Click on PRINT A PDF

PRINT A PDF

GREENCASTLE-ANTRIM SCHOOL DISTRICT

Planned Course

Board Approved February 16, 2012

Course Title: Science

Grade Level(s) 8

Course Materials:

Primary Source(s)

Science Interactions Course 3 Textbook
Science Interactions Course 3 Review and Assessment Book
Science Interactions Course 3 Lab Manual
Science Interactions Course 3 Study Guide
(all Glencoe Publishing, copyright 1993)

PSSA Finish Line Grade 8, Continental Press, copyright 2008

National Oceanic and Atmospheric Administration Internet Website

Supplemental Source(s)

Science related videos and internet websites

Teacher made resources:

Objectives:

All students will:

1. Pose questions and hypotheses based on observations of biological and physical phenomena and processes.
2. Design and conduct experiments through scientific inquiry related to the biological and physical sciences.
3. Analyze biological and physical findings obtained from scientific investigations and research.
4. Explain, interpret, and predict, biological and physical phenomena/systems using various models.

Essential Questions: Genetic Traits and Characteristics

1. Why is DNA called the “blueprint of life”?
2. How do cells grow and reproduce?
3. How is genetic information inherited and expressed?
4. What is the difference between dominant and recessive traits?
5. How do the inherited characteristics of living things depend on genes?
6. What are the principal mechanisms by which living things reproduce and transmit information between parent and offspring?
7. How do the four bases of DNA make up the double helix?
8. What are some of the careers, scientists and historical breakthroughs related to Genetics?

Essential Questions: Structure and Function of Organisms (Animal)

1. How are plants and animals organized to carry on the processes of life?
2. What are the "life processes" that cells carry out?
3. What are the basic organelles and their functions in the animal cell?
4. What are the main differences between the animal and plant cell?
5. What are the key concepts in the cell theory?
6. Why are cells different in shape and size?
7. How do we use a microscope to observe cell parts?
8. How are organisms classified and organized?
9. What are some examples found in each level of organization?

Essential Questions: Properties and Changes

1. What is the difference between an element, a compound, and a mixture?
2. What is the difference between a physical change and chemical change?
3. How does the law of conservation of matter relate to reactants and products?
4. What quantities are measured that relate to chemical/physical changes within a system?
5. What physical properties are used to identify substances?
6. What are the differences between a solid, liquid, plasma and gas?
7. What are 2 types of energy that can be released during a chemical reaction?
8. What happens to the molecules in a substance if it is cooled? Heated?
9. What happens to the mass of a substance after a chemical reaction?
10. What are ways to increase the rate of a chemical reaction?
11. How are the products and reactants in a chemical reaction similar? Different?
12. How do you determine a chemical reaction has taken place and a new substance has been formed?
13. How do you use chemical equations and formulas to represent a chemical reaction?
14. Why are changes in matter accompanied by changes in energy?
15. What factors determine the types of chemical bonds that form between particles?
16. How do energy transformations explain that energy is neither created nor destroyed?

Essential Questions: Periodic Table

1. How do you create atomic models of the common elements?
2. How do the characteristics of atomic theory and scientific theory compare?
3. What is the composition of the structure of an atom?
4. How do you determine the number of electrons, protons and neutrons in an atom?
5. How do you use the Periodic Table to classify elements and the properties of elements?
6. What patterns in the properties of the elements contribute to the layout of the periodic table?
7. What factors determine the types of chemical bonds that form between particles?
8. What are the types of chemical bonds?
9. What do elements in the same group/family have in common? How are they different?
10. What do elements in the same period/series have in common? How are they different?
11. How is the number of valence electrons related to an element's properties?
12. Where are the metals, nonmetal, and metalloids located on the periodic table?
13. How do periodic properties vary from left to right and top to bottom on the periodic table?
14. How can an element's periodic properties be determined from its position on the periodic table?

