



Online Courses for High School Students

1-888-972-6237

PHYSICS

Course Description:

This course provides a comprehensive survey of all key areas: physical systems, measurement, kinematics, dynamics, momentum, energy, thermodynamics, waves, electricity, and magnetism, and introduces students to modern physics topics such as quantum theory and the atomic nucleus. The course gives students a solid basis to move on to more advanced courses later in their academic careers. The program consists of online instruction, virtual laboratories, and related assessments, plus an associated problem-solving book.

Prerequisites: Algebra II & Pre-Calculus/Trigonometry (or equivalents)

Course Length: Two semesters

Required Text: Physics: Problems and Solutions (Included within the course)

Semester I

Course Outline:

Unit 1: Introduction to Physics

- Semester Introduction
- The History of Physics
- Physics and Society
- Physics and Science
- Physical Systems and Models

Unit 2: Physical Units and Measurement

- The Metric System: History and Use
- The Metric System: Base Units
- The Metric System: Derived Units
- Measurement and Scientific Notation
- Conversion Techniques
- Significant Figures
- Laboratory: Measurement and Significant Figures 1
- Laboratory: Measurement and Significant Figures 2

Unit 3: Graphing and Problem Solving

- Graphing Physical Data
- Graphs and Data Relationships
- Laboratory: Creating and Interpreting Graphs 1
- Laboratory: Creating and Interpreting Graphs 2
- Problem Solving Strategies: Units

- Problem Solving Strategies: Estimation

Unit 4: Kinematics

- Rotation and Translation
- Frame of Reference
- Speed and Velocity
- Position-Time and Velocity-Time Graphs
- Laboratory: Kinematics 1
- Laboratory: Kinematics 2
- Acceleration
- Acceleration and Displacement
- Laboratory: Acceleration 1
- Laboratory: Acceleration 2

Unit 5: Forces

- Forces
- Inertia and Newton's First Law
- Newton's Second Law
- Mass and Weight
- Laboratory: Newton's Laws of Motion 1
- Laboratory: Newton's Laws of Motion 2
- Newton's Third Law

Unit 6: Net Forces and Vectors

- The Net Forces Problem
- Resolving Vectors
- Adding Vectors
- Laboratory: Working with Vectors
- Net Forces at Equilibrium
- Free Fall and Equilibrium
- Calculating Net Force I
- Calculating Net Force II
- Friction
- Laboratory: Net Force 1
- Laboratory: Net Force 2

Unit 7: Motion in Two Dimensions

- Projectile Motion
- Uniform Circular Motion
- Laboratory: Motion in Two Dimensions 1
- Laboratory: Motion in Two Dimensions 2
- Laboratory: Motion in Two Dimensions 3
- Angular Displacement and Torque
- Simple Harmonic Motion: Springs
- Simple Harmonic Motion: Pendulum
- Laboratory: Harmonic Motion 1
- Laboratory: Harmonic Motion 2

Unit 8: Gravitation

- History of Gravitation
- Laboratory: Kepler's Laws
- Universal Gravitation
- Einstein and the Gravitational Field

Unit 9: Physics and Scientific Inquiry

- Physics Inquiry: Inductive Reasoning
- Physics Inquiry: Questions and Hypotheses
- Physics Inquiry: Experimentation
- Physics Inquiry: Data Collection and Analysis
- Physics Inquiry: Conclusions and Communicating

Unit 10: Semester Review and Test

- Semester Review

Semester II

Course Outline:

Unit 1: Momentum

- Linear Momentum and Impulse
- Law of Conservation of Momentum
- Momentum in Collisions 1
- Momentum in Collisions 2
- Laboratory: Momentum 1
- Laboratory: Momentum 2
- Conservation of Angular Momentum

Unit 2: Work

- Work and Power
- Direction of Force and Work
- Laboratory: Work and Power
- Machines and Mechanical Advantage
- Laboratory: Simple and Compound Machines 1
- Laboratory: Simple and Compound Machines 2

Unit 3: Energy

- Types of Energy and Their Conversions
- Kinetic and Potential Energy
- Conservations of Energy 1
- Conservations of Energy 2
- Laboratory: Conservation of Energy 1
- Laboratory: Conservation of Energy 2
- Energy During Collisions

Unit 4: Thermal Energy

- Kinetic-Molecular Theory
- Specific Heat
- Laboratory: Specific Heat 1

- Laboratory: Specific Heat 2
- States of Matter
- Heat During Change of State
- First Law of Thermodynamics
- Second Law of Thermodynamics and Entropy

Unit 5: Waves

- Characteristics of Waves 1
- Characteristics of Waves 2
- Sound: Vibration and Waves
- Qualities of Sound
- Laboratory: Sound 1
- Laboratory: Sound 2

Unit 6: Light

- The Electromagnetic Spectrum
- Diffraction and Interference
- Reflection
- Refraction Mirrors
- Lenses
- Laboratory: Optics 1
- Laboratory: Optics 2
- Laboratory: Optics 3

Unit 7: Electric Forces

- Static Electricity
- Electric Force
- Electric Fields
- Laboratory: Electrostatics 1
- Laboratory: Electrostatics 2
- Electric Potential

Unit 8: Currents and Circuits

- Current and Circuits
- Current Electric Forces
- Series Circuits
- Parallel Circuits
- Combined Circuits
- Laboratory: Circuits 1
- Laboratory: Circuits 2

Unit 9: Magnetism

- Magnets and Magnetic Fields
- Forces in Magnetic Fields
- Electromagnetic Induction
- Laboratory: Magnetic Fields 1
- Laboratory: Magnetic Fields 2

Unit 10: Modern Physics

- Atomic Spectra and Quantum Theory
- The Nature of Light and the Photoelectric Effect
- Relativity
- Structure of the Nucleus
- Radioactivity

Unit 11: Semester Review and Test

- Semester Review

***** Please Note:**

- All labs must be provided and administered by the Home District.