2023 8th Grade Curriculum

TIME: When and for how long will the content be taught	*Standard: List the exact standard as adopted or our locally adopted skill*	*Topic: Brief explanation of what you will be doing to teach this standard*	*Assessments: How and when students will be assessed*
1st Semester August-December			
Branches of Science: PHYSICAL Units: -Properties of Matter Chapters: -Chapter 1 Foundations of Chemistry -Chapter 2 Understanding the Atom -Chapter 3 The Periodic Table -Chapter 4 Elements and Chemical Bonds -Chapter 5 Chemical Reactions and Equations	ENGINEERING DESIGN ● 6-8.ETS 1-1, 6-8.ETS 1-2, 6-8.ETS 1-3, 6-8.ETS 1-4 6-8.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. 6-8.ETS1-.2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. 6-8.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. 6-8.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. MATTER AND ITS INTERACTIONS ● MS-PS 1-1, MS-PS 1-2, MS-PS 1-3, MS-PS 1-4, MS-PS 1-5, MS-PS 1-6 MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures. [Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.] MS-PS 1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. [Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.] MS-PS 1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. [Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.] MS-PS 1-4 Develop a model that predicts and describes	Engineering Design (Chapter NOS) The following are links that I use to teach these standards -SHOW WHAT YOU KNOW -SLIDE SHOW -DOODLE NOTES -READING PASSAGE -POWERPOINT -STUDENT NOTES -Scientific Method Homework and Study Guide -PRACTICE IDENTIFYING PARTS OF THE SCIENTIFIC METHOD AND GRAPHING -SCIENTIFIC SCENARIOS -Exploring the Scientific Method -Can You Write a Clear & Concise Lab Procedure? -Radish Lab or gummy bear lab MATTER AND ITS INTERACTIONS Chapter 1 Foundations of Chemistry -Classifying Matter --What is a substance --How atoms and elements are different --How mixtures are different from substance -Physical properties of matter --How physical properties are used to separate matter -Physical changes of matter --changes in states of matter are physical --conservation of mass -Chemical properties and changes of matter --signs of chemical changes --chemical equations and why are they useful --factors that affect the rate of chemical changes Chapter 2 Understanding the Atom -Parts of an Atom --size of an atom --change in the atomic model -Protons, Neutrons, Electrons --nuclear decay --how atoms can change when	Engineering Design At the end of each lesson and chapter Tests/Quizzes (Vocabulary & Content) ⬇

	changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. [Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawing and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.] MS-PS 1-5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. [Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.] MS-PS 1-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. [Clarification Statement: Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could involve chemical reactions such as dissolving ammonium chloride or calcium chloride.]	they've lost protons or neutrons or electrons Chapter 3 The Peridodic Table -Using the periodic table --how elements are arranged -Metals --what elements are metals --properties of metals -Nonmetals and metalloids -where nonmetals and metalloids are on the periodic table --properties of nonmetals and metalloids Chapter 4 Elements and Chemical Bonds -Electrons and energy levels --how electron energy is related to distance from the atom --why atoms lose, gain, or share electrons -Compounds, chemical formulas, and covalent bonds --how elements differ from the compounds they form --covalent bond properties --why water is polar -Ionic and metallic bonds --properites of ionic and metallic bonds --how all bonds are different Chapter 5 Chemical Reactions -Types of chemical reactions --how to recognize the type of chemical reaction by number or type of reactans or products --the different types of chemical reactions -Energy changes and chemical reactions --chemical reactions involve a change in energy --endothermic and exothermic reactions --factors affecting the rate of reaction	

2nd Semester January-May			
Branches of Science: Earth Life UNITS: Earth's Systems Exploring Life Chapters -Chapter 6 Weather (1-2) -Chapter 7 Climate (1-2) -Chapter 9 Environmental Impacts -Chapter 11 Reproduction of Organisms -Chapter 12 Genetics -Chapter 13 The Environment and Change Over Time	EARTH'S SYSTEMS ● MS-ESS2-4, MS-ESS2-5, MS-ESS2-6, MS-ESS2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. [Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.] MS-ESS2-5 Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. [Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).] 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. [Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.] Science and Engineering EARTH AND HUMAN ACTIVITY ● MS-ESS3-3, MS-ESS3-4, MS-ESS3-5 MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. [Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]	EARTH'S SYSTEMS Chapter 6 -Describing weather --variables used to describe weather --how weather is related to the water cycle -Weather Patterns --2 types of pressure systems (high & low) --what drives weather patterns --why it's useful to understand weather patterns --severe weather Chapter 7 Climate -Climate of Earth --why is one climate different from another? --how climates classified -Climate Cycles --how climate has varied over time --what causes seasons --how the ocean affects climate -Recent Climate Change --how humans can affect climate --how predictions for climate change are made Chapter 9 Environmental Impacts -People and the Environment --the relationship between resource availability and population growth --how daily activities impact the environment -Impacts on Land --consequences of using land as a resource --proper waste management helps prevent pollution --what actions help protect land -Impacts on Water --how humans use water as a resource --how pollution affects water quality --what actions prevent water pollution -Impacts on the atmosphere --types of air pollution --how global warming and the carbon cycle are related --how air pollution affects human health --what actions prevent air pollution	

	MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.] MS-ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over time. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.] FROM MOLECULES TO ORGANISMS:STRUCTURES AND PROCESSES ● MS-LS1-4, MS-LS1-5 MS-LS1-4 Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively. [Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.] MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. [Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in	FROM MOLECULES TO ORGANISMS:STRUCTURES AND PROCESSES Chapter 11 Reproduction of Organisms -Sexual Reproduction and Meiosis --why sexual reproduction is beneficial (genetic variation, selective breeding) --what is the order of meiosis --why meiosis is important -Asexual reproduction --why asexual reproduction is beneficial (fast to reproduce, no mate) --the types of asexual reproduction Chapter 12 Genetics -Mendel --why Mendel performed cross-pollination experiments --what Mendel concluded about inherited traits --how dominant and recessive factors interact -inheritance --what determines the expression of traits -Patterns of inheritance -DNA & genetics --what is DNA --what is the role of RNA in protein production	

	different conditions, and fish growing larger in large ponds than they do in small ponds.] HEREDITY:INHERITANCE & VARIATION OF TRAITS ● MS-LS3-1, MS-LS3-2 MS-LS3-1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. [Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.] MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. [Clarification Statement: Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause-and-effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation.] BIOLOGICAL EVOLUTION:UNITY & DIVERSITY ● MS-LS4-1, MS-LS4-2, MS-LS4-3, MS-LS4-4, MS-LS4-5, MS-LS4-6 MS-LS4-1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. [Clarification Statement: Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers.] MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. [Clarification Statement: Emphasis is on explanations of the evolutionary relationships among organisms in terms of similarity or differences of the gross appearance of anatomical structures.] MS-LS4-3 Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. [Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures.] MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. [Clarification Statement: Emphasis is on using simple probability statements and	--how do changes in the sequence of DNA affect traits Chapter 13 The Environment & Change Over Time -Fossil evidence of evolution --how fossils form --how scientists date fossils --how fossils are evidence of biological evolution -theory of evolution by natural selection --how Darwin's theory of evolution by natural selection explains how species change over time --how adaptations are evidence of natural selection -Biological evidence of evolution --evidence from living species supports the theory that species descended from other species over time --how earth's organisms are related	

	proportional reasoning to construct explanations.] MS-LS4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. [Clarification Statement: Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries.] MS-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. [Clarification Statement: Emphasis is on using mathematical models, probability statements, and proportional reasoning to support explanations of trends in changes to populations over time.]		