Platte County School District #2

Science Standards

6th Grade

2017-2018 School Year

Quarter 1: Engineering, Technology, and Applications of Science

ESTABLISHED STANDARDS

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 the 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.

Quarter 2: Part A - Structures and Properties of Matter

ESTABLISHED GOALS

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. Assessment boundary: Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete description of all individual atoms in a complex molecule or extended structure.

MS-PS1-3: 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. Assessment boundary: Assessment is limited to qualitative information.

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. 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.

Quarter 2: Part B - Chemical Reactions

MS-PS1-2: 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. Assessment boundary: Assessment is limited to analysis of the following properties: Density, melting point, boiling point, solubility, flammability, and odor.

MS-PS1-5: 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. Assessment boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.

MS-PS1-6: 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.Assessment boundary: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.

Quarter 3: Forces and Interactions

MS-PS2-1: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. Clarification statement: Examples of practical problems could include the impact of collisions between two cars, between a car and a stationary object, and between a meteor and a space vehicle. Assessment boundary: Assessment is limited to vertical or horizontal interactions in one dimension.

MS-PS2-2: Plan 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 specification of units. Assessment boundary: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.

MS-PS2-3: Ask questions about 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 or strength of magnets on the speed of an electric motor. Assessment boundary: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.

Quarter 4: Energy Part A – Potential and Kinetic Energy

ESTABLISHED GOALS

MS-PS3-1: 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 bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a whiffle ball versus a tennis ball.]

MS-PS3-2: 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 cart 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. Examples of models could include representations, diagrams, pictures, and written descriptions of systems.] [Assessment boundary: Assessment is limited to two objects and electric, magnetic, and gravitational interactions.]

MS-PS3-5: 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 change or motion of object.] [Assessment boundary: Assessment does not include calculations of energy.]

Quarter 4: Energy Part B - Waves and Electromagnetic Radiation

MS-PS4-2: 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. Assessment boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.