

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

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PHYSICS	Boardworks High School Physics Presentation
SP1. Students will analyze the relationships between force, mass, gravity, and the motion of objects.	
a. Calculate average velocity, instantaneous velocity, and acceleration in a given frame of reference.	Acceleration Speed and Velocity
b. Compare and contrast scalar and vector quantities.	Momentum Speed and Velocity Vectors and Scalars
c. Compare graphically and algebraically the relationships among position, velocity, acceleration, and time.	Acceleration Displacement, Velocity and Acceleration Speed and Velocity
d. Measure and calculate the magnitude of frictional forces and Newton's three Laws of Motion.	Friction Newton's First Law Newton's Second Law Newton's Third Law
e. Measure and calculate the magnitude of gravitational forces.	Gravity Gravitational and Potential Energy
f. Measure and calculate two-dimensional motion (projectile and circular) by using component vectors.	Circular Motion Projectiles Vectors and Scalars
g. Measure and calculate centripetal force.	Circular Motion
<i>h. Determine the conditions required to maintain a body in a state of static equilibrium.</i>	–
SP2. Students will evaluate the significance of energy in understanding the structure of matter and the universe.	
a. Relate the energy produced through fission and fusion by stars as a driving force in the universe.	Nuclear Fission Nuclear Fusion
b. Explain how the instability of radioactive isotopes results in spontaneous nuclear reactions.	Radioactivity Structure of the Atom
SP3. Students will evaluate the forms and transformations of energy.	

a. Analyze, evaluate, and apply the principle of conservation of energy and measure the components of work-energy theorem by: i. describing total energy in a closed system ii. identifying different types of potential energy. iii. calculating kinetic energy given mass and velocity. iv. relating transformations between potential and kinetic energy.	Gravitational and Potential Energy Kinetic Energy
b. Explain the relationship between matter and energy.	Nuclear Fission
c. Measure and calculate the vector nature of momentum.	Vectors and Scalars
d. <i>Compare and contrast elastic and inelastic collisions.</i>	–
e. Demonstrate the factors required to produce a change in momentum.	Changes in Momentum
f. <i>Analyze the relationship between temperature, internal energy, and work done in a physical system.</i>	–
g. Analyze and measure power.	Power
SP4. Students will analyze the properties and applications of waves.	
a. Explain the processes that results in the production and energy transfer of electromagnetic waves.	Electromagnetic Waves
b. Experimentally determine the behavior of waves in various media in terms of reflection, refraction, and diffraction of waves.	Diffraction Reflection Refraction Waves
c. Explain the relationship between the phenomena of interference and the principle of superposition.	Superposition and Interference
d. <i>Demonstrate the transfer of energy through different mediums by mechanical waves.</i>	–
e. Determine the location and nature of images formed by the reflection or refraction of light.	Lenses Refraction
SP5. Students will evaluate relationships between electrical and magnetic forces.	
a. Describe the transformation of mechanical energy into electrical energy and the transmission of electrical energy.	Energy Transfers
b. Determine the relationship among potential difference, current, and resistance in a direct current circuit.	Current and Potential Difference Current, Voltage and Resistance
c. Determine equivalent resistances in series and parallel circuits.	Factors Affecting Resistance 2 Series and Parallel Circuits
d. Determine the relationship between moving electric charges and magnetic fields.	Magnetism, Current and Force
SP6. The student will describe the corrections to Newtonian physics given by quantum mechanics and relativity when matter is very small, moving fast compared to the speed of light, or very large.	
a. Explain matter as a particle and as a wave.	Wave Properties of Particles
b. <i>Describe the Uncertainty Principle.</i>	–

<i>c. Explain the differences in time, space, and mass measurements by two observers when one is in a frame of reference moving at constant velocity parallel to one of the coordinate axes of the other observer's frame of reference if the constant velocity is greater than one tenth the speed of light.</i>	–
<i>d. Describe the gravitational field surrounding a large mass and its effect on a ray of light.</i>	–