Essential Questions: Scientific Method

1. How will using the Scientific Methods help you solve problems?
2. What is the dependent and independent variable?
3. How do you justify conclusions based on appropriate and unbiased observations?
4. How do you formulate a testable problem by using an experimental design?
5. How do you analyze a set of scientific data using mean, median, mode, and range using *SI units?*
6. What are several ways you can suggest to analyze real world problems using scientific data?
7. How do you go from a problem to a solution?

Essential Questions: Weather

1. What is weather and its effect on humans?
2. What is the role of humidity and its relationship to precipitation?
3. How is the amount of water vapor/humidity measured?
4. How can observing different types of clouds predict weather?
5. How do clouds form?
6. How does the dew point create fog?
7. How do weather fronts and storms affect the movement of water through the water cycle?
8. How do weather fronts cause the formation of different types of clouds?
9 How do you read a weather map?
10. What are the elements needed to create a hurricanes and tornadoes?
11. What are the 5 categories of hurricanes using the Saffir/Simpson Scale?
12. How do you use the Fujita Tornado Damage Scale to measure tornadoes?
13. What is the role of a thunderstorm in creating tornadoes?
14. What safety procedures do you use before, during and after a tornado?
15. What are the advantages and disadvantages of the Fujita and Torro tornado scales.
16. How do you characterize a supercell?
17. What is weather?
18. How does weather impact our lives?
19. What is meteorology?
20. What are the layers of the atmosphere?
21. What is the ozone layer and its importance?
22. How does temperature affect weather changes?
23. How do you convert between temperature scales?

Essential Questions: Electricity and Magnetism

1. How do regions of electric potential difference cause charges to move through a conductor?
2. How do voltage, current and resistance vary mathematically in a DC current?
3. How is magnetism a result of the alignment of many magnetic domains in a metal?
4. How is a current induced by moving through an electrical field through a conductor?
5. How is lightning formed?
6. How are electrical forces determined?

GREENCASTLE-ANTRIM SCHOOL DISTRICT

Standards	Content (What the Student Will Know)	Performance (What the Student will Do)	Activities & Assessments	Vocabulary
3.1.8.A 3.1.8.A9	**Structure and Function of Organisms (Animal)** Students will know how to name and identify the levels of organization from cell to organism. Know the simplest level of multicellular organization is the cell. Understand cells and tissues combine to create organs with specific functions. Know organ systems function to meet the needs of organisms. Know how to compare structural and functional similarities and differences between the animal and plant cell. Cells grow and divide thereby producing more cells. Differentiate between living and nonliving organisms. Know the parts and functions of the compound light microscope.	Name the levels of organization from simple to complex. Compare and contrast each level of organization and give examples. Compare and contrast animal and plant cell structures. Name the organelles and their functions in the animal cell. Determine the importance of cell size. Name the parts of the cell theory. Differentiate between living and nonliving. Identify the parts of the compound light microscope.	Class Notes Class Activities Laboratory Activities Tests/Quizzes Posters Presentations 3-D models Power points Internet Activities Culmination Projects Graphic Organizers Videos Handouts	Tissue Cell Organs Organ Systems Cell Cell Membrane Nucleus Nuclear Membrane Ribosomes Endoplasmic Recticulum (smooth and rough) Chromosomes Vacuoles Cytoplasm Mitochondria Chloroplasts Organelles Thylakoid Cell Wall Lysosomes Abiotic Biotic Microscope Ocular Stage Stage Clips Diaphragm Base Low Power Objective High Power Objective Rotating Nosepiece Tube Coarse Focus, Fine Focus

