4th Grade Science Curriculum Guide
Lunenburg County Public Schools
June 2014

Marking Period: 1st 9 weeks
Days: 5 (On going)
Reporting Category/Strand: Scientific Investigation, Reasoning, and Logic

SOL 4.1a-m	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) distinctions are made among observations, conclusions, inferences, and predictions; b) objects or events are classified and arranged according to characteristics or properties; c) appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units; d) appropriate instruments are selected and used to measure elapsed time; e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources; f) independent and dependent variables are identified; g) constants in an experimental situation are identified; h) hypotheses are developed as cause and effect relationships; i) data are collected, recorded, analyzed, and displayed using bar and basic line graphs; j) numerical data that are contradictory or unusual in experimental results are recognized; k) data are communicated with simple graphs, pictures, written statements, and numbers; l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and m) current applications are used to reinforce science concepts
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● differentiate among simple observations, conclusions, inferences, and predictions, and correctly apply the terminology in oral and written work. ● analyze a set of 20 or fewer objects or pictures. Sort them into categories to organize the data (qualitative or quantitative); and construct bar graphs and line graphs depicting the distribution of those data based on characteristics or properties. ● use millimeters, centimeters, meters, kilometers, grams, kilograms, milliliters, liters, and degrees Celsius in measurement. ● choose the appropriate instruments, including centimeter rulers, meter sticks, scales, balances, graduated cylinders, beakers, and Celsius thermometers, for making basic metric measures.

	• measure elapsed time using a stopwatch or a clock. • make predictions, inferences, and draw conclusions using a variety of sources such as picture graphs, bar graphs, and basic line graphs • analyze the variables in a simple experiment. Identify the independent variable and the dependent variable. Decide which other variable(s) must be held constant (not allowed to change) in order for the investigation to represent a fair test. • create a plausible hypothesis, stated in terms of cause (if) and effect (then), from a set of basic observations that can be tested. Hypotheses can be stated in terms such as: —If the water temperature is increased, then the amount of sugar that can be dissolved in it will increase.‖ • organize and analyze data from a simple experiment. Construct bar graphs and line graphs depicting the data. • judge which, if any, data in a simple set of results (generally 10 or fewer in number) appear to be contradictory or unusual. • present results of a simple experiment using graphs, pictures, statements, and numbers. • construct a physical model to clarify an explanation, demonstrate a relationship, or solve a need.
Essential Questions	How do scientists decide whether a topic is worthy of investigation? • How do scientists determine the criteria needed to conduct meaningful investigations? • How and why do you select variables when planning an investigation? • How can you effectively communicate findings and conclusions from scientific investigations? • How do scientists use tools in an investigation?
Primary Resources	**Web Sites:** VDOE Science Standards of Learning and Curriculum Framework: http://www.doe.virginia.gov/testing/sol/standards_docs/science/ VDOE Science Enhanced Scope/Sequence Sample Lesson Plans: http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml • www.brainpop.com Scientific Method and Precision and Accuracy • Smartboard, Powerpoint and SOL review activities: Arlington Public Schools 2013 http://www.rockingham.k12.va.us/resources/elementary/4science.htm **Discovery Education:** • Everyday Science: Discovering the Scientific Method. (Gr. 3-5). Run time: 20:51 • The Scientific Method – the Movie. (Gr. 3-5). Interactive PowerPoint • The Scientific Method – cuny_pisa.mpg. (Gr. 3-5). Interactive PowerPoint

Essential Vocabulary	**independent variable** - the independent variable is the thing that you change in the experiment. All the other things in your experiment should stay the same. **dependent variables** - the dependent variable is the thing that changes because of the independent variable. **constants** - the group in which nothing changes at all **hypotheses, millimeters, centimeters, meters, kilometers, grams, kilograms, milliliters, liters, and degrees Celsius, graduated cylinders, beakers, balance**

Marking Period: 1st 9 weeks
Days: 20
Reporting Category/Strand: Interrelationships in Earth/Space Systems

