COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Measurement				**Pacing:** ***First 9 Weeks, Days 1-9***
Essential Question(s):Are you able to use scientific tools to make accurate measurements? **What is Measurement?** **Why is it important to use SI?**				**Big Idea :Measurements**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
"Measurements" Define Measurements. Compare English (standard) and SI (Metric) Measurements. Become familiar with metric prefixes.	**1.Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment.** **2.Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following: a.bar graphs** **b. line graphs** **c. stem and leaf plots** **d. circle graphs** **e. histograms** **f. box and whisker plots** **g. scatter plots** **h.cumulative frequency (ogive) graphs** **Define a problem based on a specific body of knowledge,** **Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the**	MA.912.S.1.2 MA.912.S.3.2 SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.4	• Become familiar with measurement tools used by scientists. • Associate various scientific tools with specific properties and units of measurement. • Use conversion factors to relate quantities. • Infer that units cancel when placed in the numerator and denominator of conversion factors along a chain. •	**measurement** **mass** **volume** **length** **unit** **English system** **SI** **Distance** **length** **meter** **conversion factor** **dimensional analysis** **significant digits** **accuracy** **precision** **resolution**

	data presented. **Identify sources of information and assess their reliability according to the strict standards of scientific investigation.**			

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Science Skills				Pacing: *First 9 Weeks, Days 9-18*
Essential Question(s):How can you find the mass of a single grain of rice? How is an object's density related to its volume, mass, and tendency to sink or float?			**Big Idea : Science Skills**	
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Distinguish between qualitative and quantitative observations. Make predictions about measuring the mass and volume of matter. Compare methods of measuring mass directly and indirectly. Analyze a graph of mass versus volume to infer the meaning of density. • Use the density of an object to predict whether it will sink or float.	1. Explain the meaning of mass and 2. describe the units for measuring mass. 3. Distinguish between mass and weight. 4. Define volume and explain how the volume of matter is measured. 5. Define density in terms of mass and volume. 6. Identify units used to express the density of materials. 7. Apply the density formula to solve problems. 8. Use graphs to create a visual representation of data. 9. Analyze trends on a graph. 10. Explain the difference between a direct relationship and an inverse relationship. 11. Apply a four-step technique to solve problems. 12. Use the design cycle to solve problems.	MA.912.S.1.2 MA.912.S.3.2 SC.912.N.1.1 (6) SC.912.N.1.6 SC.912.N.2.1 SC.912.P.8.2	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem and use tools to gather, analyze, and interpret data. Describe how scientific inferences are drawn from scientific observations and provide examples. Identify what is science, what clearly is not science, and what superficially resembles science. Differentiate between physical and chemical properties and physical and	**quantitative observations** **qualitative observations** **mass** **volume** **density** **line of best fit** **slope** **kilogram gram** **weight** **Newton**

			chemical changes in matter.	

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: The Scientific Process				**Pacing:** ***First 9 Weeks, Days 18-24***
Essential Question(s): How is time measured accurately? How do you design a valid experiment?				**<u>Big Idea</u> : Science as a process**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Describe time in two ways. Use a stopwatch to measure time intervals. Learn to operate the Data Collector in timer mode with the photogates Set up an experiment. Explain the difference between control and experimental variables. Discuss why conducting multiple experimental	1. Apply deductive reasoning skills to solve problems. 2. Contrast hypotheses, theories, and laws. 3. Explore the scientific process and apply steps of the scientific method. 4. Define experiment. 5. Contrast experimental and control variables. 6. Discuss how experiments are carried out and the importance of 7. Examine the importance of ethics in scientific research and reporting. 8. Discuss examples of how science helps to solve problems.	MA.912.S.1.2 MA.912.S.3.2 SC.912.N.1.1 SC.912.N.1.2 SC.912.N.1.3 SC.912.N.1.6 SC.912.P.12.2	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Describe and explain what characterizes science and its methods. Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends	**natural laws** **inquiry** **deduce** **objective** **repeatable** **theory** **hypothesis** **scientific method** **time interval** **reaction time** **experiment** **control variable** **experimental trial** **technology** **engineer** **prototype**

trials is better than gathering only one set of data.	9. Consider the role of engineering in scientific and technological advancement.		on critical and logical thinking. Describe how scientific inferences are drawn from scientific observations and provide examples. Analyze the motion of an object in terms of its position, velocity, and acceleration as functions of time.	