Standards	Content (What the Student Will Know)	Performance (What the Student will Do)	Activities & Assessments	Vocabulary
3.1.8.B **3.1.8.B6**	**<u>Genetic Traits and Characteristics</u>** Genetic instructions determine inherited traits of organisms. There are differences between inherited and acquired traits. The gene is the basic unit of inheritance, there are dominant and recessive genes, and traits are inherited. The similarities and differences in mitosis and meiosis in passing on genetic information. Ability to compare and contrast genotype and phenotype. Disease affects the structures and/or functions of an organism. Hereditary information (set of instructions) is contained in genes, located on chromosomes in cells. Genes can randomly change or mutate, causing changes in certain traits of the offspring. Explain Mendel's laws in relationship to the results he obtained in his pea plants. Study the inheritance of traits in a monohybrid and dihybrid cross.	Name the 4 bases of DNA. Differentiate and name dominant and recessive traits. Identify inherited and acquired traits Name the phases of mitosis/meiosis and their role in reproduction Differentiate between genotype and phenotypes in organisms. Determine the effects of diseases acquired and inherited. Identify the parts of a chromosome and the functions of those structures. Identify types of mutations that are inherited or acquired. Discuss Mendel's pea plant experiments and their effect on genetics. Differentiate between a monohybrid and dihybrid cross.	Class Notes Class Activities Laboratory Activities Tests/Quizzes Posters Presentations 3-D models Power points Internet Activities Culmination Projects Graphic Organizers Videos Research Handouts	Genetics Inherited traits Acquired traits Dominant Gene Recessive Guanine Cytosine Adenine Thymine RNA DNA Allele Autosome Phenotype Genotype Mutation Homozygous Heterozygous Haploid Diploid Mitosis Meiosis Interphase Prophase Metaphase Anaphase Telophase Watson Crick Body Cell Sex Cell Haploid Diploid Mendel Monohybrid Dihybrid

Standards	**Content (What the Student Will Know)**	**Performance (What the Student will Do)**	**Activities & Assessments**	**Vocabulary**
3.3.8.A 3.3.8.A7	**<u>Weather</u>** There are global patterns of atmospheric movement that influence regional weather and climate Know the composition and layers of the atmosphere Global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation There are patterns in global and local weather that enable us to predict weather occurrences with some accuracy. We can control to some degree how weather impacts us as individuals and as societies. Develop awareness of weather patterns through the study of local weather maps, observable weather changes, and the construction of weather instruments. Weather is an everyday happening and that	Describe how weather changes daily and season-to-season and make predictions based on observations. Use weather instruments accurately and appropriately. Read weather maps and explain their symbols. Explain the types of cloud formation and type of weather associated with each one. Compare and contrast global weather trends to local weather conditions. Identify global patterns of atmospheric movement influence regional weather and climate. Discuss cause-and-effect relationships and how they allow us to make accurate weather. Name common weather instruments and how to use them. Compare and contrast extreme weather conditions. Compare and contrast weather fronts. Identify the layers of the atmosphere.	Class Notes Class Activities Laboratory Activities Tests/Quizzes Posters Presentations 3-D models Power points Internet Activities Culmination Projects Graphic Organizers Video Research Handouts	Weather Atmosphere, Troposphere, Stratosphere Mesosphere, Thermosphere Exosphere Ozone Layer Meteorology Warm front, Cold Front Air Mass Humidity Psychrometer Hygrometer Barometer Thermometer Celsius Fahrenheit Kelvin Precipitation Clouds Cumulus Cirrus Stratus Stratocumulus Nimbostratus Dew Point

