

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

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PHYSICAL SCIENCE	Boardworks High School Physics Presentation
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.	Structure of the Atom
ii. Atomic mass and atomic number.	See Boardworks High School Chemistry for relevant presentations.
iii. Atoms with different numbers of neutrons (isotopes).	
iv. 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.	See Boardworks High School Chemistry for relevant presentations.
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:	
i. binary ionic compounds (containing representative elements).	
ii. 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:	
i. Synthesis	
ii. Decomposition	
iii. Single Replacement	
iv. Double Replacement	
SPS3. Students will distinguish the characteristics and components of radioactivity.	
a. Differentiate among alpha and beta particles and gamma radiation.	Gamma Rays 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.	Radioactive Dating
d. Describe nuclear energy, its practical application as an alternative energy source, and its potential problems.	Nuclear Fission

SPS4. Students will investigate the arrangement of the Periodic Table.	
a. Determine the trends of the following:	
<i>i. Number of valence electrons</i>	See Boardworks High School Chemistry for relevant presentations.
<i>ii. Types of ions formed by representative elements</i>	
<i>iii. Location of metals, nonmetals, and metalloids</i>	
<i>iv. Phases at room temperature</i>	
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.	Changing State Particles in Action
<i>b. Relate temperature, pressure, and volume of gases to the behavior of gases.</i>	–
SPS6. Students will investigate the properties of solutions.	
a. Describe solutions in terms of:	
<i>i. Solute/solvent</i>	See Boardworks High School Chemistry for relevant presentations.
<i>ii. Conductivity</i>	
<i>iii. Concentration</i>	
<i>b. Observe factors affecting the rate a solute dissolves in a specific solvent.</i>	
<i>c. Demonstrate that solubility is related to temperature by constructing a solubility curve.</i>	
<i>d. Compare and contrast the components and properties of acids and bases.</i>	
<i>e. Determine whether common household substances are acidic, basic, or neutral.</i>	
SPS7. Students will relate transformations and flow of energy within a system.	
<i>a. Identify energy transformations within a system (e.g. lighting of a match).</i>	–
b. Investigate molecular motion as it relates to thermal energy changes in terms of conduction, convection, and radiation.	Conduction and Convection Radiation
<i>c. Determine the heat capacity of a substance using mass, specific heat, and temperature.</i>	–
<i>d. Explain the flow of energy in phase changes through the use of a phase diagram.</i>	–
SPS8. Students will determine relationships among force, mass, and motion.	
a. Calculate velocity and acceleration.	Acceleration Speed and Velocity
b. Apply Newton's three laws to everyday situations by explaining the following:	
<i>i. Inertia</i>	Newton's First Law
<i>ii. Relationship between force, mass and acceleration</i>	Newton's Second Law
<i>iii. Equal and opposite forces</i>	Newton's Third Law
c. Relate falling objects to gravitational force	Gravitational and Potential Energy

d. Explain the difference in mass and weight.	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.	Waves
b. Relate frequency and wavelength to the energy of different types of electromagnetic waves and mechanical waves.	Electromagnetic Waves Longitudinal Waves Transverse Waves
c. Compare and contrast the characteristics of electromagnetic and mechanical (sound) waves.	Waves
d. Investigate the phenomena of reflection, refraction, interference, and diffraction.	Diffraction Interference Reflection Refraction
e. Relate the speed of sound to different mediums.	–
f. Explain the Doppler Effect in terms of everyday interactions.	Doppler Effect
SPS10. Students will investigate the properties of electricity and magnetism.	
a. Investigate static electricity in terms of friction induction conduction:	
i. Friction	Static Electricity
ii. Induction	–
iii. Conduction	–
b. Explain the flow of electrons in terms of:	–
i. Alternating and direct current.	Types of Current
ii. The relationship among voltage, resistance and current.	Current and Potential Difference Current, Voltage and Resistance
iii. Simple series and parallel circuits.	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	Magnetism, Current and Force
ii. Simple motors	Motors
iii. Permanent magnets	–