L14 (pp116-121)<br/>SG: L26 (pp230-235)<br/>TG: L08-9 (pp91-112)<br/>TG: L14 (pp153-160)<br/>TG: L26 (pp313-332)</p> | <p><b>SC-07-1.2.1</b><br/><b>Students will explain the cause and effect relationship between simple observable motion and unbalanced forces.</b></p> <p><b>An object remains at rest or maintains a constant speed and direction of motion unless an unbalanced force acts on it (e.g., gravity). When an unbalanced force acts on an object, the change in speed or direction depends on the size and direction of the force.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |

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|   | <p>SC-7-MF-S-2<br/>Students will test the cause and effect relationship between straight-line motion and unbalanced forces</p> <p>SC-7-MF-S-3<br/>Students will investigate balanced and unbalanced forces and their effect on objects and their motion</p> <p>SC-7-MF-S-4<br/>Students will make inferences and draw conclusions about the motion of objects, and predict changes in position and motion as related to the mass or force</p> <p><b>Energy Machines and Motion</b><br/>SG: L21 (pp214-225)<br/>TG: L18.Exts (p224)</p> <p><b>Earth in Space</b><br/>TG: L15 (pp221-244)</p> <p>SC-7-MF-S-5<br/>Students will calculate work as the product of force and distance moved in the direction of the force</p> <p><b>Energy Machines and Motion</b><br/>SG: L08 (pp72-81)<br/>SG: L10-16 (pp92-161)<br/>SG: L20-22 (pp200-236)<br/>TG: L07.Exts (p83)<br/>TG: L08 (pp85-98)<br/>TG: L09.Exts (p105)<br/>TG: L10-16 (pp107-202)<br/>TG: L20-22 (pp235-254)</p> |   |
| <p>SC-7-MF-U-3<br/>Students will understand that gravity is an attractive force created by mass. All objects are attracted to each other by gravity, but this attraction is easy to see only when at least one of the objects has a large mass.</p> | <p>SC-7-MF-S-6<br/>Students will identify gravity as a force that acts over a distance, and distinguish it from other forces that do the same (e.g. magnetism)</p> <p><b>Energy Machines and Motion</b><br/>SG: L05-6 (pp36-61)</p>   | <p><b>SC-07-1.2.1</b><br/><b>Students will explain the cause and effect relationship between simple observable motion and unbalanced forces.</b></p> <p><b>An object remains at rest or maintains a</b></p> |

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| <p><b>Energy Machines and Motion</b><br/>         SG: L05-6 (pp36-61)<br/>         SG: L20-21 (pp200-225)<br/>         TG: L05 (pp47-58)<br/>         TG: L20-21 (pp235-246)</p> | <p>SG: L20-21 (pp200-225)<br/>         TG: L05 (pp47-58)<br/>         TG: L20-21 (pp235-246)</p> <p>SC-7-MF-S-7<br/>         Students will investigate the properties of gravity and observe its effects on objects</p> <p><b>Energy Machines and Motion</b><br/>         SG: L05-6 (pp36-61)<br/>         SG: L20-21 (pp200-225)<br/>         TG: L05 (pp47-58)<br/>         TG: L20-21 (pp235-246)</p> <p>SC-7-MF-S-8<br/>         Students will distinguish between weight (as a function of gravity) and mass (matter content) of an object</p> <p><b>Energy Machines and Motion</b><br/>         SG: L05-6 (pp36-61)<br/>         TG: L05-6 (pp47-74)<br/>         TG: L07.Exts (p83)<br/>         TG: L18.Exts (p224)<br/>         TG: L21.Exts (p245)</p> <p><b>Earth in Space</b><br/>         SG: L14-15 (pp200-243)<br/>         TG: L14-15 (pp209-244)</p> <p><b>Properties of Matter</b><br/>         SG: L01-2 (pp2-23)<br/>         SG: L04 (pp30-37)<br/>         SG: L08 (pp74-77)<br/>         SG: L09 (pp78-83)<br/>         SG: L14 (pp116-121)<br/>         SG: L25-26 (pp224-235)<br/>         TG: L01-2 (pp3-26)<br/>         TG: L04 (pp39-48)<br/>         TG: L08-9 (pp91-112)<br/>         TG: L14 (pp153-160)<br/>         TG: L25-26 (pp303-332)</p> | <p><b>constant speed and direction of motion unless an unbalanced force acts on it (e.g., gravity). When an unbalanced force acts on an object, the change in speed or direction depends on the size and direction of the force.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |
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| <p>SC-7-MF-U-4<br/> Students will understand that technology used to gather data enhances accuracy and allows scientists to analyze and quantify results of investigations.</p> <p><b>Energy Machines and Motion</b><br/> TG: L04.Exts (pp41-42)<br/> TG: L06.Exts (pp68-69)<br/> TG: L12.Exts (p153)<br/> TG: L17.Exts (p208)<br/> TG: L21.Exts (p245)</p> <p><b>Properties of Matter</b><br/> TG: L11.Exts (p132)<br/> TG: L15.Exts (p166)<br/> TG: L16.Exts (p178)<br/> TG: L17.Exts (p185)<br/> TG: L18.Exts (p201)<br/> TG: L21.Exts (p251)<br/> TG: L23.Exts (p284)</p> | <p>SC-7-MF-S-9<br/> Students will explore the impact of technology on measurement by making measurements with tools of varying precision, comparing the results and predicting possible impacts that variation in measurements might have in real-life investigations</p> <p><b>Energy Machines and Motion</b><br/> TG: L04.Exts (pp41-42)<br/> TG: L06.Exts (pp68-69)<br/> TG: L12.Exts (p153)<br/> TG: L17.Exts (p208)<br/> TG: L21.Exts (p245)</p> <p><b>Properties of Matter</b><br/> TG: L11.Exts (p132)<br/> TG: L15-18 Exts (p166)<br/> TG: L18.Exts (p201)<br/> TG: L21.Exts (p251)<br/> TG: L23.Exts (p284)</p> |  |
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**Big Idea: The Earth and the Universe (Earth/Space Science) Grade 7**

The Earth system is in a constant state of change. These changes affect life on Earth in many ways. Development of conceptual understandings about processes that shape the Earth begin at the elementary level with understanding *what* Earth materials are and that change occurs. At the middle level, students investigate *how* these changes occur. An understanding of systems and their interacting components will enable students to evaluate supporting theories of Earth changes. The use of models and observance of patterns to explain common phenomena is essential to building a conceptual foundation and supporting ideas with evidence at all levels. In middle school, students begin to look beyond what can be directly observed as they explore the Earth-sun-moon system, as well as the rest of our solar system, employing the concept of scale within their models. Patterns play an important role as students seek to develop a conceptual understanding of gravity in their world and in the universe.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment   |
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| <p>SC-7-EU-U-1<br/>Students will understand that regular and predictable movement is not limited to our solar system. New technologies, coupled with an understanding of the laws of motion, allow for the discovery of celestial bodies that cannot be directly observed.</p> | <p>SC-7-EU-S-1<br/>Students will research how the laws of motion have been (and are still) used to make predictions about the movement of planets and satellites<br/><b>Earth in Space</b><br/>SG: L15 (pp216-243)<br/>TG: L15-16 (pp221-268)</p> <p>SC-7-EU-S-3<br/>Students will investigate the structure of the galaxy and the Earth’s place within it</p> | <p><b>SC-07-2.3.3</b><br/><b>Students will describe the concept of gravity and the effect of gravitational force between the sun, moon and Earth.</b></p> <p><b>The gravitational pull of the Sun and moon on Earth’s oceans as the major cause of tides can be understood from generalizations based on evidence.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Energy, Machines, and Motion</b><br/>TG: L05.Exts (pp53-54)<br/><b>Earth in Space</b><br/>SG: L14-16 (pp200-265)<br/>TG: L14-16 (pp209-268)</p> |
| <p>SC-7-EU-U-2<br/>Students will understand that our solar system is part of a larger collection of millions of stars (Milky Way Galaxy), any of which may be the center of its own system of orbiting planets.</p>  | <p>SC-7-EU-S-3<br/>Students will investigate the structure of the galaxy and the Earth’s place within it</p>   |   |

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| <p>SC-7-EU-U-3<br/>Students will understand that gravitational interactions within the Earth, sun and moon system impact phenomena and organisms on the surface of the Earth.</p> <p><b>Catastrophic Events</b><br/>SG: L07 (pp80-95)<br/>TG: L01.Exts (pp10-11)<br/>TG: L07 (pp83-102)</p> <p><b>Energy Machines and Motion</b><br/>TG: L05.Exts (pp53-54)</p> <p><b>Earth in Space</b> SG: L01-9 (pp2-127)<br/>SG: L14-16 (pp200-265)<br/>TG: L01-9 (pp3-146)<br/>TG: L14-16 (pp209-268)</p>                     | <p>SC-7-EU-S-2<br/>Students will describe the effects of gravity on the movements and interactions of the Earth, sun and moon</p> <p><b>Energy Machines and Motion</b><br/>TG: L05.Exts (pp53-54)</p> <p><b>Earth in Space</b><br/>SG: L14-16 (pp200-265)<br/>TG: L14-16 (pp209-268)</p>  | <p><b>SC-07-2.3.3</b><br/><b>Students will describe the concept of gravity and the effect of gravitational force between the sun, moon and Earth.</b></p> <p>The gravitational pull of the Sun and moon on Earth's oceans as the major cause of tides can be understood from generalizations based on evidence.</p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Energy, Machines, and Motion</b><br/>TG: L05.Exts (pp53-54)</p> <p><b>Earth in Space</b><br/>SG: L14-16 (pp200-265)<br/>TG: L14-16 (pp209-268)</p>  |
| <p>SC-7-EU-U-4<br/>Students will understand that models of the interior of the Earth have been constructed primarily from inferences based on limited data obtained during earthquakes and volcanic eruptions. These models are useful, but are open to revision or rejection as new information is obtained.</p> <p><b>Catastrophic Events</b><br/>SG: L10 (pp114-119)<br/>SG: L14-18 (pp164-209)<br/>TG: L10 (pp143-148)<br/>TG: L14-18 (pp187-264)</p> <p><b>Properties of Matter</b><br/>SG: L05 (pp38-55)</p> | <p>SC-7-EU-S-4<br/>Students will analyze the evidence used to infer the composition of the Earth's interior and evaluate the models based upon that evidence</p> <p><b>Catastrophic Events</b><br/>SG: L10 (pp114-119)<br/>SG: L14-18 (pp164-209)<br/>TG: L10-18 (pp143-264)</p> <p><b>Properties of Matter</b><br/>SG: L05 (pp38-55)</p> | <p><b>SC-07-2.3.1</b><br/><b>Students will make inferences and predictions related to changes in the Earth's surface or atmosphere based on data/evidence.</b></p> <p>The Earth's processes we see today, including erosion, movement of lithospheric plates and changes in atmospheric composition, are predictable and similar to those that occurred in the past. Analysis of evidence from Earth's history substantiates the conclusion that the planet has also been influenced by occasional catastrophes such as the impact of an asteroid or comet.</p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Catastrophic Events</b><br/>SG: L09 (pp102-112)<br/>SG: L24 (pp264-273)<br/>TG: L09 (pp127-142)<br/>TG: L19.Exts (pp274-275)<br/>TG: L24 (pp329-346)</p> <p><b>Earth in Space</b><br/>SG: L13 (pp174-199)</p> |

