Science 8th Grade

1st Quarter

Standard 1: Students will learn that science and technology can make lives healthier, more convenient, and safer.

Topic: The Nature of Science

Week	Performance Objectives	Performance Indicators	SA	TA
1	• Identify how science is a part of your everyday life • Describe what skills and tools are used in science	I can identify ways to apply science in everyday life		
		I can list tools that scientists use to make observations		
		I can describe how scientists communicate their observations		
	• Examine the steps used to solve a problem in a scientific way • Explain how a well-designed investigation is developed	I can list the steps of the scientific method		
		I can explain what a hypothesis is		
		I can compare the descriptive research and experimental research design		
2	• Determine how science and technology influence your life • Analyze how modern technology allows scientific discoveries to be communicated worldwide	I can identify one way that science or technology has improved health		
		I can list ways scientists are able to communicate their discoveries		
		I can explain why modern communication systems are important to scientists worldwide		

Standard 2: Students will learn that the environment and changes over time can affect genetic traits.

Topic: Traits and How They Change

2	• Compare and contrast phenotype and genotype • Describe some effects the environment has on traits • Explain how traits are formed	I can describe two factors that determine the phenotype of a trait		
		I can identify a phenotype that changes as seasons change		
		I can explain the difference between an organism's genotype and its phenotype		
3	• Differentiate between genetics and heredity • Explain the results of Mendel's pea plant experiments • Identify the results shown by a Punnett square	I can state some early beliefs of human heredity		
		I can contrast heredity and genetics		
		I can describe the primary purpose of using a Punnett square		
	• Explain how living and nonliving environmental factors impact evolution • Describe how natural selection occurs in a species • Compare and contrast selective breeding and natural selection	I can list some nonliving factors in the environment that can cause change in species over several generations		
		I can differentiate between selective breeding and natural selection		
		I can describe how evolution and extinction are related		

Standard 3: The students will learn that our health and survival depend on the interactions of our body systems

Topic: Interactions of Human Systems

4	• Describe the basic structure and function of a typical human cell. • Identify and describe the five levels of organization in the body	I can list all level of organization in the human organism		
		I can explain why our body needs minerals		
		I can explain why cells are vital for life		

	• Discuss how body systems work together to carry out important life functions • Explain how negative feedback mechanisms in the body help maintain homeostasis • Compare negative feedback mechanisms and positive feedback mechanisms in the body	I can discuss how the digestive and circulatory systems work together to get food to cells		
		I can compare and contrast negative and positive feedback mechanisms		
		I can describe how body systems work together to maintain homeostasis		
Standard 4: Students will learn that living organisms interact with their environment and with one another in many ways.				
Topic: Interactions of Life				
5	• Identify places where life is found on Earth • Define ecology • Observe how the environment influences life	I can list three parts of the Earth included in the biosphere		
		I can compare and contrast the terms habitat and biosphere		
		I can identify the major difference between a community and the population		
	• Identify methods for estimating population sizes • Explain how competition limits population growth • List factors that influence changes in population size	I can describe three ways in which ecologists can estimate the size of population		
		I can explain how birthrates and death rates influence population size		
		I can explain how carrying capacity influences the number of organisms in an ecosystem		
	• Describe how organisms obtain energy for life • Explain how organisms interact • Recognize that every organism occupies a niche	I can explain why all consumers depend on producers for food		
		I can compare and contrast the terms habitat and niche		
		I can define symbiosis and identify its different types		
Standard 5: Students will learn that environments have both living and nonliving elements.				
Topic: The Nonliving Environment				
6	• Identify common abiotic factors in most ecosystems • List the components of air that are needed for life • Explain how climate influences life in an ecosystem	I can compare and contrast biotic and abiotic factors in ecosystems		
		I can explain why soil is considered both an abiotic and biotic factor		
		I can identify what supports almost all life on Earth		
6	• Explain the importance of Earth's water cycle • Diagram the carbon cycle • Recognize the role of nitrogen in life on Earth	I can describe the water cycle		
		I can infer how burning fossil fuels might affect the makeup of gases in the atmosphere		
		I can explain why organisms need nitrogen		
	• I can explain how organisms produce energy-rich compounds • I can describe how energy flows through ecosystems • I can recognize how much energy is available at different levels in a food chain	I can compare and contrast a food web and an energy pyramid		
		I can explain why there is a limit to the number of links in a food chain		
		I can create my own energy pyramid		

