

**Louisiana Science Grades 9–12  
Grade Level Expectation Mapping**

© Boardworks 2010

Physics	Boardworks High School Physics Presentation
<b>Forces and Motion</b>	
6. Explain the role of strong nuclear forces and why they are the strongest of all forces (PS-H-E1)	–
7. Relate gravitational force to mass and distance (PS-H-E1)	Gravitational and Potential Energy
8. Compare and calculate electrostatic forces acting within and between atoms to the gravitational forces acting between atoms (PS-H-E1)	–
9. Describe and measure motion in terms of position, displacement time, and the derived quantities of velocity and acceleration (PS-H-E2)	Displacement, Velocity and Acceleration Speed and Velocity
10. Determine constant velocity and uniform acceleration mathematically and graphically (PS-H-E2)	Displacement, Velocity and Acceleration
11. Plot and interpret displacement-time and velocity-time graphs and explain how these two types of graphs are interrelated (PS-H-E2)	Displacement, Velocity and Acceleration
12. Model scalar and vector quantities (PS-H-E2)	Vectors and Scalars
	Circular Motion Projectiles
13. Solve for missing variables in kinematic equations relating to actual situations (PS-HE2)	Displacement, Velocity and Acceleration
14. Add and resolve vectors graphically and mathematically to determine resultant/equilibrant of concurrent force vectors (PS-H-E3)	Displacement, Velocity and Acceleration
15. Calculate centripetal force and acceleration in circular motion (PS-H-E3)	Circular Motion
16. Analyze circular motion to solve problems relating to angular velocity, acceleration, momentum, and torque (PS-H-E3)	Circular Motion
17. Analyze simple harmonic motion (PS-H-E3)	–
18. Demonstrate the independence of perpendicular components in projectile motion and predict the optimum angles and velocities of projectiles (PS-H-E3)	Projectile Motion
<b>Energy</b>	
19. Explain quantitatively the conversion between kinetic and potential energy for objects in motion (e.g., roller coaster, pendulum) (PS-H-F1)	Conservation of Energy
20. Calculate the mechanical advantage and efficiency of simple machines and explain the loss of efficiency using the dynamics of the machines (PS-H-F1)	–
21. Explain and calculate the conversion of one form of energy to another (e.g., chemical to thermal, thermal to mechanical, magnetic to electrical) (PS-H-F1)	Energy Transfers Gravitational and Potential Energy Kinetic Energy
22. Analyze energy transformations using the law of conservation of energy (PS-H-F2)	Conservation of Energy

23. Apply the law of conservation of momentum to collisions in one and two dimensions, including angular momentum (PS-H-F2)	Conservation of Momentum
24. Apply the concept of momentum to actual situations with different masses and velocities (PS-H-F2)	Momentum
<b>Interactions of Energy and Matter</b>	
25. Determine the relationships among amplitude, wavelength, frequency, period, and velocity in different media (PS-H-G1)	Longitudinal Waves Transverse Waves Waves
26. Evaluate how different media affect the properties of reflection, refraction, diffraction, polarization, and interference (PS-H-G1)	Diffraction Polarization Refraction Reflection Interference Superposition and Interference
27. Investigate and construct diagrams to illustrate the laws of reflection and refraction (PS-H-G1)	Refraction Reflection
28. Draw constructive and destructive interference patterns and explain how the principle of superposition applies to wave propagation (PS-H-G1)	Superposition and Interference
29. Describe observed electrostatic phenomena, calculate Coulomb's law, and test charge pole, electric field, and magnetic field (PS-H-G2)	Static Electricity
30. Construct basic electric circuits and solve problems involving voltage, current, resistance, power, and energy (PS-H-G2)	Calculating Resistance Circuit Diagrams Current and Potential Difference Current, Voltage and Resistance Electrical Power Factors Affecting Resistance 1 Factors Affecting Resistance 2 Series and Parallel Circuits
31. Describe the relationship of electricity, magnetism, and inductance as aspects of a single electromagnetic force (PS-H-G2)	Magnetism, Current and Force Motors
32. Compare properties of electromagnetic and mechanical waves (PS-H-G3)	Electromagnetic Waves Longitudinal Waves Transverse Waves Waves
33. Solve problems related to sound and light in different media (PS-H-G3)	Sound
34. Compare the properties of the electromagnetic spectrum as a wave and as a particle (PS-H-G3)	–
35. Analyze the Doppler effect of a moving wave source (PS-H-G3)	Doppler Effect