5th Grade Science Curriculum Guide
Lunenburg County Public Schools
June 2014

Marking Period: 1st
Days: 5 (then ongoing)
Reporting Category/Strand: Scientific Investigation, Reasoning, and Logic

SOL 5.1 a-k	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which 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.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● use classification keys to identify rocks, minerals, and organisms. ● select and use the appropriate instruments, including centimeter rulers, meter sticks, graduated cylinders, balances, stopwatches, and thermometers for making basic measurements. ● make reasonable estimations of length, mass, volume, and elapsed time. ● measure length, mass, volume, and temperature using metric measures. This includes millimeters, centimeters, meters, kilometers, grams, kilograms, milliliters, liters, and degrees Celsius. ● use a testable question to form a hypothesis as cause and effect (e.g., ―if…, then…‖) statement. ● analyze the variables in a simple experiment and identify the independent and dependent variables, and the constants. ● collect, record, analyze, and report data, using charts and tables, and translate numerical data into bar or line graphs. ● make predictions based on trends in data. This requires the recognition
Essential Questions	What does a scientific process, or research method, allow us to do? Can you identify the independent and dependent variables in an experiment? What tools and units of measure should be used to measure the variables in an experiment?

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	What are some methods of collecting, recording, and reporting data from an experiment?
Primary Resources	**Correlations:** **Interactive Websites**: SOL Pass: Scientific Method Quiz SOL Pass: Order the Scientific Method Steps SOL Pass: Scientific Method Released Questions **Lesson Plans:** VDOE: 5th Grade Lesson Plans **Videos:** BrainPOP: Scientific Method BrainPOP: Scientific Inquiry BrainPOP: Microscopes BrainPOP: Precision and Accuracy BrainPOP: Classification Bill Nye the Science Guy: Do It Yourself Science Bill Nye the Science Guy: Measurement **Literature/Music Connections:** Scientific Methods and Process: Meet Tierney Thys. You Tube Song: Scientific Method
Essential Vocabulary	**DO NOT DELETE: http://www.loudoun.k12.va.us/cms/lib4/VA01000195/Centricity/Domain/8642/5th%20Grade%20Refridgerator%20Cards.pdf** **qualitative data-** data that uses descriptions to show how things are. **quantitative data-** data that uses numbers to show how things are. **classification-** organizing and identifying things based on their characteristics **independent variable-** the factor in an experiment that is altered by the experimenter. The independent variable is purposely changed or manipulated **dependent variable-** the factor in an experiment that changes as a result of the manipulation of the independent variable. **constants-** those things that are purposefully kept the same throughout the experiment. **control-** the part of an experiment where the independent variable is left unchanged to provide a comparison

Marking Period: 1st

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Days: 40

Reporting Category/Strand: Earth Patterns, Cycles, and Change

SOL 5.7 a-g	The student will investigate and understand how Earth's surface is constantly changing. Key concepts include a) identification of rock types; b) the rock cycle and how transformations between rocks occur; c) Earth history and fossil evidence; d) the basic structure of Earth's interior; e) changes in Earth's crust due to plate tectonics; f) weathering, erosion, and deposition; and g) human impact.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● apply basic terminology to explain how Earth's surface is constantly changing. ● draw and label the rock cycle and describe the major processes and rock types involved. ● compare and contrast the origin of igneous, sedimentary, and metamorphic rocks. ● identify rock samples (granite, gneiss, slate, limestone, shale, sandstone, and coal), using a rock classification key. ● 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. ● describe the structure of Earth in terms of its major layers — crust, mantle, and outer core and inner core — and how Earth's interior affects the surface. ● 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). ● compare and contrast the origin of earthquakes and volcanoes and how they affect Earth's surface. ● differentiate between weathering, erosion, and deposition. ● 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. ● describe how people change Earth's surface and how negative changes can be controlled.
Essential Questions	Can you analyze how different types of rocks change during the rock cycle? What evidence do fossils give us about change over time? Can you describe the effect of plate tectonics on changes to the Earth's surface and the ocean floor? What is the relationship between weathering and erosion? Can you identify and describe the layers of the Earth? How would you analyze the impact of humans on Earth?