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|  |  | SG: L17 (pp268-289)<br>SG: L19 (pp312-323)<br>TG: L13 (pp197-208)<br>TG: L17 (pp269-276)<br>TG: L19 (pp287-292)  |
| <p>SC-7-EU-U-5<br/>Students will understand that the Earth's layers vary widely in their properties, and interactions between them can manifest themselves in ways that impact both the Earth and its organisms.</p> <p><b>Catastrophic Events</b><br/>         SG: L10 (pp114-119)<br/>         SG: L14-18 (pp164-209)<br/>         TG: L10 (pp143-148)<br/>         TG: L14-18 (pp187-264)</p> <p><b>Properties of Matter</b><br/>         SG: L05 (pp38-55)</p> | <p>SC-7-EU-S-5<br/>Students will model the layers of the Earth, explain interactions between them and describe potential results of those interactions</p> <p><b>Catastrophic Events</b><br/>         SG: L08 (pp96-101)<br/>         SG: L10-20 (pp114-231)<br/>         SG: L23-25 (pp252-282)<br/>         TG: L08 (pp103-126)<br/>         TG: L10 (pp143-148)<br/>         TG: L11-20 (pp149-292)<br/>         TG: L23-25 (pp217-372)</p> <p><b>Earth in Space</b><br/>         SG: L13 (pp174-199)<br/>         TG: L13 (pp197-208)</p> <p><b>Properties of Matter</b><br/>         SG: L05 (pp38-55)<br/>         TG: L05.Exts (p56)<br/>         TG: L11.Exts (p132)</p> | <p><b>SC-07-2.3.2</b><br/> <b>Students will explain the layers of the Earth and their interactions.</b></p> <p><b>The use of models/diagrams/graphs helps illustrate that the Earth is layered. The lithosphere is the thin crust and the upper part of the mantle. Lithospheric plates move slowly in response to movements in the mantle. There is a dense core at the center of the Earth.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Catastrophic Events</b><br/>         SG: L10 (pp114-119)<br/>         SG: L14-18 (pp164-209)<br/>         TG: L10 (pp143-148)<br/>         TG: L14-18 (pp187-264)</p> <p><b>Properties of Matter</b><br/>         SG: L05 (pp38-55)</p> |

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| <p>SC-7-EU-U-6<br/>Students will understand that while some changes to the Earth occur without warning, many changes to the surface or atmosphere can be predicted from available data/evidence.</p> <p><b>Catastrophic Events</b><br/>SG: L09 (pp102-112)<br/>SG: L24 (pp264-273)<br/>TG: L03.Exts (pp35-36)<br/>TG: L09 (pp127-142)<br/>TG: L19.Exts (pp274-275)<br/>TG: L24 (pp329-346)</p> <p><b>Earth in Space</b><br/>SG: L13 (pp174-199)<br/>TG: L13 (pp197-208)</p> | <p>SC-7-EU-S-6<br/>Students will investigate the forces and processes that change Earth's surface or atmosphere and analyze data to generate predictions of their effects</p> | <p><b>SC-07-2.3.1</b><br/><b>Students will make inferences and predictions related to changes in the Earth's surface or atmosphere based on data/evidence.</b></p> <p><b>The Earth's processes we see today, including erosion, movement of lithospheric plates and changes in atmospheric composition, are predictable and similar to those that occurred in the past. Analysis of evidence from Earth's history substantiates the conclusion that the planet has also been influenced by occasional catastrophes such as the impact of an asteroid or comet.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Catastrophic Events</b><br/>SG: L09 (pp102-112)<br/>SG: L24 (pp264-273)<br/>TG: L09 (pp127-142)<br/>TG: L19.Exts (pp274-275)<br/>TG: L24 (pp329-346)</p> <p><b>Earth in Space</b><br/>SG: L13 (pp174-199)</p> |
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**Big Idea: Unity and Diversity (Biological Science) Grade 7**

All matter is comprised of the same basic elements, goes through the same kinds of energy transformations, and uses the same kinds of forces to move. Living organisms are no exception. In middle school, students begin to compare, contrast, and classify the microscopic features of organisms—the cells, as well as investigate reproduction as the essential process to the continuation of all species. Expected patterns of genetic traits are predicted. Distinctions are made between learned behaviors and inherited traits. Emphasis at every level should be placed upon the understanding that while every living thing is composed of similar small constituents that combine in predictable ways, it is the subtle variations within these small building blocks that account for both the likenesses and differences in form and function that create the diversity of life.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment  |
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| <p>SC-7-UD-U-1<br/>Students will understand that specialized structures called genes are located in the chromosomes of each living cell. These structures have the task of passing on characteristics that make offspring resemble their parents (heredity).</p> | <p>SC-7-UD-S-2<br/>Students will research and describe the role of genes/chromosomes in the passing of information from one generation to another (heredity)</p> | <p><b>SC-07-3.4.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"><li>• describe the role of genes/chromosomes in the passing of information from one generation to another (heredity);</li><li>• compare inherited and learned traits.</li></ul> <p>Every organism requires a set of instructions for specifying its traits. This information is contained in genes located in the chromosomes of each cell that can be illustrated through the use of models. Heredity is the passage of these instructions from one generation to another and should be distinguished from learned traits.</p> <p style="text-align: right;"><b>DOK 2</b></p> |

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| <p><b>SC-7-UD-U-2</b><br/>Students will understand that inherited traits of an offspring come directly from the genes of the parent, while learned traits are acquired after birth through interactions with the offspring's surroundings</p>   | <p><b>SC-7-UD-S-3</b><br/>Students will describe the differences between learned and inherited behaviors and characteristics, and classify examples of each using tables, graphs or diagrams</p> | <p><b>SC-07-3.4.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• describe the role of genes/chromosomes in the passing of information from one generation to another (heredity);</li> <li>• compare inherited and learned traits.</li> </ul> <p>Every organism requires a set of instructions for specifying its traits. This information is contained in genes located in the chromosomes of each cell that can be illustrated through the use of models. Heredity is the passage of these instructions from one generation to another and should be distinguished from learned traits.</p> <p style="text-align: right;"><b>DOK 2</b></p> |
| <p><b>SC-7-UD-U-3</b><br/>Students will understand that asexual reproduction involves only the passing on of one parent's genes, resulting in offspring with genes identical to those of the parent. Sexual reproduction requires the combination of genes from male and female sex cells, creating offspring with a blend of traits.</p> | <p><b>SC-7-UD-S-1</b><br/>Students will describe and compare sexual and asexual reproduction, including advantages and disadvantages of each</p>   | <p><b>SC-07-3.4.2</b><br/><b>Students will describe and compare sexual and asexual reproduction.</b></p> <p>Reproduction is a characteristic of all living systems and is essential to the continuation of every species as evidenced through observable patterns. A distinction should be made between organisms that reproduce asexually and those that reproduce sexually. In species that reproduce sexually, including humans and plants, male and female sex cells carrying genetic information unite to begin the development of a new individual.</p> <p style="text-align: right;"><b>DOK 2</b></p>  |

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| <p>SC-7-UD-U-4<br/>Students will understand that sexual reproduction creates variations among offspring, gradually contributing to a wide variety of life.</p>  | <p>SC-7-UD-S-4<br/>Students will research variations within species that result from sexual reproduction</p>                                | <p><b>SC-07-3.4.2</b><br/><b>Students will describe and compare sexual and asexual reproduction.</b></p> <p>Reproduction is a characteristic of all living systems and is essential to the continuation of every species as evidenced through observable patterns. A distinction should be made between organisms that reproduce asexually and those that reproduce sexually. In species that reproduce sexually, including humans and plants, male and female sex cells carrying genetic information unite to begin the development of a new individual.</p> <p style="text-align: right;"><b>DOK 2</b></p>  |
| <p>SC-7-UD-U-5<br/>Students will understand that the observable differences among humans are minor compared to their internal similarity, as evidenced by the ability of people from all over the world to physically mix through reproduction, blood transfusions and organ transplants.</p> | <p>SC-7-UD-S-5<br/>Students will compare the physiological similarities among people from geographically and culturally diverse origins</p> | <p><b>SC-07-3.4.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• <b>describe the role of genes/chromosomes in the passing of information from one generation to another (heredity);</b></li> <li>• <b>compare inherited and learned traits.</b></li> </ul> <p>Every organism requires a set of instructions for specifying its traits. This information is contained in genes located in the chromosomes of each cell that can be illustrated through the use of models. Heredity is the passage of these instructions from one generation to another and should be distinguished from learned traits.</p> <p style="text-align: right;"><b>DOK 2</b></p> |

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| <p>SC-7-UD-U-6<br/>Students will understand that research involving living things requires ethical considerations not required when investigating non-living things. Human subjects must be fully informed about potential risks and freely consent to any involvement. Because animals cannot make their own choices, special care must be taken in using them in scientific research.</p> | <p>SC-7-UD-S-6<br/>Students will support and/or defend a position related to the ethical considerations of scientific research involving humans and other organisms, both orally and in writing</p> |  |
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**Big Idea: Biological Change (Biological Science) Grade 7**

The only thing certain is that everything changes. At the middle school level, students study relationships among populations and ecosystems that contribute to the success or demise of a specific population or species. Students construct basic explanations that can account for the great diversity among organisms.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.5 Students understand that under certain conditions nature tends to remain the same or move toward a balance.
- 2.6 Students understand how living and nonliving things change over time and the factors that influence the changes.

| <b>Program of Studies: Understandings</b>   | <b>Program of Studies: Skills and Concepts</b>   | <b>Related Core Content for Assessment</b>  |
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| <p>SC-7-BC-U-1<br/>Students will understand that over time, some species have become so adapted to each other that neither could survive without the other.</p> | <p>SC-7-BC-S-1<br/>Students will investigate parasitic and symbiotic relationships among organisms</p> | <p><b>SC-07-3.5.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"><li>• describe the usefulness of fossil information to make conclusions about past life forms and environmental conditions;</li><li>• explain the cause and effect relationship of the extinction of a species and environmental changes.</li></ul> <p><b>Extinction of species is common and occurs when the adaptive characteristics of a species are insufficient to allow its survival. Most of the species that have lived on Earth no longer exist. Fossils provide evidence of how environmental conditions and life have changed.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Earth in Space</b><br/>SG: L18 (pp290-311)<br/>TG: L18 (pp277-286)</p> |