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Motion				**Pacing:** ***First 9 Weeks, Days 24-31***
Essential Question(s): Can you predict the speed of the car as it moves down the track? What is acceleration?				**Big Idea : Motion**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Predict what happens to the car's speed as it travels down the track. Create and interpret a speed vs. position graph. Use a graph to make a prediction that can be quantitatively tested. Calculate the percent error between a measurement and a prediction. Define acceleration. Analyze position versus time and speed versus time graphs to explain changes in motion of the energy car in terms of acceleration.	1. Explain the meaning of motion. 2. Describe an object's position relative to a reference point. 3. Use the speed formula. 4. Tell the difference between speed and velocity. 5. Construct and analyze graphs of position versus time, and speed versus time. 6. Recognize and explain how the slope of a line describes the motion of and object. 7. Explain the meaning of constant speed. 8. Define acceleration. 9. Determine acceleration by mathematical and graphical means. 10. Explain the role of acceleration in describing curved motion and objects in free fall.	MA.912.S.3.2 SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.6 SC.912.N.2.1 SC.912.P.12.2	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking. Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied. Identify what is science, what clearly is	**velocity** **vector** **origin** **position** **speed** **constant speed,** **average speed** **coordinates** **axis** **graph** **slope** **independent variable** **dependent Variable** **acceleration** **projectile** **free fall** **acceleration due to gravity**

Apply the acceleration formula to solve problems.			not science, and what superficially resembles science. Analyze the motion of an object in terms of its position, velocity, and acceleration	

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Forces				**Pacing:** ***First 9 Weeks, Days 31-37***
Essential Question(s): What is force and how is it measured? How does friction affect motion?				**<u>Big Idea</u> : Forces**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Explain the meaning of force. Define newton. Infer the difference between mass and weight. Use a graph of mass versus weight to determine the strength of gravity. Observe the effects of air, rolling, and sliding friction. Compare the effects of air, rolling, and sliding friction on an object's motion.	• Define force as a vector and describe how it is measured. • Explain how forces are created. • Compare and contrast types of forces. • Define friction. • Identify causes of friction. • Distinguish among various types of friction. • Determine the net force acting on an object. • Define equilibrium. • Draw free-body diagrams to represent all forces acting on a body.	MA.912.S.1.2 MA.912.S.3.2 SC.912.N.1.1 SC.912.P.12.2 SC.912.P.12.4	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Analyze the motion of an object in terms of its position, velocity, and acceleration as functions of time. Describe how the gravitational	**force** **pound** **newton** **weight** **compression** **tension** **friction** **sliding friction** **static friction** **balanced forces** **equilibrium** **normal force** **free-body diagram** **net force**

			force between two objects depends on their masses and the distance between them.	

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Laws of Motion	**Pacing:** ***First 9 Weeks, Days 37-43***
Essential Question(s): What is the relationship between force and motion? What happens when equal and opposite forces are exerted on a pair of energy cars?	**Big Idea : Newton's Laws**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Describe how a net force impacts motion. Explain the meaning of acceleration. Use observations to interpret Newton's first and second laws of motion. Explain the meaning of action-reaction forces. Apply knowledge of Newton's first and second laws to explain the	**• Describe how a net force impacts motion.** **• Explain the meaning of acceleration.** **• Use observations to interpret Newton's first and second laws of motion.** **• Explain the meaning of action-reaction forces.** **• Apply knowledge of Newton's first and second laws to explain the resulting force when objects experience equal and opposite forces.** **• Observe examples of Newton's third law.**	MA.912.S.3.2 SC.912.N.1.1 SC.912.N.1.2 SC.912.N.1.3 SC.912.N.2.1 SC.912.P.12.2 SC.912.P.12.3	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Describe and explain what characterizes science and its methods. Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking. Identify what is science, what clearly is not science, and what superficially resembles science. Analyze the motion of an object in terms of its position, velocity, and acceleration as functions of time. Interpret and apply Newton's three laws of motion.	1. Newton's first law 2. unbalanced forces 3. inertia 4. Newton's second law 5. Newton's third law 6. momentum

resulting force when objects experience equal and opposite forces. Observe examples of Newton's third law.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: ENERGY	**Pacing:** ***Second 9 Weeks, Days 43-47***
Essential Question(s): How is energy related to motion? What limits how much a system may change?	**<u>Big Idea</u> : Energy in a System**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Define energy as a description of an object's ability to change or cause change. Discuss examples of different forms of energy. Distinguish potential and kinetic energy and apply formulas to solve problems. Describe how energy changes as systems	**• Discuss the meaning of a system. • Describe the motion of car in terms of energy. • Infer that objects possess either energy due to their position or energy due to their motion. • Analyze a speed versus height graph. • Calculate potential energy. • Use energy conservation to derive a formula for the speed of the car in terms of energy.**	MA.912.S.3.2 SC.912.N.1.1 SC.912.P.10.1 SC.912.P.10.2 SC.912.P.12.2	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Differentiate among the various forms of energy and recognize that they can be transformed from one form to others. Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity. Analyze the motion of an object in terms of its position, velocity, and acceleration as functions of time.	**1. potential energy 2. kinetic energy 3. joule 4. chemical energy 5. mechanical energy 6. radiant energy; nuclear energy 7. Calorie 8. law of conservation of energy**

