



**MISSOURI**  
**Science Grade Level Expectations**  
**Scope and Sequence Grade 7**  
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STANDARDS	PAGE REFERENCES
<b>Standard 1: Properties and Principles of Matter and Energy</b>	
1. Changes in properties and states of matter provide evidence of the atomic theory of matter	
D. Physical changes in the state of matter that result from thermal changes can be explained by moving particles (The kinetic theory of matter) a. Describe the relationship between temperature and the movement of atmospheric gases (i.e., warm air rises due to expansion of the volume of gas, cool air sinks due to contraction of the volume of gas)	SE: 90-95, 100-101, 103-104, 600-601 TWE: Identifying Misconceptions 101, 104 Science Journal 101 Teacher FYI 95 Tie to Prior Knowledge 90, 99 Use an Analogy 100 TR: Chapter Resources Fast File <i>Atmosphere</i> Critical Thinking/ Problem Solving- Physical Science 10 Laboratory Activities Manual 139-140 Science Inquiry Lab Manual 37-38 Study Guide and Reinforcement 13, 82 Transparency Chapter 4, Section 2 Teaching Transparency
I. Mass is conserved during any physical or chemical change b. Explain that the amount of matter remains constant while being recycled through the water cycle	SE: 101, 548 Lab 665 TWE: Identifying Misconceptions 548 Science Journal 101 Teacher FYI 548 TR: Chapter Resources Fast File <i>Atmosphere</i> Critical Thinking/ Problem Solving- Physical Science 10 Laboratory Activities Manual 127-130 Study Guide and Reinforcement 13, 82 Transparency Chapter 18, Section 3 Teaching Transparency
2. Energy has a source, can be transferred, and transformed into various forms but is conserved between and within systems.	

STANDARDS	PAGE REFERENCES
<p>A. Forms of energy have a source, a means of transfer (work and heat) and a receiver</p> <p>a. Recognize thermal energy as the random motion (kinetic energy) of molecules or atoms within a substance</p> <p>b. Use the molecular kinetic model to explain changes in the temperature of a material</p> <p>c. Recognize that thermal energy is transferred as heat from warmer objects to cooler objects until both reach the same temperature</p> <p>d. Recognize the type of materials that transfer energy by conduction, convection, and radiation</p> <p>e. Describe how heat is transferred by conduction, convection, and radiation and classify examples of each</p> <p>f. Classify common materials (e.g. wood, foam, plastic, glass, aluminum foil, soil, air, water) as conductors or insulators of thermal energy</p> <p>g. Predict the differences in temperature over time on different colored (black and white) objects placed under a heat source</p> <p>h. Describe the interactions (i.e., repel, attract) of like and unlike charges (i.e., magnetic, static electric, electrical)</p> <p>i. Diagram and identify a complete electric circuit by using a source (battery), a means of transfer (wires), and a receiver (resistance bulbs, motors, fans)</p> <p>j. Observe and describe the evidence of energy transfer in a closed series circuit</p> <p>k. Describe the effects of resistance (number of receivers), amount of voltage (number of energy sources), and kind of transfer materials on the current being transferred through a circuit (e.g., brightness of light, speed of motor)</p> <p>l. Classify materials as conductors or insulators of electricity when placed within a circuit (e.g. wood, pencil lead, plastic, glass, aluminum foil, lemon juice, air, water)</p> <p>m. Diagram and distinguish between complete series and parallel circuits</p> <p>n. Identify advantages and disadvantages of series and parallel circuits</p>	<p>SE: 716-720, 729-737 <i>National Geographic</i> 724 <i>Lab</i> 728</p> <p>TWE: Activity 718 Differentiated Instruction 725 Inquiry Lab 717 Tie to Prior Knowledge 716 Theme Connection 88 Lab Demonstration 722</p> <p>TR: Chapter Resources Fast File <i>Energy and Energy Resources</i> Cultural Diversity 41-42 Laboratory Activities Manual 153-154 Study Guide and Reinforcement 89-91 Transparency Chapter 24, Section 1</p>

