Moon Area School District Curriculum Map

Course: Physical Science
Grade Level: 11/12
Content Area: Science
Frequency: Full-Year Course

Big Ideas

1. Substructure of atoms provide mechanistic explanations of properties of substances.
2. The periodic table can be used as a tool to explain and predict the properties of elements.
3. Biological and geophysical phenomena can be explained by knowledge of chemical reactions.
4. Forces and interactions support students' understanding of motion.
5. Energy at both the macroscopic and the atomic scale can be accounted for as either, motions of particles, or energy associated with the configuration of particles.
6. Core physical science ideas can be demonstrated by developing and using models, conducting investigations, analyzing and interpreting data, using mathematical and computational thinking, and constructing explanations.

Essential Questions

7. How can one explain the structure and properties of matter?
8. How do substances combine or change to make new substances?
9. How does one characterize and explain reactions and make predictions about them?
10. How can one explain and predict interactions (motion) between objects and within systems of objects?
11. How is energy transferred and conserved?

Primary Resource(s) & Technology:
Textbook Series, Lab Activities
Microsoft Teams, Promethean Boards, Student Laptops/iPads

Pennsylvania and/or focus standards referenced at:
www.pdesas.org
www.education.pa.gov

Big Ideas/EQs	Focus Standard(s)	Assessed Competencies (Key content and skills)	Timeline
THE NATURE OF SCIENCE 5	3.2.10.A 3.2.10.C 3.2.10.D	Identify the steps of the scientific method Identify lab safety procedures Name prefixes used in SI	August - September 2 weeks

Scientific Method Lab Safety Standards and Measurement Graphs		Identify units used for length, mass, volume, density, time, and temperature Identify three types of graphs Determine dependent and independent variables Analyze data using graphs	
CLASSIFICATION OF MATTER 1, 5, 6, 7 Composition of Matter Properties of Matter	3.4.10.A 3.7.10.B 3.2.10.A 3.2.10.C	Define pure and impure substances Explain the differences between elements and compounds Identify differences and similarities between elements, compounds, and mixtures Identify substances using physical properties Compare and contrast physical and chemical changes Identify chemical changes Determine how the law of conservation of mass applies to chemical changes	Sept. 3 weeks
STATES OF MATTER 1, 3, 5, 6, 9 Kinetic Theory Properties of Fluids Behavior of Gases	3.1.10.B 3.1.10.E 3.2.10.A 3.4.10.A 3.4.10.B 3.4.10.D	Explain the kinetic theory of matter Identify the four states of matter Describe particle movement in the four states of matter Describe melting point and boiling points Explain particle behavior at melting and boiling points Define thermal expansion and where it can be observed daily Define Archimedes' principle, with example Define Pascal's principle, give example Define Bernoulli's principle, give example Define pressure and the unit used for measurement Explain Boyle's law Solve Boyle's law equations Explain Charles' law Solve Charles' law equations	Oct. 3 weeks

PROPERTIES OF ATOMS AND THE PERIODIC TABLE 1, 2, 5, 6 Structure of the Atom Masses of Atoms The Periodic Table	3.4.10.A 3.4.10.D	Name and list symbols of common elements Identify quarks and all other subatomic particles Describe the electron cloud model of an atom Compute the atomic mass of an element Identify the components of an isotope Explain the composition of the periodic table Use the periodic table to obtain information about elements	Oct.-Nov. 3 weeks
ELEMENTS AND THEIR PROPERTIES 1, 2, 6 Metals Nonmetals Mixed Groups	3.4.10.A 3.4.10.D	Compare and contrast metals, nonmetals, and metalloids Describe where each are found on the periodic table Describe the properties of metals, nonmetals, and metalloids	Nov. 2 weeks
CHEMICAL BONDS 1, 2, 3, 5, 6, 7, 8 Bond Stability Types of Bonds Writing formula and ming compounds	3.4.10.A 3.4.10.D	Describe the differences between compounds and their component elements Draw electron dot diagrams Explain what a chemical formula represents Describe ionic and covalent bonds Explain the differences between ionic and covalent bonds Distinguish the difference between polar and non-polar covalent bonds Determine oxidation numbers for elements Write formulas and names for ionic compounds Write formulas and names for covalent molecules	Nov.-Dec. 3 weeks
CHEMICAL REACTIONS 1, 2, 3, 5, 6, 7, 8 Chemical Changes Chemical Equations	3.4.10.A 3.4.10.B 3.4.10.D	Identify the reactants and products in a chemical reaction Determine how a chemical reaction satisfies the law of conservation of mass Determine how to express chemical changes using equations	Dec. -Jan. 3 weeks

Classifying Rxns Chemical Reactions and Energy		Determine how to write a balanced equation Classify chemical reactions Identify the source of energy changes in a chemical reaction Define exergonic and endergonic reactions Identify the effects of a catalyst or inhibitor on the rate of a chemical reaction	
MOTION 4, 5, 6, 9, 10 Describing Motion Acceleration Motion and Forces	3.1.10.B 3.4.10.C	Distinguish between distance and displacement Explain the difference between speed and velocity Interpret motion graphs Identify how acceleration, time, and velocity are related Explain how positive and negative acceleration affect motion Calculate the acceleration of an object Explain how force and motion are related Describe inertia and Newton's first law of motion Identify forces present during a car crash	Jan.- Feb. 4 weeks
FORCES 4, 5, 6, 9, 10 Newton's Second Law Gravity The Third Law of Motion	3.1.10.B 3.4.10.C	Apply Newton's second law of motion Describe three different types of friction Observe the effects of air resistance on falling objects Describe the gravitational force Distinguish between mass and weight Compare circular and straight-line motion Apply Newton's third law of motion Identify action and reaction forces Calculate momentum	Feb.-March 4 weeks
ENERGY 4, 5, 6, 9, 10 The Nature of Energy	3.2.10.C 3.2.10.D	Distinguish between kinetic and potential energy Calculate kinetic energy Describe different forms of potential energy	March-April 4 weeks

Conservation of Energy	3.4.10.C 3.4.10.D	Calculate gravitational potential energy Describe how energy can be transformed from one form to another Explain how the mechanic energy of a system is the sum of the kinetic and potential energy Discuss the law of conservation of energy	
WORK and MACHINES 4, 5, 6, 9, 10 Work Using Machines Simple Machines	3.2.10.C 3.2.10.D 3.4.10.C 3.2.10.A 3.2.10.B	Explain the meaning of work Describe how work and energy are related Calculate work and power Explain how simple machines make doing work easier Calculate the mechanical advantage of a machine Calculate the efficiency of a machine Describe six types of simple machines Explain how the different types of simple machines make doing work easier Calculate the ideal mechanical advantage of the different types of machines	May 4 weeks