SOL 4.6a-c	The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include a) weather phenomena; b) weather measurements and meteorological tools; and c) use of weather measurements and weather phenomena to make weather predictions
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● design an investigation in which a thermometer is used to compare air temperatures over a period of time. ● analyze the changes in air pressure occurring over time, using a barometer, and predict what the changes mean in terms of changing weather patterns. ● illustrate and label high and low pressures on a map. ● differentiate between the types of weather associated with high and low pressure air masses. Illustrate and label high and low pressure air masses and warm and cold fronts. ● differentiate between cloud types (i.e., cirrus, stratus, cumulus, and cumulo-nimbus clouds) and the associated weather. ● compare and contrast the formation of different types of precipitation (e.g., rain, snow, sleet, and hail). ● recognize a variety of storm types, describe the weather conditions associated with each, and explain when they occur (e.g., thunderstorms, hurricanes, and tornadoes).

	• analyze and report information about temperature and precipitation on weather maps. • measure wind speed, using an anemometer. • measure precipitation with a rain gauge. • design an investigation in which weather data are gathered using meteorological tools and charted to make weather predictions.
Essential Questions	What causes changing weather conditions? • How do scientists predict the weather? • How do scientists measure the weather?
Primary Resources	**Web Sites:** VDOE Science Standards of Learning and Curriculum Framework: http://www.doe.virginia.gov/testing/sol/standards_docs/science/ VDOE Science Enhanced Scope/Sequence Sample Lesson Plans: http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml • www.brainpop.com (Weather, Wind, Hurricanes, Climate Types, Thunderstsorms, Tornadoes, Clouds, Snowflakes, Temperature, Humidity, Natural Disasters) **Smartboard, Powerpoint and SOL review activities:** http://www.rockingham.k12.va.us/resources/elementary/4science.htm • http://www.nws.noaa.gov Excellent information and activities, teacher resources, maps, etc. • http://www.education.noaa.gov Great resource for teachers on a variety of weather topics. Student activities cover disasters, types of weather, and other topics. • http://www.fema.gov/kids Information for students, teachers, and parents about disaster preparedness. **Discovery Education:** • Elementary Video Adventures: Weather and Climate. (Gr. 3-5). Run time: 18:00 • Earth Science: Weather and Climate. (Gr. 3-5). Run time: 20:00Arlington Public Schools 2013 • Weather Smart: Thunderstorms. (Gr. 3-5). Run time: 15:00 • Weather Smart: Heat, Wind, and Pressure. (Gr. 3-5). Run time: 15:00 • Weather Smart: Tornadoes. (Gr. 3-5). Run time: 15:00 • Weather Smart: Winter and Snow. (Gr. 3-5). Run time: 15:00 • Weather Smart: Weather. (Gr. 3-5). Run time: 15:00 • Weather Smart: Climate. (Gr. 3-5). Run time: 15:00 • Weather Smart: Forecasting and Weather Instruments. (Gr. 3-5). Run time: 15:00

	• Weather Smart: Hurricanes. (Gr. 3-5). Run time: 15:00 • Enviro-Tacklebox: Module 02: Decisions Based on Science: Extreme Weather. (Gr. 3-5). Run time: 19:55
Essential Vocabulary	**barometer** - measures air pressure **anemometer** - measures wind speed **rain gauge** - precipitation **high and low pressures** **cloud types** (i.e., cirrus, stratus, cumulus, and cumulo-nimbus clouds)

Marking Period: 1st 9 weeks
Days: 20
Reporting Category/Strand: Earth Resources

SOL 4.9a-d	The student will investigate and understand important Virginia natural resources. Key concepts include a) watersheds and water resources; b) animals and plants; c) minerals, rocks, ores, and energy sources; and d) forests, soil, and land.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● compare and contrast natural and human-made resources. ● distinguish among rivers, lakes, and bays; describe characteristics of each; and name an example of each in Virginia. ● create and interpret a model of a watershed. Evaluate the statement: —We all live downstream.‖ ● identify watershed addresses. ● recognize the importance of Virginia's mineral resources, including coal, limestone, granite, and sand and gravel. ● appraise the importance of natural and cultivated forests in Virginia. ● describe a variety of soil and land uses important in Virginia.
Essential Questions	• How do water-related resources in Virginia impact everyday living? • How do you think mineral and geographical resources have influenced Virginia's development?