STANDARDS	PAGE REFERENCES
<p>C. Electromagnetic energy from the sun (solar radiation) is a major source of energy on Earth</p> <p>a. Recognize that the energy from the Sun is transferred to Earth in a range of wavelengths including visible light, infrared radiation, and ultraviolet radiation</p> <p>b. Recognize that the sun is the source of almost all energy used to produce the food for living organisms</p>	<p>SE: 96, 99-100 <i>Integrate Life Science</i> 96 <i>Lab</i> 98 <i>MiniLAB</i> 101</p> <p>TWE: Cultural Diversity 96 Discussion 100 Teacher FYI 100</p> <p>TR: Chapter Resources Fast File <i>Atmosphere</i> Critical Thinking/ Problem Solving-Life Science 8 Cultural Diversity 41-42 Laboratory Activities Manual 31-34 Study Guide and Reinforcement 12 Transparency Chapter 4, Section 2</p>
<p>F. Energy can change from one form to another within systems but the total amount remains the same</p> <p>a. Identify the different energy transformations that occur between different systems (e.g. chemical energy in battery converted to electricity in circuit converted to light and heat from a bulb)</p> <p>b. Recognize that, during an energy transformation, heat is often transferred from one object (system) to another because of a difference in temperature</p> <p>c. Recognize that energy is not lost but conserved as it is transferred and transformed</p>	<p>SE: 99-100, 721-727</p> <p>TWE: Activity 727 Discussion 726 Identifying Misconceptions 721, 725 Lab Demonstration 722 Quick Demo 723, 731 Science Journal 719 Teacher FYI 725 Tie to Prior Knowledge 721</p> <p>TR: Chapter Resources Fast File <i>Energy and Energy Resources</i> Critical Thinking/ Problem Solving-Physical Science 6 Cultural Diversity 41-42 Laboratory Activities Manual 153-154 Probeware Lab Manual 71-74 Reading and Writing Skill Activities 35-36 Study Guide and Reinforcement 89-91 Transparency Chapter 24, Section 3 Teaching Transparency</p>
<b>Standard 2: Properties and Principles of Force and Motion</b>	
1. The motion of an object is described by its change in position relative to another object or point	

STANDARDS	PAGE REFERENCES
<p>A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference)</p> <p>a. Describe circular motion of a moving object as the result of a force acting toward the center</p> <p>b. Classify different types of motion (e.g., straight line, projectile, circular, vibrational)</p> <p>c. Given an object in motion, calculate its speed (distance/time)</p> <p>d. Interpret a line graph representing an object's motion in terms of distance over time (speed) using metric units</p>	<p>SE: 684-689 <i>Applying Math</i> 686 <i>MiniLAB</i> 687, 704</p> <p>TWE: Activity 687 Differentiated Instruction 688 Discussion 686 Science Journal 685 Teacher FYI 685 Theme Connection 682 Tie to Prior Knowledge 684</p> <p>TR: Chapter Resources Fast File <i>Newton's Laws of Motion</i> Laboratory Activities Manual 145-148 Probeware Lab Manual 67-70 Study Guide and Reinforcement 85 Transparency Chapter 23, Section 1</p>
<b>2. Forces affect motion</b>	
<p>A. Forces are classified as either contact forces (pushes, pulls, friction, buoyancy) or non-contact forces (gravity, magnetism) that can be described in terms of direction and magnitude</p> <p>a. Identify and describe the types of forces acting on an object in motion, at rest, floating/sinking (i.e., type of force, direction, and amount of force in Newtons)</p> <p>b. Compare the forces acting on an object by using a spring scale to measure them to the nearest Newton</p>	<p>SE: 684-688, 690-700 <i>Launch Lab</i> 683 <i>Lab</i> 701 <i>Applying Math</i> 695 <i>Design Your Own Lab</i> 706-707</p> <p>TWE: Differentiated Instruction 691 Discussion 697 Fun Fact 696 Quick Demo 696 Tie to Prior Knowledge 690 Teacher FYI 696 Use an Analogy 697 Visual Learning 695</p> <p>TR: Chapter Resources Fast File <i>Newton's Laws of Motion</i> Critical Thinking/ Problem Solving-Physical Science 4 Laboratory Activities Manual 149-152 Performance Assessment 37-38 Probeware Lab Manual 84-88 Study Guide and Reinforcement 87 Transparency Chapter 23, Section 4</p>
<p>B. Every object exerts a gravitational force on every other object</p> <p>a. Recognize that every object exerts a gravitational force of attraction on every other object</p> <p>b. Recognize that an object's weight is a measure of the gravitational force of a planet/moon acting on that object</p> <p>c. Compare the amount of gravitational force acting between objects (which is dependent upon their masses and the distance between them)</p>	<p>SE: 696, 700, 704, 705</p> <p>TWE: Fun Fact 696 Quick Demo 696 Science Journal Teacher FYI 696</p> <p>TR: Chapter Resources Fast File <i>Newton's Laws of Motion</i> Critical Thinking/ Problem Solving-Physical Science 4 Study Guide and Reinforcement 87</p>

