

**6th Grade Science Curriculum Guide
Lunenburg County Public Schools
June 2014**

Marking Period: 1

Days: 25 (ongoing throughout the year)

Reporting Category/Strand: Scientific Investigation, Reasoning, and Logic

<p>SOL 6.1</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) observations are made involving fine discrimination between similar objects and organisms; b) precise and approximate measurements are recorded; c) c) scale models are used to estimate distance, volume, and quantity; d) hypotheses are stated in ways that identify the independent and dependent variables; e) a method is devised to test the validity of predictions and inferences; f) one variable is manipulated over time, using many repeated trials; g) data are collected, recorded, analyzed, and reported using metric measurements and tools; h) data are analyzed and communicated through graphical representation; i) models and simulations are designed and used to illustrate and explain phenomena and systems; and j) current applications are used to reinforce science concepts.
<p>Essential Knowledge/Skills/Understandings</p>	<p>ESSENTIAL UNDERSTANDINGS</p> <p>The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts</p> <ul style="list-style-type: none"> a) the natural world is understandable; b) science is based on evidence, both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected; e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. <ul style="list-style-type: none"> ● To communicate an observation accurately, one must provide critical details of exactly what is being observed. Using that information, students will be able to differentiate definitively between or among similar objects and/or organisms. ● Systematic investigations require accurate measurements; however, in the absence of precision tools, observers must record careful estimations. ● Scale models must maintain relative values of size and/or quantity in order to maintain the integrity of the object or topic being modeled.

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- An experiment is a structured test of a hypothesis. A hypothesis is stated in terms of a testable relationship.
- A scientific prediction is a forecast about what may happen in some future situation. It is based on the application of scientific principle and factual information.
- An inference is an explanation based on observations and background knowledge. A conclusion is formulated from collected data. For example, one might observe darkly colored pond water and make the inference that it is polluted. However, only after data are collected can a conclusion be formulated.
- Patterns discerned from direct observations can be the basis for predictions or hypotheses that attempt to explain the mechanism responsible for the pattern.
- Accurate observations and evidence are necessary to draw realistic and plausible conclusions.
- In order to conduct an experiment, one must recognize all of the potential variables that can affect an outcome.
- In a scientific investigation, data should be collected, recorded, analyzed, and reported using appropriate metric measurement and tools.
- In a scientific investigation, data should be organized and communicated through appropriate graphical representation (graph, chart, table, and diagram).
- Models provide a way of visually representing abstract concepts. The use of models permits students to order events or processes.
- Science concepts are applied through observations and connections with everyday life and technology.

ESSENTIAL KNOWLEDGE, SKILLS, & PROCESSES

- Make connections between the components of the nature of science and their investigations and the greater body of scientific knowledge and research.
- Make observations that can be used to discriminate similar objects and organisms, paying attention to fine detail.
- Make precise and consistent measurements and estimations.
- Create approximate scale models to demonstrate an understanding of distance, volume, and quantity.
- Differentiate between independent and dependent variables in a hypothesis.
- Propose hypotheses or predictions from observed patterns.
- Compare and contrast predictions and inferences. Analyze and judge the evidence, observations, scientific principles, and data used in making predictions and inferences.
- Design an experiment in which one variable is manipulated over many trials.
- Collect, record, analyze, and report data, using metric terminology and tools.
- Analyze and communicate data, using graphs (bar, line, and circle), charts, and diagrams.
- Design a model that explains a sequence, for example, the sequence of events involved in the formation of a cloud.

Essential Questions	<p>How do scientists study our world? How does the scientific process work? Correlate metric prefixes with appropriate place value (meaning) Explain the differences in inferences and observations as well as inferences and conclusions. Why do scientists prefer the use of graphs in analyzing data?</p>
Primary Resources	<ul style="list-style-type: none"> ● Texts

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<p>Teacher made notes and worksheets located in SOL binder.</p>	<p><i>Prentice Hall Science Explorer Grade 6</i> Teacher made notes derived from the curriculum framework and worksheets</p> <ul style="list-style-type: none"> • Videos Study Jams: Scientific Methods Brain Pop: Metric Units • Interactive Websites Walk the Plank AAA Math: Measurement Metric System
<p>Essential Vocabulary</p>	

Marking Period: 1
Days: 5 (Ongoing throughout the year)
Reporting Category/Strand: Earth Resources

<p>SOL 6.9</p>	<p>The student will investigate and understand public policy decisions relating to the environment. Key concepts include</p> <ul style="list-style-type: none"> a) management of renewable resources; b) management of nonrenewable resources; c) the mitigation of land-use and environmental hazards through preventive measures; and d) cost/benefit tradeoffs in conservation policies.
<p>Essential Knowledge/Skills/Understandings</p>	<p>ESSENTIAL UNDERSTANDINGS</p> <ul style="list-style-type: none"> • People, as well as other living organisms, are dependent upon the availability of clean water and air and a healthy environment. • Local, state, and federal governments have significant roles in managing and protecting air, water, plant, and wildlife resources.

