Grade 8	Unit 1: Motions and Forces		Suggested Length: 4 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
1. How can we use forces and the laws of motion to understand the motion of objects? 2. How can you find the speed and velocity of an object? 3. What happens to the motion of an object as it accelerates? 4. How is momentum conserved? 5. What factors determine the friction force between two surfaces?	**Program of Studies** ❑ PS-8 investigate forces and the effects of forces on the motion of objects. ❑ PS-9investigate gravitational and electromagnetic forces. ❑ SI-2design and conduct different kinds of scientific investigations for a wide variety of reasons. ❑ SI-3use equipment (e.g., microscopes, lasers), tools (e.g., beakers), techniques (e.g., microscope skills), technology (e.g., computers), and mathematics to improve scientific investigations and communications. ❑ AC-11investigate advances in science and technology that have important and long-lasting effects on science and society (e.g., Newtonian mechanics, plate tectonics, germ theory, medical and health technology). **Core Content** ❑ **SC-08-1.2.1 Students will describe and explain the effects of balanced and unbalanced forces on motion as found in real-life phenomena.** **Objects change their motion only when a net force is applied. Newton's Laws of Motion are used to describe the effects of forces on the motion of objects. DOK 3** ❑ **SC-HS- 1.2.1 Students will:** ❑ **select or construct accurate and appropriate representations fro motion (visual, graphical, and mathematical);** ❑ **defend conclusions/explanations about the motion of objects and real – life**	❑ Motion ❑ Reference Point ❑ Meter ❑ Speed ❑ Velocity ❑ Slope ❑ Plate ❑ Acceleration ❑ Linear ❑ Nonlinear ❑ Force ❑ Net Force ❑ Unbalanced Forces ❑ Balanced Forces ❑ Inertia ❑ Newton ❑ Friction ❑ Gravity ❑ Free Fall ❑ Projectile ❑ Air Resistance ❑ Terminal Velocity ❑ Momentum ❑ Law of Conservation of Momentum ❑ Centripetal Force ❑ Pressure ❑ Pascal ❑ Fluid ❑ Hydraulic System ❑ Buoyant Force ❑ Archimedes' Principle ❑ Bernoulli's Principle	❑ Students will complete a skills test on reviewing over the use of graduated cylinders, rulers, thermometers, and the triple beam balance. ❑ Students will review over scientific method vocabulary using the 3-column vocabulary strategy. ❑ Students will create bar and line graphs. ❑ Students will use students notes to correctly write a lab report. ❑ Students will develop a hypothesis about how changing the mass of the bob on a pendulum affects the time of a pendulum swing. They will work in groups to control variables so that only the mass of the bob changes. They will draw conclusions based on their data. ❑ Students will use a triple-beam balance to measure the mass of several objects correctly. ❑ Students will use the List-Group-Label vocabulary strategy for the motion vocabulary. ❑ Students will popcorn read about how to describe and measure motion. They will use the reading strategy of rewriting the headings a s questions and then reading to find the answer to the questions. ❑ Students will find the speed of a ball rolling down an incline at two different positions along the ramp and evaluate the accuracy and reproducibility of the data. ❑ Students will graph the positions of objects over time to determine the relative rates of speed. ❑ Students will read about plate tectonics and learn how to determine the speed of the plates to determine what future Earth will look like. Before reading, the students will scan the text and identify the three most important things. ❑ Students will determine what distance is needed between an out of bounds line and a wall of a basketball court so that a player can stop before hitting a wall. Students will use measurements of reaction time, running speeds, and stopping distances to help them