STANDARDS	PAGE REFERENCES
<p>D. The interaction of mass and forces can be explained by Newton’s Laws of Motion that are used to predict changes in motion</p> <p>a. Compare the effects of balanced and unbalanced forces (including magnetic, gravity, friction, push or pull) on an object’s motion</p> <p>b. Explain that when forces (including magnetic, gravity, friction, push or pull) are balanced, objects are at rest or their motion remains constant</p> <p>c. Explain that a change in motion is the result of an unbalanced force acting upon an object</p> <p>d. Explain how the acceleration of a moving object is affected by the amount of net force applied and the mass of the object</p>	<p>SE: 684-688, 690-700  <i>Launch Lab</i> 683  <i>Lab 701</i>  <i>Applying Math</i> 695  <i>Design Your Own Lab</i> 706-707</p> <p>TWE: Differentiated Instruction 691  Discussion 697  Fun Fact 696  Quick Demo 696  Tie to Prior Knowledge 690  Teacher FYI 696  Use an Analogy 697  Visual Learning 695</p> <p>TR: Chapter Resources Fast File <i>Newton’s Laws of Motion</i>  Critical Thinking/ Problem Solving- Physical Science 4  Laboratory Activities Manual 149-152  Performance Assessment 37-38  Probeware Lab Manual 84-88  Study Guide and Reinforcement 87  Transparency Chapter 23, Section 4</p>
<p>F. Simple machines (levers, inclined planes, wheels &amp; axles, and pulleys) affect the forces applied to an object and/or direction of movement as work is done</p> <p>a. Recognize examples of work being done on an object (force applied and distance moved in the direction of the applied force) with and without the use of simple machines</p> <p>b. Calculate the amount of work done when a force is applied to an object over a distance (<math>W = F \times d</math>)</p> <p>c. Explain how simple machines affect the amount of effort force, distance through which a force is applied, and/or direction of force while doing work</p> <p>d. Recognize that the amount of work input equals the amount of work output with or without the use of a simple machine</p> <p>e. Evaluate simple machine designs to determine which design requires the least amount of effort force and explain why</p>	<p>SE: 440, 697  <i>National Geographic</i> 699  <i>MiniLAB</i> 704</p> <p>TWE: Tie to Prior Knowledge 694  Inquiry Lab 698</p> <p>TR: Chapter Resources Fast File <i>Newton’s Laws of Motion</i>  Performance Assessment 37-38</p>
<p><b>Standard 5: Processes and Interactions of the Earth’s Systems (Geosphere, Atmosphere and Hydrosphere)</b></p>	
<p>1. Earth’s Systems (Geosphere, Atmosphere and Hydrosphere) have common components and unique structure</p>	

STANDARDS	PAGE REFERENCES
<p>C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles</p> <p>a. Describe the composition of the Earth's atmosphere (i.e., mixture of gases, water and minute particles) and how it circulates as air masses</p> <p>b. Describe the role the atmosphere (e.g., clouds, ozone) plays in precipitation, reflecting and filtering light from the sun, and trapping heat energy emitted from the Earth's surface</p>	<p>SE: 90-97, 161, 568 <i>MiniLAB</i> 95 <i>Integrate Career</i> 161</p> <p>TWE: Differentiated Instruction 92 Fun Fact 92 Identifying Misconceptions 92 Teacher FYI 91, 93, 95 Tie to Prior Knowledge 90 Visual Learning 91</p> <p>TR: Chapter Resources Fast File <i>Atmosphere</i> Critical Thinking/ Problem Solving-Earth Science 13 Laboratory Activities Manual 15-18 Performance Assessment 48-49 Study Guide and Reinforcement 11 Transparency Chapter 4, Section 2</p>
<p>D. Climate is a description of average weather conditions in a given area over time</p> <p>a. Differentiate between weather and climate</p> <p>b. Identify factors that affect climate (e.g., latitude, altitude, prevailing wind currents, amount of solar radiation)</p>	<p>SE: 127-133, 156-166 <i>Chapter Preview</i> 88, 592 <i>Launch Lab</i> 89 <i>National Geographic</i> 158-159</p> <p>TWE: Curriculum Connection 158 Discussion 127, 160, 163, 165 Fun Fact 160 Identifying Misconceptions 160 Lab Demonstration 94, 164 Teacher FYI 162 Visual Learning 164</p> <p>TR: Chapter Resources Fast File <i>Climate</i> Laboratory Activities Manual 19-26 Probeware Lab Manual 57-62 Reading and Writing Skill Activities 3-4, 13-14, 45-46 Study Guide and Reinforcement 21 Transparency Chapter 6, Section 3</p>
<p>2. Earth's Systems (Geosphere, Atmosphere and Hydrosphere) interact with one another as they undergo change by common processes</p>	