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- Modern industrial society is dependent upon energy. Fossil fuels are the major sources of energy in developed and industrialized nations and should be managed to minimize adverse impacts.
- Many renewable and nonrenewable resources are managed by the private sector (private individuals and corporations).
- Renewable resources should be managed so that they produce continuously. Sustainable development makes decisions about long-term use of the land and natural resources for maximum community benefit for the longest time and with the least environmental damage.
- Regulations, incentives, and voluntary efforts help conserve resources and protect environmental quality.
- Conservation of resources and environmental protection begin with individual acts of stewardship.
- Use of renewable (water, air, soil, plant life, animal life) and nonrenewable resources (coal, oil, natural gas, nuclear power, and mineral resources) must be considered in terms of their cost/benefit tradeoffs.
- Preventive measures, such as pollution prevention or thoughtfully planned and enforced land-use restrictions, can reduce the impact of potential problems in the future.
- Pollution prevention and waste management are less costly than cleanup.

ESSENTIAL KNOWLEDGE, SKILLS, & PROCESSES

- Differentiate between renewable and nonrenewable resources.
- Describe the role of local and state conservation professionals in managing natural resources. These include wildlife protection; forestry and waste management; and air, water, and soil conservation.
- Analyze resource-use options in everyday activities and determine how personal choices have costs and benefits related to the generation of waste.
- Analyze how renewable and nonrenewable resources are used and managed within the home, school, and community.
- Analyze reports, media articles, and other narrative materials related to waste management and resource use to determine various perspectives concerning the costs/benefits in real-life situations.
- Evaluate the impact of resource use, waste management, and pollution prevention in the school and home environment.

Essential Questions

What resources do humans depend on?
How are renewable and nonrenewable resources different? How would conserving these different types resources be different?

Primary Resources

Teacher made notes and worksheets located in SOL binder.

- **Texts**
Prentice Hall Science Explorer Grade 6
Teacher made notes derived from the curriculum framework
- **Videos**
[Brain Pop: Natural Resources](#)
[Air: State of the Earth](#)
- **Interactive Websites**
[Study Jams: Natural Resources](#)

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Essential Vocabulary	Renewable resources - resources that are always available or replaced in a relatively short amount of time Nonrenewable resources - resources that are never replaced or take millions of years to replace (i.e. coal) Conservation - protection and preservation of natural resources Sustainable development -
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Marking Period: 2

