

Fifth Grade Science Pacing Guide

August 2017

1 st Nine Weeks	2 nd Nine Weeks	3 rd Nine Weeks	4 th Nine Weeks
<p><u>Scientific Investigation, Reasoning, and Logic</u></p> <p>Overview</p> <p>The skills in standard 5.1 are intended to define the —investigatell component and the understanding of the nature of science for all of the other fifth-grade standards (5.2–5.7). The intent of standard 5.1 is for students to continue to develop a range of inquiry skills, achieve proficiency with those skills, and develop and reinforce their understanding of the nature of science in the context of the concepts developed at the fifth-grade level. Standard 5.1 does not require a discrete unit be taught on scientific investigation because the skills that make up the standard should be incorporated in all the other fifth-grade standards. It is also intended that by developing these skills, students will achieve a greater understanding of scientific inquiry and the nature of science and will more fully grasp the content-related concepts</p> <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"> a) items such as rocks, minerals, and organisms are identified using various classification keys; b) estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools; c) estimates are made and accurate measurements of elapsed time are made using proper tools; d) hypotheses are formed from testable questions; e) independent and dependent variables are identified; f) constants in an experimental situation are identified; g) data are collected, recorded, analyzed, and communicated using proper graphical representations and metric measurements; h) predictions are made using patterns from data collected, and simple graphical data are generated; i) inferences are made and conclusions are drawn; j) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and k) current applications are used to reinforce science concepts. (5.1) <p>Suggestions for incorporating these objectives into the other strands will be included with each strand.</p>			

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<p>Scientific Investigations (5.1) Scientific Investigations (5.1a) -Use a classification and minerals</p> <p>Scientific Investigations (5.1b) -Estimate length, mass, and volume</p> <p>Scientific Investigations (5.1c) -Use appropriate instruments including centimeter rulers, meter sticks, graduated cylinders, balances, and stop watches</p> <p>-Measure, record, identify, collect, organize observations</p> <p>-Distinguish between qualitative and quantitative observations</p> <p>Scientific Investigations (5.1d) -Measure length, volume, mass, and temperature using metric measures; Measure accurately using basic tools</p> <p>Scientific Investigations (5.1e) -Collect & interpret data using graphical representations</p> <p>-Translate numerical data into bar or line graphs; using graphs</p> <p>-Determine what trends represent</p>	<p>MATTER (5.4) -Matter has mass;takes up space</p> <p>Distinguishing properties of each phase (5.4a): -activity of molecules in solids, liquids, and gases</p> <p>Effect of temperature (5.4b) -Temperature effects the state of matter (solid, liquid, gas)</p> <p>-Temperature increases- solid to liquid to gas</p> <p>-Temperature decreases- gas to liquid to solid</p> <p>Atoms and Elements (5.4c) -is made of tiny particles</p> <p>-Atoms & molecules cannot be seen w/unaided eye</p> <p>-more than 100 known elements</p> <p>-Atoms: smallest part of element</p> <p>-model of atom</p> <p>Molecules and Compounds (5.4d) -Compounds: 2 or more elements combine (H₂O/ NaCl)</p> <p>-Molecules: smallest part of compound</p> <p>-model of molecule</p>	<p>Oceans (5.6) cover 70% of Earth's surface</p> <p>Geological Characteristics (5.6a) -*Continental Shelf (shallow)</p> <p>-*Continental Slope</p> <p>-*Continental Rise</p> <p>*thick layers of sediments</p> <p>-Ocean trenches (very deep)</p> <p>-Abyssal plain (flat)</p> <p>- Depth effects pressure, amount of sunlight, and life forms present</p> <p>Physical Characteristics (5.6b) -cover 70% of Earth's surface</p> <p>-Complex mixture of gases (air) and dissolved solids (salts, especially sodium chloride)</p> <p>-Salinity- varies with rate of evaporation and run-off</p> <p>-Waves-caused by wind, crest, trough, wavelength</p> <p>-Major Currents- Gulf Stream</p> <p>-wind pattern/water densities</p> <p>- navigation routes</p> <p>-Tides- gravitational pull of moon</p>	<p>Review all Material</p>