Grade 8	Unit 1: Motions and Forces		Suggested Length: 4 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	phenomena from evidence/data. **Objects change their motion only when a net force is applied. Newton's Laws of motion are used to describe the effects of forces on the motion of objects. Conservation of mechanical energy and conservation of momentum may also be used to predict motion. DOK 3** ❑ **SC-HS-2.3.1. Students will:** ❑ **explain phenomena (falling objects, planetary motion, satellite motion) related to gravity;** ❑ **describe the factors that affect gravitational force** **Gravity is a universal force that each mass exerts on every other mass. DOK 3**		decide, where a basketball court should be located. DOK 3 ❑ Students will show that the greater the mass of an object, the more force is needed to achieve the same change in motion. Students will use a shot coin and a target coin. Controlling the amount of force given to the shot coin, they will determine the distance traveled by the target coin. ❑ Students will read about the nature of forces. Reading strategy- work with partners defining the bold faced words. ❑ Students will investigate how a ball moves when the forces acting on it are balanced and unbalanced. They will work in groups determining the distance traveled by a rolling ball at 1 second intervals for 5 to 10 seconds. ❑ Students will complete an exploration guide: fan cart Physics gizmo (explorelearning.com). They will gain an understanding of Newton's Laws by experimenting with a cart (on which up to three fans are placed) on a linear track. The cart has a mass, as does each fan. The fans exert a constant force when switched on, and the direction of the fans can be altered as the position, velocity , and acceleration of the cart are measured. ❑ Students will read about how force, mass, and acceleration are related. They will learn how to calculate force, mass, and acceleration. ❑ Students will watch a video and learn how weight and mass are different. They will calculate the their weight on the moon. ❑ Students will read about how action and reaction of forces are equal and opposite. Reading strategy- preview illustrations and captions. ❑ Students will read about orbiting satellites. Reading strategy – outline the section. ❑ Students will work in groups to identify several examples of motion and measure how fast each one moves. Examples include a falling feather, a person walking, a toy vehicle, the scent of vanilla moving across a room, the rising water level in a bathtub, a bird

Grade 8	Unit 1: Motions and Forces		Suggested Length: 4 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
			flying by, etc….. DOK 2 ❑ Students will design and build a vehicle that is powered only according to Newton's third law of motion. DOK 3 ❑ Students will perform an activity to determine the density of six different cubes. They will work in groups to measure the mass and volume of these cubes. They will then use this information to determine the density. DOK 2 ❑ Students will perform an experiment using an object at different weights. They will analyze and draw conclusions on how the buoyant force on a floating object is related to the weight of the displaced water. DOK 2 ❑ Students will study the operation of a lawn sprinkler by examining the factors that affect the pressure of water escaping a can. Students will control variables such as the size and the number of holes in the can. DOK 2 ❑ Students will work in groups to create a boat out of metal materials that does not weigh more than ten pennies and can hold the weight of fifty pennies for 10 seconds. DOK 2 ❑ Music Rocket Man Free Falling ❑ Baseball Review Game ❑ Complete two chapter tests (CLA) ❑ Crawling Baby Open Response DOK 2 ❑ Conservation of Momentum Open Response ❑ Forces in Fluids Open Response DOK 2 ❑ Vocabulary Assessment DOK 1 ❑ Newton's Laws quiz

Grade 8	Unit 2: Energy		Suggested Length: 7 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
1. How do	**Program of Studies** ❑ PS-8 investigate forces and the effects of	❑ Work	❑ Students will read about the forms of energy. Students