Days: 30

Reporting Category/Strand: Interrelationships in Earth/Space Systems

SOL 6.8	The student will investigate and understand the organization of the solar system and the interactions among the various bodies that comprise it. Key concepts include a) the sun, moon, Earth, other planets and their moons, dwarf planets, meteors, asteroids, and comets; b) relative size of and distance between planets; c) the role of gravity; d) revolution and rotation; e) the mechanics of day and night and the phases of the moon; f) the unique properties of Earth as a planet; g) the relationship of Earth's tilt and the seasons; h) the cause of tides; and
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	i) the history and technology of space exploration.
Essential Knowledge/Skills/Understandings	<p>ESSENTIAL UNDERSTANDINGS</p> <ul style="list-style-type: none"> ● The solar system consists of the sun, moon, Earth, other planets and their moons, meteors, asteroids, and comets. Each body has its own characteristics and features. ● The distance between planets and sizes of the planets vary greatly. The outer, —gas planets are very large, and the four inner planets are comparatively small and rocky. ● Gravity is a force that keeps the planets in motion around the sun. Gravity acts everywhere in the universe. ● Planets revolve around the sun, and moons revolve around planets. A planet rotates upon an axis. ● A dwarf planet revolves around the sun, and can maintain a nearly round shape as planets do, but it cannot move other objects away from its orbital neighborhood. ● As Earth rotates, different sides of Earth face toward or away from the sun, thus causing day and night, respectively. ● The phases of the moon are caused by its position relative to Earth and the sun. ● Earth is a rocky planet, extensively covered with large oceans of liquid water and having frozen ice caps in its polar regions. Earth has a and has a magnetic field. The atmosphere and the magnetic field help shield Earth’s surface from harmful solar radiation. Scientific evidence indicates that Earth is about 4.5 billion years old. ● Seasons are caused by a combination of the tilt of Earth on its axis, the curvature of Earth’s surface and, thus, the angle at which sunlight strikes the surface of Earth during its annual revolution around the sun. ● Tides are the result of the gravitational pull of the moon and sun on the surface waters of Earth. ● The ideas of Ptolemy, Aristotle, Copernicus, and Galileo contributed to the development of our understanding of the solar system. ● With the development of new technology over the last half-century, our knowledge of the solar system has increased substantially. ● <p>ESSENTIAL KNOWLEDGE, SKILLS, & PROCESSES</p> <ul style="list-style-type: none"> ● Describe the planets and their relative positions from the sun. ● Compare the characteristics of Pluto to the planets and explain its designation as a dwarf planet. ● Design and interpret a scale model of the solar system. (A scale model may be a physical representation of an object or concept. It can also be a mathematical representation that uses factors such as ratios, proportions, and percentages.) ● Explain the role of gravity in the solar system. ● Compare and contrast revolution and rotation and apply these terms to the relative movements of planets and their moons. ● Model and describe how day and night and the phases of the moon occur. ● Model and describe how Earth’s axial tilt and its annual orbit around the sun cause the seasons. ● describe the unique characteristics of planet Earth. ● Discuss the relationship between the gravitational pull of the moon and the cycle of tides. ● Compare and contrast the ideas of Ptolemy, Aristotle, Copernicus, and Galileo related to the solar system. ● Create and interpret a timeline highlighting the advancements in solar system exploration over the past half century. This should include information on the first modern rockets, artificial satellites, orbital missions, missions to the moon, Mars robotic explorers, and exploration of the outer planets.

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<p>Essential Questions</p>	<p>How does Earth's position and relationship with the sun and moon cause phases of the moon, tides, and seasons? In what ways is Earth unique as a planet? What are the main differences in the inner and outer planets? Explain the role of gravity and inertia in planetary motion. Describe the progression of space exploration beginning with Aristotle continuing to present.</p>
<p>Primary Resources</p> <p>Teacher made notes and worksheets located in SOL binder.</p>	<ul style="list-style-type: none"> ● Texts <i>Prentice Hall Science Explorer Grade 6</i> Teacher made notes derived from the curriculum framework ● Videos Study Jams: Gravity & Inertia Brain Pop: Solar System ● Interactive Websites SOL Pass 6.8 Activity Page (Pluto is included as a planet on the outdated notes page) Science-Lunar Cycle Astronomy Connections: Earth in Motion ● Enhanced Scope & Sequence (VDOE) Phases of the Moon Space Exploration
<p>Essential Vocabulary</p>	

Marking Period: 3

Days: 15

Reporting Category/Strand: Force, Motion, and Energy

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<p>SOL 6.2</p>	<p>The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include</p> <ul style="list-style-type: none"> a) potential and kinetic energy; b) the role of the sun in the formation of most energy sources on Earth; c) nonrenewable energy sources; d) renewable energy sources; and e) energy transformations.
<p>Essential Knowledge/Skills/Understandings</p>	<p>ESSENTIAL UNDERSTANDINGS</p> <ul style="list-style-type: none"> ● Potential energy is energy that is not —in use‡ and available to do work. Kinetic energy is energy that is —in use‡ — the energy a moving object has due to its motion. For example, moving water and wind have kinetic energy. The chemical energy in fossil fuels is potential energy until it is released. ● Solar energy from the ancient past is stored in fossil fuels, such as coal, petroleum, and natural gas. Fossil fuels are rich in the elements carbon and hydrogen. These sources of energy take very long periods of time to form and once depleted, are essentially nonrenewable. Nuclear power is also a source of nonrenewable energy. ● Many of Earth’s energy resources are available on a perpetual basis. These include solar, wind, water (hydropower, tidal and waves), biofuels and geothermal energy. Some energy sources can be replenished over relatively short periods of time. These include wood and other biomass. All are considered renewable. ● Secondary sources of energy, such as electricity, are used to store, move, and deliver energy easily in usable form. hydrogen is also a secondary source of energy, also called an energy carrier. ● Thermal and radiant energy can be converted into mechanical energy, chemical energy, and electrical energy and back again. <p>ESSENTIAL KNOWLEDGE, SKILLS, & PROCESSES</p> <ul style="list-style-type: none"> ● Compare and contrast potential and kinetic energy through common examples found in the natural environment. ● Analyze and describe the transformations of energy involved with the formation and burning of coal and other fossil fuels. ● Compare and contrast renewable (solar, wind, water [hydropower, tidal and waves], biofuels, geothermal, and biomass) and nonrenewable energy sources (coal, petroleum, natural gas, nuclear power). ● Explain that hydrogen is not an energy source, but a means of storing and transporting energy. ● Design an application of the use of solar and wind energy. ● Chart and analyze the energy a person uses during a 24-hour period and determine the sources. ● Compare and contrast energy sources in terms of their origins, how they are utilized, and their availability. ● Analyze the advantages and disadvantages of using various energy sources and their impact on climate and the environment. ● Analyze and describe how the United States’ energy use has changed over time. ● Analyze and describe sources of energy used in Virginia related to energy use nationally and globally.