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| <p>SC-7-BC-U-2<br/>Students will understand that most of the species that have lived on Earth no longer exist. A species will become extinct when changes in environmental conditions (either gradual or rapid) are greater than its ability to adapt</p> <p><b>Earth in Space</b><br/>SG: L18 (pp290-311)<br/>TG: L18 (pp277-286)</p> | <p>SC-7-BC-S-2<br/>Students will explore the environmental factors that have resulted in the extinction of species</p> <p><b>Earth in Space</b><br/>SG: L18 (pp290-311)<br/>TG: L18 (pp277-286)</p>   | <p><b>SC-07-3.5.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>describe the usefulness of fossil information to make conclusions about past life forms and environmental conditions;</li> <li>explain the cause and effect relationship of the extinction of a species and environmental changes.</li> </ul> <p>Extinction of species is common and occurs when the adaptive characteristics of a species are insufficient to allow its survival. Most of the species that have lived on Earth no longer exist. Fossils provide evidence of how environmental conditions and life have changed.</p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Earth in Space</b><br/>SG: L18 (pp290-311)<br/>TG: L18 (pp277-286)</p> |
| <p>SC-7-BC-U-3<br/>Students will understand that fossils provide evidence of how biological change over time accounts for the diversity of species developed through gradual processes over many generations.</p>  | <p>SC-7-BC-S-3<br/>Students will use information from the fossil record to investigate changes in organisms and their environments to make inferences about past life forms and environmental conditions</p> <p><b>Earth in Space</b><br/>SG: L18 (pp290-311)<br/>TG: L18 (pp277-286)</p> | <p><b>SC-07-3.5.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>describe the usefulness of fossil information to make conclusions about past life forms and environmental conditions;</li> <li>explain the cause and effect relationship of the extinction of a species and environmental changes.</li> </ul> <p>Extinction of species is common and occurs when the adaptive characteristics of a species are insufficient to allow its survival. Most of the species that have lived on Earth no longer exist. Fossils provide evidence of how environmental</p>   |

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|  |   | <p><b>conditions and life have changed.</b></p> <p><b>DOK 3</b></p> <p><b>Earth in Space</b><br/>         SG: L18 (pp290-311)<br/>         TG: L18 (pp277-286)</p> |
| <p>SC-7-BC-U-4<br/>         Students will understand that results of scientific investigations are seldom exactly the same, but if the differences are large it is important to try to figure out why. Keeping careful records is important to help investigate what might have caused the differences.</p> <p><b>Properties of Matter</b><br/>         SG: L04 (pp30-37)<br/>         SG: L13 (pp112-115)<br/>         SG: L26 (pp230-235)<br/>         TG: L04 (pp39-48)<br/>         TG: L13 (pp143-152)<br/>         TG: L26 (pp313-332)</p> | <p>SC-7-BC-S-4<br/>         Students will compare the results from a variety of investigations (based on similar hypotheses) to identify differences between their outcomes/conclusions and propose reasonable explanations for those discrepancies</p> |  |

**Big Idea: Energy Transformations (Unifying Concepts) Grade 7**

Energy transformations are inherent in almost every system in the universe—from tangible examples at the elementary level, such as heat production in simple Earth and physical systems to more abstract ideas beginning at middle school, such as those transformations involved in the growth, dying and decay of living systems. The use of models to illustrate the often invisible and abstract notions of energy transfer will aid in conceptualization, especially as students move from the macroscopic level of observation and evidence (primarily elementary school) to the microscopic interactions at the atomic level (middle and high school levels).

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts   | Related Core Content for Assessment  |
|--|---|--|
| <p>SC-7-ET-U-1<br/>Students will understand that most of the energy that powers the Earth’s systems comes from the sun. Energy from inside the Earth, however, is responsible for some important phenomena (volcanism, plate tectonics).</p> <p><b>Catastrophic Events</b><br/>SG: L10 (pp114-119)<br/>SG: L13-18 (pp154-209)<br/>SG: L22 (pp240-251)<br/>TG: L10 (pp143-148)<br/>TG: L13-18 (pp177-264)<br/>TG: L19.Exts (pp274-275)<br/>TG: L22 (pp303-316)</p> <p><b>Energy Machines and Motion</b><br/>SG: L08 (pp72-81)</p> <p><b>Earth in Space</b><br/>SG: L07 (pp88-101)<br/>SG: L13 (pp174-199)<br/>TG: L07 (pp83-96)<br/>TG: L13 (pp197-208)</p> <p><b>Properties of Matter</b><br/>SG: L05 (pp38-55)<br/>TG: L05.Exts (p56)</p> | <p>SC-7-ET-S-1<br/>Students will investigate a variety of Earth systems that are powered by solar (e.g. water cycle, climate, carbon cycle) and/or geothermal (e.g. plate tectonics, volcanism) energy</p> <p><b>Catastrophic Events</b><br/>SG: L06-7 (pp68-95)<br/>SG: L16 (pp190-193)<br/>SG: L18 (pp200-209)<br/>SG: L22 (pp240-251)<br/>TG: L06-7 (pp69-102)<br/>TG: L16 (pp219-232)<br/>TG: L18 (pp257-264)<br/>TG: L22 (pp303-316)</p> <p><b>Energy Machines and Motion</b><br/>SG: L08 (pp72-81)</p> <p><b>Earth in Space</b><br/>SG: L19 (pp312-323)<br/>TG: L19 (pp287-292)</p> <p><b>Properties of Matter</b><br/>SG: L01 (pp2-13)</p> | <p><i>SC-07-4.6.1</i><br/><i>Students will understand that Earth systems have sources of energy that are internal and external to the Earth. The Sun is the major external source of energy.</i></p> <p><b>Catastrophic Events</b><br/>SG: L13 (pp154-163)<br/>SG: L16 (pp190-193)<br/>SG: L18 (pp200-209)<br/>SG: L22 (pp240-251)<br/>TG: L13 (pp177-186)<br/>TG: L16 (pp219-232)<br/>TG: L18 (pp257-264)<br/>TG: L22 (pp303-316)</p> <p><b>Energy, Machines, and Motion</b><br/>SG: L08 (pp72-81)<br/>SG: L09 (pp82-91)<br/>TG: L04.Exts (pp41-42)</p> <p><b>Earth in Space</b><br/>SG: L07 (pp88-101)<br/>TG: L07 (pp83-96)</p> |

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| <p>SC-7-ET-U-2<br/>Students will understand that the amount of energy in a closed system remains the same, so that the energy lost by a hot object equals the energy gained by a cold one.</p> | <p>SC-7-ET-S-3<br/>Students will explain where energy comes from (and goes next) in a variety of real-world examples (e.g. burning, respiration, residential lighting, dry cell batteries) involving different forms of energy (e.g. heat, light, kinetic, chemical)</p> <p><b>Catastrophic Events</b><br/>SG: L13 (pp154-163)<br/>TG: L13 (pp177-186)<br/>EECD - TG: L01.Exts (p16)</p> <p><b>Energy Machines and Motion</b><br/>SG: L09 (pp82-91)</p> <p><b>Earth in Space</b><br/>SG: L07 (pp88-101)<br/>TG: L07 (pp83-96) SC-7-ET-S-6</p> <p>Students will describe the kinetic molecular theory of matter</p> <p>SC-7-ET-S-7<br/>Students will experiment with heat flow inside closed and open systems to explore the concept of thermal equilibrium</p> | <p><b>SC-07-4.6.2</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>describe the transfer and/or transformations of energy which occur in examples that involve several different forms of energy (e.g., heat, electrical, light, motion of objects and chemical).</li> <li>Explain, qualitatively or quantitatively, that heat lost by hot object equals the heat gained by cold object.</li> </ul> <p>The transfer and transformation of energy can be examined in a variety of real life examples. Models are an appropriate way to convey the abstract/invisible transfer of energy in a system.</p> <p>Heat energy is the disorderly motion of molecules. Heat can be transferred through materials by the collisions of atoms or across space by radiation. If the material is fluid, currents will be set up in it that aid the transfer of heat. To change something's speed, to bend or stretch things, to heat or cool them, to push things together, to expand or contract them or tear them apart all require transfers (and some transformations) of energy. Heat lost by hot object equals the heat gained by cold object. This is an energy conservation statement. Whenever hot and cold objects are put in contact, heat energy always transfers from the hot object to the cold object and this continues until all the mass is at the same temperature. Students should understand that heat produced by burning comes from the release of chemical energy of the substance.</p> <p style="text-align: right;"><b>DOK 3</b></p> <p style="text-align: center;"><b>Energy, Machines, and Motion</b></p> |
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|  |   | <p>SG: L02-4 (pp12-35)<br/>         SG: L10 (pp92-97)<br/>         SG: L17 (pp164-173)<br/>         SG: L19 (pp188-199)<br/>         SG: L20 (pp200-213)<br/>         SG: L22 (pp226-236)<br/>         TG: L02-4 (pp23-46)<br/>         TG: L09 (pp99-106)<br/>         TG: L10 (pp107-130)<br/>         TG: L17 (pp203-216)<br/>         TG: L19-22 (pp229-254)</p>  |
| <p>SC-7-ET-U-3<br/>         Students will understand that all energy must have a source and may change forms or be transferred in a wide variety of ways, including via waves.</p> <p><b>Catastrophic Events</b><br/>         SG: L11 (pp120-133)<br/>         SG: L14 (pp164-169)<br/>         SG: L17 (pp194-197)<br/>         TG: L11 (pp149-162)<br/>         TG: L12.Exts (p172)<br/>         TG: L14 (pp187-196)<br/>         TG: L17 (pp233-256)</p> <p><b>Energy Machines and Motion</b><br/>         SG: L02 -4(pp12-35)<br/>         SG: L10 (pp92-97)<br/>         SG: L17-20 (pp164-213)<br/>         SG: L22 (pp226-236)<br/>         TG: L02-4 (pp23-46)<br/>         TG: L09-10 (pp99-130)<br/>         TG: L17 (pp203-216)<br/>         TG: L19-22 (pp229-254)</p> | <p>SC-7-ET-S-3<br/>         Students will explain where energy comes from (and goes next) in a variety of real-world examples (e.g. burning, respiration, residential lighting, dry cell batteries) involving different forms of energy (e.g. heat, light, kinetic, chemical)</p> <p><b>Catastrophic Events</b><br/>         SG: L13 (pp154-163)<br/>         TG: L13 (pp177-186)<br/>         EECD - TG: L01.Exts (p16)</p> <p><b>Energy Machines and Motion</b><br/>         SG: L09 (pp82-91)</p> <p><b>Earth in Space</b><br/>         SG: L07 (pp88-101)<br/>         TG: L07 (pp83-96)</p> <p>SC-7-ET-S-4<br/>         Students will identify forms of energy that are transferred via waves</p> <p><b>Catastrophic Events</b><br/>         SG: L11 (pp120-133)<br/>         SG: L14 (pp164-169)<br/>         SG: L17 (pp194-197)<br/>         TG: L11 (pp149-162)<br/>         TG: L12.Exts (p172)<br/>         TG: L14 (pp187-196)<br/>         TG: L17 (pp233-256)</p> <p><b>Energy Machines and Motion</b><br/>         SG: L18 (pp174-187)</p> | <p>SC-07-4.6.3<br/> <i>Students will understand that waves are one way that energy is transferred. Types of waves include sound, light, earthquake, ocean and electromagnetic.</i></p> <p><b>Catastrophic Events</b><br/>         SG: L11 (pp120-133)<br/>         SG: L14 (pp164-169)<br/>         SG: L17 (pp194-197)<br/>         TG: L11 (pp149-162)<br/>         TG: L12.Exts (p172)<br/>         TG: L14 (pp187-196)<br/>         TG: L17 (pp233-256)</p> <p><b>Energy, Machines, and Motion</b><br/>         SG: L18 (pp174-187)<br/>         SG: L19 (pp188-199)<br/>         TG: L19 (pp229-234)</p> <p><b>Earth in Space</b><br/>         SG: L07 (pp88-101)<br/>         TG: L07 (pp83-96)</p> |

