AP PHYSICS

UNIT 1: METHODS OF SCIENCE AND FORCE EQUILIBRIUM

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. What are the methods, processes and tools used by scientists and engineers? 2. What are the differences and similarities between vectors and scalars? 3. What are the conditions for Force Equilibrium? 4. What is Newton's First Law? 5. What is Inertia? 6. What is the difference between mass and weight?	Options may include, but are not limited to: - Measurement Lab - Excel Graphing Activity - Force Equilibrium Lab - Friction Lab - Unit Exam

Curriculum Benchmark	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Describe changes in society that have resulted from significant discoveries and advances in technology in physics. *For example:* Transistors, generators, radio/television, or microwave ovens. (P. 1.3.3.1)		Textbook: Physics: Principles with Applications (6th Edition) (Pearson Education)
Use significant figures and an understanding of accuracy and precision in scientific measurements to determine and express the uncertainty of a result. (P.1.3.4.1)		

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UNIT 2: MOTION AND FORCES

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. What is the relationship between Force and Motion? 2. What is the relationship between position, velocity and acceleration? 3. How can the position and velocity of an object be calculated from initial conditions? 4. What are the differences and similarities between linear motion and projectile motion?	Options may include, but are not limited to: - Domino Lab - Speed Lab - Projectile Lab - Unit Exam

Curriculum Benchmark	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimensional space. (P.2.2.1.1)		Textbook: Physics: Principles with Applications (6th Edition) (Pearson Education)
Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion. (P.2.2.1.2)		

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UNIT 3: MOMENTUM, WORK, ENERGY AND POWER

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. How can Conservation of Momentum be used to predict the velocity of an object following a collision? 2. What are the similarities and differences between Elastic and Inelastic collisions? 3. What is the relationship between Force and Displacement and Work and Power? 4. How can Conservation of Energy be used to predict final conditions? 5. What are the components of Mechanical Energy? 6. How can energy be transformed from one type to another?	Options may include, but are not limited to: - Work &Power Lab - Conservation of Momentum Lab - Rube Goldberg Device - Unit exam

Curriculum Benchmark	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Use conservation of momentum and conservation of energy to analyze an elastic collision of two solid objects in one-dimensional motion. (P.2.2.2.3)		Textbook: Physics: Principles with Applications (6th Edition) (Pearson Education)
Use gravitational force to explain the motion of objects near Earth and in the universe. (P.2.2.1.3)		
Explain and calculate the work, power, potential energy and kinetic energy involved in objects moving under the influence of gravity and other mechanical forces. (P.2.2.2.1)		

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UNIT 4: CIRCULAR MOTION AND ROTATIONAL MOTION

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. What happens to the motion of an object when the force is perpendicular to the velocity? 2. How can Newton's Law of Gravitation be used to describe the motion of objects in the solar system, galaxy and universe? 3. What is the relationship between angular position, angular velocity and torque? 4. What is meant by Time Dilation and Length Contraction?	Options may include, but are not limited to: - Circular Motion Lab - Rotational Motion Lab - Orbits Lab - Unit Exam

Curriculum Benchmark	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Use gravitational force to explain the motion of objects near Earth and in the universe. (P.2.2.1.3)		Textbook: Physics: Principles with Applications (6th Edition) (Pearson Education)
Describe and calculate the change in velocity for objects when forces are applied perpendicular to the direction of motion. *For example:* Objects in orbit. (P.2.2.2.2)		

UNIT 5: PROPERTIES OF MATTER

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. Why are atoms called the building blocks of matter? 2. How is the density of a substance related to mass and volume? 3. What is Archimedes' Principle? 4. What is meant by Pascal's Principle? 5. How is Bernoulli's Principle applied to fluids? 6. What is the source of Atmospheric pressure?	Options may include, but are not limited to: - Density lab - Archimedes' Lab - Unit Exam

AP PHYSICS

UNIT 6: HEAT ENERGY AND THERMODYNAMICS

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. What is the relationship between Pressure, Temperature and Volume? 2. What properties of a substance are dependent upon temperature? 3. How does the temperature of a substance change as heat energy is added or removed? 4. How does the phase of a substance change as heat energy is added or removed? 5. What are the methods of heat transfer? 6. What determines the direction of heat energy flow in a system? 7. How are the Laws of Thermodynamics applied to systems?	Options may include, but are not limited to: - Latent Heat Lab - Specific Heat Lab - Heat Transfer Lab - Unit Exam