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Primary Resources	**Correlations:** **Interactive Websites**: SOL Pass: The Rock Cycle Drag and Drop SOL Pass: The Earth's Crust Game SOL Pass: The Rock Cycle Game SOL Pass: Earth Released Questions 1 SOL Pass: Earth Released Questions 2 **Lesson Plans:** VDOE: Do Rocks Absorb Water? VDOE: What Kind of Weathered Rock Have You Found? VDOE: The Rock Cycle VDOE: The Evidence is In VDOE: The Layers of the Earth VDOE: Plate Tectonics VDOE: Weathering and Erosion **Videos:** BrainPOP: Types of Rocks BrainPOP: Rock Cycle BrainPOP: Fossils BrainPOP: Earth BrainPOP: Earth's Structure BrainPOP: Weathering BrainPOP: Erosion BrainPOP: Soil BrainPOP: Earthquakes BrainPOP: Volcanoes BrainPOP: Plate Tectonics Bill Nye the Sciene Guy: Pollution Solutions Bill Nye the Science Guy: Erosion Bill Nye the Science Guy: Earthquakes Bill Nye the Science Guy: Atmosphere Bill Nye the Science Guy: Earth's Crust Eyewitness Video: Rocks and Minerals Eyewitness Video: Weather Planet Earth: Mountains Teacher Tube: The Formation of the Moon

	You Tube: A Perfect Planet...the Formation of the Earth **Literature/Music Connections:** Songs For Teaching: The Rock Cycle
Essential Vocabulary	**weathering-** **deposition-** moving materials to a new locations as sediment **fault-** boundries between two plates on the earth's surface **igneous rock-** rocks formed by heating a cooling **sedimentary rock-** rocks formed by layers of sediment pressured together **metamorphic rock-** rocks changed by heat and pressure **plate tectonics-** **divergent boundaries-** plates moving apart **convergent boundaries-** plates moving together **transform boundaries-** plates sliding by each other **crust-** **mantle-** **outer core-** **inner core-** **erosion-**

Marking Period: 2nd
Days: 40
Reporting Category/Strand: Living Systems

SOL 5.5 a-c	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 a) basic cell structures and functions; b) classification of organisms using physical characteristics, body structures, and behavior of the organism; and c) traits of organisms that allow them to survive in their environment.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● draw, label, and describe the essential structures and functions of plant and animal cells. For plants, include the nucleus, cell wall, cell membrane, vacuole, chloroplasts, and cytoplasm. For animals, include the nucleus, cell membrane, vacuole, and cytoplasm. ● design an investigation to make observations of cells. ● compare and contrast plant and animal cells and identify their major parts and functions. ● group organisms into categories, using their characteristics: plants (vascular and nonvascular) and animals (vertebrates or invertebrates). Name and

	describe two common examples of each group. ● compare and contrast the distinguishing characteristics of groups of organisms. ● identify and explain traits of organisms that allow them to survive in their environment.
Essential Questions	Can you compare and contrast the parts and functions of plant and animal cells? Can you identify and explain traits of organisms that allow them to survive in their environment?
Primary Resources	**Correlations:** **Interactive Websites**: SOL Pass: Classify Vertebrae and Invertebrates Game SOL Pass: Classify Vascular and Nonvascular Plants SOL Pass: Living Systems Released Questions **Lesson Plans:** VDOE: Building a Cell VDOE: Vertebrae in the Animal Kingdom, **Videos:** BrainPOP: Cells BrainPOP: Cell Structures BrainPOP: Cell Specialization BrainPOP: Kingdoms BrainPOP: Plant Growth BrainPOP: Vertebrates BrainPOP: Invertebrates Bill Nye the Science Guy: Cells Bill Nye the Science Guy: Invertebrates Bill Nye the Science Guy: Mammals Bill Nye the Science Guy: Evolution Bill Nye the Science Guy: Populations Bill Nye the Science Guy: Flowers 100% Educational School Video: The Living Cell Magic School Bus: Goes Cellular Magic School Bus: Gets Planted National Geographic: Galapagos **Literature/Music Connections:**

