

Physics Standards and Benchmarks

Standard 1: Understands and applies principles of scientific inquiry

*Power Benchmarks: Identifies questions and concepts that guide science investigations
Uses technology and mathematics to improve investigations and communications
Formulates and revises scientific explanations and models using logic and evidence
Recognizes and analyzes alternative explanations and models*

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
A. Formulates and revises scientific explanations and models	<ul style="list-style-type: none"> • scientific explanation • scientific model • data • within tolerance • scientific method 	<ul style="list-style-type: none"> • Knows scientific explanations and models are based on data • Know new data may lead to the modification of scientific explanations and models 	<ul style="list-style-type: none"> • Analyzes data with respect to scientific explanations and models (ACT, SAT, ITED, AP PHYSICS) • Adjusts scientific explanations and models based on data (ACT, SAT, ITED, AP PHYSICS) 	Physics Curriculum Guide Emphasized throughout the entire curriculum
B. Understands how scientific knowledge changes with new evidence	<ul style="list-style-type: none"> • scientific knowledge • evidence • influence • ethics 	<ul style="list-style-type: none"> • Knows examples of scientific knowledge that changed when new evidence was presented • Knows that science is an ongoing process and is always open to new ideas 	<ul style="list-style-type: none"> • Describes how science concepts have evolved with the discovery of new evidence • Hypothesizes how current science concepts and practices will influence future societies 	
C. Uses technology and mathematics to perform accurate scientific investigations and communications	<ul style="list-style-type: none"> • technology • mathematics • probability • ratio • accuracy • scientific investigations • scientific communication • spreadsheet and graphs 	<ul style="list-style-type: none"> • Knows how technology can help scientific investigations and communications • Knows mathematical computations and formulas are essential to scientific investigations 	<ul style="list-style-type: none"> • Determines tools most appropriate to use given a particular situation • Uses the necessary mathematics for a particular situation (ACT, SAT, ITED, AP PHYSICS) • Calculates results with a given degree of accuracy • Formulates graphic representation of data (ACT, SAT, ITED, AP PHYSICS) 	<u>Technology:</u> use of science to solve everyday problems
D. Demonstrates safe handling procedures	<ul style="list-style-type: none"> • OSHA • EPA • MSDS • Right to Know • hazardous • safety procedures 	<ul style="list-style-type: none"> • Knows appropriate safety procedures for a given situation • Knows where safety devices are located in the classroom • Understands the process of waste disposal 	<ul style="list-style-type: none"> • Follows required safety procedures. • Recognizes, reports, and corrects safety problems. • Follows waste disposal procedures 	

Physics Standards and Benchmarks

Standard 2: Understands and applies principles of physical science

Power Benchmarks: Understands and applies knowledge of motions and forces

Understands and applies knowledge of conservation of energy and increase in disorder

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
A. Analyzes the world in terms of Newtonian mechanics	<ul style="list-style-type: none"> • Newtonian mechanics • balanced force • unbalanced force • net force • dynamics • acceleration • velocity • speed • motion • magnitude • vector • conservation of energy • kinetic energy • potential energy • momentum • conservation of momentum • elastic collision • inelastic collision 	<ul style="list-style-type: none"> • Knows when forces are balanced, no acceleration occurs (Newton's first law) • Knows a net force on an object causes it to accelerate (Newton's second law) • Knows when one object exerts a force on a second object, the second object always exerts a force of equal magnitude and in the opposite direction (Newton's third law) • Knows circular motion requires the application of a constant force directed towards the center of the circle • Knows conservation of energy in simple systems can be shown mathematically • Knows an unbalanced force on an object produces a change in its momentum • Knows momentum is a conserved quantity 	<ul style="list-style-type: none"> • Solves problems that involve constant speed and average speed • Applies the law $F=ma$ to solve one-dimensional motion problems that involve constant forces (Newton's second law) • Resolves two-dimensional vectors into their components and calculates the magnitude and direction of the vector from its components • Solves problems in circular motion by using the formula for centripetal acceleration in the following form: $a=v^2/r$ • Calculates kinetic energy by using the formula $E=(1/2)mv^2$ • Calculates momentum as the product mv • Solves problems involving elastic and inelastic collisions in one dimension by using the principles of conservation of momentum and energy 	Physics Curriculum Guide

Physics Standards and Benchmarks

Standard 2: Understands and applies principles of physical science

Power Benchmarks: Understands and applies knowledge of interactions of energy and matter

Course Level Benchmarks	Vocabulary	Knowledge	Skills	Classroom Resources
B. Analyzes the world of wave theory	<ul style="list-style-type: none"> • wave theory • transverse wave • longitudinal wave • mechanical media • wave speed • wavelength • frequency • Doppler shift • harmonics • resonance • electromagnetic spectrum • vacuum • light • image • reflection • refraction • critical angle • Snell's law • optics 	<ul style="list-style-type: none"> • Knows waves carry energy from one place to another • Knows transverse and longitudinal waves can be identified in mechanical media • Knows sound is a longitudinal wave • Knows the speed of a wave depends on the properties of the medium in which it propagates • Knows radio waves, light, and X-rays are different wavelength bands in the electromagnetic spectrum • Knows the speed of radio waves, light, and X-rays in a vacuum is approximately 3×10^8 m/s (186,000 miles/s) 	<ul style="list-style-type: none"> • Solves problems involving wavelength, frequency, and wave speed • Identifies types of images in mirrors and lenses • Solves problems related to Snell's law • Solves problems for optics of mirrors and lenses 	Physics Curriculum Guide

Common Labs:

1. Acceleration due to gravity
2. Range of a projectile
3. Conservation of momentum
4. Speed of Sound
5. Snell's Law
6. Mirrors