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| <p>SC-7-ET-U-4<br/>Students will understand that thermal energy and motion are inseparable when viewed at the molecular level.</p> <p><b>Properties of Matter</b><br/>TG: L02.Exts (p21)<br/>TG: L07.Exts (p86)<br/>TG: L08.Exts (p96)<br/>TG: L12.Exts (p140)<br/>TG: L14.Exts (p157)<br/>TG: L15.Exts (p166)</p> | <p>SC-7-ET-S-5<br/>Students will equate work done on an object with change in energy of the object</p> <p><b>Energy Machines and Motion</b><br/>SG: L08 (pp72-81)<br/>SG: L10-16 (pp92-161)<br/>SG: L20-22 (pp200-236)<br/>TG: L07.Exts (p83)<br/>TG: L08 (pp85-98)<br/>TG: L09.Exts (p105)<br/>TG: L10-16 (pp107-202)<br/>TG: L20-22 (pp235-254) SC-7-ET-S-6</p> <p>Students will describe the kinetic molecular theory of matter</p> | <p><b>SC-07-4.6.2</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>describe the transfer and/or transformations of energy which occur in examples that involve several different forms of energy (e.g., heat, electrical, light, motion of objects and chemical).</li> <li>Explain, qualitatively or quantitatively, that heat lost by hot object equals the heat gained by cold object.</li> </ul> <p>The transfer and transformation of energy can be examined in a variety of real life examples. Models are an appropriate way to convey the abstract/invisible transfer of energy in a system.</p> <p>Heat energy is the disorderly motion of molecules. Heat can be transferred through materials by the collisions of atoms or across space by radiation. If the material is fluid, currents will be set up in it that aid the transfer of heat. To change something's speed, to bend or stretch things, to heat or cool them, to push things together, to expand or contract them or tear them apart all require transfers (and some transformations) of energy. Heat lost by hot object equals the heat gained by cold object. This is an energy conservation statement. Whenever hot and cold objects are put in contact, heat energy always transfers from the hot object to the cold object and this continues until all the mass is at the same temperature. Students should understand that heat produced by burning comes from the release of chemical energy of the substance.</p> <p style="text-align: right;"><b>DOK 3</b></p> |
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| <p>SC-7-ET-U-5<br/>Students will understand that the role various organisms play within an ecosystem can be determined by observing the flow of energy between them.</p> | <p>SC-7-ET-S-2<br/>Students will model, explain and analyze the flow of energy in ecosystems and draw conclusions about the role of organisms in an ecosystem<br/><b>Earth in Space</b><br/>TG: L07.Exts (pp92-93)</p>   | <p><b>SC-07-4.6.4</b><br/><b>Students will describe or represent the flow of energy in ecosystems, using data to draw conclusions about the role of organisms in an ecosystem.</b></p> <p>For most ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism in food webs.</p> <p style="text-align: right;"><b>DOK 3</b></p>   |
| <p>SC-7-ET-U-6<br/>Students will understand that systems tend to change until they become stable and remain that way unless conditions change.</p>                       | <p>SC-7-ET-S-5<br/>Students will equate work done on an object with change in energy of the object<br/><b>Energy Machines and Motion</b><br/>SG: L08 (pp72-81)<br/>SG: L10-16 (pp92-161)<br/>SG: L20-22 (pp200-236)<br/>TG: L07.Exts (p83)<br/>TG: L08 (pp85-98)<br/>TG: L09.Exts (p105)<br/>TG: L10-16 (pp107-202)<br/>TG: L20-22 (pp235-254)</p> <p>SC-7-ET-S-6<br/>Students will describe the kinetic molecular theory of matter<br/><b>Properties of Matter</b><br/>TG: L02.Exts (p21)<br/>TG: L07.Exts (p86)<br/>TG: L08.Exts (p96)<br/>TG: L12.Exts (p140)<br/>TG: L14.Exts (p157)<br/>TG: L15.Exts (p166)</p> | <p><b>SC-07-4.6.2</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• describe the transfer and/or transformations of energy which occur in examples that involve several different forms of energy (e.g., heat, electrical, light, motion of objects and chemical).</li> <li>• Explain, qualitatively or quantitatively, that heat lost by hot object equals the heat gained by cold object.</li> </ul> <p>The transfer and transformation of energy can be examined in a variety of real life examples. Models are an appropriate way to convey the abstract/invisible transfer of energy in a system.<br/>Heat energy is the disorderly motion of molecules. Heat can be transferred through materials by the collisions of atoms or across space by radiation. If the material is fluid, currents will be set up in it that aid the transfer of heat. To change something's speed, to bend or stretch things, to heat or cool them, to push things together, to expand or contract them or tear them apart</p> |

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|  | <p>SC-7-ET-S-7<br/> Students will experiment with heat flow inside closed and open systems to explore the concept of thermal equilibrium</p> | <p><b>all require transfers (and some transformations) of energy. Heat lost by hot object equals the heat gained by cold object. This is an energy conservation statement. Whenever hot and cold objects are put in contact, heat energy always transfers from the hot object to the cold object and this continues until all the mass is at the same temperature. Students should understand that heat produced by burning comes from the release of chemical energy of the substance.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Energy, Machines, and Motion</b><br/> SG: L02-4 (pp12-35)<br/> SG: L10 (pp92-97)<br/> SG: L17 (pp164-173)<br/> SG: L19 (pp188-199)<br/> SG: L20 (pp200-213)<br/> SG: L22 (pp226-236)<br/> TG: L02-4 (pp23-46)<br/> TG: L09 (pp99-106)<br/> TG: L10 (pp107-130)<br/> TG: L17 (pp203-216)<br/> TG: L19-22 (pp229-254)</p> |
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**Big Idea: Interdependence (Unifying Concepts) Grade 7**

It is not difficult for students to grasp the general notion that species depend on one another and on the environment for survival. But their awareness must be supported by knowledge of the kinds of relationships that exist among organisms, the kinds of physical conditions that organisms must cope with, the kinds of environments created by the interaction of organisms with one another and their physical surroundings, and the complexity of such systems. In middle school, students should be guided from specific examples of the interdependency of organisms to a more systematic view of the interactions that take place among organisms and their surroundings. Students growing understanding of systems in general will reinforce the concept of ecosystems. Stability and change in ecosystems can be considered in terms of variables such as population size, number and kinds of species, productivity, and the effect of human intervention.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| <b>Program of Studies: Understandings</b>   | <b>Program of Studies: Skills and Concepts</b>   | <b>Related Core Content for Assessment</b>   |
|---|--|--|
| <p>SC-7-I-U-1<br/>Students will understand that species may become extinct even if environmental conditions remain constant. Competition between species for limited resources can result in extinction.</p> <p>SC-7-I-U-2<br/>Students will understand that changes within an ecosystem may be caused by the interactions of many factors, both biotic and abiotic. Seemingly small changes can have significant consequences as their effects ripple through a community.</p> <p><b>Catastrophic Events</b><br/>SG: L24 (pp264-273)<br/>TG: L24 (pp329-346)</p> | <p>SC-7-I-S-1<br/>Students will research and investigate environmental situations where small changes may have large impacts in both living and non-living components of systems (e.g., introduction of zebra mussels into the Kentucky river, planting kudzu to stabilize hillsides)</p> <p><b>Catastrophic Events</b><br/>SG: L24 (pp264-273)<br/>TG: L24 (pp329-346)</p> <p>SC-7-I-S-2<br/>Students will investigate potential factors contributing to endangerment or extinction, including the effects of competition for resources</p> | <p><b>SC-07-4.7.1</b><br/><b>Students will compare abiotic and biotic factors in an ecosystem in order to explain consequences of change in one or more factors.</b></p> <p><b>The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition). Given adequate biotic and abiotic resources and no diseases or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |

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|  | <p>SC-7-I-S-3<br/>Students will identify a species which has become extinct and analyze data/evidence to infer the contributing factors which led to extinction</p> <p><b>Earth in Space</b><br/>SG: L18 (pp290-311)<br/>TG: L18 (pp277-286)</p> <p>SC-7-I-S-5<br/>Students will design and conduct investigations of changes to abiotic and biotic factors in ecosystems, document and communicate observations, procedures, results and conclusions</p>   |  |
| <p>SC-7-I-U-3<br/>Students will understand that not all actions/decisions have the possibility of a desirable outcome. Sometimes a compromise requires accepting one unwanted outcome to avoid a different unwanted outcome.</p> | <p>SC-7-I-S-4<br/>Students will research and discuss environmental impacts of actions (human or non-human) which necessitate choosing between undesirable alternatives (e.g., losing crops to insects vs. applying toxic pesticides)</p> <p><b>Catastrophic Events</b><br/>SG: L09 (pp102-112)<br/>TG: L09 (pp127-142)</p> <p><b>Energy Machines and Motion</b><br/>SG: L04 (pp26-35)<br/>EP - RB: (pp20-21)<br/>EP - RB: (pp24-25)<br/>EP - TG: L02.Exts (p24)</p> <p><b>Properties of Matter</b><br/>SG: L12 (pp106-111)<br/>TG: L03.Exts (p32)</p> |  |

# Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

Grade 8



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## Correlation of Carolina™ Curriculum with Kentucky Program of Studies 2006 and the Core Content for Assessment - Version 4.1

| Grade Range           | <i>STC PROGRAM™ and GEMS® Units</i>  |
|-----------------------|--|
| K-3                   | <ul style="list-style-type: none"> <li>• <b>Changes</b></li> <li>• <b>Electric Circuits</b></li> <li>• <b>The Life Cycle of Butterflies</b></li> <li>• <b>Organisms</b></li> <li>• <b>Rocks and Minerals</b></li> <li>• <b>Solids and Liquids</b></li> <li>• <b>Sound</b></li> <li>• <b>Weather</b></li> <li>• <b>GEMS: Space Science</b></li> </ul> |
| 4 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Animal Studies</b></li> <li>• <b>Motion and Design</b></li> <li>• <b>Land and Water</b></li> <li>• <b>GEMS: Hot Water and Warm Homes</b></li> </ul>  |
| 5 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Ecosystems</b></li> <li>• <b>Experiments with Plants</b></li> <li>• <b>GEMS: Messages From Space</b></li> </ul>  |
| 6 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Organisms–From Macro to Micro</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 7 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Earth in Space</b></li> <li>• <b>Energy, Machines, and Motion</b></li> <li>• <b>Properties of Matter</b></li> </ul>  |
| 8 <sup>th</sup> Grade | <ul style="list-style-type: none"> <li>• <b>Catastrophic Events</b></li> <li>• <b>Light</b></li> <li>• <b>Organisms–From Macro to Micro</b></li> </ul>   |

The STC PROGRAM™ and GEMS® Units are recommended based on the Kentucky Program of Studies and the Core Contents for Assessment. Provided for each grade level, are the units that most strongly align with the content objectives. Other STC PROGRAM™ Units may also match objectives within each grade level. For more information about any STC PROGRAM™ unit or GEMS® unit, visit [www.carolinacurriculum.com](http://www.carolinacurriculum.com).