Grade 8	Unit 2: Energy		Suggested Length: 7 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and <u>Assessment</u> Student will:
machines make work easier? 2. How are work and energy related? 3. How are different forms of energy related? 4. How is the thermal energy of a substance transferred?	forces on the motion of objects. ❑ PS-10 examine how energy is transferred (e.g., collisions, light waves) and recognize that the total energy of the universe is constant. ❑ PS-11distinguish between types of energy (e.g., kinetic energy, potential energy, energy fields). ❑ PS-12examine how everything tends to become less organized and less orderly over time (e.g., heat moves from hotter to cooler objects). ❑ PS-13investigate energy transfer caused when waves and matter interact (e.g., atoms and molecules can absorb and emit light waves). ❑ SI-2design and conduct different kinds of scientific investigations for a wide variety of reasons. ❑ SI-3use equipment (e.g., microscopes, lasers), tools (e.g., beakers), techniques (e.g., microscope skills), technology (e.g., computers), and mathematics to improve scientific investigations and communications. ❑ AC-2examine the interaction between science and technology. ❑ AC-5use science to analyze the use of natural resources by an increasing human population. ❑ AC-9analyze the role science plays in everyday life and compare different careers in science. <u>**Core Content**</u>. ❑ **SC-08-4.6.1 Students will:** ❑ **explain the cause and effect relationships between global climate and energy transfer;** ❑ **use evidence to make inferences or predictions about global climate issues.**	❑ Machine ❑ Input force ❑ Output force ❑ Mechanical advantage ❑ Efficiency ❑ Inclined plane ❑ Wedge ❑ Screw ❑ Lever ❑ Fulcrum ❑ Wheel and axel ❑ Pulley ❑ Compound machine ❑ Gears ❑ Energy ❑ Kinetic Energy ❑ Potential Energy ❑ Elastic Potential Energy ❑ Gravitational Potential Energy ❑ Mechanical Energy ❑ Chemical Energy ❑ Electrical Energy ❑ Electromagnetic energy ❑ Nuclear Energy ❑ Law of Conservation of Energy ❑ Fossil Fuels ❑ Power ❑ Fahrenheit Scale ❑ Celsius Scale ❑ Kelvin Scale ❑ Absolute Zero ❑ Heat ❑ Conduction ❑ Convection ❑ Radiation ❑ Insulator	will create a concept map to organize information about the six major forms of energy. ❑ Students will complete an exploration guide: potential energy on shelves (explorelearning.com). They will compare the potential energy of several objects when you place them on shelves of different heights. Learn that two objects at different heights can have the same potential energy, while two objects at the same height can have different potential energy. ❑ Investigate the relationship between the height reached by a rocket and the amount of stretch in a rubber band. Students will determine if the gravitational potential energy of a straw rocket depends on the elastic potential energy of a rubber band. DOK 3 ❑ Students will read about energy conversion and conservation. They will complete flow charts for different energy conversions. ❑ Students will perform experiments with a pendulum to gain an understanding of energy conservation in simple motion. The gravity, length and mass of the pendulum can be adjusted, as well as the initial starting angle of the pendulum. Data (tables, bar chart, and graphs) of the potential and kinetic energies are shown. ❑ Work in groups to create working models of roller coasters. They will control variables as they experiment with different hill heights and turns and loops. The students will present their projects. DOK 3 ❑ Students will be able to define and calculate power. ❑ Students will watch a video of energy resources. Students will be able to identify renewable and nonrenewable energy resources. ❑ Students will watch a video of the transfer of energy. They will review over the law of conservation of energy. ❑ Work in a group to determine the relationship between distance and weight for a balanced seesaw. The students will build a seesaw using a dowel and a meter stick. The students will use a 50 g object and pennies to determine the relationship. DOK 2

