SCIENCE - PHYSICAL SCIENCE

PS.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- a) chemicals and equipment are used safely;
- b) length, mass, volume, density, temperature, weight, and force are accurately measured;
- c) conversions are made among metric units, applying appropriate prefixes;
- d) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, probeware, and spring scales are used to gather data;
- e) numbers are expressed in scientific notation where appropriate;
- f) independent and dependent variables, constants, controls, and repeated trials are identified;
- g) data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted;
- h) data tables for descriptive statistics showing specific measures of central tendency, the range of the data set, and the number of repeated trials are constructed and interpreted;
- i) frequency distributions, scatterplots, line plots, and histograms are constructed and interpreted;
- j) valid conclusions are made after analyzing data;
- k) research methods are used to investigate practical problems and questions;
- l) experimental results are presented in appropriate written form;
- m) models and simulations are constructed and used to illustrate and explain phenomena; and
- n) current applications of physical science concepts are used.

PS.2 The student will investigate and understand the nature of matter. Key concepts include
- a) the particle theory of matter;
- b) elements, compounds, mixtures, acids, bases, and salts;
- c) solids, liquids, and gases;
- d) physical properties;
- e) chemical properties; and
- f) characteristics of types of matter based on physical and chemical properties.

PS.3 The student will investigate and understand the modern and historical models of atomic structure. Key concepts include
- a) the contributions of Dalton, Thomson, Rutherford, and Bohr in understanding the atom; and
- b) the modern model of atomic structure.

PS.4 The student will investigate and understand the organization and use of the periodic table of elements to obtain information. Key concepts include
- a) symbols, atomic numbers, atomic mass, chemical families (groups), and periods;
- b) classification of elements as metals, metalloids, and nonmetals; and
- c) formation of compounds through ionic and covalent bonding.

PS.5 The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy. Key concepts include
- a) physical changes;
- b) chemical changes; and
- c) nuclear reactions.

PS.6 The student will investigate and understand forms of energy and how energy is transferred and transformed. Key concepts include
- a) potential and kinetic energy; and
- b) mechanical, chemical, electrical, thermal, radiant, and nuclear energy.

PS.7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. Key concepts include
- a) Celsius and Kelvin temperature scales and absolute zero;
- b) phase change, freezing point, melting point, boiling point, vaporization, and condensation;
- c) conduction, convection, and radiation; and
- d) applications of thermal energy transfer.

PS.8 The student will investigate and understand the characteristics of sound waves. Key concepts include
- a) wavelength, frequency, speed, amplitude, rarefaction, and compression;
- b) resonance;
- c) the nature of compression waves; and
- d) technological applications of sound.

PS.9 The student will investigate and understand the characteristics of transverse waves. Key concepts include
- a) wavelength, frequency, speed, amplitude, crest, and trough;
- b) the wave behavior of light;
- c) images formed by lenses and mirrors;
- d) the electromagnetic spectrum; and
- e) technological applications of light.

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SCIENCE - PHYSICAL SCIENCE

PS.10 The student will investigate and understand the scientific principles of work, force, and motion. Key concepts include

a) speed, velocity, and acceleration;
b) Newton's laws of motion;
c) work, force, mechanical advantage, efficiency, and power; and
d) technological applications of work, force, and motion.

PS.11 The student will investigate and understand basic principles of electricity and magnetism. Key concepts include

a) static electricity, current electricity, and circuits;
b) relationship between a magnetic field and an electric current;
c) electromagnets, motors, and generators and their uses; and
d) conductors, semiconductors, and insulators.