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<p>Scientific Investigations (5.1f) -Predict using patterns -Draw conclusions about data</p> <p>Scientific Investigations (5.1g) -Analyze the variables in a simple experiment -Identify manipulated and responding variables -Define and make observations and inferences -Distinguish between observations and inferences</p> <p>Scientific Investigations(5.1h) -Understand nature of science</p> <p><u>Scientific Investigation Reasoning & Logic</u></p> <ul style="list-style-type: none"> • Distinguish among observations, conclusions, inferences, and predictions. (4.1a) • Classification of objects & events according to characteristics or properties (4.1b) • Measuring in metric units (4.1c) (tested in math) • Measuring elapsed time (tested in math) (4.1d) • Make predictions, inferences, and conclusions based on data from a 	<p>Mixtures and Solutions (5.4e) -Mixture- do not lose identifying characteristics (trail mix, fruit salad) -Solution- one substance dissolves in another (Kool-aid) -Higher temperature will dissolve faster -Temperature decrease- gas to liquid to solids -Solutions one substance dissolves in another</p> <p style="text-align: center;">Science 5.4 – 9 days</p> <p><u>SOUND (5.2)</u> -A means of communication</p> <p>Compression waves (5.2a) -Energy produced and transmitted by vibrating matter -Model of compression wave -Diagram of compression wave waves</p> <p>Basic Terminology (5.2b)-</p> <ul style="list-style-type: none"> - wavelength -compression -frequency -pitch- understand relationship to frequency -amplitude -vibration 	<p>Ecological Characteristics (5.6c) -Marine food webs -floating organisms -swimming organisms -organisms living on ocean floor -Phytoplankton: -90% of Earth’s oxygen -Base of ocean ecosystem -Eaten by zooplankton -Flourish in nutrient rich areas where water upwells from deep</p> <p style="text-align: center;">Science 5.6 – 9 days</p> <p><u>Interrelationships in Earth/Space Systems</u></p> <ul style="list-style-type: none"> • Weather phenomena (4.6a) <ul style="list-style-type: none"> ○ Weather fronts (warm/cold) ○ Air pressure (high/low) ○ Types of clouds (cirrus, cumulus, stratus, cumulonimbus) ○ Precipitation (rain, snow, sleet, hail) ○ Storms (thunderstorms, hurricanes, tornadoes) <p>Label, analyze and report information about temperature, fronts high</p>	

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<ul style="list-style-type: none"> • Defining variables (dependent and independent) (4.1f) • Identify constants (4.1g) • Formulating hypotheses (4.1h) • Recognize contradictory data from experiments (4.1j) <p style="text-align: center;">Science 4.1 and 5.1 – 7 DAYS</p> <p><u>Living Systems (5.5) – Cells (5.5a)</u></p> <ul style="list-style-type: none"> -All living things made of cells -Cells carry out life processes -New cells come from existing ones -Too small to be see with unaided eye -Parts of a cell can be seen by a microscope -Animal Cells <ul style="list-style-type: none"> -spherical/irregular shape -nucleus: controls cell functions -cell membrane: thin lining that allows nutrients in and waste out -vacuole: storage bin for water and nutrients 	<p>Transmission of Sound (5.2c)</p> <ul style="list-style-type: none"> -Sound travels more quickly through solids because the molecules are closer together -Sound travels the slowest through gases because molecules farthest apart <p>Uses and Application of Sound (5.2d)</p> <ul style="list-style-type: none"> -Animals are able to hear sounds at higher frequencies than humans -Musical instruments – string, woodwind, percussion, and brass -Voice -Animal sounds (bats, dogs, whales) -Echolocation -Sonar <p style="text-align: center;">Science 5.2 – 9 days</p> <p><u>LIGHT (5.3)</u></p> <p>Transverse Waves(5.3a)</p> <ul style="list-style-type: none"> -Travels faster than sound *Takes sunlight 8 ½ minutes to reach Earth -Travels in straight paths (rays) 	<ul style="list-style-type: none"> ○ and low pressure air masses, and precipitation on weather maps. • Weather measurements and meteorological tools (air pressure-barometer, with speed-anemometer, rainfall-rain gauge, and temperature-thermometer) (4.6b) • Use weather measurements and phenomena to make predictions (4.6c) <p style="text-align: center;">Science 4.6 – 9 days</p> <p><u>ROCK / EARTH (5.7)</u></p> <p>Scientific Investigation (5.1a, h ,i, j, k)</p> <p>Rock Classification (5.7a)</p> <ul style="list-style-type: none"> -Rock properties: <ul style="list-style-type: none"> composition grain size textural features color fossils hardness -Identify Rock Samples <table style="margin-left: 20px; border: none;"> <tr> <td>granite</td> <td>gneiss</td> </tr> <tr> <td>slate</td> <td>limestone</td> </tr> <tr> <td>shale</td> <td>sandstone</td> </tr> <tr> <td>coal</td> <td></td> </tr> </table> 	granite	gneiss	slate	limestone	shale	sandstone	coal		
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<p>-cytoplasm: jelly-like substance that fills cell; needed to keep cell alive</p> <p>-Plant Cells</p> <p>-rectangular shape</p> <p>*above structures, plus</p> <p>-cell wall: outer wall that keeps cells shape</p> <p>-chloroplasts: contain chlorophyll used for photosynthesis</p> <p><u>Living Systems (5.5)</u></p> <p>Plants (5.5b)</p> <p>-Vascular: special tubes to transport water and nutrients through the plant (trees & flowering Plants)</p> <p>-Nonvascular: no special tube (moss, liverwort, & hornwort)</p> <p>Animals (5.5b)</p> <p>-Vertebrate: backbone</p> <p>-Invertebrate: no backbone</p> <p>Traits of organisms that allow them to survive (5.5c)</p> <p style="text-align: center;">Science 5.5 – 10 DAYS</p> <p><u>Life Process</u></p> <ul style="list-style-type: none"> Plant structure and functions (leaves, stems, roots, and flowers) (4.4a) 	<p>-reflected, refracted, transmitted, or absorbed as heat</p> <p>-Travels through vacuum where there is no matter – outer space</p> <p>-diagram of transverse wave including wavelength, crest,&</p> <p>Visible spectrum (5.3b)</p> <p>-Relationship between wavelength and color</p> <p>-Red- longest</p> <p>-Violet-shortest</p> <p>-Colors(ROY G BIV)</p> <p>Materials (5.3c)</p> <p>-Transparent: clear glass</p> <p>-Translucent: wax paper</p> <p>-Opaque: desk</p> <p>Reflection (5.3d)</p> <p>-Mirrors- Angle of Reflection</p> <p>-Angle of incidence</p> <p>-Bouncing of light</p> <p>Refraction (5.3e)</p> <p>-Bending of light</p> <p>-Prisms</p> <p>-water</p> <p style="text-align: center;">Science 5.3 – 9 days</p>	<p>Rock Cycle (5.7b)</p> <p>-Sedimentary</p> <p>-Igneous</p> <p>-Metamorphic</p> <p>-How transformations occur</p> <p>Earth's History (5.7c)</p> <p>-Fossils</p> <p>-4.6 billion</p> <p>-Presence of fossils in VA (Appalachians, Piedmont, Tidewater regions)</p> <p>Structure of Earth's Interior/ Composition (5.7d)</p> <p>-Crust: rocky material</p> <p>-Mantle: molten/liquid rock</p> <p>-Inner core: iron /Nickel</p> <p>-Outer core: iron/nickel</p> <p>Plate Tectonics (5.7e)</p> <p>-Earth's heat causes movement of plates</p> <p>-Convergent boundaries (move together)</p> <p>-Divergent boundaries (move apart)</p> <p>-transform boundaries (slip past horizontally)</p> <p>-Earthquakes/volcanoes</p>	

