Science Core Units

Course Title: Science 6 **Unit Title: Earth's Place in the Universe** **Length of Unit___3 weeks_____**

Grade Level: 6 **Page _1_ of _2__**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Suggested Assessment	Possible Resources	Possible Labs
MS-ESS1-1: Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. MS-ESS1-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. MS-ESS1-3: Analyze and interpret data to determine scale properties of objects in the solar system. ESS1.A: The Universe and Its Stars • Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. • Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. ESS1.B: Earth and the Solar System • The solar system consists of the sun and collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. • This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but titled relative to	I can list the phases of the moon in order. I can draw a model of the Earth-sun-moon system to show the phases of the moon. I can create a model to show a solar and lunar eclipse. I can explain why Earth has seasons. I can explain how gravity impacts the solar system. I can explain how gravity impacts Earth and its moon. I can create a scale model of the solar system.	Moon Phase New Moon Waxing Full Moon Waning Solar Eclipse Lunar Eclipse Solar System Galaxy	Teacher created quiz on space Model of Moon Phases	Cosmos Series Glencoe Science Astronomy Textbook (if purchased)	<u>Scale models of the planets</u> -Sidewalk chalk -Meter Sticks -Lab paper for sizes <u>Scale models of the distance between planets</u> -Sidewalk chalk -Meter sticks -Lab paper for distances Glencoe Science Virtual Lab: The Sun-Earth-Moon System Glencoe Science Virtual Lab: The Solar System

its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. • The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. Engineering Design ETS1-1 ETS1-2 ETS1-3 ETS1-4 ETS1.A ETS1.B ETS1.C					

Science Core Units

Course Title: Science 6 **Unit Title: Geoscience processes** **Length of Unit__3 weeks____**

Grade Level: 6 **Page 1 of _1__**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Suggested Assessment	Possible Resources	Possible Labs
MS-ESS2-1: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives the process. **MS-ESS2-2:** Construct an explanation based on evidence for how geosciences processes have changed Earth's surface at varying time and spatial scales. **ESS2.A:** Earth's Materials and Systems • All Earth processes are the result of energy flowing and cycling within and among the planet systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms (MS-ESS2-1) • The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future (MS-ESS2-2)	I can describe how weathering affects Earth's surface. I can explain how climate affects weathering. I can explain the difference between chemical and mechanical weathering. I can give examples of chemical and mechanical weathering. I can explain the difference between weathering and erosion. I can list the agents of erosion. I can explain the differences between erosion and deposition. I can explain how glaciers change Earth's surface. I can list ways Earth's surface changes rapidly. I can list ways Earth's surface changes slowly.	Geoscience Processes Weathering Mechanical Weathering Chemical Weathering Soil Erosion Deposition Mass Movement Glacier Moraine Esker Runoff Current Tides	Teacher created quiz on Weathering Teacher created quiz on Erosion & Deposition Teacher created test on Geoscience Processes Unit	Textbook: The Changing Surface of Earth chapters 2, 3, 4 UnitedStreaming Videos:	Glencoe Science Virtual Labs: Weathering & Soil Erosional Forces Water Erosion & Deposition Glacial Erosion & Deposition <u>Mechanical Weathering</u> -Sugar cubes -pebbles -plastic containers with lids -timers <u>Chemical Weathering</u> -Chalk - pennies -vinegar -glass beakers or plastic cups -lab papers <u>Water Erosion Lab: Determine the type of water erosion</u> -sand -gravel -water -cookie sheet -paint tray <u>Erosion by Gravity Lab: Rockslide</u> -gravel -rocks -water -cookie sheet -paint tray

Science Core Units

Course Title: Science 6 **Unit Title: Plate Tectonics/Large-Scale Interactions** **Length of Unit: 3 weeks**