STANDARDS	PAGE REFERENCES
<p>E. Changes in the form of water as it moves through Earth's systems are described as the water cycle</p> <p>a. Explain and trace the possible paths of water through the hydrosphere, geosphere and atmosphere (i.e., the water cycle: evaporation, condensation, precipitation, groundwater/ surface run-off)</p> <p>b. Relate the different forms water can take (i.e., snow, rain, sleet, fog, clouds, dew, humidity) as it moves through the water cycle to atmospheric conditions (i.e., temperature, pressure, wind direction and speed, humidity) at a given geographic location</p> <p>c. Explain how thermal energy is transferred throughout the water cycle by the processes of convection, conduction, and radiation</p>	<p>SE: 101, 548 Lab 665</p> <p>TWE: Identifying Misconceptions 548 Science Journal 101 Teacher FYI 548</p> <p>TR: Chapter Resources Fast File <i>Atmosphere</i> Critical Thinking/ Problem Solving-Earth Science 15 Laboratory Activities Manual 19-22 Science Inquiry Lab Manual 5-6 Reading and Writing Skill Activities 3-4, 29 Study Guide and Reinforcement 13</p>
<p>F. Constantly changing properties of the atmosphere occur in patterns which are described as weather</p> <p>a. Explain how the differences in surface temperature, due to the different heating and cooling rates of water and soil, affect the temperature and movement of the air above</p> <p>b. Recognize the characteristics of air masses (i.e., high/low barometric pressure, temperature) and predict their effect on the weather in a given location</p> <p>c. Identify weather conditions associated with cold fronts and warm fronts</p> <p>d. Identify factors that affect weather patterns in a particular region (e.g., proximity to large bodies of water, latitude, altitude, prevailing wind currents, amount of solar radiation, location with respect to mountain ranges)</p> <p>e. Collect and interpret weather data (e.g., cloud cover, precipitation, wind speed and direction) from weather instruments and maps to explain present day weather and to predict the next day's weather</p> <p>f. Recognize that significant changes in temperature and barometric pressure may cause dramatic weather phenomena (i.e., severe thunderstorms, tornadoes, hurricanes)</p>	<p>SE: 118-125, 127, 134-136 <i>Design Your Own Lab</i> 108-109 <i>Launch Lab</i> 117 <i>Lab</i> 137, 168-169 <i>Model and Invent Lab</i> 138-139</p> <p>TWE: Activity 132 Daily Intervention 133 Fun Fact 129 Identifying Misconceptions 123 Lab Demonstration 120 Quick Demo 119 Teacher FYI 119, 122, 132 Tie to Prior Knowledge 118 Visual Learning 122, 135</p> <p>TR: Chapter Resources Fast File <i>Weather</i> Home and Community Involvement 41 Laboratory Activities Manual 19-26 Mathematics Skills Activities 42, 46, 49 Probeware Lab Manual 57-62 Reading and Writing Skill Activities 3-4, 13-14, 45-46 Study Guide and Reinforcement 15-17 Transparency Chapter 5, Section 2 Transparency Chapter 5, Section 3</p>
<p>3. Human activity is dependent upon and affects Earth's resources and systems</p>	

STANDARDS	PAGE REFERENCES
<p>A. Earth's materials are limited natural resources that are affected by human activity</p> <p>a. Distinguish between renewable (e.g., geothermal, hydroelectric) and nonrenewable (e.g., fossil fuels) energy sources</p> <p>b. Provide examples of how the availability of fresh water for humans and other living organisms is dependent upon the water cycle</p>	<p>SE: 558-566, 567, 573, 575</p> <p>TWE: Activity 561 Curriculum Connection 562 Identifying Misconceptions 561 Teacher FYI 565 Tie to Prior Knowledge 560 Use an Analogy 561</p> <p>TR: Chapter Resources Fast File <i>Conserving Resources</i> Critical Thinking/ Problem Solving-Life Science 10, 13 Critical Thinking/ Problem Solving-Earth Science 2, 6 Critical Thinking/ Problem Solving-Physical Science 14, 15, 17 Cultural Diversity 3-4, 45-46, 53-54, 65-66 Laboratory Activities Manual 115-118, 119-122 Performance Assessment 53-54 Study Guide and Reinforcement 71-73 Transparency Chapter 19, Assessment Transparency</p>
<b>Standard 6: Composition and Structure of the Universe and the Motion of the Objects within It</b>	
1. The universe has observable properties and structure	
<p>A. The Earth, sun, and moon are part of a larger system that includes other planets and smaller celestial bodies</p> <p>a. Classify celestial bodies in the solar system into categories: sun, moon, planets and other small bodies (i.e., asteroids, comets, meteors) based on physical properties</p> <p>b. Compare and contrast the size, composition, atmosphere and surface of the planets (inner vs. outer) in our solar system and Earth's moon</p> <p>c. Identify the relative proximity of common celestial bodies (i.e., sun, moon, planets, smaller celestial bodies such as comets and meteors, and other stars) in the sky to the Earth</p>	<p>SE: 194-201</p> <p>TWE: Activity 197 Differentiated Instruction 195, 197 Discussion 196, 198, 200 Make a Model 195 Quick Demo 200 Science Journal 196 Teacher FYI 195, 197 Tie to Prior Knowledge 194 Visual Learning 196</p> <p>TR: Chapter Resources Fast File <i>Earth in Space</i> Critical Thinking/ Problem Solving-Physical Science 4 Laboratory Activities Manual 35-38 Mathematic Skills Activities 2, 40 Study Guide and Reinforcement 25</p>
<p>B. The Earth has a composition and location that is suitable to sustain life</p> <p>a. Describe how the Earth's placement in the solar system is favorable to sustain life (i.e. distance from the sun, temperature, atmosphere)</p> <p>b. Compare and contrast the characteristics of Earth that support life with the characteristics of other planets that are considered favorable or unfavorable to life (e.g. atmospheric gases, extremely high/low temperatures)</p>	<p>SE: 178-183</p> <p>TWE: Differentiated Instruction 180 Discussion 181 Teacher FYI 179</p> <p>TR: Chapter Resources Fast File <i>Earth in Space</i> Mathematic Skills Activities 2 Study Guide and Reinforcement 23 Transparency Chapter 7, Section 1 Teaching Transparency</p>