	• How are Virginia's plant and animal resources unique?
Primary Resources	**Web Sites:** VDOE Science Standards of Learning and Curriculum Framework: http://www.doe.virginia.gov/testing/sol/standards_docs/science/ VDOE Science Enhanced Scope/Sequence Sample Lesson Plans: http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml • www.brainpop.com (Natural Resources, Groundwater, Mineral Identification) **Smartboard, Powerpoint and SOL review activities:** http://www.rockingham.k12.va.us/resources/elementary/4science.htm • http://www.sites.ext.vt.edu/virtualforest/ look at modules for "Trees" "Old Field Succession" and "Timber" • http://www.vanaturally.com A "must" for 4th grade teachers! Site has free materials and resources about Virginia's natural resources; complete resource manual available for educators available online. **Discovery Education:** • A Natural Focus with Laurie Sanders: What is a Watershed? (Gr. 6-8). Run time: 5:00 • Geologist's Notebook: The Biggest Treasure Chest: Our Natural Resources Run time: 11:00 • The Chesapeake Bay Ecosystem: Pollution and Protection; Settlement of Colonial Maryland (Video segment). (Gr. 3-5). Run time: 1:51
Essential Vocabulary	**watershed/ drainage basin** - 1 : a dividing ridge (as a mountain range) separating one drainage area from others 2 : the area that drains into a river or lake

Marking Period: 2nd 9 weeks
Days: 20
Reporting Category/Strand: Earth Patterns, Cycles, and Change

SOL 4.7a-c	The student will investigate and understand the organization of the solar system. Key concepts include a) the planets in the solar system; b) the order of the planets in the solar system; and

	c) the relative sizes of the planets.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● name the eight planets and describe whether they are a terrestrial planet or a gas giant. ● sequence the eight planets in the solar system based on their position from the sun. (Mercury is the first from the sun, Venus is the second, etc.) ● sequence the eight planets in the solar system based on size (Jupiter is the largest, Saturn is next, etc.) ● construct a simple model of the sun and the planets in our solar system.
Essential Questions	How is the solar system organized?
Primary Resources	**Web Sites:** VDOE Science Standards of Learning and Curriculum Framework: http://www.doe.virginia.gov/testing/sol/standards_docs/science/ VDOE Science Enhanced Scope/Sequence Sample Lesson Plans: http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml • www.brainpop.com (Galileo, Solar System, Space Flight, Sally Ride, International Space Station) **Smartboard, Powerpoint and SOL review activities:** http://www.rockingham.k12.va.us/resources/elementary/4science.htm • http://www.challenger.org/resources/for-students/ Links from Challenger Center; teacher information about Earth, moon, and solar system. • http://starchild.gsfc.nasa.gov/docs/StarChild/StarChild.html Fun, engaging site about the sun, moon, and planets. • http://aa.usno.navy.mil/idltemp/current_moon.html Visuals of moon phases on any date. **Discovery Education:** Magic School Bus: Gets Lost in Space. Run time: 27 • A First Look: The Sky Above. (Gr. 3-5). Run time: 17:00 • A First Look: Earth. (Gr. 3-5). Run time: 20:00 • Junior Space Scientist: Our Solar System. (Gr. 3-5). Run time: 9:33 • The Solar System: Above and Beyond. (Gr. 3-5). Run time: 15:00 • TLC Elementary School: The Story of the Solar System. (Gr. 3-5). Run time: 24:34

	• A Closer Look at Space: The Planets. (Gr. 3-5). Run time: 20:00 • Our Home in Space. (Gr. 3-5). Run time: 15:00 • A Closer Look at Space: The Sun and Stars. (Gr. 3-5). Run time: 20:59
Essential Vocabulary	**terrestrial planet** - any of the four planets, Mercury, Venus, Earth, or Mars, that are nearestthe sun and have similar size and density. **gas giant** - one of the four planets in our solar system that are composed chiefly of hydrogen and helium, namely Jupiter, Saturn, Uranus, and Neptune

Marking Period: 2nd 9 weeks
Days: 25
Reporting Category/Strand: Interrelationships in Earth/Space Systems