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Essential Vocabulary	**cells-** **nucleus-** **cell wall-** **cell membrane-** **vacuole-** **chloroplast-** **cytoplasm-** **vascular-** **nonvascular-** **vertebrate-** **invertebrate** **structure-** **function-**

Marking Period: 3rd
Days: 14
Reporting Category/Strand: Matter

SOL 5.4 a-e	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 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.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● construct and interpret a sequence of models (diagrams) showing the activity of molecules in all three basic phases of matter. ● construct and interpret models of atoms and molecules. ● identify substances as being an element or a compound. ● 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. ● compare and contrast mixtures and solutions.
Essential Questions	What is matter and how is it organized? Can you compare and contrast mixtures and solutions?

	Can you give an example of and explain what is a physical change and a chemical change? What is the influence of heat on matter?
Primary Resources	**Correlations:** **Interactive Websites**: SOL Pass: Atoms and Molecules Rags to Riches Game SOL Pass: Matter Millionaire Game SOL Pass: Matter Released Questions **Lesson Plans:** VDOE: Does Air Take Up Space? VDOE: Molecule Motion in the Three Phases of Matter VDOE: Things are Heating Up VDOE: What's the Matter? VDOE: All Mixed Up **Videos:** BrainPOP: States of Matter BrainPOP: Matter Changing States BrainPOP: Atoms BrainPOP: Periodic Table BrainPOP: Compounds and Mixtures Bill Nye the Science Guy: Chemical Reactions Bill Nye the Science Guy: Phases of Matter Bill Nye the Science Guy: Magnetism **Literature/Music Connections:**
Essential Vocabulary	**atom-** **element-** **molecule-** **compound-** **phase-** **mixture-** **solution-**

Marking Period: 3rd

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Days: 14

Reporting Category/Strand: Force, Motion, and Energy

SOL 5.3 a-e	The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include 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.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● diagram and label a representation of a light wave, including wavelength, crest, and trough. ● explain the relationships between wavelength and the color of light. Name the colors of the visible spectrum. ● explain the terms transparent, translucent, and opaque, and give an example of each. ● compare and contrast reflection and refraction, using water, prisms, and mirrors. ● analyze the effects of a prism on white light and describe why this occurs. ● explain the relationship between the refraction of light and the formation of a rainbow.
Essential Questions	Can you create and interpret a model of a transverse wave? How would you model and explain reflection, refraction, and transmisson? What is the effect of a prism on white light? What is the relationship between the color of light and wavelength?
Primary Resources	**Correlations:** **Interactive Websites**: SOL Pass: Light Millionaire Game SOL Pass: Light Released Questions **Lesson Plans:** VDOE: Make a Rainbow VDOE: Transparent, Translucent, or Opaque? **Videos:** BrainPOP: Waves BrainPOP: Light BrainPOP: Refraction and Diffraction BrainPOP: Rainbows

	BrainPOP: Color BrainPOP: Prisms Bill Nye the Science Guy: Light and Color Bill Nye the Science Guy: Light Energy Bill Nye the Science Guy: Light Bending and Bouncing Bill Nye the Science Guy: Energy **Literature/Music Connections:**
Essential Vocabulary	**wavelength-** **visible spectrum-** **crest-** **trough-** **reflection-** **refraction-** **transparent-** **translucent-** **opaque-** **transverse-** **waves-**

Marking Period: 3rd
Days: 12
Reporting Category/Strand: Force, Motion, and Energy

SOL 5.2	The student will investigate and understand how sound is created and transmitted, and how it is used. Key concepts include a) compression waves; b) vibration, compression, wavelength, frequency, amplitude; c) the ability of different media (solids, liquids, and gases) to transmit sound; and d) uses and applications of sound waves.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● use the basic terminology of sound to describe what sound is, how it is formed, how it affects matter, and how it travels. ● create and interpret a model or diagram of a compression wave. ● explain why sound waves travel only where there is matter to transmit them. ● explain the relationship between frequency and pitch.