STANDARDS	PAGE REFERENCES
<p>C. Most of the information we know about the universe comes from the electromagnetic spectrum</p> <p>a. Recognize that stars are separated from one another by vast and different distances, which causes stars to appear smaller than the Sun</p> <p>b. Compare the distance light travels from the sun to Earth to the distance light travels from other stars to Earth using light years</p>	<p>SE: 176, 194</p> <p>TR: Cultural Diversity 41-42, 51-52 Probeware Lab Manual 63-66</p>
<p>2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces</p>	
<p>A. The positions of the Sun and other stars, as seen from Earth, appear to change in observable patterns</p> <p>a. Relate the apparent east-to-west changes in the positions of the Sun, other stars, and planets in the sky over the course of a day to Earth's counterclockwise rotation about its axis</p> <p>b. Describe the pattern that can be observed in the changes in number of hours of visible sunlight, and the time and location of sunrise and sunset, throughout the year</p> <p>c. Recognize that in the Northern Hemisphere, the Sun appears lower in the sky during the winter and higher in the sky during the summer</p> <p>d. Recognize that in winter, the Sun appears to rise in the Southeast and set in the Southwest, accounting for a relatively short day length, and that in summer, the Sun appears to rise in the Northeast and set in the Northwest, accounting for a relatively long day length</p> <p>e. Recognize that the Sun is never directly overhead when observed from North America</p>	<p>SE: 180-183</p> <p>TWE: Differentiated Instruction 180, 181 Discussion 181 Lab Demonstration 180 Quick Demo 180 Teacher FYI 182 Visual Learning 182</p> <p>TR: Chapter Resources Fast File <i>Earth in Space</i> Critical Thinking/ Problem Solving-Earth Science 23 Cultural Diversity 71-72 Laboratory Activities Manual 39-41 Study Guide and Reinforcement 23 Transparency Chapter 7, Section 1 Teaching Transparency</p>

STANDARDS	PAGE REFERENCES
<p>B. The appearance of the moon that can be seen from Earth and its position relative to Earth changes in observable patterns</p> <ol style="list-style-type: none"> <li>Observe the change in time and location of moon rise, moon set, and the moon's appearance relative to time of day and month over several months and note the pattern in this change</li> <li>Recognize that the Moon rises later each day due to its revolution around the Earth in a counterclockwise direction</li> <li>Recognize that the Moon is in the sky for roughly 12 hours in a 24-hour period (i.e., if the Moon rises at about 6 P.M., it will set at about 6 A.M.)</li> <li>Recognize that one half of the Moon is always facing the Sun and therefore one half of the Moon is always lit</li> <li>Relate the apparent change in the moon's position in the sky as it appears to move east to west over the course of a day to Earth's counterclockwise rotation about its axis</li> <li>Describe how the appearance of the moon that can be seen from Earth changes approximately every 28 days in an observable pattern (moon phases)</li> </ol>	<p>SE: 184-192 Lab 193</p> <p>TWE: Activity 187 Differentiated Instruction 187 Discussion 188 Fun Fact 188, 190 Identifying Misconceptions 185 Quick Demo 187, 189 Science Journal 190 Teacher FYI 186 Tie to Prior Knowledge 184 Visual Learning 189</p> <p>TR: Chapter Resources Fast File <i>Earth in Space</i> Cultural Diversity 71-72 Study Guide and Reinforcement X Transparency Chapter 7, Section 1 Teaching Transparency</p>
<p>C. The regular and predictable motions of the Earth and moon relative to the sun explain natural phenomena on Earth such as the day, the month, the year, shadows, moon phases, eclipses, tides, and seasons</p> <ol style="list-style-type: none"> <li>Illustrate and explain a day as the time it takes a planet to make a full rotation on its axis</li> <li>Diagram the path (orbital ellipse) the Earth travels as it revolves around the sun</li> <li>Illustrate and explain a year as the time it takes a planet to revolve around the sun</li> <li>Explain the relationships between a planet's length of year (period of revolution) and its position in the solar system</li> <li>Describe how the Moon's relative position changes as it revolves around the Earth</li> <li>Recognize that the phases of the moon are due to the relative positions of the Moon with respect to the Earth and Sun</li> <li>Relate the axial tilt and orbital position of the Earth as it revolves around the sun to the intensity of sunlight falling on different parts of the Earth during different seasons</li> </ol>	<p>SE: 184-192 Lab 193</p> <p>TWE: Activity 187 Differentiated Instruction 187 Discussion 188 Fun Fact 188, 190 Identifying Misconceptions 185 Quick Demo 187, 189 Science Journal 190 Teacher FYI 186 Tie to Prior Knowledge 184 Visual Learning 189</p> <p>TR: Chapter Resources Fast File <i>Earth in Space</i> Cultural Diversity 71-72 Study Guide and Reinforcement 24 Transparency Chapter 7, Section 1 Teaching Transparency</p>