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	<ul style="list-style-type: none"> ● Predict the impact of unanticipated energy shortages ● Comprehend and apply basic terminology related to energy sources and transformations. ● Create and interpret a model or diagram of an energy transformation. ● Design an investigation that demonstrates how light energy (radiant energy) can be transformed into other forms of energy (mechanical, chemical and electrical).
Essential Questions	<p>Compare and contrast potential and kinetic energy. What are the different forms of energy and how can they be classified? How can most energy resources on Earth be connected to the sun?</p>
<p>Primary Resources</p> <p>Teacher made notes and worksheets located in SOL binder.</p>	<ul style="list-style-type: none"> ● Texts <i>Prentice Hall Science Explorer Grade 6</i> Teacher made notes derived from the curriculum framework ● Videos Brain Pop: Forms of Energy ● Interactive Websites Study Jams: Renewable Fuels Jason Digital Lab Coaster Creator SOL Pass 6.2 Activity Page ● Enhanced Scope & Sequence Lessons (VDOE) Energy Electricity Generation
Essential Vocabulary	

Marking Period: 3

Days: 15

Reporting Category/Strand: Matter

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<p>SOL 6.4</p>	<p>The student will investigate and understand that all matter is made up of atoms. Key concepts include</p> <ul style="list-style-type: none"> a) atoms consist of particles, including electrons, protons, and neutrons; b) atoms of a particular element are alike but are different from atoms of other elements; c) elements may be represented by chemical symbols; d) two or more atoms interact to form new substances, which are held together by electrical forces (bonds); e) compounds may be represented by chemical formulas; f) chemical equations can be used to model chemical changes; and g) a limited number of elements comprise the largest portion of the solid Earth, living matter, the oceans, and the atmosphere.
<p>Essential Knowledge/Skills/Understandings</p>	<p>ESSENTIAL UNDERSTANDINGS</p> <ul style="list-style-type: none"> ● The basic structural components of a typical atom are electrons, protons, and neutrons. Protons and neutrons comprise the nucleus of an atom. ● An element is a form of matter made up of one type of atom. The atoms of an element are basically alike, though the number of neutrons may vary. ● The atoms of one element differ from those of another element in the number of protons. ● Elements can be represented by chemical symbols. ● Two or more atoms of different elements may combine to form a compound. ● Compounds can be represented by chemical formulas. Each different element in the compound is represented by its unique symbol. The number of each type of element in the compound (other than 1) is represented by a small number (the subscript) to the right of the element symbol. ● Chemical equations can be used to model chemical changes, illustrating how elements become rearranged in a chemical reaction. ● A limited number of elements, including silicon, aluminum, iron, sodium, calcium, potassium, magnesium, hydrogen, oxygen, nitrogen, and carbon, form the largest portion of Earth's crust, living matter, the oceans, and the atmosphere. <p>ESSENTIAL KNOWLEDGE, SKILLS, & PROCESSES</p> <ul style="list-style-type: none"> ● create and interpret a simplified modern model of the structure of an atom. ● Compare and contrast the atomic structure of two different elements. ● Explain that elements are represented by symbols. ● Identify the name and number of each element present in a simple molecule or compound, such as O₂, H₂O, CO₂, or CaCO₃. ● Model a simple chemical change with an equation and account for all atoms. Distinguish the types of elements and number of each element in the chemical equation. (Balancing equations will be further developed in Physical Science.) ● Name some of the predominant elements found in the atmosphere, the oceans, living matter, and Earth's crust.
<p>Essential Questions</p>	<p>Describe the basic structure of an atom identifying the particles and their electrical charges..</p>