Grade 8	Unit 2: Energy		Suggested Length: 7 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	Global climate is determined by energy transfer from the Sun at and near Earth's surface. DOK 3 ❑ **SC-08-4.6.2 Students will:** ❑ **describe or explain energy transfer and energy conservation;** ❑ **evaluate alternative solutions to energy problems.** **Energy can be transferred in many ways, but it can neither be created nor destroyed. DOK 3.** SC-08-4.6.3 Students will understand that all energy can be considered to be kinetic energy, potential energy, or energy contained by a field (e.g., electric, magnetic, gravitational). ❑ **SC-HS-4.6.1 Students will:** ❑ **explain the relationships and connections between matter, energy, living systems, and the physical environment;** ❑ **give examples of conservation of matter and energy.** **As matter and energy flow through different organizational levels (e.g., cells, organs, organisms, communities) and between living systems and physical environment, chemical elements are recombined in different ways. Each recombination results in storage and dissipation of energy into the environment as heat. Matter and energy are conserved in each change. DOK 3**	❑ Specific Heat ❑ Thermal Expansion	❑ Work in groups to design and build a device that is a compound machine able to lift a 600-g load using less than a 600-g mass as an input force. DOK 3 ❑ Conduct an experiment to determine if there is a difference in the rate of heat loss of the same substance. The students will use warm water in two different cups. One cup will have an ice cube added immediately. The other cup will sit for five minutes then an ice cube will be added. After a total of ten minutes the students will take the temperature of the water in both cups .DOK 2 ❑ Compare and contrast internal and external combustion engines using Venn diagrams. DOK 1 ❑ Construct a calorimeter using foam cups and a thermometer. The students will use the calorimeter to calculate the amount of heat that is transferred from hot water to cold water. DOK 2 ❑ Determine if color and composition have an effect on temperature. Students will use different color M&M'S and a reflector lamp to compare the time at which it takes them to melt. The students will use the information gained to design and draw an efficient device that can collect heat from the sun. DOK 3 ❑ Music ❑ You Dropped a Bomb on Me ❑ Electric Avenue ❑ Solar Boys ❑ Here Comes the Sun ❑ Beverly Hillbillies ❑ Walking on Sunshine ❑ Heat is On ❑ Kinetic and Potential Energy Quiz ❑ Primary Energy Source Quiz ❑ Complete three chapter tests. (CLA) ❑ "Roller Coaster" Open Response DOK 3 ❑ "Thermometer" Open Response DOK 2 ❑ "Work" Open Response DOK 2 ❑ Vocabulary Assessment DOK 1

Grade 8	Unit 2: Energy		Suggested Length: 7 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	❑ SC-HS-4.6.6. Students will understand that heat is the manifestation of the random motion and vibrations of atoms. ❑ **SC-HS-4.6.7 Students will:** • **explain real world applications of energy using information/data;** • **evaluate explanations of mechanical systems using current scientific knowledge about energy.** **The universe becomes less orderly and less organized over time. Thus, the overall effect is that the energy is spread out uniformly. For example, in the operation of mechanical systems, the useful energy output is always less the energy input; the difference appears as heat. DOK 2**		

Grade 8	Unit 3: Sound and Light		Suggested Length: 6 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
1. What causes waves? 2. How is sound different when it travels through different media? 3. What happens when two or more waves	**Program of Studies** ❑ PS-10 examine how energy is transferred (e.g., collisions, light waves) and recognize that the total energy of the universe is constant. ❑ PS-13 investigate energy transfer caused when waves and matter interact (e.g., atoms and molecules can absorb and emit light waves). ❑ SI-2 design and conduct different kinds of scientific investigations for a wide variety of reasons. ❑ SI-5 communicate designs, procedures, and	❑ Wave ❑ Vibration ❑ Mechanical Wave ❑ Transverse Wave ❑ Crest ❑ Longitudinal Wave ❑ Compression ❑ Rarefaction ❑ Surface Wave ❑ Amplitude ❑ Wavelength ❑ Frequency	❑ Model the behavior of waves in a harbor by observing water waves under varying conditions. The students will control variables to produce waves of different amplitude, frequency and wavelength. The students will interpret the data and draw conclusions about wave behavior. DOK 2 ❑ Create waves on paper using water. The students will calculate the speed of the waves using distance and time then the students will calculate the speed using the frequency and wavelength. The two calculations will be compared to determine how does a waves speed relate to its frequency and wavelength. DOK 3