GEMS® Space Science is research-based 3-5 science curriculum that teach fundamental concepts in space science.

### Legend

To save paper, the curriculum location information in this document has been abbreviated as follows:

- Unit abbreviations = noted in parentheses in the chart above
- TG = Teacher’s Guide
- S-Sec3 = Section 3 (containing a section on safety) in the STC® Teacher’s Guide
- L01, L02, etc. = Lesson 1, Lesson 2, etc.
- Les01 = Lesson 1
- Act01=Activity 1
- p, pp = page, pages
- RB = STC BOOK™ (a science reading book included in some of the grades 3–5 STC® unit kits)
- SB = Student Book
- Exts = Extensions (found at the end of most lessons in the Teacher’s Guide)
- App-A, App-B = Appendix A, Appendix B (found at the end of Section 4 in the Teacher’s Guide)

**Big Idea: Structure and Transformation of Matter (Physical Science) Grade 8**

A basic understanding of matter is essential to the conceptual development of other big ideas in science. During the middle years, physical and chemical changes in matter are observed, and students begin to relate these changes to the smaller constituents of matter—namely, atoms and molecules. The use of models (and an understanding of their scales and limitations) is an effective means of learning about the structure of matter. Looking for patterns in properties is also critical to comparing and explaining differences in matter.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.
- 2.5** Students understand that under certain conditions nature tends to remain the same or move toward a balance.

| <b>Program of Studies: Understandings</b>   | <b>Program of Studies: Skills and Concepts</b>  | <b>Related Core Content for Assessment</b>  |
|---|---|---|
| <p>SC-8-STM-U-1<br/>Students will understand that all matter is made of tiny moving particles called atoms, which are far too small to see directly through a microscope. The atoms of any element are alike but are different from atoms of other elements.</p> <p><b>Light</b><br/>TG: L10.Exts (p124)</p> <p>SC-8-STM-U-2<br/>Students will understand that because atomic structure is not directly observable, models (physical and conceptual) are used to facilitate understanding. What kind of model to use and how complex it should be depends on its purpose.</p> | <p>SC-8-STM-S-2<br/>Students will analyze models/representations of elements and basic atomic structure</p> | <p><b>SC-08-1.1.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"><li>• <b>interpret models/representations of elements;</b></li><li>• <b>classify elements based upon patterns in their physical (e.g., density, boiling point, solubility) and chemical (e.g., flammability, reactivity) properties.</b></li></ul> <p><b>Models enhance understanding that an element is composed of a single type of atom. Organization/interpretation of data illustrates that when elements are listed according to the number of protons, repeating patterns of physical (e.g., density, boiling point, solubility) and chemical properties (e.g., flammability, reactivity), can be used to identify families of elements with similar properties.</b></p> <p><b>DOK 2</b></p> |

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|  |   | <p>SC-08-1.1.2<br/> <i>Students will understand that matter is made of minute particles called atoms, and atoms are composed of even smaller components. The components of an atom have measurable properties such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and the electrons holds the atom together.</i></p> <p>SC-08-1.1.3<br/> <i>Students will understand that the atom's nucleus is composed of protons and neutrons that are much more massive than electrons.</i></p> |
| <p>SC-8-STM-U-3<br/> Students will understand that elements do not break down during chemical reactions (e.g., heating, exposure to electric currents, reaction with acids).</p> <p><b>Light</b><br/> TG: L10.Exts (p124)</p>  | <p>SC-8-STM-S-5<br/> Students will investigate the relationship between the seemingly indestructible nature of the atom and the concept of conservation of matter</p> | <p>SC-08-1.1.2<br/> <i>Students will understand that matter is made of minute particles called atoms, and atoms are composed of even smaller components. The components of an atom have measurable properties such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and the electrons holds the atom together.</i></p>  |
| <p>SC-8-STM-U-4<br/> Students will understand that the idea of atoms explains the conservation of matter: If the number of atoms stays the same no matter how they are rearranged, then their total mass stays the same. The atoms that are present today are the same atoms that have always existed.</p> | <p>SC-8-STM-S-5<br/> Students will investigate the relationship between the seemingly indestructible nature of the atom and the concept of conservation of matter</p> | <p><b>SC-08-1.1.1</b><br/> <b>Students will:</b></p> <ul style="list-style-type: none"> <li>● <b>interpret models/representations of elements;</b></li> <li>● <b>classify elements based upon patterns in their physical (e.g., density, boiling point, solubility) and chemical (e.g., flammability, reactivity) properties.</b></li> </ul> <p><b>Models enhance understanding that an element is composed of a single type of atom. Organization/interpretation of data illustrates that when elements are listed according to the number of protons,</b></p>                                   |

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|   |   | <p>repeating patterns of physical (e.g., density, boiling point, solubility) and chemical properties (e.g., flammability, reactivity), can be used to identify families of elements with similar properties.</p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>SC-08-1.1.4</b><br/>Students will describe interactions which cause the movement of each element among the solid Earth, oceans, atmosphere and organisms (biogeochemical cycles)</p> <p>Earth is a system containing essentially a fixed amount of each stable chemical atom or element that can exist in several different reservoirs. The interactions within the earth system cause the movement of each element among reservoirs in the solid Earth, oceans, atmosphere and organisms as part of biogeochemical cycles.</p> <p style="text-align: right;"><b>DOK 2</b></p> |
| <p>SC-8-STM-U-5<br/>Students will understand that there are groups of elements that have similar properties, including highly reactive metals, less-reactive metals, highly reactive nonmetals (such as chlorine, fluorine and oxygen) and some almost completely non-reactive gases (such as helium and neon). Some elements don't fit into any of the categories; among them are carbon and hydrogen, essential elements of living matter.</p> <p style="text-align: center;"><b>Organisms-From Macro to Micro</b><br/>TG: L05.Exts (pp69-70)</p> | <p>SC-8-STM-S-1<br/>Students will classify substances by how they react in given situations</p> | <p><b>SC-08-1.1.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• interpret models/representations of elements;</li> <li>• classify elements based upon patterns in their physical (e.g., density, boiling point, solubility) and chemical (e.g., flammability, reactivity) properties.</li> </ul> <p><b>Models enhance understanding that an element is composed of a single type of atom. Organization/interpretation of data illustrates that when elements are listed according to the number of protons, repeating patterns of physical (e.g., density, boiling point, solubility) and chemical properties (e.g., flammability, reactivity), can be used to identify families of elements with similar properties.</b></p>   |

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|  |   | <b>DOK 2</b>   |
| <p>SC-8-STM-U-6<br/>Students will understand that over a long time, matter is transferred from one organism to another repeatedly and between organisms and their physical environment. As in all material systems, the total amount of matter remains constant, even though its form and location change.</p> | <p>SC-8-STM-S-3<br/>Students will describe and illustrate the movement of elements between organisms and their physical environment and within the Earth system<br/><b>Organisms-From Macro to Micro</b><br/>SG: L10 (pp120-131)</p> <p>SC-8-STM-S-4<br/>Students will analyze factors that may influence the movement of elements among the solid Earth, oceans, atmosphere and organisms<br/><b>Organisms-From Macro to Micro</b><br/>SG: L10 (pp120-131)</p> | <p><b>SC-08-1.1.4</b><br/><b>Students will describe interactions which cause the movement of each element among the solid Earth, oceans, atmosphere and organisms (biogeochemical cycles)</b></p> <p><b>Earth is a system containing essentially a fixed amount of each stable chemical atom or element that can exist in several different reservoirs. The interactions within the earth system cause the movement of each element among reservoirs in the solid Earth, oceans, atmosphere and organisms as part of biogeochemical cycles.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> |

**Big Idea: Motion and Forces (Physical Science) Grade 8**

Whether observing airplanes, baseballs, planets, or people, the motion of all bodies is governed by the same basic rules. At the middle level, qualitative descriptions of the relationship between forces and motion will provide the foundation for quantitative applications of Newton’s Laws.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts   | Related Core Content for Assessment  |
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| <p>SC-8-MF-U-1<br/>Students will understand that Isaac Newton developed a set of rules that can be used to describe and predict virtually all observed motion on Earth and in the universe. These Laws of Motion demonstrate that the rules governing the Earth are the same as those controlling the rest of the observed universe.</p> <p><b>Catastrophic Events</b><br/>SG: L12 (pp134-153)<br/>TG: L12 (pp163-176)</p> <p><b>Light</b><br/>TG: L02 (pp21-36)</p> | <p>SC-8-MF-S-1<br/>Students will differentiate speed and acceleration and classify real-life examples of each</p> <p>SC-8-MF-S-2<br/>Students will explain and experimentally verify how Newton’s Laws show that forces between objects affect their motion, allowing future positions to be predicted from their present speeds and positions</p> <p><b>Catastrophic Events</b><br/>SG: L12 (pp134-153)<br/>TG: L12 (pp163-176)</p> <p><b>Light</b><br/>TG: L02 (pp21-36)</p> <p>SC-8-MF-S-3<br/>Students will investigate motion of objects to generate and experimentally test predictions/conclusions. Compare and critique the results of others for accuracy, identifying strengths and weaknesses in the experiment, insisting on the use of evidence to support decisions</p> <p><b>Light</b><br/>SG: L12-13 (pp132-141)<br/>SG: L25 (pp284-293)<br/>TG: L12-13 (pp137-168)<br/>TG: L25 (pp335-348)</p> | <p><b>SC-08-1.2.1</b><br/><b>Students will describe and explain the effects of balanced and unbalanced forces on motion as found in real-life phenomena.</b></p> <p><b>Objects change their motion only when a net force is applied. Newton’s Laws of Motion are used to describe the effects of forces on the motion of objects.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |

