

TX-Physics		Scope and Sequence
Unit	Lesson	Objectives
Nature of Science		
The Progress of Scientific Knowledge		
		Describe the cumulative nature of science and give examples of how a diverse group of scientists have contributed to science.
		Explain why curiosity, creativity, openness, and skepticism are important in the progress of science.
		Analyze how new technologies and experiments affect previous scientific explanations.
		Science Practice: Summarize the history of a scientific discovery.
Hypotheses, Theories, and Laws		
		Distinguish between hypotheses, theories, and laws.
		Identify examples of scientific theories and laws.
		Explain that theories may change as new areas of science and technology develop.
		Give examples of how hypotheses lead to new experimentation.
Safety in Science		
		Demonstrate safe practices while conducting investigations.
		Outline the correct protocol for reporting safety violations and accidents in the lab.
		Use a material safety data sheet (MSDS) to learn about specific chemical hazards and proper chemical disposal.
		Science Practice: Write a safety contract, revising as necessary.
Tools, Technology, and Measurement		
		Select and use appropriate tools to perform tests and collect data.
		Select and use appropriate technology such as computers and graphing calculators to gather, analyze, interpret, and display data.

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		Use the SI system of measurement to convert between standard and metric, and metric and metric, and to recognize approximate representations of measurement.
		Science Practice: Use technology to display data in tables and graphs, and use the graphical representations to interpret the data.
	Data Analysis	
		Read and interpret graphs.
		Distinguish between direct and inverse relationships.
		Calculate percent error.
	Assessing Claims and Evidence	
		Identify the claims made within a scientific text.
		Evaluate the merit and accuracy of scientific claims based on supporting evidence.
		Assess the reliability of a variety of sources of scientific information.
		Science Practice: Critique scientific writing.
	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.
	Careers in Science	
		Evaluate the occupational prospects of science fields.
		Science Practice: Analyze the impact that advances in technology have had on careers.
	Unit Test	
	1-Dimensional Motion	
	Speed and Velocity	

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		Differentiate between speed and velocity.
		Describe the motion of an object using different reference frames.
		Use graphs and equations to solve speed and velocity problems.
		Interpret motion maps to describe linear motion.
	Acceleration	
		Distinguish between constant velocity and constant acceleration.
		Use graphs to analyze motion with constant acceleration.
		Solve problems involving distance, time, velocity, and acceleration.
		Interpret motion maps to describe linear motion.
	Lab: Motion with Constant Acceleration	
		Recognize the relationships between position, time, velocity, and acceleration.
		Calculate the average velocity of a moving object.
		Use graphs to determine acceleration.
	Vectors	
		Use vector diagrams to determine the resultant vector.
		Resolve a vector into horizontal and vertical components.
	Unit Test	
	2-Dimensional Motion	
	Projectile Motion	
		Recognize that the horizontal and vertical motions of a projectile are independent.
		Identify examples of projectile motion.
		Solve problems involving projectile motion.

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	Centripetal Acceleration	<p>Describe and calculate tangential speed.</p> <p>Define and identify examples of centripetal acceleration.</p> <p>Solve problems involving centripetal acceleration.</p>
	Circular Motion	<p>Describe how circular motion is caused by centripetal force.</p> <p>Explain the relationship between centripetal force and inertia.</p> <p>Use centripetal force concepts to solve problems.</p> <p>Interpret motion maps to describe circular motion.</p>
	Orbital Motion	<p>Explain how Newton's universal law of gravitation affects orbital motion.</p> <p>Identify the forces acting on an object in orbit.</p> <p>Solve problems involving the orbital speed and period of an object in orbit.</p>
	Unit Test	
	Forces	
	Introduction to Forces	<p>Identify and describe various forces.</p> <p>Analyze free-body diagrams.</p> <p>Determine how net force affects the motion of an object.</p>
	Universal Law of Gravitation	<p>Explain the relationships among gravitational force, mass, and distance.</p> <p>Solve problems that involve the universal law of gravitation.</p>

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		Describe the effect of gravity on an object.
		Use mathematical representations to predict the gravitational and electrostatic forces between objects.
	Newton's First and Third Laws	
		Describe Newton's first law of motion and how it relates to inertia.
		Explain Newton's third law of motion and how it relates to action and reaction forces.
		Use vectors to calculate the effect of forces on objects.
	Newton's Second Law	
		Describe Newton's second law of motion.
		Calculate force, mass, or acceleration given the other two quantities.
		Interpret free-body diagrams for accelerating objects.
	Lab: Newton's Second Law	
		Determine how force and mass affect acceleration.
		Calculate the acceleration of a moving object.
	Unit Test	
Work and Energy		
	Work and Power	
		Define and describe work.
		Compare the work done in different situations.
		Explain how work and power are related.
		Calculate work and power.

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	Kinetic Energy	<p>Define kinetic energy and identify situations in which it's present.</p> <p>Calculate kinetic energy, mass, or velocity given the other two quantities.</p> <p>Describe the work-energy theorem and use it to solve problems.</p>
	Potential Energy	<p>Identify and describe different types of potential energy.</p> <p>Solve problems involving the potential energy of an object.</p>
	Energy Transformations	<p>Explain how energy changes form.</p> <p>Identify and describe examples of energy transformations.</p> <p>Solve problems involving energy transformations.</p> <p>Analyze and interpret energy transfer diagrams.</p>
	Conservation of Energy	<p>Explain the law of conservation of energy.</p> <p>Apply the law of conservation of energy to solve problems.</p> <p>Use energy transfer diagrams to illustrate that energy is conserved.</p>
	Unit Test	
Cumulative Exam		
	Cumulative Exam Review	
	Cumulative Exam	
Momentum		
	Impulse and Momentum	

TX-Physics		Scope and Sequence
Unit	Lesson	Objectives
		Calculate mass, velocity, or momentum given the other two quantities.
		Describe impulse and how it relates to momentum.
		Solve problems involving impulse.
		Analyze and compare the momentum and impulse of different objects.
	Conservation of Momentum	
		Describe the law of conservation of momentum.
		Apply the law of conservation of momentum to analyze collisions between objects.
		Solve problems involving the conservation of momentum.
		Use mathematical representations to show that the total momentum of a system of objects is conserved when there is no net force on the system.
	Lab: Conservation of Linear Momentum	
		Calculate the momentum of a moving object before and after a collision.
		Demonstrate that momentum is conserved during a collision.
	Unit Test	
	Waves I	
	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.

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		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.
	Unit Test	
	Waves II	
	Dual Nature of Light	
		Describe and give evidence for the dual nature of light.
		Examine the photoelectric effect.
		Calculate the energy of a photon.
	Simple Harmonic Motion	
		Describe simple harmonic motion.
		Explain how position, velocity, and acceleration change during simple harmonic motion.
		Solve problems using Hooke's law.

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	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.
		Solve problems involving lenses.
	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.

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

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		Apply Ohm's law to calculate voltage, current, or resistance in a parallel or series circuit.
	Electricity Use in Homes and Businesses	
		Analyze how electrical energy is produced and transferred.
		Define and calculate electric power.
		Compare energy used by household appliances.
		Calculate energy efficiency.
	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		
	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.

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	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	
Cumulative Exam		
	Cumulative Exam Review	
	Cumulative Exam	