

## 5<sup>th</sup> Grade Science Pacing Guide

Time Frame	Understanding the Standard	Essential Knowledge, Skills, and Processes
SOL 5.1 Ongoing throughout the year	<p>The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which:</p> <ul style="list-style-type: none"> <li>a. Items such as rocks, minerals, and organisms are identified using various classification keys;</li> <li>b. Estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools;</li> <li>c. Estimates are made and accurate measurements of elapsed time are made using proper tools;</li> <li>d. Hypotheses are formed from testable questions;</li> <li>e. Independent and dependent variables are identified</li> <li>f. Constants in an experimental situation are identified;</li> <li>g. Data are collected, recorded, analyzed, and communicated using proper graphical representations and metric measurements;</li> <li>h. Predictions are made using patterns from data collected, and simple graphical data are generated;</li> <li>i. Inferences are made and conclusions are drawn;</li> <li>j. Models are constructed to clarify explanations, demonstrate relationships, and solve needs; and</li> <li>k. Current applications are used to reinforce science concepts.</li> </ul>	<p>In order to meet this standard, it is expected that students will</p> <ul style="list-style-type: none"> <li>a. use classification keys to identify rocks, minerals, and organisms.</li> <li>b. select and use the appropriate instruments, including centimeter rulers, meter sticks, graduated cylinders, balances, stopwatches, and thermometers for making basic measurements.</li> <li>c. make reasonable estimations of length, mass, volume, and elapsed time.</li> <li>d. Measure length, mass, volume, and temperature using metric measures. This includes millimeters, centimeters, meters, kilometers, grams, kilograms, milliliters, liters, and degrees Celsius.</li> <li>e. use a testable question to form a hypothesis as cause and effect (e.g., "if..., then...") statement.</li> <li>f. analyze the variables in a simple experiment and identify the independent and dependent variables, and the constants.</li> <li>g. collect, record, analyze, and report data, using charts and tables, and translate numerical data into bar or line graphs.</li> </ul>

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		<ul style="list-style-type: none"> <li>h. make predictions based on trends in data. This requires the recognition of patterns and trends and determination of what those trends may represent.</li> <li>i. make inferences and draw conclusions.</li> <li>j. construct a physical model to clarify an explanation, demonstrate a relationship, or solve a need.</li> </ul>
<p>First Quarter SOL 5.1 (ongoing)</p> <p>SOL 5.5</p>	<p>The student will investigate and understand that organisms are made of one or more cells and have distinguishing characteristics that play a vital role in the organism’s ability to survive and thrive in its environment. Key concepts include</p> <ul style="list-style-type: none"> <li>a. basic cell structures and functions;</li> <li>b. classification of organisms using physical characteristics, body structures, and behavior of the organism; and</li> <li>c. traits of organisms that allow them to survive in their environment</li> </ul>	<p>In order to meet this standard, it is expected that students will</p> <ul style="list-style-type: none"> <li>a. draw, label, and describe the essential structures and functions of plant and animal cells. For plant, include the nucleus, cell wall, cell membrane, vacuole, chloroplasts, and cytoplasm. For animals, include the nucleus, cell membrane, vacuole, and cytoplasm.</li> <li>b. design an investigation to make observations of cells.</li> <li>c. compare and contrast plant and animal cells and identify their major parts and functions.</li> <li>d. Groups organisms into categories, using their characteristics: plants (vascular and nonvascular) and</li> </ul>

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		<p>animals (vertebrates and invertebrates). Name and describe two common examples of each group.</p> <p>e. Compare and contrast the distinguishing characteristics of groups of organisms.</p> <p>f. Identify and explain traits of organisms that allow them to survive in their environment.</p>
<p>SOL 5.7</p>	<p>The student will investigate and understand how Earth's surface is constantly changing. Key concepts include</p> <ul style="list-style-type: none"> <li>a. Identification of rock types;</li> <li>b. The rock cycle and how transformations between rocks occur;</li> <li>c. Earth history and fossil evidence;</li> <li>d. the basic structure of Earth's interior;</li> <li>e. changes in Earth's crust due to plate tectonics;</li> <li>f. weathering, erosion, and deposition;</li> <li>g. human impact</li> </ul>	<p>In order to meet this standard, it is expected that students will</p> <ul style="list-style-type: none"> <li>a. apply basic terminology to explain how Earth's surface is constantly changing.</li> <li>b. draw and label the rock cycle and describe the major processes and rock types involved.</li> <li>c. compare and contrast the origin of igneous, sedimentary, and metamorphic rocks.</li> <li>d. identify rock samples (granite, gneiss, slate, limestone, shale, sandstone, and coal), using a rock classification key.</li> <li>e. make plausible inferences about changes in Earth over time based on fossil evidence. This includes the presence of fossils of organisms in sedimentary rocks of Virginia found in the Appalachian Mountains, Piedmont, and Coastal Plain/Tidewater.</li> <li>f. describe the structure</li> </ul>