Grade Level: 6 **Page 1 of __1_**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Suggested Assessment	Possible Resources	Possible Labs
MS-ESS2-3: Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. **ESS2.B**: Plate Tectonics and Large-Scale Interactions • Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3) Engineering Design ETS1-1 ETS1-2 ETS1-3 ETS1-4 ETS1.A ETS1.B ETS1.C	I can use fossil evidence to recreate an ancient continent. I can explain seafloor spreading. I can explain the hypothesis of continental drift. I can identify evidence to support continental drift. I can recognize how age and magnetic clues support seafloor spreading. I can compare and contrast different types of plate boundaries. I can explain how heat inside Earth (convection currents) causes plate tectonics. I can recognize features caused by plate tectonics.	Continental drift Pangaea Seafloor Spreading Plate Plate tectonics Lithosphere Asthenosphere Convection Current Alfred Wegener Harry Hess	Teacher created assessment Chapter 4 standardized test practice from textbook Paragraph writing: How has Earth changed over the years?	Continents Adrift (video from UnitedStreaming) Textbook: Earth Materials and Processes Chapter 4 Chapter Resource: Plate Tectonics (Fast File)	Pangaea Puzzle with fossil clues -printed map of Pangaea -crayons/colored pencils -scissors -glue Paleogeographic Mapping -crayons/colored pencils Glencoe Science Virtual Lab: Plate Tectonics

Science Core Units

Course Title: Science 6 **Unit Title: Ecosystems** **Length of Unit__3 weeks____**

Grade Level: 6 **Page _1_ of _2__**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Suggested Assessment	Possible Resources	Possible Labs
MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. LS2.A: Interdependent Relationships in Ecosystems • Organisms and populations of organisms are dependent on their environmental interactions both with other living things and with nonliving factors. • In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. • Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, n contrast, may become so interdependent that each organism requires the other for	I can observe how the environment influences life. I can explain how competition limits population growth. I can list factors that influence changes in population size. I can describe how organisms obtain energy for life. I can explain how organisms interact. I can identify limiting factors in an ecosystem. I can create a model to show how energy is transferred in an ecosystem. I can give examples of symbiosis.	Biosphere Ecosystem Ecology Population Community Habitat Producer Consumer Decomposer Symbiosis Mutualism Commensalism Parasitism Niche Limiting Factor Carrying Capacity Biotic Abiotic Troposhere	Teacher created quiz on Chapter 1 Teacher created test on Chapter 1 Teacher created life science assessment Symbiosis pamphlet created by the student Ecosystem research assignment Ecosystem children's' book	Ecology Textbook chapters 1 & 2 Chapter Resources: Interactions of Life Wild Kratts (PBS kids) video on Food Chains UnitedStreaming video on Food Chains and Food Webs	<u>Limiting Factors Lab (owl, mice)</u> -beans -pipe cleaners -lab paper <u>Predator/Prey Lab</u> -beans -paper bags -lab paper Glencoe Science Virtual Lab: Interactions of Life Glencoe Science Virtual Lab: Nonliving Environment Glencoe Science Virtual Lab: Ecosystems

survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. LS2.B: Cycle of Matter and Energy Transfer in Ecosystems • Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. Engineering Design ETS1-1 ETS1-2 ETS1-3 ETS1-4 ETS1.A ETS1.B ETS1.C					

Science Core Units

Course Title: Science 6 **Unit Title: Matter and Its Interactions** **Length of Unit___4 weeks_____**

Grade Level: 6 **Page _1_ of _2__**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Suggested Assessment	Possible Resources	Possible Labs
MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures. MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. MS-PS1-4: Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. PS1.A: Structure and Properties of Matter • Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms. • Each pure substance has characteristic physical and chemical properties that can used to identify it. • Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. • Ina liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change	I can list the four states of matter. I can describe the particles in the three states of matter (solid, liquid, gas). I can explain how thermal energy affects the particles in matter. I can create a model of molecule. I can explain the difference between synthetic materials and natural resources. I can name and describe the three subatomic particles. I can use a simple molecular formula to create a model of a molecule. I can explain the difference between an element and molecule.	Solid Liquid Gas Plasma Thermal Energy Molecule Atom Element Proton Neutron Electron Synthetic Natural Resource State of Matter	Make a molecule given a chemical formula Matter and atom quiz Physical Science Test Draw the particles in a solid, liquid, and gas. Explain the spacing and movement	Scholastic Study Jams: States of Matter Glencoe Science: The Nature of Matter	Models of atoms and molecules -toothpicks -marshmallows -play-doh Warm/Cold water molecules -glass beakers -thermometers -food coloring -timers/stopwatches Glencoe Science Virtual Lab: States of Matter

relative locations. • Solids may be formed from molecules, or they may be extended structures with repeating subunits. • The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. Engineering Design ETS1-1 ETS1-2 ETS1-3 ETS1-4 ETS1.A ETS1.B ETS1.C					

