

Cobb County School District 2018-2019

AP Physics Teaching & Learning Framework

(for detailed information and course descriptions, and pacing options refer to: http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/2262.html)

Big Idea 1	Big Idea 2	Big Idea 3	Big Idea 4	Big Idea 5	Big Idea 6	Big Idea 7	SLO & AP Exam
<p>Objects and systems have properties such as mass and charge. Systems may have internal structures.</p>	<p>Fields existing in space can be used to explain interactions.</p>	<p>The interactions of an object with other objects can be described by forces.</p>	<p>Interactions between systems can result in changes in those systems.</p>	<p>Changes that occur as a result of interactions are constrained by conservation laws.</p>	<p>Waves can transfer energy & momentum from one location to another without the permanent transfer of mass and serve as mathematical model for the description of other phenomena.</p>	<p>The mathematics of probability can be used to describe the behavior of complex systems and to interpret the behavior of quantum mechanical systems.</p>	
<p>Enduring Understandings: EU 1A: The internal structure of a system determines many properties of the system. • EU 1B: Electric charge is a property of an object or system that effects its interactions with other objects or systems containing charge. • EU 1C: Objects and systems have properties of inertial mass and gravitational mass that are experimentally verified to be the same and that satisfy conservation principles. • EU 1D: Classical mechanics cannot describe all properties of objects. • EU 1E: Materials have many macroscopic properties that result from arrangement and interactions of the atoms & molecules that make up the material.</p>	<p>Enduring Understandings: EU 2A: A field associates a value of some physical quantity with every point in space. Field models are useful for describing interactions that occur at a distance as well as a variety of other physical phenomena. • EU 2B: A gravitational field is caused by an object with mass. • EU 2C: An electric field is caused by an object with electric charge. • EU 2D: A magnetic field is caused by a magnet or a moving electrically charged object. Magnetic fields observed in nature always seem to be produced either by moving charged objects or by magnetic dipoles or combinations of dipoles and never by single poles. • EU 2E: Physicists often construct a map of isolines connecting points of equal value for some quantity related to a field and use maps to help see the field.</p>	<p>Enduring Understandings: 3A: All forces share certain common characteristics when considered by observers in inertial reference frame. • EU 3B: Classically, the acceleration of an object interacting with other objects can be predicted by using $a=F/m$. • EU 3C: At the macroscopic level, forces can be categorized as either long-range (action-at-a-distance) forces or contact forces. • EU 3D: A force exerted on an object can change the momentum of the object. • EU 3E: A force exerted on an object can change the kinetic energy of the object. • EU 3F: A force exerted on an object can cause a torque on that object. • EU 3G: Certain types of forces are considered fundamental.</p>	<p>Enduring Understandings: EU 4A: The acceleration of the center of mass of a system is related to the net force exerted on the system, where $a=F/m$. • EU 4B: Interactions with other objects or systems can change the total linear momentum of a system. • EU 4C: Interactions with other objects or systems can change the total energy of a system. • EU 4D: A net torque exerted on a system by other objects or systems will change the angular momentum of the system. • EU 4E: The electric and magnetic properties of a system can change in response to the presence of, or changes in, other objects or systems.</p>	<p>Enduring Understandings: EU 5A: Certain quantities are conserved, in the sense that the changes of those quantities in a given system are always equal to the transfer of that quantity to or from the system by all possible interactions with other systems. • EU 5B: The energy of a system is conserved. • EU 5C: The electric charge of a system is conserved. • EU 5D: The linear momentum of a system is conserved. • EU 5E: The angular momentum of a system is conserved. • EU 5F: Classically, the mass of a system is conserved. • EU 5G: Not in AP Physics 1 (nucleons conservation)</p>	<p>Enduring Understandings • EU 6A: A wave is a traveling disturbance that transfers energy and momentum. • EU 6B: A periodic wave is one that repeats as a function of both time and position and can be described by its amplitude, frequency, wavelength, speed, and energy. • EU 6C: Only waves exhibit interference and diffraction. • EU 6D: Interference and superposition lead to standing waves and beats. • EU 6E: The direction of propagation of a wave such as light may be changed when the wave encounters an interface between two media. • EU 6F: EM radiation can be modeled as waves or as fundamental particles. • EU 6G: All matter can be modeled as waves or as particles.</p>	<p>Enduring Understandings EU 7A: The properties of an ideal gas can be explained in terms of a small number of macroscopic variables including temperature and pressure. • EU 7B: The tendency of isolated systems to move toward states with higher disorder is describe by probability. • EU 7C: At the quantum scale, matter is described by a wave function, which leads to a probabilistic description of the microscopic world.</p>	

For AP courses, the College Board provides multiple options for teachers with respect to course planning and pacing. Teachers are encouraged to adopt the framework that best fits their school and students. AP instruction is also infused with Scientific Practices. Scientific Practices provide ways for students to coordinate knowledge and skills and establish lines of evidence which they can use them to develop and refine testable explanations and predictions of natural phenomena.

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