Grade 8	Unit 3: Sound and Light		Suggested Length: 6 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and <u>Assessment</u> Student will:
interact? 4. How do you hear sound? 5. How do electromagnetic waves differ from each other?	results of scientific investigations. ❑ AC-1 apply scientific inquiry and conceptual understandings to solving problems of technological design (e.g., styrofoam cups, transistors, computer chips). **<u>Core Content</u>** ❑ **SC-08-4.6.4 Students will:** ❑ **analyze information/data about waves and energy transfer;** ❑ **describe the transfer of energy via waves in real life phenomena.** **Waves, including sound and seismic waves, waves on water, and electromagnetic waves, can transfer energy when they interact with matter. DOK 2** ❑ **SC-HS-4.6.2. Students will:** ❑ **predict wave behavior and energy transfer;** ❑ **apply knowledge of waves to real life phenomena/investigations.** **Waves, including sound and seismic waves, waves on water, and electromagnetic waves, can transfer energy when they interact with matter. Apparent changes in frequency can provide information about relative motion. DOK 3** ❑ SC-HS-4.6.3. Students will understand that electromagnetic waves, including radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x-rays, and gamma rays, result when a charged object is accelerated.	❑ Hertz ❑ Reflection ❑ Refraction ❑ Diffraction ❑ Standing Wave ❑ Node ❑ Antinode ❑ Resonance ❑ Seismic Wave ❑ Primary Wave ❑ Secondary Wave ❑ Tsunami ❑ Seismograph ❑ Decibels ❑ Ultrasound ❑ Infrasound ❑ Pitch ❑ Doppler Effect ❑ Timbre ❑ Dissonance ❑ Acoustics ❑ Sonar ❑ Echolocation ❑ Sonogram ❑ Electromagnetic Wave ❑ Electromagnetic Radiation ❑ Electromagnetic Spectrum ❑ Photon ❑ Radio Wave ❑ Magnetic Resonance Imaging ❑ Infrared Ray ❑ Thermogram ❑ Ultraviolet Ray ❑ X-Ray ❑ Gamma Ray ❑ Illuminated	❑ Work in groups to construct and modify a simple musical instrument. The students will present their project by communicating the processes that they went through to get a working instrument. DOK 2 ❑ Create and distribute survey sheets to find out how people use communication devices. Students collect data, then compile and analyze the data to find out how different people rely on different forms of communication. Finally the students create graphs and present their conclusions to the class. DOK 2 ❑ Design experiments to compare the illumination provided by different light bulbs. The students will use a light box to measure the illumination produced by each light bulb. Then the results will be analyzed and compared to prediction. DOK 3 ❑ Students will perform an experiment by controlling variables to explore how a convex lens forms images. Students will use different focal lengths from a light bulb. DOK 2 ❑ Students will perform a lab studying the effect of color filters on white light. The students will use different colored object and compare how they change using different colors of cellophane and a shoe box with a viewing hole on one end and a flashlight on the other end. DOK 2 ❑ <u>Four chapter tests. (CLA)</u> ❑ <u>Waves Open Response</u> DOK 3 ❑ <u>Sound Open Response</u> DOK 2 ❑ <u>Electromagnetic Spectrum Open Response</u> DOK 2 ❑ <u>Light Open Response</u> DOK 2 ❑ <u>Vocabulary Assessment</u> DOK 1

Grade 8	Unit 3: Sound and Light		Suggested Length: 6 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
		❑ Spectroscope ❑ Bioluminescence ❑ Amplitude Modulation ❑ Frequency Modulation ❑ Visible Light ❑ Microwaves	

Grade 8	Unit 4: Electricity and Magnetism		Suggested Length: 8 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
1. How do magnetic poles interact? 2. How can an electrical current produce a magnetic field? 3. How is static electricity formed? 4. How are series and parallel circuits different? 5. How can a generator produce an	**Program of Studies** ❑ PS-9 investigate gravitational and electromagnetic forces. ❑ PS-14 investigate electrical energy and conductivity through matter. ❑ SI-6 review and analyze scientific investigations and explanations of others. ❑ AC-1 apply scientific inquiry and conceptual understandings to solving problems of technological design (e.g., styrofoam cups, transistors, computer chips). ❑ AC-5 use science to analyze the use of natural resources by an increasing human population. **Core Content** ❑ SC-HS-1.1.4 Students will understand that in conducting materials, electrons flow easily; whereas, in insulating materials, they can hardly flow at all. Semiconducting materials have intermediate behavior. At low temperatures, some materials become superconductors and offer no resistance to the flow of electrons.	❑ Magnetism ❑ Magnetic Pole ❑ Magnetic Field ❑ Compass ❑ Magnetic Declination ❑ Magnetosphere ❑ Electric Charge ❑ Electric Current ❑ Electric Circuit ❑ Insulator ❑ Resistor ❑ Resistance ❑ Superconductor ❑ Electromagnet ❑ Electric Field ❑ Static Electricity ❑ Conduction ❑ Induction ❑ Static Discharge ❑ Voltage ❑ Ammeter ❑ Ohm's Law ❑ Series Circuit	❑ Students will apply concepts about magnetism and electricity to design a circuit and build electromagnetic fishing rods. They will present their project using their fishing rods to lift paper clips and move them to another container. DOK 3 ❑ Students will use a magnet, steel washers, and various coins to make inferences about the content of metallic objects based on their reaction to a magnetic field. ❑ DOK 2 ❑ Students will make a model flashlight that includes a complete circuit. DOK 2 ❑ Students will use a construct a dimmer switch. Students will be able to observe that the bulb gets dimmer as the amount of resistance in the circuit increases. DOK 2 ❑ Students will work in groups to analyze the way that they use electricity. Students will prepare a list of appliances in their home that use electricity. They will also record the length of time each appliance is used during an average week. The average electrical energy used for each appliance will be calculated. DOK 1 ❑ Students will make a model of an electric motor. DOK 3 ❑ Students will be able to model the operation of a computer using pennies to represent electronic switches. DOK 2 Four chapter tests. (CLA)