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| <p>SC-8-MF-U-2<br/> Students will understand that preconceived expectations can influence what people actually observe, preventing them from detecting other results. In order to maintain objectivity, different investigators should investigate the same question independently. For example, Newton's Laws are widely accepted because they have been verified by so many different observers.</p> <p><b>Catastrophic Events</b><br/> SG: L09 (pp102-112)<br/> TG: L09 (pp127-142)</p> | <p>SC-8-MF-S-3<br/> Students will investigate motion of objects to generate and experimentally test predictions/conclusions. Compare and critique the results of others for accuracy, identifying strengths and weaknesses in the experiment, insisting on the use of evidence to support decisions</p> <p><b>Light</b><br/> SG: L12-13 (pp132-141)<br/> SG: L25 (pp284-293)<br/> TG: L12-13 (pp137-168)<br/> TG: L25 (pp335-348)</p> |  |
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**Big Idea: The Earth and the Universe (Earth/Space Science) Grade 8**

The Earth system is in a constant state of change. These changes affect life on Earth in many ways. Development of conceptual understandings about processes that shape the Earth begin at the elementary level with understanding *what* Earth materials are and that change occurs. At the middle level, students investigate *how* these changes occur. An understanding of systems and their interacting components will enable students to evaluate supporting theories of Earth changes. The use of models and observance of patterns to explain common phenomena is essential to building a conceptual foundation and supporting ideas with evidence at all levels. In middle school, students begin to look beyond what can be directly observed as they explore the Earth-sun-moon system, as well as the rest of our solar system, employing the concept of scale within their models. Patterns play an important role as students seek to develop a conceptual understanding of gravity in their world and in the universe.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts   | Related Core Content for Assessment   |
|---|---|---|
| <p>SC-8-EU-U-1<br/>Students will understand that the Earth is almost unimaginably old when viewed on a human time scale, and some processes that shape it are happening so slowly they cannot be easily detected in a lifetime. The accepted age of our Earth and solar system (4.6 billion years) is based on a wide variety of data collected by a number of different methods.</p> | <p>SC-8-EU-S-1<br/>Students will research and evaluate the geological dating techniques that were used to determine the accepted age of the Earth<br/>SC-8-EU-S-2<br/>Students will identify a variety of landforms on the Earth’s surface that have undergone changes (both fast and slow) and investigate the forces responsible for those changes<br/><b>Catastrophic Events</b><br/>SG: L01 (pp2-11)<br/>SG: L09 (pp102-112)<br/>SG: L15 (pp170-189)<br/>SG: L17 (pp194-197)<br/>SG: L19 (pp210-223)<br/>SG: L24 (pp264-273)<br/>TG: L01 (pp3-16)<br/>TG: L09 (pp127-142)<br/>TG: L15 (pp197-218)<br/>TG: L17 (pp233-256)<br/>TG: L19 (pp265-278)<br/>TG: L24 (pp329-346)</p> | <p><b>SC-08-2.3.1</b><br/><b>Students will describe various techniques for estimating geological time (radioactive dating, observing rock sequences, comparing fossils).</b></p> <p><b>Techniques used to estimate geological time include using radioactive dating, observing rock sequences and comparing fossils to correlate the rock sequences at various locations. Deductions can be made based on available data and observation of models as to the age of rocks/fossils.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p>SC-08-2.3.4<br/><i>Students will understand that the Sun, Earth and the rest of the solar system formed approximately 4.6 billion years ago.</i></p> |

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| <p>SC-9-EU-U-2<br/>Students will understand that heat flow and movement of molten rock within the interior of the Earth results in crustal changes such as earthquakes, volcanoes and continental drift.</p> <p><b>Catastrophic Events</b><br/>SG: L15-16 (pp170-193)<br/>SG: L18 (pp200-209)<br/>TG: L15-16 (pp197-232)<br/>TG: L18 (pp257-264)<br/>TG: L19.Exts (pp274-275)</p> | <p>SC-8-EU-S-2<br/>Students will identify a variety of landforms on the Earth's surface that have undergone changes (both fast and slow) and investigate the forces responsible for those changes</p> <p><b>Catastrophic Events</b><br/>SG: L01 (pp2-11)<br/>SG: L09 (pp102-112)<br/>SG: L15 (pp170-189)<br/>SG: L17 (pp194-197)<br/>SG: L19 (pp210-223)<br/>SG: L24 (pp264-273)<br/>TG: L01 (pp3-16)<br/>TG: L09 (pp127-142)<br/>TG: L15 (pp197-218)<br/>TG: L17 (pp233-256)<br/>TG: L19 (pp265-278)<br/>TG: L24 (pp329-346)</p> <p>SC-8-EU-S-3<br/>Students will observe convection currents in liquids and model the movement of molten rock within the Earth in order to explain how internal heat is transferred</p> <p><b>Catastrophic Events</b><br/>SG: L16 (pp190-193)<br/>TG: L16 (pp219-232)</p> | <p>SC-08-2.3.2<br/><i>Students will understand that earthquakes and volcanic eruptions can be observed on a human time scale, but many processes, such as mountain building and plate movements, take place over hundreds of millions of years.</i></p> <p><b>Catastrophic Events</b><br/>SG: L09 (pp102-112)<br/>SG: L15 (pp170-189)<br/>SG: L24 (pp264-273)<br/>TG: L09 (pp127-142)<br/>TG: L15 (pp197-218)<br/>TG: L19.Exts (pp274-275)<br/>TG: L24 (pp329-346)</p> <p><b>SC-08-2.3.3</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• explain the transfer of Earth's internal heat in the mantle (crustal movement, hotspots, geysers);</li> <li>• describe the interacting components (convection currents) within the Earth's system.</li> </ul> <p><b>The outward transfer of Earth's internal heat drives convection circulation in the mantle. This causes the crustal plates to move on the face of the Earth.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Catastrophic Events</b><br/>SG: L10 (pp114-119)<br/>SG: L13-18 (pp154-209)<br/>TG: L19.Exts (pp274-275)</p> |
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| <p>SC-8-EU-U-3<br/>Students will understand that a model cannot represent a full-scale phenomenon with complete accuracy, even if it only addresses very few attributes of the original.</p> <p><b>Catastrophic Events</b><br/> SG: L02 (pp12-25)<br/> SG: L06 (pp68-79)<br/> SG: L11 (pp120-133)<br/> SG: L17 (pp194-197)<br/> TG: L02 (pp17-26)<br/> TG: L06 (pp69-82)<br/> TG: L11 (pp149-162)<br/> TG: L14.Exts (pp193-194)<br/> TG: L17 (pp233-256)<br/> TG: L23.Exts (pp325-326)</p> | <p>SC-8-EU-S-4<br/>Students will discuss and identify the strengths and limitations of a variety of physical and conceptual scientific models</p> <p><b>Catastrophic Events</b><br/> SG: L02 (pp12-25)<br/> SG: L06 (pp68-79)<br/> SG: L11 (pp120-133)<br/> SG: L17 (pp194-197)<br/> TG: L02 (pp17-26)<br/> TG: L06 (pp69-82)<br/> TG: L11 (pp149-162)<br/> TG: L14.Exts (pp193-194)<br/> TG: L17 (pp233-256)<br/> TG: L23.Exts (pp325-326)</p> |  |

**Big Idea: Unity and Diversity (Biological Science) Grade 8**

All matter is comprised of the same basic elements, goes through the same kinds of energy transformations, and uses the same kinds of forces to move. Living organisms are no exception. In middle school, students begin to compare, contrast, and classify the microscopic features of organisms—the cells, as well as investigate reproduction as the essential process to the continuation of all species. Expected patterns of genetic traits are predicted. Distinctions are made between learned behaviors and inherited traits. Emphasis at every level should be placed upon the understanding that while every living thing is composed of similar small constituents that combine in predictable ways, it is the subtle variations within these small building blocks that account for both the likenesses and differences in form and function that create the diversity of life.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3** Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| <b>Program of Studies: Understandings</b>  | <b>Program of Studies: Skills and Concepts</b>   | <b>Related Core Content for Assessment</b>  |
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| <p>SC-8-UD-U-1<br/>Students will understand that all cells contain specialized parts that are structured to efficiently perform the cell's essential functions.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L07-8 (pp82-105)<br/>TG: L07-8 (pp105-150)</p> | <p>SC-8-UD-S-1<br/>Students will investigate, model and explain the functions of the specialized parts within the cell</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L07 (pp82-93)<br/>TG: L07 (pp105-130)</p> | <p><b>SC-08-3.4.1</b><br/><b>Students will explain the relationship between structure and function of the cell components using a variety of representations.</b></p> <p><b>Observations of cells and analysis of cell representations point out that cells have particular structures that underlie their function. Every cell is surrounded by a membrane that separates it from the outside world. Inside the cell is a concentrated mixture of thousands of different molecules that form a variety of specialized structures. These structures carry out specific cell functions.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |

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| <p>SC-8-UD-U-2<br/>Students will understand that complex organisms can exist because their genes contain the information needed to create and reproduce cells with specialized functions.</p>   | <p>SC-8-UD-S-4<br/>Students will describe the role of genes/chromosomes in the passing of information from one generation to another (heredity)<br/><b>Organisms-From Macro to Micro</b><br/>SG: L08 (pp96-105)<br/>SG: L19 (pp216-235)<br/>TG: L08 (pp131-150)<br/>TG: L19 (pp303-330)</p> <p>SC-8-UD-S-6<br/>Students will collect and analyze information to answer questions about factors influencing heredity and learned behaviors and explain how scientific knowledge has been modified as new information is revealed<br/><b>Organisms-From Macro to Micro</b><br/>SG: L18-19 (pp204-235)<br/>TG: L02.Exts (p25)<br/>TG: L18-19 (pp293-330)</p> | <p>SC-08-3.4.2<br/><i>Students will understand that in the development of multicellular organisms, cells multiply (mitosis) and differentiate to form many specialized cells, tissues and organs. This differentiation is regulated through the expression of different genes.</i></p>  |
| <p>SC-8-UD-U-3<br/>Students will understand that organisms have nervous systems that allow them to react to changes in their surroundings and within themselves. Some of their reactions (e.g. pain response) are determined genetically while others (e.g. pushing a button to obtain food) are learned.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L17 (pp194-203)<br/>TG: L02.Exts (p25)<br/>TG: L06.Exts (pp89-91)<br/>TG: L16.Exts (p273)<br/>TG: L17 (pp281-292)</p> | <p>SC-8-UD-S-2<br/>Students will identify patterns of behavior within populations and classify them as either innate or learned<br/><b>Organisms-From Macro to Micro</b><br/>SG: L02 (pp12-27)<br/>SG: L06 (pp64-81)<br/>TG: L02 (pp15-32)<br/>TG: L06 (pp73-104)<br/>TG: L16.Exts (p273)<br/>TG: L17.Exts (pp287-288)</p>  | <p><b>SC-08-3.4.3</b><br/><b>Students will form or justify conclusions as to whether a response is innate or learned using data/evidence on behavioral responses to internal and external stimuli.</b></p> <p><b>Behavioral responses to internal changes and external stimuli can be innate or learned. Responses to external stimuli can result from interactions with the organism's own species or other species, as well as environmental changes.</b></p> <p><b>DOK 3</b></p> |

