The AP Physics 1 Exam

Exam Overview

AP PHYSICS 1 EXAM: 3 HOURS

Exam questions are based on learning objectives, which combine science practices with specific content. Students learn to

- Solve problems mathematically — including symbolically
- Design and describe experiments and analyze data and sources of error
- Explain, reason, or justify answers with emphasis on deeper, conceptual understanding
- Interpret and develop conceptual models

Format of Assessment

Section I: Multiple Choice: 50 Questions | 90 Minutes | 50% of Exam Score

- Discrete items
- Items in sets
- Multi-select items (two options are correct)

Section II: Free Response: 5 Questions | 90 Minutes | 50% of Exam Score

- Experimental Design (1 question)
- Quantitative/Qualitative Translation (1 question)
- Short Answer (3 questions, one requiring a paragraph-length argument)

AP Physics 1: Giancoli Chapters

UNIT 1: Kinematics

Giancoli chapter 2: Describing Motion – Kinematics in One Dimension pg 21

- Reference Frames and Displacement
- Average velocity
- Instantaneous velocity
- Acceleration
- Motion at Constant Acceleration
- Solving Problems
- Freely Falling Objects
- Graphical Analysis of Linear Motion

Giancoli chapter 3: Kinematics in Two Dimensions; Vectors pg 49

- Vectors and Scalars
- Addition of Vectors – Graphical Methods
- Subtraction of Vectors, and Multiplication of a Vector by a Scalar
- Adding Vectors by Components
- Projectile Motion
- Solving Projectile Motion Problems
UNIT 2: Newton’s Laws of Motion

Giancoli chapter 4: Dynamics – Newton’s Laws of Motion pg 75
- Force
- Newton’s First Law of Motion
- Mass
- Newton’s Second Law of Motion
- Newton’s Third Law of Motion
- Weight – the Force of Gravity; and the Normal Force
- Solving Problems with Newton’s Laws: Free-Body Diagrams
- Problems Involving Friction, Inclines

UNIT 3: Work, Energy & Power

Giancoli chapter 6: Work and Energy pg 138
- Work Done by a Constant Force
- Kinetic Energy, and the Work-Energy Principle
- Potential Energy
- Conservative and Non-conservative Forces
- Mechanical Energy and Its Conservation
- Problem Solving Using Conservation of Mechanical Energy
- Other Forms of Energy and Energy Transformations; The Law of Conservation of Energy
- Energy Conservation with Dissipative Forces: Solving Problems

UNIT 4: Linear Momentum

Giancoli chapter 7: Linear Momentum pg 170
- Momentum and Its Relation to Force
- Conservation of Momentum
- Collisions and Impulse
- Conservation of Energy and Momentum in Collisions
- Elastic Collisions in One Dimension
- Inelastic Collisions
- Center of Mass (CM)

UNIT 5: Torque, Rotational Motion and Angular Momentum

Giancoli chapter 8: Rotational Motion pg 198
- Angular Quantities
- Constant Angular Acceleration
- Rolling Motion (Without Slipping)
- Torque
- Rotational Dynamics; Torque and Rotational Inertia
- Solving Problems in Rotational Dynamics
- Rotational Kinetic Energy
- Angular Momentum and Its Conservation

UNIT 6: Circular Motion and Gravitation

Giancoli chapter 5: Circular Motion; Gravitation pg 109
- Kinematics of Uniform Circular Motion
- Dynamics of Uniform Circular Motion
- Highway Curves: Banked and Unbanked
- Newton’s Law of Universal Gravitation
Gravity Near the Earth’s Surface
Satellites and “Weightlessness”
Planets, Kepler’s Laws, and Newton’s Synthesis
Types of Forces in Nature
# Unit 7: Oscillations, Mechanical Waves and Sound

Giancoli chapter 11: Oscillations and Waves  pg 292
- Simple Harmonic Motion – Spring Oscillations
- Energy in Simple Harmonic Motion
- The Period and Sinusoidal Nature of SHM
- The Simple Pendulum
- Damped Harmonic Motion
- Forced Oscillations; Resonance
- Wave Motion
- Types of Waves and Their Speeds: Transverse and Longitudinal
- Energy Transported by Waves
- Reflection and Transmission of Waves
- Interference; Principle of Superposition
- Standing Waves; Resonance

Giancoli chapter 12: Sound  pg 328
- Characteristics of Sound
- Sources of Sound: Vibrating Strings and Air Columns
- Interference of Sound Waves; Beats
- Doppler Effect

# Unit 8: Introduction to Electric Currents

Giancoli chapter 16: Electric Charge and Electric Field  pg 443
- Static Electricity; Electric Charge and Its Conservation
- Electric Charge in the Atom
- Insulators and Conductors
- Induced Charge; the Electroscope
- Coulomb’s Law

Giancoli chapter 17: Electric Potential  pg 473
- Electric Potential Energy and Potential Difference

Giancoli chapter 18: Electric Currents  pg 501
- The Electric Battery
- Electric Current
- Ohm's Law: Resistance and Resistors
- Resistivity
- Electric Power
- Power in Household Circuits

Giancoli chapter 19: DC Circuits  pg 526
- EMF and Terminal Voltage
- Resistors in Series and in Parallel
- Kirchhoff’s Rules