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<ul style="list-style-type: none"> • Plant processes and structures involved with reproduction (pollination, stamen, pistil, sepal, fertilization, stigma, embryo, spore, and seed) (4.4b) • Process of photosynthesis (4.4c) • Adaptations (including dormancy and responses to moisture and light) in seeds and plants (4.4d) <p style="text-align: center;">Science 4.4 – 9 DAYS</p> <p><u>Living Systems</u></p> <ul style="list-style-type: none"> • Distinguish between behavioral & structural adaptations in plants and animals (4.5a) • Organization of communities (4.5b) • Flow of energy through food chains and webs (4.5c) • Habitats and niches (4.5d) • Changes in an organism’s niche during various stages of its life cycle (butterfly and frog) with focus on 	<p><u>Force, Motion and Energy</u></p> <ul style="list-style-type: none"> • Conductors and insulators (4.3a) • Basic circuits (open/closed, parallel/ series) (4.3b) • Static electricity (rubbing certain materials together and lightning) (4.3c) • Electrical energy changing into heat (thermal), light (radiant), and mechanical energy (4.3d) • Simple electromagnets and magnetism (4.3e) • Historical contributions (Franklin, Faraday, Edison) (4.3f) <p style="text-align: center;">Science 4.3 – 9 days</p> <p style="text-align: center;">4.3, 5.2, 5.3, 5.4 on CIP Second Nine Weeks Benchmark Test</p>	<p><u>Weathering/Erosion (5.7f)</u></p> <ul style="list-style-type: none"> -Chemical/physical weathering -Products of Weathering: clay, sand, rock fragments and soluble substances -Weathered material moved by water and wind (erosion) -Weathered material deposited as sediment (deposition) <p><u>Human impact (5.7g)</u></p> <ul style="list-style-type: none"> -changing Earth’s surface -controlling changes <p style="text-align: center;">Science 5.7 – 9 days</p> <p style="text-align: center;">4.2, 4.6, 5.6, 5.7 on CIP Third Nine Weeks Benchmark Test</p>	