change. **Discuss examples of energy transformations.** **Explore the energy involved in carrying out daily activities.** **Explain what it means when energy is conserved.** **Use energy conservation to solve problems.** **Discuss applications of energy conservation in daily living.**				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Work and Power				Pacing: *Second 9 Weeks, Days 47-51*
Essential Question(s): How do simple machines work? How can a machine multiply forces?				**Big Idea : Efficiency and Power**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Tell what it means to "do work" in a scientific sense. Apply an equation to determine the amount of work done by a force. Infer that work requires energy. Describe the relationship between work and power. Apply a rule to	**• Define mechanical systems, machines, simple machines, input force, and output force. • Identify input and output forces on a simple machine. • Measure input and output forces on a rope and pulley machine. • Calculate the amount of work done by simple machines. • Use units of joules to measure the amount of work done. • Analyze the effects of changing force or distance in a simple machine.**	MA.912.S.1.2 MA.912.S.3.2 SC.912.N.1.1 SC.912.P.10.3 SC.912.P.12.3	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Compare and contrast work and power qualitatively and quantitatively. Interpret and apply Newton's three laws of motion.	**1. power 2. work 3. horsepower 4. watt 5. efficiency; work output 6. work input**

determine the amount of power required to do work. Explain the meaning of efficiency in terms of input and output work.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Simple Machines				Pacing: *Second 9 Weeks, Days 51-56*
Essential Question(s): How does a lever work? What types of levers does your body have?				**Big Idea : Types of Simple Machines**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Define machine. Identify examples of simple machines. Explain the meaning of input and output. Define mechanical advantage in terms of input and output forces. Classify levers as first, second, or third class. Evaluate the mechanical advantage of different simple	**• Explain how a lever works. • Describe what it means when levers are in equilibrium. • Name examples of levers. • Identify the parts of the human body that function as levers. • Calculate the mechanical advantage of levers. • Draw a diagram to demonstrate how the lever setup is similar to the action of an arm lifting a weight.**	MA.912.S.1.2 SC.912.N.1.1 SC.912.P.10.3 SC.912.P.12.3	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Compare and contrast work and power qualitatively and quantitatively. Interpret and apply Newton's three laws of motion.	**1. lever 2. mechanical advantage 3. gear 4. simple machine 5. machine 6. input; output 7. gear ratio**

machines. Locate human body parts that act as levers. Classify human body as first, second, or third class levers.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Matter and Temperature	**Pacing:** ***Second 9 Weeks, Days 56-63***
Essential Question(s): How do you determine the freezing/melting point of cetyl alcohol? How can observing the melting point identify a pure substance or mixture?	**<u>Big Idea</u> : The Nature of Matter**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Define matter. Identify the atom as the building block of matter. Explain the basis for classifying matter as either pure substances or mixtures. Define temperature in terms of the motion of atoms and molecules. Convert among Fahrenheit, Celsius, and Kelvin scales. Describe the relationship	**• Compare and contrast pure substances and mixtures.** **• Explain how the melting point of an unknown sample can be used to classify matter.** **• Distinguish between homogeneous and heterogeneous mixtures.** **• Determine the melting and freezing point of a substance.** **• Analyze a phase change curve.**	SC.912.N.1.6 SC.912.P.8.1 SC.912.P.8.2 SC.912.P.12.11	Describe how scientific inferences can be drawn from scientific observations and provide examples. Differentiate among the four states of matter. Differentiate between physical and chemical properties and physical and chemical changes of matter. Describe phase transitions in terms of kinetic molecular theory.	**1. element** **2. atom** **3. compound** **4. molecule** **5. pure substance** **6. mixture** **7. homogeneous mixture** **8. heterogeneous mixture** **9. Fahrenheit** **10. Celsius** **11. thermal energy** **12. thermometer** **13. absolute zero** **14. Kelvin scale** **15. solid** **16. liquid** **17. gas** **18. intermolecular forces** **19. melting point** **20. boiling point** **21. plasma**