SOL 4.8a-e	The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include a) the motions of Earth, the moon, and the sun; b) the causes for Earth's seasons; c) the causes for the phases of the moon; d) the relative size, position, age, and makeup of Earth, the moon, and the sun; and e) historical contributions in understanding the Earth-moon-sun system.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● differentiate between rotation and revolution. ● describe how Earth's axial tilt causes the seasons. ● model the formation of the eight moon phases, sequence the phases in order, and describe how the phases occur. ● describe the major characteristics of the sun, including its approximate size, color, age, and overall composition. ● create and describe a model of the Earth-moon-sun system with approximate scale distances and sizes.

	• compare and contrast the surface conditions of Earth, the moon, and the sun. • compare and contrast an Earth-centered to the sun-centered model of the solar system. • analyze the differences in what Aristotle, Ptolemy, Copernicus, and Galileo observed and what influenced their conclusions. • describe a contribution of the NASA Apollo missions to our understanding of the moon.
Essential Questions	How do the physical properties of the sun and moon affect the Earth? • Why does the moon look different at different times? • Why do the movement and relative position of the Earth cause changes? • What causes the seasons? • How has our knowledge of the sun, earth, the planets (of our solar system), and moon changed over time? • How have humans applied technological skills to explore space?
Primary Resources	**Web Sites:** VDOE Science Standards of Learning and Curriculum Framework: http://www.doe.virginia.gov/testing/sol/standards_docs/science/ VDOE Science Enhanced Scope/Sequence Sample Lesson Plans: http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml • www.brainpop.com (Moon Phases, Eclipse, Seasons) **Smartboard, Powerpoint and SOL review activities:** http://www.rockingham.k12.va.us/resources/elementary/4science.htm • http://www.challenger.org/resources/for-students/ Links from Challenger Center; teacher information about Earth, moon, and solar system. • http://aa.usno.navy.mil/idltemp/current_moon.html Visuals of moon phases on any date. **Discovery Education:** • Space Exploration: Phases of the Moon. (Gr. 3-5). Run time: 2:30 • A Closer Look at Space: The Moon. (Gr. 3-5). Run time: 20:00 • Junior Space Scientist: Voyage to the Moon. (Gr. 3-5). Run time: 10:02 • The Reasons for the Seasons. (Gr. 3-5). Run time: 26:05 • TLC Elementary School: The Moon and Beyond. (Gr. 3-5). Run time: 24:40 • A Closer Look at Space: The Sun and Stars. (Gr. 3-5). Run time: 20:59

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Essential Vocabulary	**axis** -a straight line about which a body or a geometric figure rotates **waning** - decreasing the amount of light **waxing** - increasing the amount of light **revolution** - orbiting **orbit** - move around an object **rotation** - spinning

Marking Period: 3rd 9 weeks
Days: 22
Reporting Category/Strand: Force, Motion, and Energy

SOL 4.2a-d	The student will investigate and understand characteristics and interactions of moving objects. Key concepts include a) motion is described by an object's direction and speed; b) changes in motion are related to force and mass; c) friction is a force that opposes motion; and d) moving objects have kinetic energy
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● describe the position of an object. ● collect and display in a table and line graph time and position data for a moving object. ● explain that speed is a measure of motion. ● interpret data to determine if the speed of an object is increasing, decreasing, or remaining the same. ● identify the forces that cause an object's motion. ● describe the direction of an object's motion: up, down, forward, backward. ● infer that objects have kinetic energy. ● design an investigation to test the following hypothesis: —If the mass of an object increases, then the force needed to move it will increase.‖ ● design an investigation to determine the effect of friction on moving objects. Write a testable hypothesis and identify the dependent variable, the independent variable, and the constants. Conduct a fair test, collect and record the data, analyze the data, and report the results of the data.
Essential Questions	How do forces influence motion?