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	<p>Compare and contrast atoms, molecules, and compounds. How can the number of atoms in a molecule or compound be calculated?</p>
<p>Primary Resources</p> <p>Teacher made notes and worksheets located in SOL binder.</p>	<ul style="list-style-type: none"> • Texts <i>Prentice Hall Science Explorer Grade 6</i> Teacher made notes derived from the curriculum framework • Videos Atoms: Protons, Neutrons & Electrons Brain Pop: Atoms • Interactive Websites Element Matching Game SOL Pass 6.4 Activity Page • Enhanced Scope & Sequence Lessons (VDOE) Modeling the Atom
<p>Essential Vocabulary</p>	

Marking Period: 4

Days: 20

Reporting Category/Strand: Matter

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<p>SOL 6.5</p> <p>6.5 and 6.7 taught simultaneously</p>	<p>The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include</p> <ul style="list-style-type: none"> a) water as the universal solvent; b) the properties of water in all three phases; c) the action of water in physical and chemical weathering; d) the ability of large bodies of water to store thermal energy and moderate climate; e) the importance of water for agriculture, power generation, and public health; and f) the importance of protecting and maintaining water resources.
<p>Essential Knowledge/Skills/Understandings</p>	<p>ESSENTIAL UNDERSTANDINGS</p> <ul style="list-style-type: none"> ● Among water’s unique properties is that one side of each water molecule is slightly negative and the other is slightly positive. Individual water molecules, therefore, attract other water molecules like little magnets as the slightly positive portion of a water molecule is attracted to the slightly negative portion of an adjacent water molecule. In this way, water molecules —stick together.↓ ● Due to water’s polar nature, a large number of substances will —dissolve in water. For this reason, water is often called the universal solvent. ● Water is the only compound that commonly exists in all three states (solid, liquid, gas) on Earth. The unique properties of water are a major factor in the ability of our planet to sustain life. ● Additional properties of water are its high surface tension and the large range of temperature (0–100 degrees Celsius) in which it can be found in the liquid state, as well as the fact that, unlike other substances, solid water is less dense than liquid water. ● Water is able to absorb thermal energy without showing relatively large changes in temperature. Large bodies of water act to moderate the climate of surrounding areas by absorbing thermal energy in summer and slowly releasing that energy in the winter. For this reason, the climate near large bodies of water is slightly milder than areas without large bodies of water. ● Water (rain, ice, snow) has shaped our environment by physically and chemically weathering rock and soil and transporting sediments. Freezing water can break rock without any change in the minerals that form the rock (physical weathering). This usually produces small particles and sand. Water with dissolved gases and other chemicals causes the minerals in rocks to be changed, leading to the deterioration of the rock (chemical weathering). ● Most of Earth’s water is salt water in the oceans (97 percent). Nonfrozen, fresh water makes up less than 1 percent of the water on Earth. ● Water is essential for agriculture. Crops watered by reliable irrigation systems are more productive and harvests more dependable. ● Water is an important resource used in power generation. Hydroelectric power plants make use of the kinetic energy of water as it flows through turbines. Water is also heated in power plants and turned to steam. The steam is used to turn turbines, which generate electricity. ● In the past, streams and rivers were often used to dispose of human waste, and open sewers were common. During the

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	<p>mid-1800s, public health officials recognized the connection between disease outbreaks and contamination of public wells and drinking water. Advances in water treatment and sanitary sewers have helped eliminate diseases associated with human waste.</p> <ul style="list-style-type: none"> ● Due to water’s importance in power generation, agriculture, and human health, it is important to conserve water resources. ● <p>ESSENTIAL KNOWLEDGE, SKILLS, & PROCESSES</p> <ul style="list-style-type: none"> ● Comprehend and apply key terminology related to water and its properties and uses. ● Model and explain the shape and composition of a water molecule. ● Design an investigation to demonstrate the ability of water to dissolve materials. ● Comprehend the adhesive and cohesive properties of water. ● Compare the effects of adding thermal energy to the states of water. ● Explain why ice is less dense than liquid water. ● Relate the three states of water to the water cycle. ● Design an investigation to model the action of freezing water on rock material. ● Design an investigation to determine the presence of water in plant material (e.g., a fruit). ● Infer how the unique properties of water are key to the life processes of organisms. ● Design an investigation to model the action of acidified water on building materials such as concrete, limestone, or marble. ● Chart, record, and describe evidence of chemical weathering in the local environment. ● Analyze and explain the difference in average winter temperatures among areas in central and western Virginia and cities and counties along the Chesapeake Bay and Atlantic coast. ● Explain the role of water in power generation. ● Describe the importance of careful management of water resources
<p>Essential Questions</p>	<p>Describe the basic structure of a water molecule. What properties result from the structure of the water molecule? Why is it important to conserve water and prevent pollution? How are coastal climates slightly different from inland for the same latitude? How can water chemically and physically weather rock changing Earth’s surface? Define and label the parts of the water cycle.</p>
<p>Primary Resources</p> <p>Teacher made notes and worksheets located in SOL binder.</p>	<ul style="list-style-type: none"> ● Texts <i>Prentice Hall Science Explorer Grade 6</i> Teacher made notes derived from the curriculum framework ● Videos Brain Pop: Water Cycle Study Jams: Weathering and Erosion