between thermal energy and temperature. Identify the phases of matter. Describe the behavior of atoms and molecules as matter undergoes phase changes. Describe properties of plasmas.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Heat				**Pacing:** ***Second 9 Weeks, Days 63-67***
Essential Question(s): How are temperature and heat related? How can you use specific heat to identify an unknown metal sample?				**Big Idea : Heat and Thermal Energy**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Describe the relationship between heat, temperature, and thermal energy. Identify and use different units to measure heat. Explain how the specific heat of different materials can be used to describe changes in temperature and energy. Compare and contrast various methods of heat transfer.	**• Describe the relationship between temperature and heat.** **• Infer that different substances are able to store different amounts of heat.** **• Apply the heat equation to determine the energy absorbed or released by a substance.** **• Identify an unknown material and determine its specific heat.** **• Use the Law of Conservation of Energy to justify experimental observations.**	MA.912.S.1.2 SC.912.N.1.1 SC.912.N.1.3 SC.912.P.10.2 SC.912.P.10.4 SC.912.P.10.5	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking. Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity. Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter. Relate temperature to the average molecular kinetic energy.	1. heat 2. specific heat 3. heat transfer 4. thermal equilibrium 5. conduction 6. convection 7. thermal radiation

Differentiate between thermal conductors and thermal insulators. Explain what it means when objects are in thermal equilibrium.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Properties of Matter				**Pacing:** ***Second 9 Weeks, Days 67-72***
Essential Question(s): How do solids and liquids differ? Can you make a clay boat?				**<u>Big Idea</u> : Chemical and physical properties of Matter.**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Distinguish chemical and physical properties of matter. Identify differences between crystalline and amorphous solids. Explain how the arrangement of atoms and molecules in solids determines their properties. Explain how pressure is created in fluids. Discuss differences between the density of solids and	**• Contrast the properties of solids and liquids.** **• Describe how the viscosity of a material changes as it is agitated.** **• Identify an example of a colloidal suspension.** **• Make predictions about whether an object will sink or float by comparing the density of an object to the density of the fluid into which it is submerged.** **• Describe the factors which determine the buoyancy of fluids.**	MA.912.S.1.2 MA.912.S.3.2 SC.912.N.1.1 SC.912.N.1.6 SC.912.P.8.1 SC.912.P.8.2 SC.912.P.12.11	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Describe how scientific inferences are drawn from scientific observations and provide examples. Differentiate among the four states of matter. Differentiate between physical and chemical properties and physical and chemical changes of matter. Describe phase transitions in terms of kinetic molecular theory.	1. physical properties 2. chemical properties 3. amorphous 4. brittleness 5. crystalline 6. ductility 7. elasticity 8. hardness 9. malleability 10. strength 11. tensile strength 12. thermal expansion 13. viscosity 14. fluid 15. pressure 16. Bernoulli’s principle 17. buoyancy 18. Archimedes's principle

fluids. Apply Bernoulli's principle to explain how energy is conserved in fluids. Define buoyancy. Explain the relationship between density and buoyancy. Discuss applications of Archimedes' principle.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: The Behavior of Gases				**Pacing:** ***Second 9 Weeks, Days 72-78***
Essential Question(s): How are pressure and volume of a gas related? How are the temperature and pressure of a gas related?				**<u>Big Idea</u> : The relationship between the pressure and volume of a gas at constant temperature.**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Describe the composition of Earth's atmosphere. Make comparisons between Earth's atmosphere and the atmospheres of other planets. Explain the meaning of atmospheric pressure and describe how it is measured. Explain how pressure, temperature, volume, and the number of molecules in a gas are related when	**• Use a gas pressor sensor to collect pressure and volume data at constant temperature.** **• Analyze a pressure vs. volume graph.** **• Use a gas pressor sensor and temperature probe to collect pressure and temperature data at constant volume.** **• Analyze a pressure vs. temperature graph.**	MA.912.S.3.2 SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.6 SC.912.P.12.10	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking. Describe how scientific inferences are drawn from scientific observations and provide examples. Interpret the behavior of ideal gases in terms of kinetic molecular theory.	1. atmosphere 2. atmospheric pressure 3. barometer 4. Boyle's law 5. Charles' law

one or more of these factors in held constant. Apply the gas laws to solve problems. Analyze graphs of data to explain how factors like pressure and volume are related.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Atoms				**Pacing:** ***Second 9 Weeks, Days 78-83***
Essential Question(s): What is inside an atom? How were the elements created?				**Big Idea : Atomic number, mass number, and isotopes.**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Identify and describe particles which comprise atoms. Describe the effects of radioactivity. Compare and contrast forces inside atoms. Compare spectra of elements. Explain the Bohr atom model.Apply principles of quantum theory to explain the behavior of electrons in atoms.	**• Build atom models.** **• Describe the relationship between the number of protons, neutrons, and electrons in an atom to its atomic and mass numbers.** **• Infer that not all atoms of an element are identical.** **• Explain how the creation of elements is related to the death of stars.** **• Apply knowledge about the structure of atoms to build heavier, stable atoms from lighter atoms.** **• Distinguish stable and unstable atoms.**	SC.912.L.15.2 SC.912.P.8.4 SC.912.P.10.11 SC.912.P.10.12 SC.912.P.8.5	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another. Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles. Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues. Differentiate between chemical and nuclear reactions. Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.	1. mass number 2. elementary charge 3. nucleus 4. electron 5. neutron 6. atomic number 7. radioactive 8. isotopes 9. energy level 10. quantum theory 11. spectral line 12. spectroscope