Standard 6: Students will learn that Earth has many diverse ecosystems on land and in water.				
Topic: Ecosystems				
7	• Explain how ecosystems change over time • Describe how new communities begin in new areas without life • Compare pioneer species and climax communities	I can compare primary and secondary succession		
		I can describe adaptations of pioneer species		
		I can describe what a climax community is		
	• Explain how climate influences land environments • Identify seen biomes of Earth	I can determine which biomes are the driest		
		I can compare and contrast tundra organisms and desert organisms		
		I can differentiate the climate of a temperate rain forest and a tropical rain forest		
	• Compare flowing freshwater and standing freshwater ecosystems • Identify and describe important saltwater ecosystems • Identify problems that affect aquatic ecosystems	I can identify the similarities between a lake and a stream		
		I can explain why fewer plants are at the bottom of deep lakes		
		I can infer what adaptations are necessary for organisms that live in the intertidal zone		

*** END OF FIRST QUARTER ***

2nd Quarter

Standard 1: Students will learn that the combination of ideas from continental drift, seafloor spreading, and many other discoveries led to the theory of plate tectonics.				
Topic: Plate Tectonics				
Week	**Performance Objectives**	**Performance Indicators**	**SA**	**TA**
1	• Describe the hypothesis of continental drift • Identify evidence supporting continental drift	I can explain Alfred Wegner's hypothesis in my own words		
		I can describe how rock clues were used to support the continental drift		
		I can summarize how fossils helped support the continental drift hypothesis		
	• Explain seafloor spreading • Recognize how age and magnetic clues support seafloor spreading	I can explain how the ages of the rocks on the ocean floor support the theory of seafloor spreading		
		I can explain why some partly molten material rises toward Earth's surface		
		I can identify who suggested the seafloor spreading hypothesis		
	• Compare and contrast different type of plate boundaries • Explain how heat inside Earth causes plate tectonics • Recognize features caused by plate tectonics	I can describe what occurs at plate boundaries that are associated with seafloor spreading		
		I can describe three types of plate boundaries where volcanic eruptions can occur		

		I can explain how convention currents are related to plate tectonics		
Standard 2: The students will learn about that most earthquakes and volcanic events occur along plate boundaries where Earth's plates move relative to one another.				
Topic: Earthquakes and Volcanoes				
2	• Explain how earthquakes are caused by buildup of strain in Earth's crust • Compare and contrast primary, secondary, and surface waves • Recognize earthquake hazards and how to prepare for them	I can explain what happens to rock after their elastic limit is passed.		
		I can identify which seismic waves cause the most damage in an earthquake		
		I can summarize how scientists use seismic waves to determine an earthquake's epicenter		
	• Explain how volcanoes can affect people • Describe how types of materials are produced by volcanoes • Compare how three different volcano forms develop	I can identify which types of lava eruptions cover the largest area on Earth's surface		
		I can describe the processes that lead to the formation of volcanoes		
		I can explain why a cinder cone has steep sides		
	• Explain how the locations of volcanoes and earthquake epicenters are related to tectonic plate boundaries • Explain how heat withing Earth causes Earth's plates to move	I can explain how volcanoes form		
		I can identify where volcanoes form		
		I can describe what causes earthquakes		
Standard 3: Students will learn that fossils, along with the relative ages and absolute ages of rocks, provide evidence of past life, climates, and environments on Earth				
Topic: Clues to Earth's Past				
3	• List the conditions necessary for fossils to form • Describe several processes of fossil formation • Explain how fossil correlation is used to determine rock ages • Determine how fossils can be used to explain changes in Earth's surface, life forms, and environments	I can describe the typical conditions necessary for fossil formation		
		I can explain how a fossil mold is different from a fossil cast		
		I can explain describe how carbon films form		
	• Describe methods used to assign relative ages to rock layers • Interpret gaps in the rock record • Give an example of how rock layers can be correlated with other rock layers	I can explain the concept of relative age		
		I can describe disconformity		
		I can describe one way to correlate similar rock layers		
	• Identify how absolute age differs from relative age • Describe how the half-lives of isotopes are used to determine a rock's age	I can explain the concept of uniformitarianism		
		I can describe how radioactive isotopes decay		
		I can differentiate absolute age from relative age		
Standard 4: Students will learn that scientists use units of geologic time to interpret the history of life on Earth.				
Topic: Geologic Time				
4	• Explain how geologic time can be divided into units • Relate changes of Earth's organisms to divisions on the geologic time scale • Describe how plate tectonics affects species	I can discuss how fossils relate to the geologic time scale		
		I can infer how plate tectonics might lead to extinction		
		I can explain how paleontologists use trilobite fossils as index fossils for various geologic time periods		