Science Core Units

Course Title: Science 6 **Unit Title: Water/ Weather** **Length of Unit____3 weeks___**

Grade Level: 6 **Page 1 of 2___**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Suggested Assessment	Possible Resources	Possible Labs
MS-ESS2-4: Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and force of gravity. MS-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. MS-ESS2-6: Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. ESS2.C: The Roles of Water in Earth's Surface Processes • Water continually cycles among land, ocean,a nd atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4) • The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landform, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5) • Global movements of water and its changes in form are	I can explain each step in the water cycle. I can list the steps of the water cycle in order. I can list and describe the 4 major air masses in North America. I can explain the difference between a maritime air mass and a continental air mass. I can explain the conditions necessary for lake effect snow. I can use maps and data to predict lake effect snow. I can compare and contrast radiation, conduction, and convection. I can describe the Coriolis Effect. I can explain how solar heating and water vapor in the atmosphere affect weather. I can describe how weather is associated with fronts and high and low pressure areas. I can explain how data are collected for weather maps and	Evaporation Condensation Precipitation Transpiration Runoff Groundwater Solar Energy Maritime Continental Polar Tropical Air Mass Radiation Conduction Convection Hydrosphere Coriolis Effect Jet Breeze Prevailing Westerlies Doldrums Sea Breeze Land Breeze Humidity Front Meteorologist	Quiz on Water Cycle Quiz on Air Masses Water drop writing assignment	Science in a Box (isbn: 978-156234-495-5) Great Lakes Climate and Weather lessons from Michigan Sea Grant http://www.miseagrant.umich.edu/ The Air Around You textbook (Chapters 1 and 2)	Weather (Warm and Cold air patterns) from Science in a Box -clear bowls -red and blue food coloring -empty film canister Predicting Lake Effect Snow Glencoe Science Virtual Lab: Weather

propelled by sunlight and gravity. (MS-ESS2-4) • Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6) • Water's movements-both on the land and underground-cause weathering and erosion, which change the land's surface features and create underground formations (MS-ESS2-2) ESS2.D: Weather and Climate • Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landorms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6) • Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5) • The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through the ocean currents. (MS-ESS2-6) Engineering Design ETS1-1 ETS1-2 ETS1-3 ETS1-4 ETS1.A ETS1.B ETS1.C	forecasts. I can identify the symbols used in a weather station model.				

Science Core Units

Course Title: Science 6 **Unit Title: Water/ Weather** **Length of Unit____3 weeks___**

Grade Level: 6 **Page 1 of 2___**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Suggested Assessment	Possible Resources	Possible Labs
MS-ESS2-4: Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and force of gravity. MS-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. MS-ESS2-6: Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. ESS2.C: The Roles of Water in Earth's Surface Processes • Water continually cycles among land, ocean,a nd atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4) • The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landform, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5) • Global movements of water and its changes in form are	I can explain each step in the water cycle. I can list the steps of the water cycle in order. I can list and describe the 4 major air masses in North America. I can explain the difference between a maritime air mass and a continental air mass. I can explain the conditions necessary for lake effect snow. I can use maps and data to predict lake effect snow. I can compare and contrast radiation, conduction, and convection. I can describe the Coriolis Effect. I can explain how solar heating and water vapor in the atmosphere affect weather. I can describe how weather is associated with fronts and high and low pressure areas. I can explain how data are collected for weather maps and	Evaporation Condensation Precipitation Transpiration Runoff Groundwater Solar Energy Maritime Continental Polar Tropical Air Mass Radiation Conduction Convection Hydrosphere Coriolis Effect Jet Breeze Prevailing Westerlies Doldrums Sea Breeze Land Breeze Humidity Front Meteorologist	Quiz on Water Cycle Quiz on Air Masses Water drop writing assignment	Science in a Box (isbn: 978-156234-495-5) Great Lakes Climate and Weather lessons from Michigan Sea Grant http://www.miseagrant.umich.edu/ The Air Around You textbook (Chapters 1 and 2)	Weather (Warm and Cold air patterns) from Science in a Box -clear bowls -red and blue food coloring -empty film canister Predicting Lake Effect Snow Glencoe Science Virtual Lab: Weather

propelled by sunlight and gravity. (MS-ESS2-4) • Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6) • Water's movements-both on the land and underground-cause weathering and erosion, which change the land's surface features and create underground formations (MS-ESS2-2) ESS2.D: Weather and Climate • Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landorms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6) • Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5) • The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through the ocean currents. (MS-ESS2-6) Engineering Design ETS1-1 ETS1-2 ETS1-3 ETS1-4 ETS1.A ETS1.B ETS1.C	forecasts. I can identify the symbols used in a weather station model.				