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|  | <p>SC-8-UD-S-3<br/>Students will investigate how the nervous systems of various organisms allow them to react (e.g. vomiting, avoidance) to internal (e.g., food toxins) and external (e.g., predator encounter) stimuli</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L17 (pp194-203)<br/>TG: L17 (pp281-292)</p>  | <p>SC-08-3.4.5<br/><i>Students will understand that multicellular animals have nervous systems that generate behavior. Nerve cells communicate with each other by secreting specific molecules.</i></p>  |
| <p>SC-8-UD-U-4<br/>Students will understand that patterns (e.g. reproductive method, number of body segments, type of skeleton) are helpful in classifying organisms based on how they are related. Science considers details of internal and external structures to be more important than behavior or general appearance.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L01 (pp2-11)<br/>SG: L20 (pp236-243)<br/>TG: L20 (pp331-350)</p> | <p>SC-8-UD-S-5<br/>Students will identify patterns among organisms that may be used for classification and compare those patterns to the currently accepted taxonomy</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L01 (pp2-11)<br/>SG: L06 (pp64-81)<br/>SG: L11 (pp132-145)<br/>SG: L20 (pp236-243)<br/>TG: L01 (pp3-14)<br/>TG: L06 (pp73-104)<br/>TG: L11 (pp185-200)<br/>TG: L20 (pp331-350)</p> | <p><b>SC-08-3.4.4</b><br/><b>Students will describe and explain patterns found within groups of organisms in order to make biological classifications of those organisms.</b></p> <p><b>Observations and patterns found within groups of organisms allow for biological classifications based on how organisms are related.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> |
| <p>SC-8-UD-U-5<br/>Students will understand that technological advances have made it possible for humans to alter the natural world. Ethical considerations and the probability of unintended consequences make it essential that the potential risks and rewards of any scientific endeavor be carefully considered before proceeding</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L06 (pp64-81)<br/>SG: L13 (pp158-171)</p>             | <p>SC-9-UD-S-7<br/>Students will research and discuss the impact of technological advances, and explore the ethical questions they often create</p>   |  |

**Big Idea: Biological Change (Biological Science) Grade 8**

The only thing certain is that everything changes. At the middle school level, students study relationships among populations and ecosystems that contribute to the success or demise of a specific population or species. Students construct basic explanations that can account for the great diversity among organisms.

**Academic Expectations**

- 2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2** Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.5** Students understand that under certain conditions nature tends to remain the same or move toward a balance.
- 2.6** Students understand how living and nonliving things change over time and the factors that influence the changes.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts  | Related Core Content for Assessment   |
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| <p>SC-8-BC-U-1<br/>Students will understand that thousands of layers of sedimentary rock provide evidence for the long history of the Earth and the long history of changing life forms whose remains are found in the rocks. More recently deposited rock layers contain fossils that more closely resemble existing species.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L13 (pp158-171)<br/>TG: L13 (pp219-236)<br/>TG: L19.Exts (pp317-318)</p> | <p>SC-8-BC-S-1<br/>Students will explore the law of superposition and the processes of fossilization in sedimentary rock</p>   | <p><b>SC-08-3.5.1</b><br/><b>Students will draw conclusions and make inferences about the consequences of change over time that can account for the similarities among diverse species.</b></p> <p>The consequences of change over time provide a scientific explanation for the fossil record of ancient life forms and for the striking molecular similarities observed among the diverse species of living organisms.</p> <p style="text-align: right;"><b>DOK 3</b></p> <p>(See also SC-08-2.3.1)</p> |
| <p>SC-8-BC-U-2<br/>Students will understand that observations of the fossil record provide evidence that helps to explain why externally diverse organisms are so similar at the molecular level.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L01 (pp2-11)<br/>SG: L03 (pp28-37)<br/>SG: L05-6 (pp46-81)<br/>SG: L09-11 (pp106-145)<br/>SG: L13-14 (pp158-179)<br/>SG: L16-18 (pp188-215)<br/>TG: L01 (pp3-14)</p>                                  | <p>SC-BC-S-2<br/>Students will synthesize evidence from the fossil record with information about currently-existing species to make inferences about why the similarities of diverse species extend beyond superficial comparisons</p> <p>SC-BC-S-3<br/>Students will research the most common fossils used to support theories of biological change</p> | <p><b>SC-08-3.5.1</b><br/><b>Students will draw conclusions and make inferences about the consequences of change over time that can account for the similarities among diverse species.</b></p> <p>The consequences of change over time provide a scientific explanation for the fossil record of ancient life forms and for the striking molecular similarities observed among the diverse species of living organisms.</p> <p style="text-align: right;"><b>DOK 3</b></p>                               |

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| <p>TG: L02.Exts (p25)<br/> TG: L03 (pp33-48)<br/> TG: L05-6 (pp57-104)<br/> TG: L09 -11(pp151-200)<br/> TG: L13-14 (pp219-252)<br/> TG: L16-18 (pp267-302)</p>  |   |  |
| <p>SC-8-BC-U-3<br/> Students will understand that scientists cannot always control experimental conditions to obtain evidence. When that is not possible, they try to observe as wide a range of natural occurrences as possible to be able to identify patterns.</p> | <p>SC-BC-S-4<br/> Students will apply research to answer student-generated questions through deductive reasoning about factors that may impact diversity of species<br/> <b>Organisms-From Macro to Micro</b><br/> SG: L02 (pp12-27)<br/> SG: L04 (pp38-45)</p> |  |

**Big Idea: Energy Transformations (Unifying Concepts) Grade 8**

Energy transformations are inherent in almost every system in the universe—from tangible examples at the elementary level, such as heat production in simple Earth and physical systems to more abstract ideas beginning at middle school, such as those transformations involved in the growth, dying and decay of living systems. The use of models to illustrate the often invisible and abstract notions of energy transfer will aid in conceptualization, especially as students move from the macroscopic level of observation and evidence (primarily elementary school) to the microscopic interactions at the atomic level (middle and high school levels).

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings  | Program of Studies: Skills and Concepts  | Related Core Content for Assessment  |
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| <p>SC-8-ET-U-1<br/>Students will understand that energy can be transferred in many ways, but it can neither be created nor destroyed.</p> | <p>SC-8-ET-S-1<br/>Students will explain the law of conservation of energy and infer where energy goes in a number of real-life energy transformations</p> <p>SC-8-ET-S-2<br/>Students will identify the energy transformations that occur in the ‘production’, transmission and use of energy by people in everyday life (e.g., electric power, automotive fuels, food)</p> <p><b>Light</b><br/>SG: L02 (pp20-31)<br/>TG: L02.Exts (p32)<br/>TG: L16.Exts (p203)</p> <p>SC-8-ET-S-5<br/>Students will classify methods of heat transfer (convection, conduction, radiation) and forms of energy (kinetic, potential, energy contained within a field)</p> <p><b>Catastrophic Events</b><br/>SG: L03-5 (pp26-67)<br/>SG: L13 (pp154-163)<br/>TG: L03-5 (pp27-68)<br/>TG: L13 (pp177-186)</p> | <p><b>SC-08-4.6.2</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• describe or explain energy transfer and energy conservation;</li> <li>• evaluate alternative solutions to energy problems.</li> </ul> <p><b>Energy can be transferred in many ways, but it can neither be created nor destroyed.</b><br/><b>DOK 3</b></p> <p><b>Catastrophic Events</b><br/>SG: L13 (pp154-163)<br/>TG: L13 (pp177-186)</p> |

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|   | <b>Light</b><br>TG: L02 (pp21-36)   |   |
| <p>SC-8-ET-U-2<br/>Students will understand that a steady supply of energy is essential for our society, but every source of energy has potential problems as well as benefits. Not all forms of energy are practical to use given our current state of technology.</p> <p><b>Catastrophic Events</b><br/>TG: L19.Exts (pp274-275)<br/>TG: L24.Exts (pp337-338)</p> | <p>SC-8-ET-S-4<br/>Students will compare a variety of energy sources (e.g., biomass, fission, fusion, ethanol) and evaluate their potential for large-scale use, as well as their benefits, risks and limitations</p>   | <p><b>SC-08-4.6.2</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• describe or explain energy transfer and energy conservation;</li> <li>• evaluate alternative solutions to energy problems.</li> </ul> <p><b>Energy can be transferred in many ways, but it can neither be created nor destroyed.</b><br/><b>Catastrophic Events</b><br/>SG: L13 (pp154-163)<br/>TG: L13 (pp177-186)</p> <p style="text-align: right;"><b>DOK 3</b></p>   |
| <p>SC-8-ET-U-3<br/>Students will understand that solar energy influences global climate in a number of direct and indirect ways. Patterns of global climate can be determined through analysis of climatic data.</p> <p><b>Catastrophic Events</b><br/>SG: L07 (pp80-95)<br/>TG: L07 (pp83-102)</p>   | <p>SC-8-ET-S-7<br/>Students will analyze multiple sources of data to identify global climate patterns</p> <p><b>Catastrophic Events</b><br/>SG: L03 (pp26-41)<br/>SG: L07 (pp80-95)<br/>TG: L03 (pp27-44)<br/>TG: L07 (pp83-102)<br/>TG: L08.Exts (p108)</p> <p><b>Organisms-From Macro to Micro</b><br/>TG: L17.Exts (pp287-288)</p> | <p><b>SC-08-4.6.1</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• explain the cause and effect relationships between global climate and energy transfer;</li> <li>• use evidence to make inferences or predictions about global climate issues.</li> </ul> <p><b>Global climate is determined by energy transfer from the Sun at and near Earth's surface.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>Catastrophic Events</b><br/>SG: L03 (pp26-41)<br/>SG: L07 (pp80-95)<br/>TG: L03 (pp27-44)<br/>TG: L07 (pp83-102)<br/>TG: L08.Exts (p108)</p> |