Grade 8	Unit 4: Electricity and Magnetism		Suggested Length: 8 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
electric current?	❑ **SC-HS-1.2.2 Students will:** ❑ **explain the relationship between electricity and magnetism;** ❑ **propose solutions to real life problems involving electromagnetism.** **Electricity and magnetism are two aspects of a single electromagnetic force. Moving electric charges produce magnetic forces or "fields", and moving magnets produce electric forces or "fields". This idea underlies the operation of electric motors and generators. DOK 3** ❑ SC-HS-1.2.3 Students will understand that the electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel.	❑ Parallel Circuit ❑ Transformer ❑ Electronics	The Easy Chore Open Response DOK 3 Electric Charges Open Response DOK 3 Electronics Open Response DOK 3

Grade 8	Unit 5: Chemical Building Blocks		Suggested Length: 11 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
1. How do the different states of matter and their properties relate to each other? 2. How are mixtures classified? 3. How can you tell the difference between different	**Program of Studies** ❑ SI-3 use equipment (e.g., microscopes, lasers), tools (e.g., beakers), techniques (e.g., microscope skills), technology (e.g., computers), and mathematics to improve scientific investigations and communications. ❑ SI-4use evidence, logic, and scientific knowledge to develop and revise scientific explanations and models. ❑ *PS-1 analyze atomic structure and electric forces.* ❑ *PS-2examine nuclear structure, nuclear forces, and nuclear reactions (e.g., fission,*	❑ Physical Change ❑ Chemical Change ❑ Density ❑ Solid ❑ Liquid ❑ Gas ❑ Viscosity ❑ Charles's Law ❑ Boyle's Law ❑ Thermal Energy ❑ Condensation ❑ Evaporation ❑ Sublimation	❑ Work in groups to compare a property of matter in three different brands of a consumer product. DOK 1 ❑ Calculate the density of objects by measuring the mass and volume using a balance and water displacement. DOK 2 ❑ Draw models that illustrate the three main states of matter. DOK 1 ❑ Predict which ice cube will melt faster one in a cup of warm water or one in a cup of room-temperature water. The students will measure the temperature change that takes place as the ice cube melts. They will then draw conclusions to explain how the addition of thermal energy causes ice to melt. DOK 2

