Science	
Physical and Chemical Properties and Changes of Matter	
	The students will be able to: ▪ Recognize elements (unique atoms) and compounds (molecules or crystals) are pure substances that have characteristic properties ▪ Describe the physical and chemical properties (e.g., magnetic attraction, conductivity, melting point and boiling point, reactivity) of pure substances (elements or compounds) (e.g., copper wire, aluminum wire, iron, charcoal, sulfur, water, salt, sugar, sodium bicarbonate, galena, quartz, magnetite, pyrite) using appropriate senses and tools ▪ Describe evidence (e.g., diffusion of colored material into clear material such as water; light reflecting off of dust particles in air; changes in physical properties and reactivity such as gold hammered into foil, oil spreading on the surface of water, decay of organic matter, condensation of water vapor by increased pressure) that supports the theory that matter is composed of moving particles too small to be seen (atoms, molecules) ▪ Describe evidence (e.g., diffusion of colored material into clear material such as water; light reflecting off of dust particles in air; changes in physical properties and reactivity such as gold hammered into foil, oil spreading on the surface of water, decay of organic matter, condensation of water vapor by increased pressure) that supports the theory that matter is composed of moving particles too small to be seen (atoms, molecules) ▪ Using the Kinetic Theory model, illustrate and account for the physical properties (i.e., shape, volume, malleability, viscosity) of a solid, liquid, or gas in terms of the arrangement and motion of molecules in a substance ▪ Use the Kinetic Theory model to explain

	changes in the volume, shape, and viscosity of materials in response to temperature changes during a phase change ▪ Predict the effect of transfer on the physical properties of a substance as it changes to or from a solid, liquid, or gas (i.e., phase changes that occur during freezing, melting, evaporation, boiling, condensation) ▪ Recognize more than 100 known elements (unique atoms) exist that may be combined in nature or by man to produce compounds that make up the living and nonliving substances in the environment (Do NOT assess memorization of the Periodic Table) ▪ Provide evidence that mass is conserved during a chemical change in a closed system (e.g., vinegar + baking soda, mold growing in a closed container, steel wool rusting) ▪ Recognize chemical energy is stored in chemical compounds (e.g., energy stored in and released from food molecules, batteries, nitrogen explosives, fireworks, organic fuels) ▪ Identify the evidence of different energy transformations (e.g., explosion of light, heat, and sound, temperature change, electrical charge) that may occur as chemical energy is released during a chemical reaction
Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere and Hydrosphere)	
	Rock Cycle and Plate Tectonics The students will be able to: ▪ Differentiate between minerals and rocks (which are composed of different kinds of minerals) ▪ Describe the distinguishing properties that can be used to classify minerals (i.e., texture, smell, luster, hardness, crystal shape, streak, reaction to magnets and acids)

	▪ Describe the methods used to identify the distinguishing properties of minerals ▪ Classify rocks as sedimentary, igneous, or metamorphic ▪ Explain convection currents are the result of uneven heating inside the mantle resulting in the melting of rock materials, convection of magma, eruption/flow of magma, and movement of crustal plates ▪ Explain how rock layers are affected by the folding, breaking, and uplifting of rock layers due to plate motion ▪ Describe how the movement of crustal plates can cause earthquakes and volcanic eruptions that can result in mountain building and trench formation ▪ Explain how heating and cooling in the mantle layer leads to the formation of metamorphic rocks and some igneous rocks ▪ Make inferences about the formation of igneous and metamorphic rocks from their physical properties (e.g., crystal size indicates rate of cooling, air pockets or glassy texture indicate volcanic activity) ▪ Explain and diagram the external and internal processes of the rock cycle (e.g., weathering and erosion, sedimentation, compaction, heating, recrystallization, resurfacing due to forces that drive plate motion) ▪ Describe the methods used to estimate geologic time and the age of the Earth (e.g., techniques used to date rocks and rock layers, presence of fossils) ▪ Use rock and fossil evidence to make inferences about the age, history, and changing life forms and environment of the Earth (i.e., changes in successive layers of sedimentary rock and the fossils contained within them, similarities between fossils in different geographic locations, similarities between fossils and organisms present today, fossils of organisms indicating changes in climate, fossils of extinct organisms)

