

Options EHS General Physics B 2020 Scope and Sequence

Unit Lesson

Objectives

Waves and Sound

Introduction to Waves

Define waves and explain how they carry energy.

Differentiate mechanical and electromagnetic waves.

Compare and contrast transverse waves and longitudinal waves.

Identify everyday examples of transverse and longitudinal waves.

Wave Properties

Identify and describe the properties of transverse and longitudinal waves.

Analyze the relationship between wavelength, frequency, and wave speed.

Solve problems involving wavelength, frequency, and wave speed.

Identify factors that affect wave speed.

Use mathematical representations to show relationships among the frequency, wavelength, and speed of waves traveling in various media.

Wave Interactions

Distinguish between absorption, transmission, reflection, refraction, and diffraction.

Compare and contrast constructive and destructive interference.

Identify everyday examples of wave interactions.

Sound Waves

Analyze how sounds are created and propagated.

Identify and describe properties of sound waves.

Examine how the Doppler effect applies to sound waves.

Properties of Sound Waves

Unit Lesson**Objectives**

Analyze the relationship between amplitude, energy, intensity, and loudness.

Identify factors that affect intensity of sounds.

Analyze the relationship between pitch and frequency.

Explain resonance.

Unit Test

Light

Electromagnetic Waves

Identify and compare the different regions of the electromagnetic spectrum.

Solve problems involving frequency, wavelength, speed, and energy.

Identify uses and applications of electromagnetic waves.

Reflection and Refraction

Differentiate between reflection and refraction.

Use the law of reflection to make predictions.

Apply Snell's law to solve problems.

Analyze and interpret ray diagrams.

Mirrors

Distinguish between plane, concave, and convex mirrors.

Interpret ray diagrams to predict the location, type, orientation, and size of an image formed by a mirror.

Solve problems involving mirrors.

Lenses

Distinguish between concave and convex lenses.

Interpret ray diagrams to predict the location, type, orientation, and size of an image formed by a lens.

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Solve problems involving lenses.

Diffraction

Analyze how light waves bend around objects.

Identify everyday examples of diffraction.

Solve problems involving diffraction.

Lab: Waves and Diffraction

Demonstrate diffraction and explain why it occurs.

Describe the relationship between wavelength, gap width, and diffraction.

Solve problems involving diffraction.

Unit Test

Electricity

Electrostatics

Analyze the relationship between electric charge and electric force.

Distinguish between conductors and insulators.

Examine charging by friction, conduction, and induction.

Coulomb's Law

Examine the factors that affect the electric force between two objects.

Solve problems using Coulomb's law.

Compare electric force with gravitational force.

Electric Fields

Describe the electric field due to a charge.

Analyze and interpret electric field lines.

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Solve problems involving the electric field, charge, and force on an object.

Electric Potential Difference

Differentiate electric potential energy and electric potential difference.

Solve problems involving electric potential energy and electric potential difference.

Electric Energy Storage

Examine how a capacitor works.

Solve problems involving capacitors.

Ohm's Law

Examine current, resistance, and voltage.

Solve problems involving current, charge, and time.

Use Ohm's law to calculate voltage, current, or resistance.

Electric Circuits

Interpret circuit diagrams.

Identify circuits as open, closed, or short.

Compare and contrast parallel and series circuits.

Apply Ohm's law to calculate voltage, current, or resistance in a parallel or series circuit.

Lab: Circuit Design

Construct series and parallel circuits.

Use Ohm's law to calculate current, voltage, and resistance.

Calculate the power used by elements in a circuit.

Unit Test

Magnetism

Unit	Lesson	Objectives
	Magnets and Magnetism	
		Distinguish between temporary and permanent magnets.
		Determine how magnetic poles interact with each other.
		Examine how magnetic domains are aligned in a magnet.
		Analyze the magnetic field around a magnet.
	Magnetic Field and Force	
		Analyze the magnetic field produced by a current-carrying wire.
		Use the right-hand rule to determine the direction of the magnetic field in a current-carrying wire.
		Apply the right-hand rule to determine the direction of the magnetic force on a charge.
		Solve problems involving magnetic force.
	Electromagnetic Induction	
		Indicate how magnetism is produced by electric currents.
		Examine how an electric current is produced by a magnet.
		Identify the characteristics of solenoids and electromagnets.
	Applications of Electromagnetic Induction	
		Explain how an electric motor uses a magnetic force to cause motion.
		Examine how a generator works.
		Analyze how a transformer reduces voltage.
	Lab: Electromagnetic Induction	
		Recognize that a moving magnet can induce an electric field, causing current to flow in a loop of wire.
		Examine how magnetic polarity affects the direction of induced current in a loop of wire.
	Unit Test	

Unit Lesson**Objectives****Engineering and Design**

Technological Design

Describe the four stages of technological design.

Evaluate a technological design or product to determine if it meets designated criteria.

Compare and contrast technological design and scientific investigation.

Evaluating Scientific Design

Explain how changing the variables, methods, and timing impacts scientific investigations.

Evaluate possible limitations to current scientific design.

Science Practice: Assess the possible impacts of different experimental design decisions.

Designing Scientific Investigations

Demonstrate how scientific questions are turned into investigations.

Science Practice: Design and conduct a laboratory experiment to answer a specific question.

Test

Nuclear Physics

Radioactivity

Distinguish between alpha, beta, and gamma decay.

Use the half-life concept to describe the rate of decay of an isotope.

Identify technological applications of radioactive decay.

Determine possible problems associated with radioactive decay.

Lab: Half-Life Model

Use a model to investigate half-life.

Interpret a graph showing the decay of a radioactive substance.

Options EHS General Physics B 2020 Scope and Sequence**Unit Lesson****Objectives**

Fission and Fusion

Compare and contrast nuclear fission and nuclear fusion.

Explain nuclear fission and nuclear fusion in terms of mass-energy equivalence.

Identify applications of nuclear fission and nuclear fusion.

The Sun's Energy

Identify and describe the steps of hydrogen fusion.

Examine how energy is transferred from the core to space.

Recognize the types of energy emitted by the Sun.

Fundamental Forces

Examine the four fundamental forces.

Compare the characteristics, strengths, and ranges of the fundamental forces.

Unit Test

Modern Physics

Atomic Spectra

Outline the historical development of the atomic theory.

Understand the concepts of emission and absorption spectra.

Compare and explain the emission spectra produced by various atoms.

Define spectroscopy and its applications.

Dual Nature of Light

Describe and give evidence for the dual nature of light.

Examine the photoelectric effect.

Calculate the energy of a photon.

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Unit	Lesson	Objectives
	Special Relativity	
		Identify Einstein's two postulates of special relativity.
		Analyze the motion of an object using different reference frames.
		Examine how the special theory of relativity leads to time dilation and length contraction.
	General Relativity	
		Examine Einstein's general theory of relativity.
		Recognize the evidence that supports the general theory of relativity.
		Compare and contrast Newton's universal law of gravitation with Einstein's general theory of relativity.
	Origin and Evolution of the Universe	
		Examine evidence for the big bang theory.
		Describe the evolution of the universe.
		Distinguish between the different types of stars and their life cycles.
		Analyze how stellar spectra are used to identify the composition and motion of a star.
	Unit Test	
	Cumulative Exam	
	Cumulative Exam Review	
	Cumulative Exam	