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Elements and the Periodic Table				**Pacing:** ***Second 9 Weeks, Days 83-88***
Essential Question(s): How is the periodic table organized? What information can you get from the periodic table?				**<u>Big Idea</u> : Elements are arranged in order of increasing atomic number, rather than atomic mass.**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Differentiate physical and chemical properties of elements. Explain how the periodic table is organized. Identify metals, semimetals, and nonmetals on the periodic table. Differentiate the electrical and thermal conductivity of metals and nonmetals. Define periodicity and discuss examples. Predict	**• Become more familiar with the organization of elements on the periodic table.** **• Discover trends within groups of elements that can be used to explain properties of those elements.** **• Become familiar with the arrangement of elements on the periodic table.** **• Classify elements into groups based on their location on the periodic table, and their chemical and physical properties.**	SC.912.P.8.4 SC.912.P.8.5	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles. Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.	1. periodic table 2. physical change 3. period 4. chemical change 5. group 6. atomic mass 7. nonmetals 8. periodicity 9. thermal conductor 10. insulator 11. steel 12. electrical conductor

properties of an element based on its position on the periodic table.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Compounds	Pacing: *Third 9 Weeks, Days 88-97*
Essential Question(s): Why do atoms form chemical bonds? Why do atoms combine in certain ratios?	**Big Idea : Learn how electrons are involved in forming chemical bonds.**

Concepts/ Content	Learning Targets	Benchmarks	Essential Content & Understanding	Key Terminology (bold print priority items)
Infer the relationship between the number of valence electrons and the behavior of atoms. Compare and contrast ionic and covalent bonding. Draw Lewis diagrams to represent the valence electrons of atoms. Use the periodic table to make predictions	**• Explain the role of valence electrons in chemical bonding.** **• Infer that atoms bond by sharing or transferring electrons.** **• Draw Lewis diagrams to represent chemical bonding between atoms.** **• Make predictions about the oxidation numbers of elements based on their position on the periodic table.** **• Use oxidation numbers to determine chemical formulas of compounds.** **• Properly name compounds.**	SC.912.P.8.4 SC.912.P.8.5 SC.912.P.8.7	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles. Relate properties of atoms and their position in the periodic table to the arrangement of their electrons. Interpret formula representations of molecules and compounds in terms of composition and structure.	1. chemical formula 2. covalent bond 3. chemical bond 4. ionic bond 5. Lewis dot diagram 6. ion 7. valence electrons 8. oxidation number 9. binary compound 10. polyatomic ion 11. lipids 12. polymer 13. carbohydrates 14. amino acids 15. organic chemistry 16. unsaturated fat 17. saturated fat 18. proteins 19. enzyme 20. nucleic acids

about whether atoms will most likely form ionic or covalent bonds. Describe how oxidations numbers can be used to write chemical formulas of compounds. Correctly name chemical compounds. Explain the significance of carbon in the structure of many different molecules. Describe the importance of carbon to living organisms. Compare and contrast the structure and function of carbohydrates, lipids, proteins, and nucleic acids.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Chemical Change	**Pacing:** ***Third 9 Weeks, Days 97-106***
Essential Question(s): How are atoms conserved in a chemical reaction? How do scientists describe what happens in a chemical reaction?	**<u>Big Idea</u> : Classify reactions by examining how atoms combine, break down, and are rearranged to form a variety of substances.**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Describe how energy is involved in chemical changes. Identify evidence that a chemical change has occurred. Explain what happens during chemical reactions. Relate a balanced chemical equation to the law of conservation of mass. Determine the formula and molar	**• Identify the parts of a chemical reaction.** **• Explain what it means when a chemical equation is balanced.** **• Balance equations.** **• Observe that mass is conserved in chemical reactions.** **• Use the Periodic Table Tiles to model chemical reactions.** **• Design an experiment to prove that mass is conserved in a chemical reaction.**	MA.912.S.1.2 SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.7 SC.912.N.2.1 SC.912.N.2.2 SC.912.P.8.2 SC.912.P.8.5 SC.912.P.8.7 SC.912.P.8.8	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking. Recognize the role of creativity in constructing scientific questions, methods and explanations. Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the	1. chemical reaction 2. reactant 3. product 4. precipitate 5. chemical equation 6. mole 7. formula mass 8. law of conservation of mass 9. coefficient 10. Avogadro number 11. molecular mass 12. polymerization 13. addition 14. combustion 15. decomposition