Grade 8	Unit 5: Chemical Building Blocks		Suggested Length: 11 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
types of atoms? 4. How are different elements classified? 5. What elements make up a compound?	*fusion, radioactivity).* ❑ *PS-3investigate how the structure of matter (e.g., outer electrons, type of bond) relates to chemical properties of matter.* ❑ *PS-4 investigate how the structure of matter (e.g., constituent atoms, distances and angles between atoms) relates to physical properties of matter* ❑ *PS-6 examine the transfer of electrons or hydrogen ions between reacting ions, molecules, or atoms.* ❑ *AC-2examine the interaction between science and technology.* **Core Content** ❑ SC-08-1.1.2 Students will understand that matter is made of minute particles called atoms, and atoms are composed of even smaller components. The components of an atom have measurable properties such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and the electrons holds the atom together. ❑ **SC-HS-1.1.7 Students will:** ❑ **construct diagrams to illustrate ionic or covalent bonding;** ❑ **predict compound formation and bond type as either ionic or covalent (polar, nonpolar) and represent the products formed with simple chemical formulas.** **Bonds between atoms are created when outer electrons are paired by being transferred (ionic) or shared (covalent). A**	❑ Periodic Table ❑ Ion ❑ Molecular Compound ❑ Boiling point ❑ Melting poing ❑ Solubility ❑ Flammability ❑ Reactivity ❑ Atoms ❑ Isotopes	❑ Construct models of atoms and compounds using a variety of materials. Using the models the students will compare and contrast ionic and covalent bonds. DOK 2 ❑ Work in groups to design an experiment to determine whether a sample of metal was pure gold or a mixture of gold and silver. DOK 2 ❑ Classify alien elements with respect to their counterparts on Earth. DOK 2 ❑ Compare and contrast the structure of sodium chloride crystals before and after they are mixed with water. They will use this information to draw conclusions regarding the characteristic nature of crystal structure in an ionic compound. DOK 2 ❑ Compare the rates of releasing and absorbing thermal energy using different substances. The students will determine if different liquids cool at different rates. DOK 2 ❑ Determine the average mass of pennies in a group of 10 pennies. ❑ Complete four chapter tests (CLA) ❑ "Dalton's Theory " Open Response DOK 2 ❑ "States of Matter" Open Response DOK 2 ❑ "Metals and Nonmetals" Open Response DOK 2 ❑ "Bonds" Open Response DOK 2 ❑ Vocabulary Assessment DOK 1

Grade 8	Unit 5: Chemical Building Blocks		Suggested Length: 11 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	compound is formed when two or more kinds of atoms bind together chemically. DOK 2 ❑ SC-08-1.1.3. Students will understand that the atom's nucleus is composed of protons and neutrons that are much more massive than electrons. ❑ **SC-08-1.1.1 Students will:** ❑ **interpret models/representations of elements;** ❑ **classify elements based upon patterns in their physical (e.g., density, boiling point, solubility) and chemical (e.g., flammability, reactivity) properties.** **Models enhance understanding that an element is composed of a single type of atom. Organization/interpretation of data illustrates that when elements are listed according to the number of protons, repeating patterns of physical (e.g., density, boiling point, solubility) and chemical properties (e.g., flammability, reactivity), can be used to identify families of elements with similar properties. DOK 2** ❑ **SC-08-1.1.4 Students will describe interactions which cause the movement of each element among the solid Earth, oceans, atmosphere, and organisms (biogeochemical cycles).** **Earth is a system containing essentially a fixed amount of each stable chemical atom or element that can exist in several different reservoirs. The interactions**		

Grade 8	Unit 5: Chemical Building Blocks		Suggested Length: 11 weeks
Essential Questions	*Program of Studies* and Core Content	Key Terms and Vocabulary	Classroom Instruction and Assessment Student will:
	within the earth system cause the movement of each element among reservoirs in the solid Earth, oceans, atmosphere, and organisms as part of biogeochemical cycles. DOK 2 ❑ SC-HS-1.1.3 Students will understand that solids, liquids, and gases differ in the distances between molecules or atoms and therefore the energy that binds them together. In solids, the structure is nearly rigid; in liquids, molecules or atoms move around each other but do not move apart; and in gases, molecules or atoms move almost independently of each other and are relatively far apart. The behavior of gases and the relationship of the variables influencing them can be described and predicted. ❑ **SC-HS-1.1.1. Students will classify or make generalizations about elements from data of observed patterns in atomic structure and/or position on the periodic table.** **The periodic table is a consequence of the repeating pattern of outermost electrons. DOK 2**		