

Physical Science Georgia Performance Standards

SPS1. Students will investigate our current understanding of the atom.

- a. Examine the structure of the atom in terms of proton, electron, and neutron locations. atomic mass and atomic number.
 - atoms with different numbers of neutrons (isotopes).
 - explain the relationship of the proton number to the element's identity.
- b. Compare and contrast ionic and covalent bonds in terms of electron movement.

SPS2. Students will explore the nature of matter, its classifications, and its system for naming types of matter.

- a. Calculate density when given a means to determine a substance's mass and volume.
- b. Predict formulas for stable binary ionic compounds based on balance of charges.
- c. Use IUPAC nomenclature for transition between chemical names and chemical formulas of
 - binary ionic compounds (containing representative elements).
 - binary covalent compounds (i.e. carbon dioxide, carbon tetrachloride).
- d. Demonstrate the Law of Conservation of Matter in a chemical reaction.
- e. Apply the Law of Conservation of Matter by balancing the following types of chemical equations: Synthesis, Decomposition, Single Replacement, and Double Replacement

SPS3. Students will distinguish the characteristics and components of radioactivity.

- a. Differentiate among alpha and beta particles and gamma radiation.
- b. Differentiate between fission and fusion.
- c. Explain the process half-life as related to radioactive decay.
- d. Describe nuclear energy, its practical application as an alternative energy source, and its potential problems.

SPS4. Students will investigate the arrangement of the Periodic Table.

- a. Determine the trends of the following:
 - Number of valence electrons
 - Types of ions formed by representative elements
 - Location of metals, nonmetals, and metalloids
 - Phases at room temperature
- b. Use the Periodic Table to predict the above properties for representative elements.

SPS5. Students will compare and contrast the phases of matter as they relate to atomic and molecular motion.

- a. Compare and contrast the atomic/molecular motion of solids, liquids, gases and plasmas.
- b. Relate temperature, pressure, and volume of gases to the behavior of gases.

SPS6. Students will investigate the properties of solutions.

- a. Describe solutions in terms of solute/solvent, conductivity, and concentration.
- b. Observe factors affecting the rate a solute dissolves in a specific solvent.
- c. Demonstrate that solubility is related to temperature by constructing a solubility curve.
- d. Compare and contrast the components and properties of acids and bases.
- e. Determine whether common household substances are acidic, basic, or neutral.

SPS7. Students will relate transformations and flow of energy within a system.

- a. Identify energy transformations within a system (e.g. lighting of a match).
- b. Investigate molecular motion as it relates to thermal energy changes in terms of conduction, convection, and radiation.
- c. Determine the heat capacity of a substance using mass, specific heat, and temperature.
- d. Explain the flow of energy in phase changes through the use of a phase diagram.

SPS8. Students will determine relationships among force, mass, and motion.

- a. Calculate velocity and acceleration.
- b. Apply Newton's three laws to everyday situations by explaining the following:
Inertia, Relationship between force, mass and acceleration, and Equal and opposite forces.
- c. Relate falling objects to gravitational force
- d. Explain the difference in mass and weight.
- e. Calculate amounts of work and mechanical advantage using simple machines.

SPS9. Students will investigate the properties of waves.

- a. Recognize that all waves transfer energy.
- b. Relate frequency and wavelength to the energy of different types of electromagnetic waves and mechanical waves.
- c. Compare and contrast the characteristics of electromagnetic and mechanical (sound) waves.
- d. Investigate the phenomena of reflection, refraction, interference, and diffraction.
- e. Relate the speed of sound to different mediums.
- f. Explain the Doppler Effect in terms of everyday interactions.

SPS10. Students will investigate the properties of electricity and magnetism.

- a. Investigate static electricity in terms of friction, induction, and conduction.
- b. Explain the flow of electrons in terms of
 - alternating and direct current.
 - the relationship among voltage, resistance and current.
 - simple series and parallel circuits.
- c. Investigate applications of magnetism and/or its relationship to the movement of electrical charge as it relates to: electromagnets, simple motors, and permanent magnets.