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	<ul style="list-style-type: none">● Enhanced Scope & Sequence Lessons (VDOE) Conservation of Water Universal Solvent
Essential Vocabulary	

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Days: 15

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Reporting Category/Strand: Living Systems

<p>SOL 6.7</p> <p>6.5 and 6.7 taught simultaneously</p>	<p>The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include</p> <ul style="list-style-type: none"> a) the health of ecosystems and the abiotic factors of a watershed; b) the location and structure of Virginia’s regional watershed systems; c) divides, tributaries, river systems, and river and stream processes; d) wetlands; e) estuaries; f) major conservation, health, and safety issues associated with watersheds; and g) water monitoring and analysis using field equipment including hand-held technology.
<p>Essential Knowledge/Skills/Understandings</p>	<p>ESSENTIAL UNDERSTANDINGS</p> <ul style="list-style-type: none"> ● An ecosystem is made up of the biotic (living) community and the abiotic (nonliving) factors that affect it. The health of an ecosystem is directly related to water quality. ● Abiotic factors determine ecosystem type and its distribution of plants and animals as well as the usage of land by people. Abiotic factors include water supply, topography, landforms, geology, soils, sunlight, and air quality/O₂ availability. ● Human activities can alter abiotic components and thus accelerate or decelerate natural processes. For example, people can affect the rate of natural erosion. Plowing cropland can cause greater erosion, while planting trees can prevent it. Flood protection/wetland loss is another example. ● A watershed is the land that water flows across or through on its way to a stream, lake, wetland, or other body of water. Areas of higher elevations, such as ridgelines and divides, separate watersheds. ● The three major regional watershed systems in Virginia lead to the Chesapeake Bay, the North Carolina sounds, or the Gulf of Mexico. ● River systems are made up of tributaries of smaller streams that join along their courses. Rivers and streams generally have wide, flat, border areas, called flood plains, onto which water spills out at times of high flow. ● Rivers and streams carry and deposit sediment. As water flow decreases ● in speed, the size of the sediment it carries decreases. ● Wetlands form the transition zone between dry land and bodies of water such as rivers, lakes, or bays. Both tidal and nontidal wetlands perform important water quality functions, including regulating runoff by storing flood waters; reducing erosion by slowing down run-off; maintaining water quality by filtering sediments, trapping nutrients, and breaking down pollutants; and recharging groundwater. They also provide food and shelter for wildlife and fish and nesting and resting areas for migratory birds. ● Estuaries perform important functions, such as providing habitat for many organisms and serving as nurseries for their young. ● The Chesapeake Bay is an estuary where fresh and salt water meet and are mixed by tides. It is the largest estuary in

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	<p>the contiguous United States and one of the most productive.</p> <ul style="list-style-type: none"> Water quality monitoring is the collection of water samples to analyze chemical and/or biological parameters. Simple parameters include pH, temperature, salinity, dissolved oxygen, <p>ESSENTIAL KNOWLEDGE, SKILLS, & PROCESSES</p> <ul style="list-style-type: none"> Comprehend and apply basic terminology related to watersheds. Use topographic maps to determine the location and size of Virginia’s regional watershed systems. Locate their own local watershed and the rivers and streams associated with it. Design an investigation to model the effects of stream flow on various slopes. Analyze and explain the functioning of wetlands and appraise the value of wetlands to humans. Explain what an estuary is and why it is important to people. Propose ways to maintain water quality within a watershed. Explain the factors that affect water quality in a watershed and how those factors can affect an ecosystem. Forecast potential water-related issues that may become important in the future. Locate and critique a media article or editorial (print or electronic) concerning water use or water quality. Analyze and evaluate the science concepts involved. Argue for and against commercially developing a parcel of land containing a large wetland area. Design and defend a land-use model that minimizes negative impact. Measure, record, and analyze a variety of water quality indicators and describe what they mean to the health of an ecosystem.
<p>Essential Questions</p>	<p>How did weathering and erosion lead to the formation of watersheds and river systems on Earth? Describe the steps and processes involved in the water cycle. In what ways are wetlands and estuaries particularly important to the environment and water quality? How can water quality monitoring and analysis lead to cleaner waterways? Identify Lunenburg’s local and regional watersheds.</p>
<p>Primary Resources</p> <p>Teacher made notes and worksheets located in SOL binder.</p>	<ul style="list-style-type: none"> Texts <i>Prentice Hall Science Explorer Grade 6</i> Teacher made notes derived from the curriculum framework Videos Brain Pop: Rivers Brain Pop: Water Pollution Interactive Websites Non Point Source Kids Page-EPA Enhanced Scope & Sequence Lessons (VDOE)