	• How can the principles of motion be put to use? • How do we recognize different states of energy? • How can we describe the position of an object? • How does the mass of an object influence motion? • How does friction affect a moving object?
Primary Resources	**Web Sites:** VDOE Science Standards of Learning and Curriculum Framework: http://www.doe.virginia.gov/testing/sol/standards_docs/science/ VDOE Science Enhanced Scope/Sequence Sample Lesson Plans: http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml • www.brainpop.com (Forces, Inclined Plane, Potential Energy, Isaac Newton, Newton's Laws) • http://www.eere.energy.gov/education/ Rich site with lesson plans and activities for students and teachers about energy. • http://www.can-do.com/uci/ssi2002/motion.html Activities for students about speed and motion. • http://www.teachersdomain.org/asset/mck05_int_rollercoaster/ Demonstration of potential and kinetic energy with a rollercoaster **Smartboard, Powerpoint and SOL review activities:** http://www.rockingham.k12.va.us/resources/elementary/4science.htm **Discovery Education:** • TLC Elementary School: Rules of Motion and Forces. (Gr. 3-5). Run time: 24:33 • Laws of Motion. (Gr. 3-5). Run time: 17:00 • Let's Move It: Newton's Law of Motion. (Gr. 3-5). Run time: 15:00 • The Magic School Bus: Plays Ball. (Gr. 3-5). Run time: 24:00
Essential Vocabulary	**Kinetic energy** - energy associated with motion **Potential energy** - energy associated with a still object

Marking Period: 3rd 9 weeks
Days: 23
Reporting Category/Strand: Force, Motion, and Energy

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SOL 4.3a-f	The student will investigate and understand the characteristics of electricity. Key concepts include a) conductors and insulators; b) basic circuits; c) static electricity; d) the ability of electrical energy to be transformed into light and motion, and to produce heat; e) simple electromagnets and magnetism; and f) historical contributions in understanding electricity.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● apply the terms insulators, conductors, open and closed in describing electrical circuits. ● differentiate between an open and closed electric circuit. ● use the dry cell symbols (–) and (+). ● create and diagram a functioning series circuit using dry cells, wires, switches, bulbs, and bulb holders. ● create and diagram a functioning parallel circuit using dry cells, wires, switches, bulbs, and bulb holders. ● differentiate between a parallel and series circuit. ● describe the types of energies (i.e., thermal, radiant, and mechanical) that are transformed by various household appliances (e.g., lamp, toaster, fan). ● create a diagram of a magnetic field using a magnet. ● compare and contrast a permanent magnet and an electromagnet. ● explain how electricity is generated by a moving magnetic field. ● design an investigation using static electricity to attract or repel a variety of materials. ● explain how static electricity is created and occurs in nature. ● construct a simple electromagnet using a wire, nail, or other iron-bearing object, and a dry cell. ● design and perform an investigation to determine the strength of an electromagnet. (The independent variable could be the number of coils of wire and the dependent variable could be the number of paperclips the magnet can attract.) ● describe the contributions of Ben Franklin, Michael Faraday, and Thomas Edison to the understanding and harnessing of electricity
Essential Questions	Why is it important to understand the difference between conductors and insulators? • How can we control the flow of electrical energy? • How can electrical energy be changed into other forms?

