



Wilton High School

Physics 2

Students in Physics 2 study the basics of mechanics and optics. Within mechanics, the topics of kinematics, dynamics, Newton's Laws of Motion and conservation principles (momentum & energy) are investigated. Finally waves (sound and light) as well as the interaction of light and its interactions with materials are covered. Students are expected to develop factual knowledge of all topics as well as create a conceptual framework to connect ideas. Mathematical analysis is limited to algebraic, graphical, geometric and trigonometric principles. A significant amount of class time is devoted to experimental investigation consisting of laboratory design, data collection and analysis with a focus on developing mathematical models of observed phenomenon.

Units/Topics	Students will know:	Students will be able to:
Introduction	• How to use Digital tools to model physical phenomenon	• Create a spreadsheet to analyze data • Graph data to develop a mathematical model
Describing Motion: Kinematics in One dimension	• How to identify the fundamental quantities of kinematics: • How to analyze graphs to discover relationships between physical quantities	• Differentiate between distance and displacement, velocity and speed, average and instantaneous velocity • Determine instantaneous and average velocity from a position-time graph, acceleration from a velocity-time graph
Vectors	• How vectors play a role in understanding	• Differentiate between vector and scalar

	physical phenomenon	quantities • Add two or more vectors graphically and mathematically
Kinematics in Two Dimensions	• How motion in two directions can be analyzed as two independent one dimensional motions	• Relate two-dimensional motion to a projectile • Utilize vectors, kinematic equations and trigonometry to solve projectile motion problems

Motion and Force: Dynamics	• How to relate mass and inertia (Newton's First Law) • How to relate Force to Mass and Acceleration (Newton's 2nd Law) • How every action force has an equal and opposite[action/reaction] force. (Third Law)	• Differentiate between mass and weight • Draw Free-Body-Diagrams • Work with multiple forces to solve Second Law problems on both level and inclined surfaces, with and without friction
Work and Energy	• The mathematical relationships between work, Kinetic Energy and power	• Explain how work transfers energy from one object to another • Utilize the Work-Kinetic Energy Theorem and Conservation of Energy to solve problems • Calculate the power generated by a person climbing a set stairs
Linear Momentum	• The relationship between impulse and change of momentum of an object • The difference between elastic & inelastic collisions and explosions	• Differentiate between impulse and momentum • Explain how an impulse produces a change in momentum • Utilize Conservation of momentum to solve collision problems (elastic, inelastic, explosion)

Circular Motion: Gravitation	• How forces and acceleration relate to an object in uniform circular motion • How to relate the gravitational force between any two objects to Newton's Law of Universal Gravitation	• Solve Uniform motion problems with motion in both horizontal and vertical planes • Solve problems involving forces, masses, and the distance between any two objects with a focus on celestial bodies
Light: Geometric Optics	• The difference between various types of waves • How light waves interact with reflective and opaque materials	• Use ray diagrams to find the position of an image produced by converging and diverging mirrors and lenses • Solve problems of image location and magnification using the mirror and the thin lens equations