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	● 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. ● 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. ● compare and contrast the sound (voice) that humans make and hear to those of other animals. This includes bats, dogs, and whales. ● compare and contrast how different kinds of musical instruments make sound. This includes string instruments, woodwinds, percussion instruments, and brass instruments.
Essential Questions	How are sounds produced? Can you create and interpret a model or diagram of a compression wave? How do different media affect the transmission of sound? What is the relationship between frequency and pitch? What is the relationship between amplitude and volume? How would you modify a musical instrument to change the pitch?
Primary Resources	**Correlations:** **Interactive Websites**: SOL Pass: Sound Drag and Drop SOL Pass: Sound Millionaire Game SOL Pass: Sound Released Questions **Lesson Plans:** VDOE: Sound Vibrations VDOE: Making Waves VDOE: Making Waves, Music, and Noise VDOE: Investigating Sound **Videos:** BrainPOP: Sound BrainPOP: Voice BrainPOP: Strings BrainPOP: Woodwinds Bill Nye the Science Guy: Motion Bill Nye the Science Guy: Sound Magic School Bus: Inside the Haunted House **Literature/Music Connections:**
Essential	**wave-**

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Vocabulary	**frequency-** **pitch-** **wavelength-** **compression-** **amplitude-**

Marking Period: 4th
Days: 12
Reporting Category/Strand: Interrelationships in Earth/Space Systems

SOL 5.6	The student will investigate and understand characteristics of the ocean environment. Key concepts include a) geological characteristics; b) physical characteristics; and c) ecological characteristics.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● create and interpret a model of the ocean floor and label and describe each of the major features. ● research and describe the variation in depths associated with ocean features, including the continental shelf, slope, rise, the abyssal plain, and ocean trenches. ● 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). ● interpret graphical data related to physical characteristics of the ocean. ● explain the formation of ocean currents and describe and locate the Gulf Stream. ● design an investigation (including models and simulations) related to ecological relationships of the ocean environment. ● interpret graphical data related to the ecological characteristics of the ocean, such as the number of organisms vs. the depth of the water. ● analyze how the physical characteristics (depth, salinity, and temperature) of the ocean affect where marine organism can live. ● create and interpret a model of a basic marine food web, including floating organisms (plankton), swimming organisms, and organisms living on the ocean floor.
Essential Questions	What are the geological characteristics of the ocean floor? What are the physical characteristics of the ocean water? What are the ecological characteristics of the communities of marine organisms? How do physical characteristics of ocean water affect marine organisms?
Primary Resources	**Correlations:** **Interactive Websites**:

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	SOL Pass: Ocean Floor Millionaire Game SOL Pass: Ocean Floor Crossword Puzzle SOL Pass: Oceans Released Questions **Lesson Plans:** VDOE: The Ocean Floor VDOE: Coasts to Currents VDOE: Salty Sea VDOE: Life in the Food Chain **Videos:** BrainPOP: Ocean Floor BrainPOP: Oceans BrainPOP: Ocean Currents BrainPOP: Tides BrainPOP: Underwater World Bill Nye the Science Guy: Ocean Life Bill Nye the Science Guy: Oceanography Bill Nye the Science Guy: Food Web Eyewitness Video: Oceans **Literature/Music Connections:**
Essential Vocabulary	**ocean-** **continental-** **shelf-** **continental slope-** **continental rise-** **sediment-** **trenches-** **abyssal plain-** **depth-** **salinity-** **current-** **tides-**