	climate is based on weather over a long period of time. Large-scale wind patterns drive surface currents in the oceans and affects weather. Interaction of circulating air masses gives rise to a wide variety of weather phenomena including fronts, mid-latitude cyclones (and anti-cyclones), and severe weather (tropical storms, tornados, severe thunderstorms, etc.).	Explain the effect of water vapor in the system.		Hurricane Tornado Thunderstorm Flood Temperature Evaporation, Condensation Relative Humidity Precipitation Snow, Sleet, Hail Humidity Sling Psychrometer Fog Dew Point Warm Front, Cold Front Jet Stream Air Mass/Pressure Weather Front Atmospheric Pressure Barometer High Pressure System Low Pressure System Isobars Depression Cyclone, Anticyclone Occluded Front, Stationary Front
Standards	**Content (What the Student Will Know)**	**Performance (What the Student will Do)**	**Activities & Assessments**	**Vocabulary**
3.2.8.A 3.2.8.A6	**<u>Properties and Changes</u>** All matter is made up of particles, which are far too small to see directly through a microscope. Particles are always in motion with the smallest motion in solids progressing to the largest motion in gases. Changing a substance's state of matter may change its density but not its composition. When two or more substances are combined, they may form a mixture and maintain their original properties or they may react chemically to form a new substance with new properties. Compounds may only be broken down into simpler types of matter (elements) by chemical means. Predict products of simple chemical reactions	Identify and describe the four phases of matter and their physical properties. Determine that a chemical reaction and a new substance have been formed by observing temperature changes, color changes, the formations of a precipitate, and the release of a gas. Identify and explain that matter cannot be created or destroyed in a chemical reaction by determining that the number of elements in a balanced chemical equation is the same on both the reactant and product side of the equation. Describe the difference between pure substances (elements and compounds) and mixtures. Describe the movement of particles in solids, liquids, gases, and plasmas states. Distinguish between physical and chemical properties of matter as physical (i.e., density,	Class Notes Class Activities Laboratory Activities Tests/Quizzes Posters Presentations 3-D models Power points Internet Activities Culmination Projects Graphic Organizers Video Research Handouts	Matter Solid Liquid Gas Coefficient Subscript Element Molecule Compound Mixture Physical change Chemical change Law of Conservation of Matter Reactants Products Temperature Volume

	and write the correct balanced chemical equations for those reactions. Explain the structure of matter, its properties, and what happens when one material comes in contract with another. A substance has characteristic properties such as density, boiling point, freezing point, solubility, all of which are independent of the mass or volume of the sample. Changing a substance's state of matter may change its density but not its composition.	melting point, boiling point) or chemical (i.e., reactivity, combustibility). Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color). Identify and demonstrate the Law of Conservation of Matter. Use models and patterns to make predictions, draw inferences, or explain scientific and technological concepts. Design, implement, record, explain, and justify safe and effective laboratory procedures to determine the relationship between two variables, controlling for other factors that might also affect the relationship.		Gas Precipitate Gas Production Density Boiling/Melting Points Solubility Chemical Reactivity Specific Heat Plasma Energy Chemical Equation
Standards	**Content (What the Student Will Know)**	**Performance (What the Student will Do)**	**Activities & Assessments**	**Vocabulary**
3.2.8.A 3.2.8.A6	**<u>Periodic Table</u>** All matter is made up of building blocks called atoms. Atoms are characterized by their parts including protons, electrons, and neutrons. Elements are the basic building blocks of matter that cannot be broken down chemically and are made up all of the same type of atoms. There are over one hundred known elements each with characteristic properties from which all other matter is made. There three main types of chemical bonds are covalent, ionic and hydrogen bonds. The periodic table can be used to determine the physical, chemical and bonding potential of an element based on its location on the	Name the similarities and differences of elements in the same group/family. Name the similarities and differences of elements in the same period/series. Compare the element's properties to the number of valence electrons. Distinguish between metals, nonmetals and metalloids and their location on the periodic table. Explain the systematic organization of the periodic table from left to right and top to bottom. Construct different models of atoms or molecules. Explain how the contributions of different scientists led to the development of our understanding of atomic structure. Calculate the protons and neutrons in the nucleus of an atom model and the electrons in the electron cloud. Describe how the charge and mass of each part relate to its location in the model.	Class Notes Class Activities Laboratory Activities Tests/Quizzes Posters Presentations 3-D models Power points Internet Activities Culmination Projects Graphic Organizers Video	Group Period Family Series Valence Electrons Periodic Table Scientific Theory Atomic Theory Electrons Neutrons Protons Bohr Model Elements Atomic Models Lewis Structure Atomic Mass