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<ul style="list-style-type: none"> • interactions with surroundings during various stages of the life cycle (4.5e) • Differentiate among positive and negative influences of human activity on ecosystems (4.5f) <p style="color: red; margin: 0;">Science 4.5 – 9 DAYS</p> <p style="margin: 0;">4.1, 4.4, 4.5, 5.1, 5.5 on CIP First Nine Weeks Benchmark Test</p>			

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<p><u>Scientific Investigation (5.1a)</u> investigation data observation classification classification key identification</p> <p><u>Scientific Investigation (5.1b)</u> estimate length mass volume</p> <p><u>Scientific Investigation (5.1d)</u> measurement centimeter stick meter stick graduated cylinder balance stopwatch millimeter centimeter meter kilometer grams kilograms milliliters liters Celsius</p> <p><u>Scientific Investigation (5.1e)</u> data graphical representation collect</p>	<p><u>Sound (5.2a)</u> energy produced compression wave</p> <p><u>Sound (5.2b)</u> Vibration Compression Wavelength Frequency Amplitude</p> <p><u>Sound (5.2c)</u> transmit media/medium matter molecules solid liquid gas</p> <p><u>Sound (5.2d)</u> voice sonar echolocation animal sounds animal sounds bats musical instruments pitch string instruments wind instruments percussion instruments electronic instruments</p>	<p><u>Oceans (5.6a)</u> geological characteristics continental shelf continental slope continental rise sediments (sand, mud, rock) abyssal plain ocean trenches ocean floor</p> <p><u>Oceans (5.6b)</u> basic motions wave formation wind patterns current (Gulf Stream) water density navigation routes tide mixture gas dissolve solids (salts) salinity evaporation runoff depth</p> <p><u>Oceans (5.6b) cont.</u> temperature pressure amount of light</p> <p><u>Oceans (5.6c)</u> ecological characteristics marine organisms population ocean ecosystems</p>	

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record report bar graph line graph <u>Scientific Investigation (5.1f)</u> conclusion inference prediction trends <u>Scientific Investigation (5.1g)</u> variable manipulated variable responding variable <u>Living Systems (5.5a)</u> cells plant cell rectangular animal cell spherical irregular cell structure cell function nucleus cell wall cell membrane vacuole chloroplast chlorophyll cytoplasm	<u>Light (5.3a)</u> Transverse waves Wavelengths crest trough absorbed transmit <u>Light (5.3b)</u> visible spectrum white light rainbow ROY G BIV rays medium <u>Light (5.3c)</u> Opaque Transparent Translucent <u>Light (5.3d)</u> Reflection Reflected wave Incident wave Reflective surface <u>Light (5.3e)</u> Refraction Prism Rainbow Bending of light	floating organisms phytoplankton (plant-like) oxygen plankton flourish nutrient-rich water upwells from the deep swimming organisms organisms on ocean bottom <u>Earth Patterns (5.7a)</u> rock mineral composition grain size texture characteristics color granite gneiss slate shale limestone sandstone origin coal fossils hardness properties	

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life processes existing cells microscopic <u>Living Systems (5.5 b)</u> living non-living organisms vascular nonvascular tissues transport moss flowering plants animals vertebrate invertebrate backbon e body structures behaviors physical characteristics classification of organisms <u>Living Systems (5.5c)</u> Traits of organisms Survive Environment	<u>Effect of Temperature (5.4b)</u> dissolves temperatures increase decrease changes heat atom element molecule compound particles unaided eye substance compound water (H20) table salt (NaCl) <u>Atoms & Elements (5.4c)</u> identifying characteristics atom element <u>Molecules & Compounds (5.4d)</u> Molecule Compound Water H ₂ O Table salt NaCl <u>Mixtures & Solutions(5.4e)</u> Mixture Solution Identifying characteristics dissolves	<u>Rock Cycle (5.7b)</u> rock cycle heat pressure weathering erosion sedimentary igneous metamorphic Transformations <u>Earth History(5.7c)</u> fossils evidence organisms <u>Earth Structure (5.7d)</u> layers crust mantle outer core inner core rocky materials iron nickel pressure temperature depth surface	THIRD NINE WEEKS CONT'D <u>Plate tectonics (5.7e)</u> horizontal plate tectonics plates convergent boundary divergent boundary transform boundary heat energy (thermal) material faults earthquakes volcanoes <u>Weathering/Erosion (5.7f)</u> weathering chemical weathering physical weathering products clay sand rock fragments sediment erosion deposition <u>Human Impact (5.7g)</u> negative impact positive control