	• Identify characteristic Precambrian and Paleozoic life-forms • Draw conclusions about how species adapted to changing environments in Precambrian time and the Paleozoic Era • Describe changes in Earth and its life-forms at the end of the Paleozoic Era	I can list the geologic events that ended the Paleozoic Era		
		I can infer how geologic events at the end of the Paleozoic Era might have caused extinctions		
		I can discuss the advance that allowed reptiles to reproduce away from water		
4	• Compare and contrast characteristic life-forms in the Mesozoic Era and Cenozoic Era • Explain how changes caused by plate tectonics affected organisms during the Mesozoic Era • Identify when humans first appeared on Earth	I can list the era, period and epoch where *Homo sapiens* first appeared		
		I can discuss whether mammals became more or less abundant after dinosaur extinction		
		I can explain why some paleontologists hypothesize that dinosaurs were warm-blooded animals		
Standard 5: Students will learn that many common observations, such as seasons, eclipses, and lunar phases, are caused by interactions between the Sun, Earth, and Moon.				
Topic: The Sun-Earth-Moon System				
5	• Examine Earth's physical characteristics • Differentiate between rotation and revolution • Discuss what causes seasons to change	I can explain why Aristotle thought Earth was spherical		
		I can compare and contrast rotation and revolution		
		I can explain how Earth's distance from the sun changes throughout the year		
	• Identify phases of the Moon and their cause • Explain why solar and lunar eclipses occur • Infer what the Moon's surface features my reveal about its history	I can name all the different phases of the moon		
		I can define the terms umbra and penumbra		
		I can describe what eclipses are and why they happen		
	• Describe recent discoveries about the Moon • Examine facts about the Moon that might influence future space travel	I can name several spacecrafts or apparatuses used to study the Moon		
		I can explain how ice water might be preserved in portions of deep impact craters		
		I can describe the contributions the lunar orbiter *Clementine*		
Standard 6: Students will learn that the solar system consists of planets and their moons, comets, meteoroids, and asteroids that all orbit the Sun.				
Topic: The Solar System				
6	• Compare models of the solar system • Explain that gravity holds planets in orbits around the Sun	I can describe what holds the solar system together		
		I can explain how planets in the solar system were formed		
		I can list reasons why the outer planets take longer to orbit the sun		
	• List the inner planets in order from the Sun • Describe each inner planet • Compare and contrast Venus and Earth	I can explain why Mercury's surface temperature varies from day to night		
		I can list important characteristics for each planet		
		I can identify the inner planet farthest from the sun		
7	• Describe the characteristics of Jupiter, Saturn, Uranus, and Neptune • Describe the largest moons of each of the outer planets	I can compare the inner and outer planets		
		I can describe what Saturn's rings are made of		
		I can compare Pluto to the eight planets		

7	• Describe how comets change when they approach the Sun. • Distinguish among comets, meteoroids, and asteroids • Explain that objects from space sometimes impact the Earth	I can describe how a comet changes when it comes close to the Sun		
		I can explain how craters form		
		I can summarize the differences between comets and asteroids		

*** END OF SECOND QUARTER ***

3rd Quarter

Standard 1: Students will learn that the universe is made up of stars and galaxies

Topic: Stars and Galaxies

Week	Performance Objectives	Performance Indicators	SA	TA
1	• Explain why some constellations are visible only during certain seasons • Distinguish between absolute magnitude and apparent magnitude	I can define constellation		
		I can describe circumpolar constellations		
		I can explain why some constellations are only visible during certain seasons		
	• Explain that the Sun is the closest star to Earth • Describe the structure of the Sun • Describe sunspots, prominences, and solar flares	I can explain why the sun is important for life on Earth		
		I can describe the sunspot cycle		
		I can explain why sunspots appear dark		
2	• Describe how stars are classified • Compare the sun to other types of stars on the H-R diagram • Describe how stars evolve	I can describe how the stars release energy		
		I can define a black hole		
		I can how the sun is different from other stars on the mains sequence		
	• Describe the sun's position in the Milky Way Galaxy • Explain that the same natural laws that apply to our solar system also apply in other galaxies	I can differentiate elliptical galaxies from spiral galaxies		
		I can identify the galaxy we live in		
		I can explain the Doppler shift		

Standard 2: Students will learn that the model of the atom becomes more detailed as new information is learned