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	<u>Conservation of Water</u> <u>Virginia's Watershed</u>
Essential Vocabulary	

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Reporting Category/Strand: Force, Motion, and Energy

<p>SOL 6.3</p>	<p>The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include</p> <ul style="list-style-type: none"> a) potential and kinetic energy; b) the role of the sun in the formation of most energy sources on Earth; c) nonrenewable energy sources; d) renewable energy sources; and e) energy transformations.
<p>Essential Knowledge/Skills/Understandings</p>	<p>ESSENTIAL UNDERSTANDINGS</p> <ul style="list-style-type: none"> ● Earth receives only a very small portion of the sun’s energy, yet this energy is responsible for powering the motion of the atmosphere, the oceans, and many processes at Earth’s surface. ● Solar radiation is made up of different types of radiation (including infrared, visible light, and ultraviolet). ● Incoming solar radiation is in close balance with the energy that leaves the atmosphere; otherwise Earth would heat up or cool down. Excess carbon dioxide and other gases may disrupt this balance, creating a greenhouse effect. ● About one-third of the sun’s incoming energy is reflected back out to space. About one-half of the energy striking Earth is absorbed by Earth’s surface. ● Earth’s surface is heated unequally. ● When air or water is heated, the molecules move faster and farther apart, reducing their density and causing them to rise. Cooler air or water molecules move more slowly and are denser than warm air or water. Warm air or water rising coupled with cooler air or water descending forms a cyclic rising/falling pattern called convection. ● Radiation and convection from Earth’s surface transfer thermal energy. This energy powers the global circulation of the atmosphere and the oceans on our planet. ● As bodies of water (oceans, lakes, rivers, etc.) absorb thermal energy, the water evaporates causing the air to be warm and moist. Warm, moist air is less dense than cold, dry air, so it rises relative to colder, drier air. As warm, moist air rises, it gives off some thermal energy as the moisture condenses, forming clouds. Clouds are not gaseous water vapor; rather they are minute, condensed water particles. ● Some thunderstorms are formed where the land is strongly heated. Hurricanes form over warm, tropical water and are fed by the energy of that water. <p>ESSENTIAL KNOWLEDGE, SKILLS, & PROCESSES</p> <ul style="list-style-type: none"> ● Comprehend and apply basic terminology related to solar energy, including wavelength; ultraviolet, visible, and infrared radiation; and reflection and absorption. ● Analyze and interpret a chart or diagram showing Earth’s energy budget. ● Analyze, model, and explain the greenhouse effect in terms of the energy entering and leaving the atmosphere. ● Design an investigation to determine the effect of sunlight on the heating of a surface.

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	<ul style="list-style-type: none"> ● Analyze and explain how convection currents occur and how they distribute thermal energy in the atmosphere and oceans. ● Analyze the role of heating and cooling in the formation of clouds. ● Order the sequence of events that takes place in the formation of a cloud. ● Describe the relationship between thermal energy and the formation of hurricanes and thunderstorms.
Essential Questions	<p>What role do radiation, conduction, and convection have in distributing heat around the atmosphere and oceans? Compare and contrast ultraviolet, infrared, and visible radiation in terms of wavelength and energy. How much of the incoming energy from the sun is reflected by Earth? How much is absorbed by Earth's surface?</p>
<p>Primary Resources</p> <p>Teacher made notes and worksheets located in SOL binder.</p>	<ul style="list-style-type: none"> ● Texts <i>Prentice Hall Science Explorer Grade 6</i> Teacher made notes derived from the curriculum framework ● Videos Brain Pop: Thunderstorms Brain Pop: Hurricanes Brain Pop: Tornadoes ● Interactive Websites SOL Pass 6.3 Activity Page Study Jams: Clouds and Precipitation
Essential Vocabulary	