Cells and Body Systems	
	The students will be able to: ▪ Explain that the amount of matter remains constant while being recycled through food chains and food webs ▪ Recognize that most plants and animals require food and oxygen (needed to release the energy from that food) ▪ Identify and contrast the structures of plants and animals that serve similar functions (e.g., taking in water and oxygen, support, response to stimuli, obtaining energy, circulation, digestion, excretion, reproduction) ▪ Recognize the cell membrane helps regulate the transfer of materials in and out of the cell ▪ Recognize the function of the chloroplast is photosynthesis ▪ Recognize photosynthesis is a chemical change with reactants (water and carbon dioxide) and products (energy-rich sugar molecules and oxygen) that takes place in the presence of light and chlorophyll ▪ Recognize oxygen is needed by all cells of most organisms for the release of energy from nutrient (sugar) molecules (Do NOT assess the term cellular respiration) ▪ Describe the importance of the transport and exchange of oxygen and carbon dioxide to the survival of the organism ▪ Identify and give examples of each level of organization (cell, tissue, organ, organ system) in multicultural organisms (plants, animals) ▪ Illustrate and explain the path water and nutrients take as they move through the transport system of a plant ▪ Explain the interactions between the circulatory and digestive systems as nutrients are processed by the digestive system, passed into the blood stream, and transported in and out of the cell ▪ Compare and contrast the processes of mechanical and chemical digestion, and their role in providing materials necessary for survival of the cell and organism

	▪ Identify the importance of the transport and exchange of nutrient and waste molecules to the survival of the cell and organism ▪ Explain the interactions between the circulatory and respiratory systems in exchanging oxygen and carbon dioxide between cells and the atmosphere (when oxygen enters the body, passes into the blood stream, and is transported into the cell; carbon dioxide is transported out of the cell, passes into the blood stream, and exits the body) ▪ Explain the interactions between the nervous and muscular systems when an organism responds to a stimulus ▪ Predict the response the body may take to maintain internal balance during an environmental change (e.g., shivering when cold, slowing metabolism when food supply decreases or when dehydrated, adrenaline rush when frightened) ▪ Illustrate the oxygen/carbon dioxide cycles ▪ Describe the processes involved in the recycling of matter in the oxygen/carbon dioxide cycles
Disease	
	The students will be able to: ▪ Explain the cause and effect of diseases (e.g., AIDS, cancer, diabetes, hypertension) on the human body ▪ Relate some common diseases (i.e., cold, influenza, strep throat, dysentery, fungal infections) to the organisms that cause them (bacteria, viruses, protests, fungi) ▪ Differentiate between infectious and noninfectious diseases ▪ Explain the role of antibiotics and vaccines in the treatment and prevention of diseases ▪ Explain the beneficial or detrimental impact that some organisms (i.e., viruses, bacteria, protists, fungi) may have on other organisms (e.g., diseases, antibiotics, breakdown of waste, fermentation)

Reproduction and Heredity	
	The students will be able to: ▪ Compare and contrast the processes of asexual and sexual reproduction, including the type and number of cells involved (one body cell in asexual, two sex cells in sexual), and the number of gene sets (body cell has two sets, sex cells have one set each) passed from parent(s) to offspring ▪ Identify examples of asexual reproduction (i.e., plants budding, binary fission of single cell organisms) ▪ Compare and contrast the reproductive mechanisms of classes of vertebrates (i.e., internal vs. external fertilization) ▪ Explain how flowering plants reproduce sexually ▪ Identify chromosomes as cellular structures that occur in pairs that carry hereditary information in units called genes ▪ Recognize that when asexual reproduction occurs, the same genetic information found in the parent cell is copied and passed on to each new daughter cell (Assess only the concept – not the term or process of mitosis) ▪ Recognize that when sexual reproduction occurs, genetic material from both parents is passed on and combined to form the genetic code for the new organism (Assess only the concept – not the term or process of meiosis) ▪ Recognize that when asexual reproduction occurs, the daughter cell is identical to the parent cell (assuming no change in the parent genes) ▪ Recognize that when sexual reproduction occurs, the offspring is not identical to either parent due to the combining of the different genetic codes contained in each sex cell