Topic: Inside the Atom

3	• Explain how scientists discovered subatomic particles • Explain how today's model of the atom developed • Describe the structure of the nuclear atom • Explain that all matter is made up of atoms	I can explain how the nuclear atom differs from the uniform sphere model of the atom		
		I can describe how J.J. Thomson used a cathode ray tube to observe electrons		
		I can describe how electrons move about the nucleus in an electron cloud		
	• Describe the process of radioactive decay • Explain what is meant by half-life	I can define a beta particle		
		I can explain what an isotope is		

	• Describe how radioactive isotopes are used	I can compare and contrast the two types of radioactive decay		
Standard 3: The students will learn that the periodic table provides information about all the known elements.				
Topic: The Periodic Table				
4	• Describe the history of the periodic table • Interpret an element key • Explain how the periodic table is organized	I can determine how many elements are nonmetals		
		I can list what an element key contains		
		I can describe where the metals, nonmetals, and metalloids are located in the periodic table		
	• Recognize the properties of representative elements • Identify uses for the representative elements • Classify elements into groups based on similar properties	I can compare and contrast the element in Group 1 and the elements in Group 17		
		I can describe two uses for a member of each representative group		
		I can identify the group of elements that does not really combine with other elements		
	• Identify properties of some transition elements • Distinguish lanthanides from actinides	I can determine what property all actinides share		
		I can explain the major difference between lanthanides and actinides		
		I can explain how mercury is used		
Standard 4: Students will learn that an atom's structure affect how it bonds to other atoms				
Topic: Atomic Structure and Chemical Bonds				
5	• Identify how electrons are arranged in an atom • Compare relative amounts of energy of electrons in an atom • Compare how the arrangement of electrons in an atom is related to its place in the periodic table	I can identify what determines the amount of energy an electron has		
		I can determine an atoms structure		
		I can define chemical bond		
5	• Compare and contrast ionic and covalent bonds • Distinguish between compounds and molecules • Identify the difference between polar and nonpolar covalent bonds • Interpret chemical shorthand	I can determine how atoms form covalent bonds		
		I can compare and contrast polar and nonpolar bonds		
		I can give an example of a chemical formula		
Standard 5: Students will learn that in chemical reactions, atoms in reactants are rearranged to form products with different chemical properties				
Topic: Chemical Reactions				
6	• Determine whether or not a chemical reaction is occurring • Determine how to read and understand a balanced chemical equation • Examine some reactions that release energy and others that absorb energy • Explain the law of conservation of mass	I can identify different types of chemical reactions		
		I can determine if a chemical equation is balanced or not		
		I can describe what evidence is needed to infer that a chemical reaction has occurred		

	• Determine how to describe and measure the speed of a chemical reaction • Identify how chemical reactions can be sped up or slowed down	I can define activation energy		
		I can describe what a catalyst does to a chemical reaction		
		I can describe how to measure reaction rates		
Standard 6: Students will learn that the motion of an object can be described by its velocity				
Topic: Motion and Momentum				
7	• Define distance, speed, and velocity • Graph motion	I can identify the two information you need to determine velocity		
		I can determine when an b=object is in motion		
		I can calculate the speed of an object		
	• Define acceleration • Predict what effect acceleration will have on motion	I can determine three ways to accelerate		
		I can solve simple acceleration equations		
		I can compare and contrast speed, velocity, and acceleration		
	• Define momentum • Explain why momentum might not be conserved after a collision • Predict motion using the law of conservation of momentum	I can define inertia		
		I can explain how an object's momentum changes as its velocity changes		
		I can determine if the momentum of an object moving in a circular path at constant speed is constant		

*** END OF THIRD QUARTER ***

4th Quarter

Standard 1: Students will learn that an object's motion changes of the forces acting on the object are unbalanced				
Topic: Force and Newton's Laws				
Week	**Performance Objectives**	**Performance indicators**	**SA**	**TA**
1	• Distinguish between balanced and net forces • Describe Newton's first law of motion • Explain how friction affects motion	I can identify what the different forms of friction have in common		
		I can differentiate static and sliding friction		
		I can describe the factors that cause static friction between two surfaces to increase		
	• Explain Newton's second law of motion • Explain why the direction of the force is important	I can explain how the force of air resistance depends on an object's speed		
		I can state Newton's second law of motion		
		I can describe circular motion with constant speed		
2	• Identify the relationship between the forces that objects exert on each other	I can state Newton's third law of motion		
		I can explain free fall		
		I can explain action and reaction forces		
Standard 2: The students will learn that a machine makes doing a job easier.				
Topic: Work and Simple Machines				