	• How are electricity and magnetism related? • How did scientists figure out how to harness electrical energy?
Primary Resources	**Web Sites:** VDOE Science Standards of Learning and Curriculum Framework: http://www.doe.virginia.gov/testing/sol/standards_docs/science/ VDOE Science Enhanced Scope/Sequence Sample Lesson Plans: http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml • www.brainpop.com (Electricity, Static electricity, Electromagnets, Franklin, Edison) **Smartboard, Powerpoint and SOL review activities:** http://www.rockingham.k12.va.us/resources/elementary/4science.htm • www.miamisci.org/af/sln/frankenstein/index.html Fun, visual explanation of electrical safety, static electricity and "fruity electricity" (Good for HILT/ESOL, special ed. students). • http://science.howstuffworks.com/electromagnet2.htm Visual explanation of electromagnets and related technology, questions to ask, and extension activities. • http://fi.edu/franklin/scientst/electric.html Information on Franklin and links to electricity resources. • www.thomasedison.com/ Biography and photo gallery of Thomas Edison. • http://www.phy.pmf.unizg.hr/~dpaar/fizicari/xfaraday.html Biography on Michael Faraday, who pioneered experiments in electricity and magnetism. **Discovery Education:** • Electricity and Magnetism: The Magic of Magnets. (Gr. 3-5). Run time: 17:14 • Electricity and Magnetism: Static Electricity. (Gr. 3-5). Run time: 23:45 • Electricity and Magnetism: Generating Electricity. (Gr. 3-5). Run time: 21:41 • Electricity and Magnetism: Current Electricity. (Gr. 3-5). Run time: 16:58 • A First Look: Electricity. (Gr. 3-5). Run time: 20:00 • Getting to Know: Electricity. (Gr. 3-5). Run time: 15:00 • Hot Line: All about Electricity. (Gr. 3-5). Run time: 15:00 • Physical Science: Magnetism. (Gr. 3-5). Run time: 20:00 • Animated Hero Classics: Benjamin Franklin, Scientist and Inventor. (Gr. 3-5). Run time: 25:24 • Animated Hero Classics: Thomas Edison and the Electric Light. (Gr. 3-5). Run time: 30:00
Essential Vocabulary	**conductors** - a substance or body that can allow electricity, heat, or sound to pass through it **insulators** - a material that is a poor conductor of heat or electricity or a device made of such material **circuit** - the complete path of an electric current; a group of electronic elements

	static electricity - electricity that consists of isolated stationary charges **electricity** - a form of energy **electromagnet** - a core of magnetic material (as soft iron) surrounded by a coil of wire through which an electric current is passed to magnetize the core **magnetism** - the power to attract **thermal energies** - energy in the form of heat **radiant energies** - energy traveling as electromagnetic waves **mechanical energies** - the energy of motion that does the work

Marking Period: 4th 9 weeks
Days: 22
Reporting Category/Strand: Life Processes

SOL 4.4a-d	The student will investigate and understand basic plant anatomy and life processes. Key concepts include a) the structures of typical plants and the function of each structure; b) processes and structures involved with plant reproduction; c) photosynthesis; and d) adaptations allow plants to satisfy life needs and respond to the environment.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● analyze a common plant: identify the roots, stems, leaves, and flowers, and explain the function of each. ● create a model/diagram illustrating the parts of a flower and its reproductive processes. Explain the model/diagram using the following terminology: pollination, stamen, stigma, pistil, sepal, embryo, spore, seed. ● compare and contrast different ways plants are pollinated. ● explain that ferns and mosses reproduce with spores rather than seeds. ● explain the process of photosynthesis, using the following terminology: sunlight, chlorophyll, water, carbon dioxide, oxygen, and sugar. ● explain the role of adaptations of common plants to include dormancy, response to light, and response to moisture.
Essential Questions	How do plants provide for their basic needs? (parts and processes)

	• What are the functions of each plant part? • How do plants reproduce? • How do plants undergo photosynthesis? • How and why do plants adapt to their surroundings?
Primary Resources	**Web Sites:** VDOE Science Standards of Learning and Curriculum Framework: http://www.doe.virginia.gov/testing/sol/standards_docs/science/ VDOE Science Enhanced Scope/Sequence Sample Lesson Plans: http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml • www.brainpop.com (Seed Plants, Photosynthesis, Pollination, Plant Growth, Carnivorous plants. Brainpop Jr.: parts of plants) **Smartboard, Powerpoint and SOL review activities:** http://www.rockingham.k12.va.us/resources/elementary/4science.htm • http://plantfacts.osu.edu Resource of specific plants and visual images for research. • http://www.discoveryeducation.com/teachers/free-lesson-plans/pollination-parties.cfm "Pollination Parties" activity for students to learn about pollination. **Discovery Education:** • The Language of Science: Life Science 3-5: Plants [36:18] • The Science of Plants: Grades 03-05: The Life Cycle: Generation P. (Gr. 3-5). Runtime: 19:10 • The Science of Plants: Grades 03-05: Diversity: It takes all Kinds. (Gr. 3-5). Run time: 20:46 • TLC Elementary School: All about Plants. (Gr. 3-5). Run time: 24:37 • Debbie Greenthumb: Where Plants Come From. (Gr. 3-5). Run time: 12:54 • How Plants Grow. (Gr. 3-5). Run time: 19:00 The World of Plants: Plant Adaptations. (Gr. 6-8). Run time: 13:15
Essential Vocabulary	**photosynthesis** - the process by which plants that contain chlorophyll make carbohydrates from water and from carbon dioxide in the air in the presence of light **parts of a plant** - pollination, stamen, stigma, pistil, sepal, embryo, spore, seed.

