Applied Physics & Engineering

(formerly Principles of Technology)

PRE-TEST/POST-TEST TEKS BLUEPRINT

Pre-Test/Post-Test Development Overview

TEKS Addressed Selection Process

The Texas Essential Knowledge & Skills (TEKS) included in the course pre-test and post-test were selected for their direct relevance to the course content. This selection process was guided by the goal of assessing learners' understanding of specific topics and skills that are integral to the course. As a result, TEKS related to general employability skills or broader topics were often excluded. This focus ensures that the assessments accurately measure students' mastery of the subject matter, allowing educators to gain a clear insight into areas where students excel or may need additional support. By concentrating on content-specific TEKS, the tests provide a more precise evaluation of the students' knowledge and understanding of the core material.

Test Question Development Process

The questions created for the pre-test and post-test were designed using psychometric principles to ensure they are of high quality and fairness. This approach helps to accurately assess student understanding. These principles guide the development of questions to be reliable, valid, and free from bias, ensuring that they effectively measure the knowledge and skills the students are expected to acquire in the course.

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Knowledge & Skills Statement	Student Expectation	iCEV Lesson Title
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(A) generate and interpret relevant equations using graphs and charts for one dimensional-motion	One-Dimensional Motion
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(B) define scalar and vector quantities:	One-Dimensional Motion
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(C) use one-dimensional equations for displacement, velocity, average velocity, acceleration, and average acceleration within a frame of reference	One-Dimensional Motion
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(D) use graphical vector addition for displacement, velocity, average velocity, accleration, and average acceleration within a frame of reference	One-Dimensional Motion
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(E) generate and interpret relevant equations using graphs and charts for two- dimensional motion, including:	Two-Dimensional Motion
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(F) explain projectile and circular motion using two-dimensional equations or vectors and apply the concepts to an investigation such as testing a catapult or carousel	Projectile Motion Circular Motion
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(G) explain Newton's first law of motion and apply the concepts of equilibrium and inertia to investigations using relevant real-world examples such as rockets, satellites, and automobile safety devices	Newton's Laws
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(H) conduct investigations that include calculations and free body diagrams to observe the effect of forces on objects, including tension, friction, normal, gravity, centripetal, and applied forces, using the relationship between force, mass and acceleration as represented by Newton's second law of motion	Newton's Laws
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(K) design, evaluate, and refine a device that uses the concepts of impulse and conservation of momentum to minimize the net force on objects during collisions such as those that occur during vehicular accidents, sports activities, or the dropping of personal electronic devices	Laws & Conservation of Energy & Momentum
(9) The student describes and applies the laws governing motion in a variety of situations. The student is expected to:	(L) describe and calculate the mechanical energy of the power generated within, the impulse applied to, and the momentum of a physical system	Mechanical Energy
(10) The student describes the nature of forces in the physical world. The student is expected to:	(A) predict how the magnitude of the electric force between two objects depends on their charges and the distance between their centers using Coulomb's law	Electrical Forces & Fields
(10) The student describes the nature of forces in the physical world. The student is expected to:	(B) Build models such as generators, motors, and transformers that show how electric, magnetic, and electromagnetic forces and field work in everyday life.	Electrical Forces & Fields
(10) The student describes the nature of forces in the physical world. The student is expected to:	(C) test a variety of materials to determine conductive or insulative properties based on their electrical properties	Circuits & Electrical Components
(10) The student describes the nature of forces in the physical world. The student is expected to:	(D) design, evaluate, and refine series and parallel circuits using schematics, digital resources, or materials such as switches, wires, resistors, lightbulbs, battteries, multimeters, voltmeters, and ammeters; and	Circuits & Electrical Components
(10) The student describes the nature of forces in the physical world. The student is expected to:	(E) construct both series and parallel circuits and use Ohm’s Law to calculate current, potential difference, resistance, and power of various real-world series and parallel circuits such as models of in-home wiring, automobile wiring, and simple electrical devices	Circuits & Electrical Components
(11) The student describes and applies the laws of the conservation of energy. The student is expected to:	(B) calculate work, power, kinetic energy, and potential energy	Work, Power & Energy

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(11) The student describes and applies the laws of the conservation of energy. The student is expected to:	(E) apply the laws of conservation of energy to a physical system using simple machines such as Rube Goldberg machine	Laws & Conservation of Energy & Momentum
(12) The student analyzes the concept of thermal energy. The student is expected to:	(B) investigate and demonstrate the movement of thermal energy through various states of matter by convection, conduction, and radiation through environmental and man-made systems	Thermal Energy Concepts
(13) The student analyzes the properties of wave motion and optics. The student is expected to:	(A) examine and describe oscillatory motion using pendulums and wave propagation in various types of media;	Wave Characteristics
(13) The student analyzes the properties of wave motion and optics. The student is expected to:	(B) investigate and analyze characteristics of waves, including period, velocity, frequency, amplitude, and wavelength;	Wave Characteristics
(13) The student analyzes the properties of wave motion and optics. The student is expected to:	(C) investigate and calculate the relationship between wave speed [wavespeed] , frequency, and wavelength;	Wave Characteristics
(13) The student analyzes the properties of wave motion and optics. The student is expected to:	(D) compare the characteristics and behaviors of transverse waves, including electromagnetic waves and sound waves;	Wave Motion
(13) The student analyzes the properties of wave motion and optics. The student is expected to:	(E) described how the differences in wavelength and frequency within the electomagnetic spectrum impact real-world technologies such as radio, x-rays, and microwaves	Wave Motion
(13) The student analyzes the properties of wave motion and optics. The student is expected to:	(F) investigate and explain behaviors of waves, including reflection, refraction, diffraction, interference, resonance, polarization, and the Doppler effect;	Wave Motion
(13) The student analyzes the properties of wave motion and optics. The student is expected to:	(G) describe and predict image formation as a consequence of reflection from a plane mirror and refraction through a thin convex lens.	Wave Motion