Marking Period: 5
Days: 15

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Reporting Category/Strand: Matter

<p>SOL 6.6</p> <p>6.3 & 6.6 taught simultaneously</p>	<p>The student will investigate and understand the properties of air and the structure and dynamics of Earth’s atmosphere. Key concepts include</p> <ul style="list-style-type: none"> a) air as a mixture of gaseous elements and compounds; b) pressure, temperature, and humidity; c) atmospheric changes with altitude; d) natural and human-caused changes to the atmosphere and the importance of protecting and maintaining air quality; e) the relationship of atmospheric measures and weather conditions; and f) basic information from weather maps, including fronts, systems, and basic measurements.
<p>Essential Knowledge/Skills/Understandings</p>	<p>ESSENTIAL UNDERSTANDINGS</p> <ul style="list-style-type: none"> ● Air is a mixture of gaseous elements and compounds. These include nitrogen, oxygen, water, argon and carbon dioxide. Nitrogen makes up the largest proportion of air. ● Air exerts pressure. Air pressure decreases as altitude increases. ● Moisture in the air is called humidity. ● The atmosphere is made up of layers (troposphere, stratosphere, mesosphere, and thermosphere) that have distinct characteristics. ● Temperature decreases as altitude increases in the lowest layer of the atmosphere. ● Most of the air that makes up the atmosphere is found in the troposphere (the lowest layer). Virtually all weather takes place there. ● Forest fires and volcanic eruptions are two natural processes that affect Earth’s atmosphere. Many gaseous compounds and particles are released into the atmosphere by human activity. All of the effects of these materials are not yet fully understood. ● The amounts of thermal energy and water vapor in the air and the pressure of the air largely determine what the weather conditions are. ● Clouds are important indicators of atmospheric conditions. Clouds are found at various levels within the troposphere. Three major types of clouds are cumulus, stratus, and cirrus. ● Ozone, a form of oxygen, can form near the surface when exhaust pollutants react with sunlight. This pollutant can cause health problems. Naturally occurring ozone is also found in the upper atmosphere and helps to shield Earth from ultraviolet radiation. ● Maintaining good air quality is a crucial goal for modern society, and it is everyone’s responsibility to work toward it. ● Weather maps show much useful information about descriptive air measurements, observations, and boundaries between air masses (fronts). The curved lines showing areas of equal air pressure and temperature are key features of weather maps. Weather maps are important for understanding and predicting the weather. <p>ESSENTIAL KNOWLEDGE, SKILLS, & PROCESSES</p>

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	<ul style="list-style-type: none"> ● Comprehend and apply basic terminology related to air and the atmosphere. ● Identify the composition and physical characteristics of the atmosphere. ● Analyze and interpret charts and graphs of the atmosphere in terms of temperature and pressure. ● Measure and record air temperature, air pressure, and humidity, using appropriate units of measurement and tools. ● Analyze and explain some of the effects that natural events and human activities may have on weather, atmosphere, and climate. ● Evaluate their own roles in protecting air quality. ● Design an investigation to relate temperature, barometric pressure, and humidity to changing weather conditions. ● Compare and contrast cloud types and relate cloud types to weather conditions. ● Compare and contrast types of precipitation. ● Compare and contrast weather-related phenomena, including thunderstorms, tornadoes, hurricanes, and drought. ● Interpret basic weather maps and make forecasts based on the information presented ● Map the movement of cold and warm fronts and interpret their effects on observable weather conditions
<p>Essential Questions</p>	<p>What are the two most abundant gases in Earth’s atmosphere. (List their percentages) Label and describe the layers of the atmosphere in terms of temperature. What are the three major parameters that determine weather conditions? How does temperature have an effect on air pressure and humidity? How can humans activities and natural events impact weather and climate?</p>
<p>Primary Resources</p> <p>Teacher made notes and worksheets located in SOL binder.</p>	<ul style="list-style-type: none"> ● Texts <i>Prentice Hall Science Explorer Grade 6</i> Teacher made notes derived from the curriculum framework ● Videos SOL Pass 6.6 Activity Page Brain Pop: Weather Study Jams: Air Pressure & Wind Study Jams: Air Masses & Fronts ● Interactive Websites Cold & Warm Fronts ● Enhanced Scope & Sequence (VDOE) Air Quality

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Essential Vocabulary	