Curriculum Benchmark	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Describe and calculate the quantity of heat transferred between solids and/or liquids, using specific heat, mass and change in temperature. (P.2.3.4.1)		Textbook: Physics: Principles with Applications (6th Edition) (Pearson Education)
Explain the role of gravity, pressure and density in the convection of heat by a fluid. (P.2.3.4.2)		
Compare the rate at which objects at different temperatures will transfer thermal energy by electromagnetic radiation. (P.2.3.4.3)		

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UNIT 7: VIBRATIONS, WAVES, SOUND AND LIGHT

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. What is a simple harmonic oscillator? 2. What are the characteristics and properties of waves? 3. What is the relationship between velocity, frequency and wavelength of a wave? 4. What is the difference between transverse and longitudinal waves? 5. How do waves transmit energy from one location to another? 6. What are the results of interference of waves? 7. What is the definition of the "Dual Nature of Light"?	Options may include, but are not limited to: - Pendulum Lab - Spring Lab - Speed of Sound Lab - Mirror Lab - Lenses Lab - Unit Exam

Curriculum Benchmark	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Analyze the frequency, period and amplitude of an oscillatory system. *For example:* An ideal pendulum, a vibrating string, or a vibrating spring-and-mass system. (P.2.3.1.1)		Textbook: Physics: Principles with Applications (6th Edition) (Pearson Education)
Describe how vibration of physical objects sets up transverse and/or longitudinal waves in gases, liquids and solid materials. (P.2.3.1.2)		
Explain how interference, resonance, refraction and reflection affect sound waves. (P.2.3.1.3)		
Describe the Doppler effect changes that occur in an observed sound as a result of the motion of a source of the sound relative to a receiver. (P.2.3.1.4)		
Explain and calculate how the speed of light and its wavelength change when the medium changes. (P.2.3.3.2)		
Explain the refraction and/or total internal reflection of light in transparent media, such as lenses and optical fibers. (P.2.3.3.3)		

AP PHYSICS

UNIT 7: VIBRATIONS, WAVES, SOUND AND LIGHT (continued)		
Curriculum Benchmark	**Standards of Proficiency** Description of what students must show to demonstrate proficiency (created by teachers/teams)	**Resources**
Use properties of light, including reflection, refraction, interference, Doppler effect and the photoelectric effect, to explain phenomena and describe applications. (P.2.3.3.4)		Textbook: Physics: Principles with Applications (6th Edition) (Pearson Education)
Compare the wave model and particle model in explaining properties of light. (P.2.3.3.5)		
Compare the wavelength, frequency and energy of waves in different regions of the electromagnetic spectrum and describe their applications. (P.2.3.3.6)		

AP PHYSICS

UNIT 8: ELECTRICITY AND MAGNETISM

Big Questions	Formative/ Summative Assessments Formative and summative assessments created by teachers/teams
1. What is the difference between an electrical insulator and an electrical conductor? 2. What is the relationship between voltage, current and resistance? 3. What is the difference between a series circuit and a parallel circuit? 4. How are the electrical energy and electrical power related? 5. What are the differences and similarities between an electric field and a magnetic field? 6. What effect does a magnetic field have on a moving charge? 7. What effect does a changing magnetic field have on a conductor?	Options may include, but are not limited to: - Resistors Lab - Ohm's Law Lab - Unit Exam

Curriculum Benchmark	Standards of Proficiency Description of what students must show to demonstrate proficiency (created by teachers/teams)	Resources
Explain why currents flow when free charges are placed in an electric field, and how that forms the basis for electric circuits. (P.2.3.2.1)		Textbook: Physics: Principles with Applications (6th Edition) (Pearson Education)
Explain and calculate the relationship of current, voltage, resistance and power in series and parallel circuits. *For example:* Determine the voltage between two points in a series circuit with two resistors. (P.2.3.2.2)		
Describe how moving electric charges produce magnetic forces and moving magnets produce electric forces. (P.2.3.2.3)		
Use the interplay of electric and magnetic forces to explain how motors, generators, and transformers work. (P.2.3.2.40)		
Describe the nature of the magnetic and electric fields in a propagating electromagnetic wave. (P.2.3.3.1)		