Revised: 7/18/2024
Board Approved:April 2019

8th Grade Science Yearly Standards

Units	Priority Standards
Unit 1 **Thermal Energy**	**6-8. PS1.A.4** **DEVELOP** a model that **DESCRIBES** 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 gasses to show that adding or removing thermal energy increases or decreases the kinetic energy of the particles until a change of state occurs. Examples of models could include drawings and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.} **6-8.PS3.A.3** **APPLY** scientific principles to **DESIGN, CONSTRUCT,** and **TEST** a device that either minimizes or maximizes thermal energy transfer. {Clarification Statement: Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup.} **6-8.PS3.A.4** **PLAN and CONDUCT** an investigation to **DETERMINE** the relationships among the energy transferred, the type of matter, the mass, and the change in the temperature of the sample. {Clarification Statement: Examples of experiments could include comparing final water temperatures after different masses of ice melted in the same volume of water with the same initial temperature, the temperature change of samples of different materials with the same mass as they cool or heat in the environment, or the same material with different masses when a specific amount of energy is added.} **6-8.PS3.B** **CONSTRUCT, USE, and PRESENT** arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. {Clarification Statement: Examples of empirical evidence used in arguments could include an inventory or other representation of the energy before and after the transfer in the form of temperature changes or motion of an object.} **6-8.PS4.A.2**

	DEVELOP and USE a model **to DESCRIBE** that waves are reflected, absorbed, or transmitted through various materials. {Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.} **6-8.ETS1.B.3** **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
Unit 2 Contact Forces	**6-8. PS2.A.1** **APPLY** physics principles to **DESIGN** a solution that minimizes the force of an object during a collision and DEVELOP an evaluation of the solution. **6-8. PS2.A.2** **PLAN and CONDUCT** an investigation to **PROVIDE** evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. {Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference and specifications of units. **6-8. PS3.A.1** **CONSTRUCT and INTERPRET** graphical displays of data to **DESCRIBE** the relationships of kinetic energy to the mass of an object and to the speed of an object. {Clarification Statement: Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bike at different speeds rolling different sizes of rocks downhill, and getting hit by a whiffle ball versus a tennis ball.} **6-8.ETS1.B.1** **EVALUATE** design solutions using a systematic process to **DETERMINE** how well they meet the criteria and constraints of the problem. **6-8.ETS1.B.2** **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.
Unit 3 **Forces at a Distance**	**6-8.PS2.B1** **ANALYZE** diagrams and **COLLECT** data to determine the factors that affect the strength of electric and magnetic forces. {Clarification Statement: Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet or the effect of increasing the number of strength of magnets on the speed of an electric motor.}

	6-8.PS2.B.3 **CONDUCT** an investigation and **EVALUATE** the experimental design to **PROVIDE** evidence that electric and magnetic fields exist between objects exerting forces on each other even though the objects are not in contact. {Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically-charged pith balls. Examples of investigations could include first-hand experiences and simulations.} **6-8.PS3.A.2** **DEVELOP** a model to **DESCRIBE** that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. {Clarification Statement: Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster car at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Example of models could include representations, diagrams, pictures, and written descriptions of systems
Unit 4 **Earth In Space**	**6-8.ESS1.A.1** **DEVELOP and USE** a model of the Earth-sun-moon system to explain the cyclic patterns of lunar phases and eclipses of the sun and moon. {Clarification Statement: Examples of models can be physical, graphical, or conceptual and should emphasize relative positions and distances} **6-8.ESS1.A.3** **DEVELOP and USE** a model to describe the role of gravity in the motions within galaxies and the solar system. {Clarification Statement: Emphasis for the model is on gravity as the force that holds together the solar system and Milky Way galaxy and controls orbital motions within them. Examples of models can be physical or conceptual. **6-8.ESS1.B** **ANALYZE and INTERPRET** data to determine scale properties of objects in the solar system. {Clarification Statement: Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features(such as volcanoes) and orbital radius. Examples of data include statistical information, drawings and photographs, and models} **PS4.A.2** **DEVELOP and USE** a model to **DESCRIBE** that waves are reflected, absorbed or transmitted through various materials. {Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations and written descriptions.}

Unit 5 **Natural Selection**	**6-8. LS1.B.1 CONSTRUCT** an explanation for how characteristic animal behaviors as well as specialized plant structures affect the probability of successful reproduction of animals and plants respectively. {Clarification Statement: Examples of animal behaviors that affect the probability of animal reproduction could include nest building to protect young from the 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 that affect the probability of plant reproduction 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.} **6-8.LS4.A ANALYZE and INTERPRET** evidence from the fossil record to infer patterns of environmental change resulting in extinction and changes to life forms throughout the history of the Earth. {Clarification Statement: Examples of evidence include sets of fossils that indicate an environment, anatomical structures that indicate the function of an organism in the environment, and fossilized tracks that indicate behavior of organisms} **6-8.LS4.B.1 CONSTRUCT** an explanation based on evidence that describes how genetic variations of traits in a population increase some individual's probability of surviving and reproducing in a specific environment. {Clarification Statement: Emphasis is on using simple probability statements and proportional reasoning to construct explanation **6-8.LS4.C INTERPRET** graphical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time **NGSS Standards in Unit that MO does not have:** 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} LS4-3 ANALYZE displays of pictorial data to compare patterns of similarities in the embryological developments 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 macroscopic appearance of diagrams or pictures. Assessment Boundary: Assessment of comparison is limited to gross appearance of anatomical structures in embryo development}