STANDARDS	PAGE REFERENCES
<p>D. Gravity is a force of attraction between objects in the solar system that governs their motion</p> <p>a. Describe how the Earth’s gravity pulls any object on or near the Earth toward it (including natural and artificial satellites)</p> <p>b. Describe how the planets’ gravitational pull keeps satellites and moons in orbit around them</p> <p>c. Describe how the sun’s gravitational pull holds the Earth and other planets in their orbits</p>	<p>SE: 179</p> <p>TWE: Fun Fact 696 Quick Demo 696 Teacher FYI 179, 696</p> <p>TR: Chapter Resources Fast File <i>Newton’s Laws of Motion</i> Critical Thinking/ Problem Solving-Physical Science 4 Study Guide and Reinforcement 87</p>
<b>Standard 7: Scientific Inquiry</b>	
1. Science understanding is developed through the use of science process skills and scientific knowledge in combination with scientific investigation, reasoning, and critical thinking	
<p>A. Scientific inquiry includes the ability of students to formulate a testable question and explanation and to select appropriate investigative methods in order to obtain evidence relevant to the explanation</p> <p>a. Formulate testable questions and hypotheses</p> <p>b. Recognize the importance of the independent variable, dependent variables, control of constants, and multiple trials to the design of a valid experiment</p> <p>c. Design and conduct a valid experiment</p> <p>d. Evaluate the design of an experiment and make suggestions for reasonable improvements or extensions of an experiment</p> <p>e. Recognize that different kinds of questions suggest different kinds of scientific investigations (e.g., some involve observing and describing objects organisms, or events; some involve collecting specimens; some involve experiments; some involve making observations in nature; some involve discovery of new objects and phenomena; and some involve making models)</p> <p>f. Acknowledge that there is no fixed procedure called “the scientific method”, but that some investigations involve systematic observations, carefully collected, relevant evidence, logical reasoning, and some imagination in developing hypotheses and other explanations</p>	<p>SE: 12-18 <i>Lab</i> 20-21, 35, 49, 78-79, 98, 108-109, 137-139, 167, 168-169, 193, 202-203, 231, 236-237, 260, 266-267, 283, 296-297, 313, 324-325, 342, 354-355, 389-391, 411, 424-425, 438, 458-459, 478, 488-489, 521-523, 538, 550-551, 577, 582-583, 599, 610-611, 633, 642-643, 665, 675, 701, 707, 729, 738-739</p> <p>TWE: Activity 15 Differentiated Instruction 13, 15 Discussion 18 Lab Demonstration 14 Quick Demo 17 Teacher FYI 13, 16 Tie to Prior Knowledge 12 Visual Learning 17</p> <p>TR: Chapter Resources Fast File <i>The Nature of Science</i> Home and Community Involvement 11-20, 23-49 Laboratory Activities Manual This objective is met throughout this book Science Inquiry Lab Manual This objective is met throughout this book Study Guide and Reinforcement 1-2 Transparency Chapter 1, Section 2 Teaching Transparency</p>

STANDARDS	PAGE REFERENCES
<p>B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations</p> <ol style="list-style-type: none"> <li>Make qualitative observations using the five senses</li> <li>Determine the appropriate tools and techniques to collect data</li> <li>Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders, stopwatches)</li> <li>Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second</li> <li>Compare amounts/measurements</li> <li>Judge whether measurements and computation of quantities are reasonable</li> <li>Calculate the range and average/mean of a set of data</li> </ol>	<p>SE: 12-18  <i>Lab</i> 21, 108-109, 138-139, 167-168, 202-203, 424-425, 438-439, 458-459, 488-489, 551-552, 557, 599, 665, 701-702</p> <p>TWE: Activity 15  Differentiated Instruction 13, 15  Discussion 18  Lab Demonstration 14  Quick Demo 17  Teacher FYI 13, 16  Tie to Prior Knowledge 12  Visual Learning 17</p> <p>TR: Chapter Resources Fast File <i>The Nature of Science</i>  Home and Community Involvement 11-20, 23-49  Laboratory Activities Manual This objective is met throughout this book  Mathematic Skills Activities 19-22  Science Inquiry Lab Manual This objective is met throughout this book  Study Guide and Reinforcement 1-2  Transparency Chapter 1, Section 2  Teaching Transparency</p>
<p>C. Evidence is used to formulate explanations</p> <ol style="list-style-type: none"> <li>Use quantitative and qualitative data to construct reasonable explanations (conclusions)</li> <li>Use data to describe relationships and make predictions to be tested</li> <li>Recognize the possible effects of errors in observations, measurements, and calculations on the formulation of explanations (conclusions)</li> </ol>	<p>SE: 12-18  <i>Lab</i> 35, 49, 79, 98, 109, 137, 139, 167, 169, 193, 203, 231, 237, 260, 267, 283, 297, 313, 325, 342, 355, 389, 391, 411, 425, 438, 459, 478, 489, 521, 523, 539, 551, 577, 583, 599, 611, 633, 643, 665, 675, 701, 707, 728</p> <p>TWE: Activity 15  Differentiated Instruction 13, 15  Discussion 18  Lab Demonstration 14  Quick Demo 17  Teacher FYI 13, 16  Tie to Prior Knowledge 12  Visual Learning 17</p> <p>TR: Chapter Resources Fast File <i>The Nature of Science</i>  Home and Community Involvement 46-48  Laboratory Activities Manual This objective is met throughout this book  Science Inquiry Lab Manual This objective is met throughout this book  Study Guide and Reinforcement 1-2  Transparency Chapter 1, Section 2  Teaching Transparency</p>