masses of chemical compounds. Write and balance chemical equations. Classify reactions based on how atoms combine to create new substances. Discuss applications of polymer science. Study examples of combustion reactions.			criteria for science). Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion. Differentiate between physical and chemical properties and physical and chemical changes of matter. Relate properties of atoms and their position in the periodic table to the arrangement of their electrons. Interpret formula representations of molecules and compounds in terms of composition and structure. Characterize types of chemical reactions.	

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Energy and Reactions	Pacing: *Third 9 Weeks, Days 106-116*
Essential Question(s): How do chemical changes involve energy? Can we measure the heat released or energy absorbed by hot packs and cold packs?	**Big Idea : Exothermic reaction occurs, energy is released. Endothermic reactions absorb energy.**

Concepts/ Content	Learning Targets	Benchmarks	Essential Content & Understanding	Key Terminology (bold print priority items)
• Contrast endothermic and exothermic reactions. • Explain why activation energy is needed to begin chemical reactions. • Describe what happens when ionic compounds are dissolved in water. • Discuss how chemical equations are similar to recipes. • Identify limiting and excess	**• Infer the meaning of exothermic and endothermic reactions.** **• Describe how changes in temperature are related to energy changes.** **• Discuss examples of evidence that a chemical change has occurred.** **• Describe what happens in a dissolution reaction.** **• Apply principles of calorimetry to explain observations of endothermic and exothermic reactions.** **• Use the heat equation to quantify the heat released (or energy absorbed) in chemical reactions.**	MA.912.S.3.2 SC.912.P.10.5 SC.912.P.10.7	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Relate temperature to the average molecular kinetic energy. Distinguish between endothermic and exothermic chemical processes.	1. activation energy 2. exothermic 3. endothermic 4. dissolution reaction 5. percent yield 6. inhibitor; catalyst 7. excess reactant 8. chemical equilibrium 9. limiting reactant 10. reaction rate 11. fusion 12. half-life 13. nuclear reaction 14. fission

reactants in chemical reactions. • Describe factors that may influence the rate at which a chemical reaction occurs. • Compare and contrast chemical and nuclear reactions. • Explain the significance of the strong nuclear force. • Explore benefits and negative effects of nuclear reactions.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Solutions	**Pacing:** ***Third 9 Weeks, Days 126-134***
Essential Question(s): What is a solubility curve? What is pH?	**<u>Big Idea</u> : Examine the relationship between temperature and the solubility of potassium nitrate.**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Describe water in terms of its polarity. Discuss properties of water related to hydrogen bonding. Explain why water is a good solvent. Explain how solutions are formed. Define solubility and interpret solubility graphs. Describe factors that affect the concentration of solutions. Compare and	**• Identify parts of a solution.** **• Explain the meaning of solubility.** **• Use data to create a solubility curve.** **• Compare the pH values of common solutions.** **• Describe uses of pH indicators.**	MA.912.S.3.2 SC.912.N.1.1 SC.912.P.8.2 SC.912.P.8.8 SC.912.P.8.11 SC.912.P.10.5	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Differentiate between physical and chemical properties and physical and chemical changes of matter. Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions. Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH. Relate temperature to the average molecular kinetic energy.	1. nonpolar molecule 2. hydrogen bond 3. polar molecule 4. unsaturated 5. solubility rules 6. suspension 7. Tyndall effect; colloid 8. solvent 9. solute 10. solution 12. alloy 13. dissolve 14. equilibrium 15. concentration 16. supersaturated 17. saturated 18. insoluble 19. molarity; mass percent 20. acid 21. base 22. pH scale 23. pH