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		<p>of Earth in terms of its major layers—crust, mantle, and outercore and innercore—and how Earth’s interior affects the surface.</p> <ul style="list-style-type: none"> <li>g. differentiate among the three types of plate tectonic boundaries (divergent, convergent, and transform) and how these relate to the changing surface of Earth and the ocean floor (5.6).</li> <li>h. compare and contrast the origin of earthquakes and volcanoes and how they affect Earth’s surface.</li> <li>i. differentiate between weathering, erosion, and deposition.</li> <li>j. Design an investigation to locate, chart, and report weathering, erosion, and deposition at home and on the school grounds. Create a plan to solve erosion and/or deposition problems that may be found.</li> <li>k. Describe how people change Earth’s surface and how negative changes can be controlled.</li> </ul>
Second Quarter		
SOL 5.1 SOL 5.7 SOL 5.6		
SOL 5.6	The student will investigate and understand characteristics of the ocean environment. Key concepts include	In order to meet this standard, it is expected that students will

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	<ul style="list-style-type: none"><li>a. Geological characteristics;</li><li>b. Physical characteristics; and</li><li>c. Ecological characteristics.</li></ul>	<ul style="list-style-type: none"><li>a. create and interpret a model of the ocean floor and label and describe each of the major features.</li><li>b. research and describe the variation in depths associated with ocean features , including the continental shelf, slope, rise, and abyssal plain, and ocean trenches.</li><li>c. design an investigation (including models and simulations)related to physical characteristics of the ocean environment (depth, salinity, formation of waves, causes of tides, and currents, such as the Gulf Stream.</li><li>d. Interpret graphical data related to physical characteristics of the ocean.</li><li>e. explain the formation of ocean currents and describe and locate the Gulf Stream.</li><li>f. design an investigation (including models and simulations) related to ecological relationships of the ocean environments.</li><li>g. interpret graphical data related to the ecological characteristics of the ocean, such as the number of organisms vs. the depth of the water.</li><li>h. analyze how the physical characteristics (dept, salinity, and temperature) of the ocean affect where</li></ul>
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		<p>marine organism can live.</p> <p>i. create and interpret a model of a basic marine food web, including floating organisms (plankton), swimming organisms, and organisms living on the ocean floor.</p>
<p>Third Quarter 5.1 5.4,5.3</p>	<p>5.4 The student will investigate and understand that matter is anything that has mass and takes up space; and occurs as a solid, liquid, or gas. Key concepts include</p> <p>a) distinguishing properties of each phase of matter; b) the effect of temperature on the phases of matter; c) atoms and elements; d) molecules and compounds; and e) mixtures including solutions.</p> <p>5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include</p> <p>a) transverse waves; b) the visible spectrum; c) opaque, transparent, and translucent; d) reflection of light from reflective surfaces; and e) refraction of light through water and prisms</p>	<p>In order to meet this standard, it is expected that students will</p> <p>a. construct and interpret a sequence of models (diagrams) showing the activity of molecules in all three basic phases of matter. b. construct and interpret models of atoms and molecules. c. identify substances as being an element or a compound. d. design an investigation to determine how a change in temperature affects the phases of matter (e.g., water). Include in the design ways information will be recorded, what measures will be made, what instruments will be used, and ways the data will be graphed. e. compare and contrast mixtures and solutions</p> <p>In order to meet this standard, it is expected that students will</p> <p>a. diagram and label a representation of a light wave, including wavelength, crest, and trough. b. explain the relationships between wavelength and the color of light. Name the colors of the visible spectrum.</p>

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		<p>c. explain the terms transparent, translucent, and opaque, and give an example of each.</p> <p>d. compare and contrast reflection and refraction, using water, prisms, and mirrors.</p> <p>e. analyze the effects of a prism on white light and describe why this occurs.</p> <p>f. explain the relationship between the refraction of light and the colors of the rainbow.</p>
Fourth Quarter 5.1 5.2 Review 4.1-4.9 5.1-5.7	<p>5.2 The student will investigate and understand how sound is created and transmitted, and how it is used.</p> <p>Key concepts include</p> <p>a) compression waves;</p> <p>b) vibration, compression, wavelength, frequency, amplitude;</p> <p>c) the ability of different media (solids, liquids, and gases) to transmit sound; and</p> <p>d) uses and applications of sound waves.</p>	<p>In order to meet this standard, it is expected that students will</p> <p>a. use the basic terminology of sound to describe what sound is, how it is formed, how it affects matter, and how it travels.</p> <p>b. create and interpret a model or diagram of a compression wave.</p> <p>c. explain why sound waves travel only where there is matter to transmit them.</p> <p>d. explain the relationship between frequency and pitch.</p> <p>e. design an investigation to determine what factors affect the pitch of a vibrating object. This includes vibrating strings, rubber bands, beakers/bottles of air and water, tubes (as in wind chimes), and other common materials.</p> <p>f. compare and contrast sound traveling through a solid with sound traveling through the air. Explain how different media (solid, liquid, and gas) will affect the transmission of sound.</p> <p>g. compare and contrast the sound (voice) that humans make and hear to those of other</p>

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		<p>animals. This includes bats, dogs, and whales.</p> <p>h. compare and contrast how different kinds of musical instruments make sound. This includes string instruments, woodwinds, percussion instruments and brass instruments.</p>
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