Science Core Units

Course Title: Science 6 **Unit Title: Engineering** **Length of Unit: 4 weeks**

Grade Level: 6

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Suggested Assessment	Possible Resources	Possible Labs
MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **MS-ETS1-2:** Evaluate competing design solutions using a systematic process to determine how well they meet criteria and constraints of the problem. **MS-ETS1-3:** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. **MS-ETS1-4:** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. **ETS1.A:** Defining and	I can explain the importance of knowing the criteria and constraints of an engineering challenge. I can use the engineering design process. I can collect data while testing my design. I can analyze data to determine the best solution to an engineering challenge. I can use the criteria and constraints to design a successful solution to an engineering challenge. I can explain each step of the engineering design process. I can work through each step of the engineering design process.	Criteria Constraints Engineering Analyze Steps in the Engineering Design Process Ask Imagine Plan Build/Create Improve	Application of the Engineering Design Process during an engineering challenge Engineering Design Quiz	PBS Kids: Design Squad www.pbskids.org/designsquad Teach Engineering http://www.teachengineering.org/ The Engineering Place http://www.engr.ncsu.edu/theengineeringplace/educators/k8plans.php NASA www.nasa.gov Engineering is Elementary www.eie.org	Tower Power Index cards Tape Aluminum Foil Boats Aluminum foil Pennies Egg/Football Headgear Eggs Junk (foam, bubble wrap, cardboard, cotton balls, string, paper, packing materials)

Delimiting Engineering Problems **ETS1.B**: Developing Possible Solutions **ETS1.C**: Optimizing the Design Solution					

Science Core Units

Course Title: Science 6 **Unit Title: Motion & Forces** **Length of Unit____4 weeks_____**

Grade Level: 6 **Page _1_ of _2__**

Standards & Benchmarks	Essential Questions, Learning Targets & "I can" Statements	Key Vocabulary	Suggested Assessment	Possible Resources	Possible Labs
MS-PS2-1: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. MS-PS2-2: Plan an investigation to provide evidence that the change in an objects motion depends on the sum of the forces on the object and the mass of the object. PS2.A: Forces and Motion • For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction. • The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. • All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared.	I can explain Newton's First Law of Motion. I can give examples of Newton's First Law of Motion. I can explain Newton's Second Law of Motion. I can give examples of Newton's Second Law of Motion. I can explain Newton's Third Law of Motion. I can give examples of Newton's Third Law of Motion. I can design a car utilizing Newton's Second Law of Motion. I can design an experiment to test Newton's Second Law of Motion.	Speed Velocity Acceleration Mass Inertia Momentum Force Net Force Balanced Forces Unbalanced Forces Newton's 1st Law of Motion Friction Newton's 2nd Law of Motion Weight Newton's 3rd Law of Motion	Newton's Laws Quiz Newton's Laws Book or Presentation (Relate each of Newton's Laws to sports) Force & Motion Test	MDOT TRAC Motion Module MDOT TRAC Maglev Module MDOT TRAC Maglev Module Glencoe Science Motion, Forces, and Energy textbook	MDOT TRAC Motion Module MDOT TRAC Maglev Module <u>1st Law Penny Experiments</u> Pennies Index Cards Plastic Cups Water Toy Cars Ramps Textbooks <u>2nd Law Car Experiments</u> Wooden Cars Ramps Weights Stopwatches Rulers <u>2nd Law Balloon Experiment</u> Balloons Drinking Straws String Tape Meterstick Stopwatch <u>3rd Law Car Experiments</u> Toy Cars Ramps Rulers <u>Maglev Experiments</u> Maglev Track Styrofoam blocks Styrofoam cutters

Engineering Design ETS1-1 ETS1-2 ETS1-3 ETS1-4 ETS1.A ETS1.B ETS1.C					Magnets Stopwatches