Marking Period: 4th 9 weeks
Days: 22

4th Grade Science Curriculum Guide
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Reporting Category/Strand: Living Systems

SOL 4.5a-f	The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include a) plant and animal adaptations; b) organization of populations, communities, and ecosystems and how they interrelate; c) flow of energy through food webs; d) habitats and niches; e) changes in an organism's niche at various stages in its life cycle; and f) influences of human activity on ecosystems.
Essential Knowledge/Skills/Understandings	In order to meet this standard, it is expected that students will ● distinguish between structural (physical) and behavioral adaptations. ● investigate and infer the function of basic adaptations. ● understand that adaptations allow an organism to succeed in a given environment. ● explain how different organisms use their unique adaptations to meet their needs. ● describe why certain communities exist in given habitats. ● illustrate the food webs in a local area. ● compare and contrast the niches of several different organisms within the community. ● compare and contrast the differing ways an organism interacts with its surroundings at various stages of its life cycle. Specific examples include a frog and a butterfly. ● differentiate among positive and negative influences of human activity on ecosystems
Essential Questions	How is energy transferred through food webs? • In what ways do living things change over time? • How are life cycles and niches related? • Have humans influenced ecosystems and, if so, how? • How do living things adapt to survive?
Primary Resources	**Web Sites:** VDOE Science Standards of Learning and Curriculum Framework: http://www.doe.virginia.gov/testing/sol/standards_docs/science/ VDOE Science Enhanced Scope/Sequence Sample Lesson Plans:

	http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/index.shtml • www.brainpop.com (Ecosystems, Food Chains) **Smartboard, Powerpoint and SOL review activities:** http://www.rockingham.k12.va.us/resources/elementary/4science.htm http://seagrant.uaf.edu/marine-ed/curriculum/grade-4/investigation-1.html Ecosystem study about sea otters in Aleutian Islands with lessons and instructional materials •http://www.bbc.co.uk/schools/ks3bitesize/science/organisms_behaviour_health/food_chains/activity.shtml BBC website about food chains • http://www.vtaide.com/png/foodchains.htm Food chains and webs • http://www.nps.gov/bisc/forteachers/underwater-ecosystem-adventure-electronic-fieldtrip.htm National Park Service "Underwater Ecosystem Electronic Field Trip" of mangrove shoreline and coral reefs in Florida • http://can-do.com/uci/ssi2001/plantadapt.html Lessons and activities that explore plant adaptations (California plants) • http://teacher.scholastic.com/activities/explorer/ecosystems/index.htm Experiences related to ecosystems in Costa Rica, Brazil and Mexico, with visuals and text. **Discovery Education:** • Animal adaptations. (Gr. 3-5). Run time: 24:00 • Animals Around Us: Animal Adaptations: What are They? (Gr. 3-5). Run time: 14:00 • The World of Plants: Plant Adaptations. (Gr. 6-8). Run time: 13:15 • Concepts in Nature: Where Animals Live. (Gr. 3-5). Run time: 14:19 • TLC Elementary School: People and the Environment. (Gr. 3-5). Run time: 25:32 • You in the Food Web. (Gr. 3-5). Run time: 18:48 • The Food Chain Mystery. (Gr. 3-5). Run time: 15:00 • Oceans Alive: The Food Web. (Gr. 3-5). Run time: 5:00 • Habitats: Homes for Living Things. (Gr. 3-5). Run time: 15:00Arlington Public Schools 2013 • Jeff Corwin Experiences – various ecosystems
Essential Vocabulary	**habitats** - the place or type of place where a plant or animal naturally or normally lives or grows **niche** - a habitat that contains the things necessary for a particular plant or animal to live; the part that a particular living thing plays in an ecological community

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