STANDARDS	PAGE REFERENCES
<p>D. Scientific inquiry includes evaluation of explanations (hypotheses, laws, theories) in light of scientific principles (understandings)</p> <p>a. Make predictions supported by scientific knowledge/explanations</p> <p>b. Analyze whether evidence (data) supports proposed explanations (hypotheses, laws, theories)</p> <p>c. Evaluate the reasonableness of an explanation (conclusion)</p>	<p>SE: 12-18 Lab 35, 49, 79, 98, 109, 137, 139, 167, 169, 193, 203, 231, 237, 260, 267, 283, 297, 313, 325, 342, 355, 389, 391, 411, 425, 438, 459, 478, 489, 521, 523, 539, 551, 577, 583, 599, 611, 633, 643, 665, 675, 701, 707, 728</p> <p>TWE: Activity 15 Differentiated Instruction 13, 15 Discussion 18 Lab Demonstration 14 Quick Demo 17 Teacher FYI 13, 16 Tie to Prior Knowledge 12 Visual Learning 17 Tie to Prior Knowledge</p> <p>TR: Chapter Resources Fast File <i>The Nature of Science</i> Home and Community Involvement 48 Laboratory Activities Manual This objective is met throughout this book Science Inquiry Lab Manual This objective is met throughout this book Study Guide and Reinforcement 1-2</p>
<p>E. The nature of science relies upon communication of results and justification of explanations</p> <p>a. Communicate the procedures and results of investigations and explanations through:</p> <ul style="list-style-type: none"> <li>⇒ oral presentations</li> <li>⇒ drawings and maps</li> <li>⇒ data tables</li> <li>⇒ graphs (bar, single line, pictographs)</li> <li>⇒ equations and writings</li> </ul> <p>b. Interpret data in order to make and support conclusions</p>	<p>SE: 12-18 Lab 35, 49, 79, 98, 109, 137, 139, 167, 169, 193, 203, 231, 237, 260, 267, 283, 297, 313, 325, 342, 355, 389, 391, 411, 425, 438, 459, 478, 489, 521, 523, 539, 551, 577, 583, 599, 611, 633, 643, 665, 675, 701, 707, 728</p> <p>TWE: Activity 15 Differentiated Instruction 13, 15 Discussion 18 Lab Demonstration 14 Quick Demo 17 Teacher FYI 13, 16 Tie to Prior Knowledge 12 Visual Learning 17</p> <p>TR: Chapter Resources Fast File <i>The Nature of Science</i> Home and Community Involvement 49 Laboratory Activities Manual This objective is met throughout this book Science Inquiry Lab Manual This objective is met throughout this book Study Guide and Reinforcement 1-2</p>
<b>Standard 8: Impact of Science, Technology and Human Activity</b>	
1. The nature of technology is advanced by and can advance science as it seeks to apply scientific knowledge in ways that meet human needs	