Scientific Inquiry and General Science Principles	
	The students will be able to: ▪ Formulate testable questions and hypotheses ▪ Recognize the importance of the independent variable, dependent variables, control of constants, and multiple trials to the design of a valid experiment ▪ Design and conduct a valid experiment ▪ Evaluate the design of an experiment and make suggestions for reasonable improvements or extensions of an experiment ▪ Recognize that different kinds of questions suggest different kinds of scientific investigations (e.g., some involve observing and describing objects organisms, or events; some involve collecting specimens; some involve experiments; some involve making observations in nature; some involve discovery of new objects and phenomena; some involve making models) ▪ Acknowledge there is no fixed procedure called "the scientific method", but some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and imagination in developing hypotheses and other explanations ▪ Make qualitative observations using the five senses ▪ Determine the appropriate tools and techniques to collect data ▪ Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders, stopwatches) ▪ Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second ▪ Compare amounts/measurements ▪ Judge whether measurements and computation of quantities are reasonable

	▪ Calculate the range and average/mean of a set of data ▪ Use quantitative and qualitative data as support for reasonable explanations (conclusions) ▪ Use data as support for observed patterns and relationships, and to make predictions to be tested ▪ Recognize the possible effects of errors in observations, measurements, and calculations on the formulation of explanations (conclusions) ▪ Evaluate the reasonableness of an explanation (conclusion) ▪ Analyze whether evidence (data) and scientific principles support proposed explanations (hypotheses, laws, theories) ▪ Communicate the procedures and results of investigations and explanations through: o oral presentations o drawings and maps o data tables (allowing for the recording and analysis of data relevant to the experiment, such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities) o graphs (bar, single line, pictograph) o equations and writings ▪ Explain how technological improvements, such as those developed for use in space exploration, the military, or medicine, have led to the invention of new products that may improve lives here on Earth (e.g., new materials, freeze-dried foods, infrared goggles, Velcro, satellite imagery, robotics, lasers) ▪ Identify the link between technological developments and the scientific discoveries made possible through their development (e.g., Hubble telescope and stellar evolution, composition and structure of the universe; the electron microscope and cell organelles; sonar and the composition of the Earth; manned and unmanned space missions and space exploration; Doppler radar and weather

	conditions; MRI and CAT-scans and brain activity) ▪ Describe how technological solutions to problems (e.g., storm water runoff, fiber optics, windmills, efficient car design, electronic trains without conductors, sonar, robotics, Hubble telescope) can have both benefits and drawbacks (e.g., design constraints, unintended consequences, risks) Describe how the contributions of scientists and inventors, representing different cultures, races, and gender, have contributed to science, technology and human activity (e.g., George Washington Carver, Thomas Edison, Thomas Jefferson, Isaac Newton, Marie Curie, Galileo, Albert Einstein, Mae Jemison, Edwin Hubble, Charles Darwin, Jonas Salk, Louis Pasteur, Jane Goodall, Tom Akers, John Wesley Powell, Rachel Carson) Recognize the difficulty science innovators experience as they attempt to break through accepted ideas (hypotheses, laws, theories) of their time to reach conclusions that may lead to changes in those ideas and serve to advance scientific understanding (e.g., Darwin, Copernicus, Newton) ▪ Recognize explanations have changed over time as a result of new evidence ▪ Describe ways in which science and society influence one another (e.g., scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment; societal challenges often inspire questions for scientific research; social priorities often influence research priorities through the availability of funding for research) ▪ Identify and evaluate the physical, social, economic, and/or environmental problems that may be overcome using science and technology (e.g., the need for alternative fuels, human travel in space, AIDS)

Eighth Grade