Physics Classes in SPPS

Please note – items in Pre-AP/IB column are meant as additions to General

Priority Benchmarks	General Physics	Pre-AP/IB Physics
Motion 9P.2.2.1.2 Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion.	- identify the forces on an object at rest, a projectile, and during a collision - give examples of how Newton's laws affect the motion of an object at rest, a projectile, and during a collision - determine resultant force (vector addition) at 180° and 90° (use Pythagorean Theorem or graphical method, using protractor to describe direction) - explain the effect of time on the force during a collision (ex – egg/sheet demo) - describe (not necessarily mathematically) resultant motion after inelastic and elastic collisions (conservation of momentum)	- calculate resultant force (vector addition) at any angles using trigonometry - mathematically manipulate the force-impulse/change in momentum relationship to solve for any component in linear situations - calculate resultant velocity for linear collisions (conservation of momentum)
Energy 9P2.2.2.1 Explain and calculate the work, power, potential energy and kinetic energy involved in objects moving under the influence of gravity and other mechanical forces.	- Manipulate equations to solve for ONE unknown (one equation process) in work, power, GPE, and KE equations. - Given 2 of the 3 (ME, KE, GPE), determine remaining variable in a rollercoaster or falling body situation - Solve for height or velocity in a roller-coaster type problem	- identify and calculate the different types of energy present at any point on a rollercoaster or pendulum situation given either maximum height or velocity - quantitative analysis of a ballistics pendulum (or equivalent) situation
Waves 9P.2.3.1.1 Analyze the frequency, period and amplitude of an oscillatory system.	- Identify amplitude, frequency, wavelength and period of an oscillatory system (i.e. pendulum or spring). - Use the wave equation to calculate wave speed, frequency, wavelength, period. - Distinguish between transverse and longitudinal waves with examples. - Describe the role of a medium when propagating waves.	-Calculate the amount of energy in an oscillatory system and the exchange between energy forms.
Light Phenomena 9P.2.3.3.4 Use properties of light, including reflection, refraction, interference, Doppler effect and the photoelectric effect, to explain phenomena and describe applications	-Students should be able explain qualitatively reflection, refraction, diffraction, interference, Doppler effect and photoelectric effect. -Qualitative explanation of how lenses and mirrors work. -Qualitatively explain light as oscillating electric and magnetic fields. -Identify qualitatively different parts of the electromagnetic spectrum. -Qualitatively describe interference in light and explain how this is evidence of light being a wave. -Explain how a telescope, microscope, camera, and human eye work. -Qualitatively describe the Doppler effect and explain how it is useful for describing relative motion. -Explain the photoelectric effect as evidence of quantization of energy. -Explain qualitatively why the sky is blue, the sunset is red, rainbows polychromatic, and snow white. -Explain why light bends around a door, or why the edges of shadows are	-Describe the behavior of a wave incident on a boundary between two different media quantitatively and qualitatively using the words reflection, refraction, diffraction, and interference, and Snell's Law. -Explain qualitatively and quantitatively the images produced by convex/concave mirrors and lenses at different distances.

	fuzzy, or some other real life example of diffraction.	
Explain and calculate the relationship of current, voltage, resistance and power in series and parallel circuits. 9P.2.3.2.2 ▪ Electron ▪ Current ▪ Voltage ▪ Resistance ▪ Power ▪ series circuit ▪ parallel circuit ▪ charge	• Define terms • Describe how properties and geometry of a material affect its electrical resistance • Calculate terms using Ohm's law (V=IR and P=IV) • Distinguish between series and parallel circuits • Calculate V=IR and P=IV for simple Series and Parallel Circuits (no more than three resistors)	• Compare Ohmic and non-Ohmic Behavior • Derive Expressions for Electrical Dissipation in Resistors • Calculate V=IR and P=IV for Combination Circuits • Use Ammeters and Voltmeters for Measurements
Describe how moving electric charges produce magnetic forces and moving magnets produce electric forces. 9P.2.3.2.3 ▪ electric charges ▪ magnetic forces ▪ magnets ▪ electric forces ▪ electric fields ▪ magnetic fields ▪ right hand rule ▪ Faraday's Law	• Define Terms • Know how the terms affect the magnetic force • Qualitatively know that a stationary charge in a magnetic field experiences no force. • Qualitatively know using the Right-Hand-Rule that a moving charge in a magnetic field experiences a force • Qualitatively know that a moving or changing a magnetic field causes a voltage • Qualitatively know how the factors affect the induced voltage • Draw the magnetic field around a straight wire	• Use qv*B to calculate magnetic force • Predict the path of a proton and electron in a magnetic field • Use F=I*l*B • Define magnetic flux and how it relates to electromagnetic induction (Faraday's and Lenz's Law) • Draw the magnetic field around two or more wires
Heat		