2	• Recognize when work is done • Calculate how much work is done • Explain the relation between work and power	I can describe a situation in which work is done on an object		
		I can determine two ways power can be increased		
		I can calculate work using the equation given		
3	• Explain how a machine makes work easier • Calculate the mechanical advantages and efficiency of a machine • Explain how friction reduces efficiency	I can identify situations where machines make work easier		
		I can solve for mechanical advantage and efficiency using the given equations		
		I can explain how friction reduces the efficiency of machines		
	• Distinguish among the different simple machines • Describe how to find the mechanical advantage of each simple machine	I can determine how the mechanical advantage of a ramp changes as the ramp becomes longer		
		I can explain how a wedge changes an input force		
		I can name different types of simple machines		
Standard 3: Students will learn that thermal energy flows from areas of higher temperature to areas of lower temperature				
Topic: Thermal Energy				
4	• Explain how temperature is related to kinetic energy • Describe three scales used for measuring temperature • Define thermal energy	I can explain the difference between temperature and thermal energy		
		I can describe how a thermometer uses the thermal expansion of a material to measure temperature		
		I can explain how kinetic energy and thermal energy are related		
	• Explain the difference between thermal energy and heat • Describe three ways thermal energy is transferred • Identify materials that are insulators or conductors	I can describe what a conductor is and its purpose		
		I can identify good conductors of thermal energy		
		I can describe three ways thermal energy is transferred		
	• Describe what a heat engine does • Explain that energy can exist in different forms, but is never created or destroyed • Describe how an internal combustion engine works • Explain how refrigerators move thermal energy	I can identify the source of thermal energy in an internal combustion engine		
		I can explain why diesel engines don't use spark plugs		
		I can explain what an internal combustion engine is		
Standard 4: Students will learn that electrical energy can be converted into other forms of energy when electric charges flow in a circuit.				
Topic: Electricity				
5	• Describe how objects can become electrically charged • Explain how an electric charge affects other electrical charges • Distinguish between electric conductors and insulators • Describe how electric discharges such as lightning occur	I can explain why electrons are transferred when objects are charged		
		I can explain why metals are good conductors		
		I can I can explain why an electric discharge occurs		
	• Relate voltage to the electrical energy carried by an electrical current • Describe a battery and how it produces an electric current • Explain electrical resistance	I can compare and contrast an electric discharge with an electric current		
		I can describe how a battery causes electrons to move in a circuit		
		I can explain why electric wires in houses are usually made of copper		

5	• Explain how voltage, current, and resistance are related in an electric circuit • Investigate the difference between series and parallel circuits • Determine the electric power used in a circuit	I can describe how the current in a circuit changes if the resistance increases and the voltage remains constant		
		I can explain why buildings are wired using parallel circuits rather than series circuits		
		I can identify what determines the damage caused to the human body by an electric shock		
Standard 5: Students will learn that magnets exert forces on other magnets and on moving charges.				
Topic: Magnetism				
6	• Describe the behavior of magnets • Relate the behavior of magnets to magnetic fields • Explain why some materials are magnetic	I can identify proof when a magnetic field exists		
		I can explain why atoms behave like magnets		
		I can explain why magnets attract iron but do not attract paper		
	• Explain how electricity can produce motion • Explain how motion can produce electricity	I can describe what a transformer does		
		I can describe how a magnetic field affects a current-carrying wire		
		I can describe how alternating current is produced		
Standard 6: Students will learn that sound and light waves are waves that transfer energy from one place to another				
Topic: Waves, Sound, and Light				
7	• Explain how waves transport energy • Distinguish among transverse, compressional, and electromagnetic waves • Describe the properties of waves • Describe reflection, refraction, and diffraction of waves	I can explain how matter moves in a compressional wave		
		I can calculate for the speed of a wave using the given formula		
		I can analyze how waves transport energy without transporting matter		
	• Describe how sound waves are produced • Explain how sound waves travel through matter • Describe the relationship between loudness and sound intensity • Explain how humans hear sound	I can describe how temperature affects the speed of sound through a material		
		I can compare and contrast sound waves produced by whispering and shouting		
		I can describe how vibrations are produced in the ear by a sound wave enable us to hear sound		
	• Identify the properties of light • Describe the electromagnetic spectrum • Describe the types of electromagnetic waves that travel from Sun to Earth • Explain human vision and color perception	I can find out what determines the intensity of light waves		
		I can describe the difference between radio waves, visible light, and gamma rays		
		I can compare and contrast the rod cells and the cone cells in the retina of the human eye		

*** END OF FOURTH QUARTER ***