contrast solubility of solid, liquid, and gaseous matter. Differentiate acids and bases. Define pH. Explain the significance of acids, bases, and pH to living organisms and the environment.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Electric Circuits	**Pacing:** ***Third 9 Weeks, Days 126-134***
Essential Question(s): How do you measure voltage and current in electric circuits? What is the relationship between current and voltage in a circuit?	**Big Idea : Explore the relationship between electrical conductivity and resistance.**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Define static electricity and discuss its causes. Explain what it means when an object is electrically charged. Discuss the relationship between like and unlike charges. Define electricity. Describe the components of an electric circuit. Explain the difference between a closed circuit and an open circuit.	**• Measure current and voltage in a battery.** **• Draw circuit diagrams.** **• Identify electrical conductors and insulators.** **• Measure resistance in a circuit.** **• Use Ohm's law to identify the mystery resistor in a circuit.** **• Investigate the relationship between voltage drop across the potentiometer and voltage drop across the bulb in a circuit.**	MA.912.S.1.2 SC.912.P.10.14 SC.912.P.10.15	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Differentiate among conductors, semiconductors, and insulators. Investigate and explain the relationships among current, voltage, resistance, and	1. coulomb 2. electrically neutral 3. positive 4. negative 5. static electricity 6. charged 7. electric current 8. switch 9. closed circuit 10. resistor 11. electric circuit 12. electricity 13. open circuit 14. ampere 15. battery 16. voltage 17. multimeter 18. volt 19. ohm 20. Ohm's law 21. conductor 22. resistance 23. insulator

Explain how current flows in an electric circuit. Define voltage and describe how it is measured. Discuss the function of a battery in an electric circuit. Use Ohm's law to relate current, voltage and resistance. Apply Ohm's law to solve problems. Classify materials as conductors, insulators, and semiconductors.				24. semiconductor 25. potentiometer

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Electrical Systems				**Pacing:** ***Fourth 9 Weeks, Days 134-143***
Essential Question(s): What are the different types of circuits? How much energy is carried by electricity?				**<u>Big Idea</u> : Explore the relationship between voltage, current, and power.**
Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Build and analyze series circuits. Apply Ohm's law to calculate the current in a series circuit. Explain how energy conservation applies to electric circuits. Build and analyze parallel circuits. Compare and contrast series and parallel circuits. Discuss advantages for using parallel	**• Build series and parallel circuits.** **• Measure voltage and current.** **• Examine short circuits.** **• Use Ohm's Law to explain circuit properties.** **• Use capacitors.** **• Compare energy and power.** **• Apply a formula to calculate power.**	MA.912.S.1.2 SC.912.P.10.14 SC.912.P.10.15	Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Differentiate among conductors, semiconductors, and insulators. Investigate and explain the relationships among current, voltage, resistance, and power.	1. series 2. Kirchhoff's voltage law 3. voltage drop 4. Kirchhoff's current law 5. parallel circuit 6. circuit breaker 7. fuse 8. short circuit 9. GFI outlet 10. transformer 11. watt 12. direct current 13. kilowatt-hour 14. electrical power 15. alternating current 16. kilowatt

circuits in homes. Define electric power and apply a formula to perform power calculations. Distinguish direct current and alternating current. Discuss applications of electricity in daily living.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Electricity and Magnetism	**Pacing:** ***Fourth 9 Weeks, Days 143-152***
Essential Question(s): How do magnets and compasses work? How are electricity and magnetism related?	**Big Idea : Electromagnetic induction and generators.**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Identify properties of magnetic materials and use interactions between magnets to explain attraction and repulsion. Describe the source of Earth's magnetism. Explain how a compass works. Define electromagnet. Build a simple electromagnet. Compare permanent magnets and electromagnets. Describe the role of electromagnetism in the function of	**• Measure magnetic force.** **• Use a compass to detect magnetic force.** **• Use a compass to detect magnetic force.** **• Build a circuit to control an electromagnet.** **• Measure the current used by an electromagnet.**	MA.912.S.3.2 SC.912.N.1.1 SC.912.N.4.1 SC.912.P.10.18 SC.912.P.10.15	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Explain how scientific knowledge and reasoning provide an empirically based perspective to inform society's decision making. Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications. Investigate and explain the relationships among current,	1. magnetic 2. magnetic field 3. magnetic declination 4. permanent magnet 5. electromagnet 6. electromagnetic induction 7. generator 8. electric motor 9. rotor 10. commutator

