

**Georgia Science Grades 9-12
Contents Standards Mapping**

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PHYSICAL SCIENCE	Boardworks High School Chemistry Presentations
SPS1. Students will investigate our current understanding of the atom.	
a. Examine the structure of the atom in terms of:	
i. Proton, electron, and neutron locations.	Atomic Structure
ii. Atomic mass and atomic number.	Atomic Number and Mass Number
iii. Atoms with different numbers of neutrons (isotopes).	Isotopes
iv. Explain the relationship of the proton number to the element's identity.	Atomic Number and Mass Number
b. Compare and contrast ionic and covalent bonds in terms of electron movement.	Comparing Bonding Covalent Bonding Ionic Bonding
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.	Compound Ions Ionic Bonding
c. Use IUPAC nomenclature for transition between chemical names and chemical formulas of:	–
i. binary ionic compounds (containing representative elements).	Naming Compounds
ii. binary covalent compounds (i.e. carbon dioxide, carbon tetrachloride).	Naming Compounds
d. Demonstrate the Law of Conservation of Matter in a chemical reaction.	Conservation of Mass
e. Apply the Law of Conservation of Matter by balancing the following types of chemical equations:	–
i. Synthesis	Reacting Masses
ii. Decomposition	Thermal Decomposition
iii. Single Replacement	Redox Reactions
iv. Double Replacement	Neutralization
SPS3. Students will distinguish the characteristics and components of radioactivity.	
a. Differentiate among alpha and beta particles and gamma radiation.	Radioactivity Types of Radiation
b. Differentiate between fission and fusion.	Nuclear Fission Nuclear Fusion
c. Explain the process half-life as related to radioactive decay.	Half-life

d. Describe nuclear energy, its practical application as an alternative energy source, and its potential problems.	Chain Reactions Nuclear Fission Nuclear Waste
SPS4. Students will investigate the arrangement of the Periodic Table.	
a. Determine the trends of the following:	
i. Number of valence electrons	Electron Structure and the Periodic Table
ii. Types of ions formed by representative elements	Formation of Ions
iii. Location of metals, nonmetals, and metalloids	Electron Structure and the Periodic Table
iv. Phases at room temperature	–
b. Use the Periodic Table to predict the above properties for representative elements.	Electron Structure and the Periodic Table
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.	Changing State Particles in Action
b. Relate temperature, pressure, and volume of gases to the behavior of gases.	Concentration, Pressure and Reaction Rates Temperature and Reaction Rates
SPS6. Students will investigate the properties of solutions.	
a. Describe solutions in terms of:	
i. Solute/solvent	Solutions Solubility
ii. Conductivity	–
iii. Concentration	Solubility
b. Observe factors affecting the rate a solute dissolves in a specific solvent.	Solutions Solubility
c. Demonstrate that solubility is related to temperature by constructing a solubility curve.	Solubility
d. Compare and contrast the components and properties of acids and bases.	Neutralization Properties of Acids and Alkalis
e. Determine whether common household substances are acidic, basic, or neutral.	Neutralization pH and Indicators
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).	Energy Transfers
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.	See Boardworks High School Physics for relevant presentations.
b. Apply Newton's three laws to everyday situations by explaining the following:	
i. Inertia	
ii. Relationship between force, mass and acceleration	
iii. 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.	See Boardworks High School Physics for relevant presentations.
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 conduction:	See Boardworks High School Physics for relevant presentations.
i. Friction	
ii. Induction	
iii. Conduction	
b. Explain the flow of electrons in terms of:	
i. Alternating and direct current.	
ii. The relationship among voltage, resistance and current.	
iii. Simple series and parallel circuits.	
c. Investigate applications of magnetism and/or its relationship to the movement of electrical charge as it relates to:	
i. Electromagnets	
ii. Simple motors	
iii. Permanent magnets	