STANDARDS	PAGE REFERENCES
<p>A. Designed objects are used to do things better or more easily and to do some things that could not otherwise be done at all</p> <p>a. Identify and evaluate the physical, social, economic, and/or environmental problems that may be overcome using science and technology (e.g., the need for alternative fuels, human travel in space, AIDS)</p> <p>b. Explain how technological improvements such as those developed for use in space exploration or by the military have led to the invention of new products that may improve our lives here on Earth (e.g., materials, freeze-dried foods, infrared goggles, Velcro, satellite imagery, robotics)</p>	<p>SE: 9, 87, 134, 140, 211, 222-223, 234-235, 321-323, 356, 423, 590, 708, 733-734</p> <p>TWE: Activity 222 Cultural Diversity 322 Discussion 140 Science Journal Teacher FYI 322 Tie to Prior Knowledge 321 Visual Learning 322</p> <p>TR: Reading and Writing Skill Activities 33</p>
<p>B. Advances in technology often result in improved data collection and an increase in scientific information</p> <p>a. Identify the link between technological developments and the scientific discoveries made possible through their development (e.g., Hubble telescope and stellar evolution, composition and structure of the universe; the electron microscope and cell organelles; sonar and the composition of the Earth; manned and unmanned space missions and space exploration; Doppler radar and weather conditions; MRI and CAT-scans and brain activity)</p>	<p>SE: 222-223</p> <p>TWE: Activity 222, 223 Content Background 223 Teacher FYI 223 Visual Learning 223</p> <p>TR: Cultural Diversity 51-52</p>
<p>C. Technological solutions to problems often have drawbacks as well as benefits</p> <p>a. Describe how technological solutions to problems can have both benefits and drawbacks (e.g., storm water runoff, fiber optics, windmills, efficient car design, electronic trains without conductors, sonar, robotics, Hubble telescope)</p>	<p>SE: 9, 87, 134, 140, 211, 222-223, 234-235, 321-323, 423, 590, 708, 733-734</p> <p>TWE: Activity 222 Cultural Diversity 322 Discussion 140 Science Journal Teacher FYI 322 Tie to Prior Knowledge 321 Visual Learning 322</p> <p>TR: Critical Thinking/ Problem Solving-Physical Science 14, 17, 19, 20 Reading and Writing Skill Activities 11-12</p>
<p>2. A historical perspective of scientific explanations helps to improve understanding of the nature of science and how science knowledge and technology evolve over time</p>	

STANDARDS	PAGE REFERENCES
<p>A. People from various cultures, races, and of different gender have contributed to scientific discoveries and the invention of technological innovations</p> <p>a. Describe how the contributions of scientists and inventors have contributed to science, technology and human activity (e.g., George Washington Carver, Thomas Edison, Thomas Jefferson, Isaac Newton, Marie Curie, Galileo, Albert Einstein, Mae Jemison, Edwin Hubble, Charles Darwin, Jonas Salk, Louis Pasteur, Jane Goodall, Tom Akers, John Wesley Powell)</p>	<p>SE: 50, 61, 218-219, 221, 238, 291, 298, 307, 336-338, 356, 381, 392, 426, 524, 690</p> <p>TWE: Activity 524 Cultural Diversity 42, 74, 182, 188, 278 Curriculum Connection 130, 248, 293, 726 Differentiated Instruction 92, 228, 294 Discussion 392, 524 Identifying Misconceptions 335 Science Journal 336, 382 Teacher FYI 219 Tie to Prior Knowledge</p> <p>TR: Critical Thinking/ Problem Solving-Earth Science 23 Cultural Diversity This objective is met throughout this book</p>
<p>B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity</p> <p>a. Recognize the difficulty science innovators experienced as they attempted to break through the accepted ideas (hypotheses, laws, theories) of their time to reach conclusions that are now considered to be common knowledge (e.g., Darwin, Copernicus, Newton)</p> <p>b. Recognize that explanations have changed over time as a result of new evidence</p>	<p>SE: 14, 15, 334-335, 690</p> <p>TWE: Discussion 691 Identifying Misconceptions 335 Tie to Prior Knowledge 334</p> <p>TR: Chapter Resources Fast File <i>The Nature of Science</i> Reading and Writing Skill Activities 17 Study Guide and Reinforcement 1-2</p>
<p>3. Science is a Human Endeavor</p>	
<p>B. Social, political, economic, ethical, and environmental factors strongly influence and are influenced by the direction of progress of science and technology</p> <p>a. Describe ways in which science and society influence one another (e.g., scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment; societal challenges often inspire questions for scientific research; social priorities often influence research priorities through the availability of funding for research)</p>	<p>SE: 80, 140, 204, 322-323, 426, 573-576, 732</p> <p>TWE: Content Background 80, 140, 426 Discussion 80, 140, 204, 426 Integrate Environment 322</p> <p>TR: Critical Thinking/ Problem Solving-Earth Science 2, 10 Critical Thinking/ Problem Solving-Physical Science 14, 17 Cultural Diversity This objective is met throughout this book Reading and Writing Skill Activities 43-44, 47-48</p>

STANDARDS	PAGE REFERENCES
<p>C. Technological solutions to problems often have drawbacks as well as benefits</p> <p>a. Identify and evaluate the environmental costs and benefits of scientific or technological solutions to a given problem (e.g., damming a river for flood control, using pesticides to eliminate mosquitoes)</p>	<p>SE: 9, 87, 134, 140, 211, 222-223, 234-235, 321-323, 423, 590, 708, 733-734</p> <p>TWE: Activity 222  Cultural Diversity 322  Discussion 140  Science Journal  Teacher FYI 322  Tie to Prior Knowledge 321  Visual Learning 322</p> <p>TR: Critical Thinking/ Problem Solving-Earth Science 2  Critical Thinking/ Problem Solving-Physical Science 14, 17, 19, 20  Reading and Writing Skill Activities 9, 11-12, 51-52</p>