electric motors and generators. Contrast energy transformations in electric motors and generators. Explain the principle of electromagnetic induction.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Waves	**Pacing:** ***Fourth 9 Weeks, Days 152-161***
Essential Question(s): How do we describe the back and forth motion of a pendulum? What is resonance and why is it important?	**<u>Big Idea</u> : Measure the speed of waves.**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Identify examples of simple oscillators. Compare and contrast harmonic motion with linear and curved motion. Apply a rule to determine the frequency and period of an oscillator. Describe the properties and behavior of waves. Calculate the speed of waves. Identify the parts of a wave.	**• Measure the amplitude and cycle of a pendulum.** **• Identify the variables that affect a pendulum.** **• Sketch harmonic motion graphs.** **• Experiment with standing waves on a string.** **• Measure frequency and wavelength.** **• Identify the relationship between frequency and wavelength.**	MA.912.S.3.2 SC.912.N.1.1 SC.912.N.1.4 SC.912.N.1.6 SC.912.N.1.7 SC.912.N.2.1 SC.912.N.2.2 SC.912.P.10.18 SC.912.P.12.2 SC.912.P.12.3	Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries. Define a problem, conduct systematic observations, plan investigations, and use tools to gather, analyze, and interpret data. Identify sources of information and assess their reliability according to the strict standards of scientific investigation. Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied. Recognize the role of creativity in constructing scientific questions, methods and explanations. Identify what is science, what clearly is not science, and what superficially resembles science. Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation. Explore the theory of electromagnetism by comparing and	1. restoring force 2. pendulum 3. oscillator 4. frequency 5. cycle 6. linear motion; harmonic motion 7. period 8. hertz 9. resonance 10. amplitude; periodic force 11. natural frequency 12. wave 13. wavelength 14. reflection 15. absorption 16. wave front 17. plane waves 18. refraction; diffraction 19. circular waves 20. destructive interference 21. constructive

Distinguish between transverse and longitudinal waves. Demonstrate an understanding of wave interactions. Distinguish constructive and destructive interference.			contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications. Analyze the motion of an object in terms of its position, velocity, and acceleration as functions of time. Interpret and apply Newton's three laws of motion.	interference 22. longitudinal wave 23. transverse wave

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Sound	**Pacing:** ***Fourth 9 Weeks, Days 161-171***
Essential Question(s): Does sound behave like other waves? How can resonance be controlled to make the sounds we want?	**<u>Big Idea</u> : Explore how changes in temperature and pressure affect sound waves.**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Describe properties of sound. Explain how sound waves are created and recorded. Discuss examples of the Doppler effect. Justify the classification of sound as a wave. Analyze sound interactions at boundaries. Explain how factors like temperature and pressure affect the behavior of sound waves.	**• Listen to beats and show how the presences of beats is evidence that sound is a wave.** **• Create interference of sound waves and explain how the interference is evidence for the wave nature of sound.** **• Demonstrate resonance.** **• Explain how a musical instrument controls frequency and wavelength.** **• Identify the frequencies of musical notes.** **• Explain the foundations of musical harmony.**	SC.912. N.4.1 SC.912.P.10.18	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.	1. Doppler effect 2. decibel 3. pitch 4. supersonic 5. harmonic 6. standing wave 7. fundamental 8. reverberation 9. frequency spectrum 10. beats 11. rhythm 12. musical scale 13. octave 14. sonogram 15. consonance 16. dissonance 17. note

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Explore how the brain makes meaning of sounds. Describe how humans hear sounds. Explain the sound is used to create music.				

COURSE: Content Area Grade Level

UNIT/ORGANIZING PRINCIPLE: Light	**Pacing:** ***Fourth 9 Weeks, Days 171-182***
Essential Question(s): What happens when you mix different colors of light? How does light behave when its path is changed?	**Big Idea : The electromagnetic spectrum and colors of light.**

Concepts/ Content	**Learning Targets**	**Benchmarks**	**Essential Content & Understanding**	**Key Terminology (bold print priority items)**
Describe the properties of light. Explain the relationship between energy and the colors of light. Describe waves included in the electromagnetic spectrum in terms of energy, frequency, and wavelength. Explain how humans see. Demonstrate knowledge of the additive and subtractive color processes. Apply	**• Compare sources of light.** **• Mix colors of light.** **• Describe how a color filter works.** **• Observe the law of reflection.** **• Observe light rays passing through a prism.** **• Draw ray diagrams.** **• Observe refraction and reflection at the same time.**	LA.910.4.2.2 SC.912.N.1.4 SC.912.N.3.5 SC.912.P.10.18 SC.912.P.12.7	The student will record information and ideas from primary and/or secondary sources accurately and coherently. Identify sources of information and assess their reliability according to the strict standards of scientific investigation. Describe the function of models in science, and identify the wide range of models used in science. Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications. Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.	1. white light 2. incandescence 3. fluorescence 4. electromagnetic wave 5. color 6. visible light 7. nanometers 8. electromagnetic spectrum 9. photon 10. cone cell 11. rod cell 12. photoreceptors 13. pixels 14. CMYK color model 15. RGB color model 16. specular reflection 17. refraction 18. mirror, prism, lens 19. transparent 20. translucent 21. index of refraction 22. diffuse reflection 23. converging lens

knowledge of the behavior of light to explain why plants have certain colors. Explain how basic optical devices function. Compare and contrast the interactions of light and matter. Distinguish between concave and convex lenses.				24. diverging lens