	periodic table. The structure of an atom can be determined by using several different models.	Calculate the number of protons or neutrons using the atomic mass Explain the significance of the valence electron to the property of reactivity Explain why elements in groups have similar properties and relate the number of valence electrons of each element in a group to their shared reactivity. Explain that elements in periods have similar energy levels, but do not have similar properties. Identify and count the number of atoms of each element in a chemical formula using subscripts and coefficients. Describe how the elements belonging to a group of the periodic table are interrelated in terms of atomic number. Describe the locations in the periodic table and the general properties of the alkali metals, the alkaline-earth metals, the halogens, and the noble gases. Define valence electrons, and state how many are present in atoms of each main-group element.	Research Handouts	Chemical Bonds Covalent Bond Ionic Bond Hydrogen Bond Valence Electron Metals Nonmetals Metalloids Alkali Metals Alkaline Earth Metals Noble Gases Rare-Earth Elements Halogens
Standards	**Content (What the Student Will Know)**	**Performance (What the Student will Do)**	**Activities & Assessments**	**Vocabulary**
3.1.8.A	**Characteristics and Processes of Science** Conduct scientific investigations that generally involve the collection of relevant evidence, the use of logical reasoning and creativity in devising hypotheses and explanations to make sense of the evidence. Know the control variables in experiments. Know the strengths and weaknesses of claims, arguments or data.	Demonstrate a working knowledge of the skills necessary to maintain a safe lab environment. Demonstrate the use of the scientific method through scientific experimentation Practice making and interpreting graphs Distinguish between variable and controlled parameters in a test. Compare and contrast scientific theories. Formulate and revise explanations and models using logic and evidence. Recognize and analyze alternative explanations and models. Use comparative and descriptive investigations to answer scientific questions.	Class Notes Class Activities Laboratory Activities Tests/Quizzes Posters Presentations 3-D models Power points Internet Activities Culmination Projects Graphic	Conclusions Observation Unbiased Formulate Problem Experimental Design Graphs Circle Graph Bar Graph Line Graph Problem Solution Hypothesis Independent Variable

		Design and conduct experimental investigations using the scientific method. Interpret, explain, and communicate data. Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment, or following a procedure. Write for scientific purposes a lab report incorporating information from a circle, bar, or line graph, data tables, diagrams, and symbols. Organize scientific information in appropriate tables, charts, and graphs, and identify relationships they reveal. Identify the flaws of reasoning in arguments that are based on poorly designed research (e.g., facts intermingled with opinion, conclusions based on insufficient evidence).	Organizers Video Research Handouts	Dependent Variable Scientific Method Experiment Dependent Variable Independent Variable Constant Control

Standards	Content (What the Student Will Know)	Performance (What the Student will Do)	Activities & Assessments	Vocabulary
3.3.8.B	**Electricity and Magnetism** Electric force depends on the size of charges and the distance between them. Static electricity is the buildup of electric charges on an object. Electric current is a continuous flow of charge caused by the motion of electrons. Ohm's law describes the relationship between current, resistance, and voltage. Magnets are surrounded by a magnetic field and have a north and south pole. The magnetic force between a magnet and wires carrying an electric current makes an electric motor turn. Transformers can increase or decrease the voltage of an alternating current. Circuits consist of series, parallel and integrated circuits that contain electric components. Coulomb's Law is the electrostatic interaction between electrically charged particles.	Explain the relationship among voltage, current and resistance in a simple series. Describe the relationship between current and magnetism. Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy. Investigate and explain that electric currents and magnets can exert force on each other. Determine if a material is a conductor, semi-conductor or insulator. Identify and construct open, closed, integrated and short circuits Construct a wet cell. Show the magnetic field of a bar magnet using iron filings and compasses. Determine the north and south poles of a magnet using another magnet. Construct an electromagnet. Produce an electric current using a solenoid, bar magnet and galvanometer. Compare and contrast direct and alternating current.	Class Notes Class Activities Laboratory Activities Tests/Quizzes Posters Presentations 3-D models Power points Internet Activities Culmination Projects Graphic Organizers Video Research Handouts	Coulomb's Law Static Electricity Electric Current Conductor Insulator Current Voltage Series Circuits Parallel Circuits Resistance Magnets Magnetism Open Circuit Closed Circuit Short Circuit Magnetic Field Iron Filings Wet Cell North Pole South Pole Electromagnet Solenoid Bar Magnet Gavanometer Magnetic Force Load Circuit Circuit Board Semi-conductor Integrated Circuit Transformers Ohms Law Direct Current Alternating Current