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| <p>SC-8-ET-U-4<br/>Students will understand that although many forms of energy exist, they can all be classified as either kinetic energy, potential energy, or energy contained within a field.</p> <p><b>Light</b><br/>TG: L02 (pp21-36)</p>   | <p>SC-8-ET-S-3<br/>Students will illustrate examples of potential and kinetic energy in everyday life, such as objects at rest, geologic fault movement and falling water</p> <p><b>Light</b><br/>TG: L02 (pp21-36)</p>  | <p>SC-08-4.6.3<br/><i>Students will understand that all energy can be considered to be kinetic energy, potential energy, or energy contained by a field (e.g., electric, magnetic, gravitational).</i></p>  |
| <p>SC-8-ET-U-5<br/>Students will understand that the interaction of waves with matter provides the vehicle for a number of important types of energy transfer.</p> <p><b>Catastrophic Events</b><br/>SG: L12 (pp134-153)<br/>SG: L14 (pp164-169)<br/>TG: L11.Exts (p157)<br/>TG: L12 (pp163-176)<br/>TG: L14 (pp187-196)</p> <p><b>Light</b><br/>SG: L02 (pp20-31)<br/>SG: L07 (pp68-81)<br/>SG: L09 (pp92-107)<br/>TG: L02 (pp21-36)<br/>TG: L07.Exts (p92)<br/>TG: L09 (pp107-118)<br/>TG: L19.Exts (p257)</p> | <p>SC-8-ET-S-6<br/>Students will model energy transfer via waves and identify real-life examples</p> <p><b>Catastrophic Events</b><br/>SG: L03-5 (pp26-67)<br/>TG: L03-5 (pp27-68)</p> <p><b>Light</b><br/>SG: L02 (pp20-31)<br/>SG: L07 (pp68-81)<br/>TG: L02 (pp21-36)</p>                     | <p><b>SC-08-4.6.4</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>analyze information/data about waves and energy transfer;</li> <li>describe the transfer of energy via waves in real life phenomena.</li> </ul> <p><b>Waves, including sound and seismic waves, waves on water and electromagnetic waves, can transfer energy when they interact with matter.</b></p> <p style="text-align: right;"><b>DOK 2</b></p> <p><b>Catastrophic Events</b><br/>SG: L11-12 (pp120-153)<br/>SG: L14 (pp164-169)<br/>SG: L17 (pp194-197)<br/>TG: L11-12 (pp149-176)<br/>TG: L14 (pp187-196)<br/>TG: L17 (pp233-256)</p> |
| <p>SC-8-ET-U-6<br/>Students will understand that changes that occur to any one component of an ecosystem may influence the entire system, since all of the components are interrelated. The relationships that exist can be determined by observing the flow of energy.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L09 (pp106-119)<br/>SG: L12 (pp146-155)<br/>TG: L09 (pp151-166)<br/>TG: L12 (pp201-218)<br/>TG: L18.Exts (pp299-300)</p>   | <p>SC-8-ET-S-8<br/>Students will graphically represent energy flow within an ecosystem to identify the existing relationships</p> <p><b>Light</b><br/>SG: L11 (pp116-131)</p> <p>SC-8-ET-S-9<br/>Students will analyze ecosystems to identify the factors that determine carrying capacities</p> | <p><b>SC-08-4.6.5</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>describe the relationships between organisms and energy flow in ecosystems (food chains and energy pyramids);</li> <li>explain the effects of change to any component of the ecosystem.</li> </ul> <p><b>Energy flows through ecosystems in one direction from photosynthetic organisms to herbivores to carnivores and decomposers.</b></p> <p style="text-align: right;"><b>DOK 2</b></p>  |

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| <p>SC-8-ET-U-7<br/>Students will understand that many systems contain feedback mechanisms that serve to keep changes within specified limits.</p> | <p>SC-8-ET-S-9<br/>Students will analyze ecosystems to identify the factors that determine carrying capacities</p> |  |
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**Big Idea: Interdependence (Unifying Concepts) Grade 8**

It is not difficult for students to grasp the general notion that species depend on one another and on the environment for survival. But their awareness must be supported by knowledge of the kinds of relationships that exist among organisms, the kinds of physical conditions that organisms must cope with, the kinds of environments created by the interaction of organisms with one another and their physical surroundings, and the complexity of such systems. In middle school, students should be guided from specific examples of the interdependency of organisms to a more systematic view of the interactions that take place among organisms and their surroundings. Students growing understanding of systems in general will reinforce the concept of ecosystems. Stability and change in ecosystems can be considered in terms of variables such as population size, number and kinds of species, productivity, and the effect of human intervention.

**Academic Expectations**

- 2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.
- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.

| Program of Studies: Understandings   | Program of Studies: Skills and Concepts  | Related Core Content for Assessment   |
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| <p>SC-8-I-U-1<br/>Students will understand that organisms both cooperate and compete in ecosystems. Balanced patterns of cooperation and competition may generate ecosystems that are relatively stable for hundreds or thousands of years.</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L02 (pp12-27)<br/>SG: L09 (pp106-119)<br/>SG: L12 (pp146-155)<br/>SG: L14 (pp172-179)<br/>TG: L02 (pp15-32)<br/>TG: L09 (pp151-166)<br/>TG: L12 (pp201-218)<br/>TG: L18.Exts (pp299-300)</p> | <p>SC-8-I-S-1<br/>Students will predict the effects of change on one or more components within an ecosystem by analyzing a variety of data</p> <p><b>Catastrophic Events</b><br/>SG: L24 (pp264-273)<br/>TG: L24 (pp329-346)</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L06 (pp64-81)<br/>SG: L12 (pp146-155)<br/>SG: L17 (pp194-203)<br/>TG: L12 (pp201-218)</p> <p>SC-8-I-S-2<br/>Students will analyze ecosystems to identify patterns of cooperation that enhance stability</p> <p><b>Organisms-From Macro to Micro</b><br/>SG: L12 (pp146-155)<br/>TG: L12 (pp201-218)</p> | <p><b>SC-08-4.7.1</b><br/><b>Students will describe the interrelationships and interdependencies within an ecosystem and predict the effects of change on one or more components within an ecosystem.</b></p> <p><b>Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> |

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| <p>SC-8-I-U-2<br/>Students will understand that the matter in an ecosystem is constantly transferred between and among organisms and the physical environment. While the form and location is continuously changing, the total amount of matter in the system remains constant.</p> | <p>SC-8-I-S-1<br/>Students will predict the effects of change on one or more components within an ecosystem by analyzing a variety of data<br/><b>Catastrophic Events</b><br/>SG: L24 (pp264-273)<br/>TG: L24 (pp329-346)<br/><b>Organisms-From Macro to Micro</b><br/>SG: L06 (pp64-81)<br/>SG: L12 (pp146-155)<br/>SG: L17 (pp194-203)<br/>TG: L12 (pp201-218)</p> <p>SC-8-I-S-2<br/>Students will analyze ecosystems to identify patterns of cooperation that enhance stability<br/><b>Organisms-From Macro to Micro</b><br/>SG: L12 (pp146-155)<br/>TG: L12 (pp201-218)</p> <p>SC-8-I-S-3<br/>Students will model the flow of energy and transfer of matter within ecosystems, communities and niches<br/><b>Light</b><br/>SG: L11 (pp116-131)</p> | <p><b>SC-08-4.7.2</b><br/><b>Students will:</b></p> <ul style="list-style-type: none"> <li>• explain the interactions of the components of the Earth system (e.g., solid Earth, oceans, atmosphere, living organisms);</li> <li>• propose solutions to detrimental interactions.</li> </ul> <p>Interactions among the solid Earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing Earth system.</p> <p style="text-align: right;"><b>DOK 3</b></p>  |
| <p>SC-8-I-U-3<br/>Students will understand that it is important to consider what population will benefit and what population (not necessarily the same one) will bear the cost when deciding among alternative courses of action.</p>   | <p>SC-8-I-S-1<br/>Students will predict the effects of change on one or more components within an ecosystem by analyzing a variety of data<br/><b>Catastrophic Events</b><br/>SG: L24 (pp264-273)<br/>TG: L24 (pp329-346)<br/><b>Organisms-From Macro to Micro</b><br/>SG: L06 (pp64-81)<br/>SG: L12 (pp146-155)<br/>SG: L17 (pp194-203)<br/>TG: L12 (pp201-218)</p>   | <p><b>SC-08-4.7.1</b><br/><b>Students will describe the interrelationships and interdependencies within an ecosystem and predict the effects of change on one or more components within an ecosystem.</b></p> <p><b>Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.</b></p> |

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|  | <p>SC-8-I-S-4<br/> Students will evaluate the risks and benefits of human actions affecting the environment and identify which populations will be harmed or helped. Use a variety of data/ sources to support or defend a position related to a proposed action, both orally and in writing. Analyze the validity of other arguments</p> <p><b>Catastrophic Events</b><br/> SG: L24 (pp264-273)<br/> TG: L24 (pp329-346)</p> <p><b>Organisms-From Macro to Micro</b><br/> SG: L06 (pp64-81)<br/> SG: L13 (pp158-171)<br/> PM - SG: L12 (pp106-111)</p>   | <p style="text-align: right;"><b>DOK 3</b></p>  |
| <p>SC-8-I-U-4<br/> Students will understand that sometimes decisions have unintended consequences no matter how thoughtfully they were made, and may actually create new problems and needs.</p> | <p>SC-8-I-S-1<br/> Students will predict the effects of change on one or more components within an ecosystem by analyzing a variety of data</p> <p><b>Catastrophic Events</b><br/> SG: L24 (pp264-273)<br/> TG: L24 (pp329-346)</p> <p><b>Organisms-From Macro to Micro</b><br/> SG: L06 (pp64-81)<br/> SG: L12 (pp146-155)<br/> SG: L17 (pp194-203)<br/> TG: L12 (pp201-218)</p> <p>SC-8-I-S-4<br/> Students will evaluate the risks and benefits of human actions affecting the environment and identify which populations will be harmed or helped. Use a variety of data/ sources to support or defend a position related to a proposed action, both orally and in writing. Analyze the validity of other arguments</p> <p><b>Catastrophic Events</b><br/> SG: L24 (pp264-273)<br/> TG: L24 (pp329-346)</p> <p><b>Organisms-From Macro to Micro</b></p> | <p><b>SC-08-4.7.1</b><br/> <b>Students will describe the interrelationships and interdependencies within an ecosystem and predict the effects of change on one or more components within an ecosystem.</b></p> <p><b>Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.</b></p> <p style="text-align: right;"><b>DOK 3</b></p> <p><b>SC-08-4.7.2</b><br/> <b>Students will:</b></p> <ul style="list-style-type: none"> <li>● explain the interactions of the components of the Earth system (e.g., solid Earth, oceans, atmosphere, living organisms);</li> <li>● propose solutions to detrimental</li> </ul> |

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|  | <p>SG: L06 (pp64-81)<br/> SG: L13 (pp158-171)<br/> PM - SG: L12 (pp106-111)</p> <p>SC-8-I-S-5<br/> Students will identify examples of human actions that have had unintended environmental consequences (e.g., DDT weakening egg shells, lead-based paint, asbestos insulation)</p> <p><b>Catastrophic Events</b><br/> SG: L24 (pp264-273)<br/> TG: L24 (pp329-346)</p> <p><b>Organisms-From Macro to Micro</b><br/> SG: L06 (pp64-81)<br/> SG: L13 (pp158-171)</p> | <p><b>interactions.</b></p> <p><b>Interactions among the solid Earth, the oceans, the atmosphere and living things have resulted in the ongoing development of a changing Earth system.</b></p> <p><b>DOK 3</b></p> |
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