AP Physics 1 Scope & Sequence

Days	Unit	Standard(s)/ Outcome(s)	Essential/Guiding Questions
16	**Unit 1: Kinematics** *You'll be introduced to the study of motion.*	**BIG IDEAS:** ● Force Interactions ● Change **SCIENCE PRACTICES:** ● Modeling ● Mathematical Routines ● Experimental Methods ● Data Analysis ● Argumentation	How can the motion of objects be predicted and/or explained? Can equations be used to answer questions regardless of the questions' specificity? How can the idea of frames of reference allow two people to tell the truth yet have conflicting reports? How can we use models to help us understand motion? Why is the general rule for stopping your car "when you double your speed, you must give yourself four times as much distance to stop?"
19	**Unit 2: Dynamics** *You'll revisit the concepts you worked with in Unit 1 to*	**BIG IDEAS:** ● Systems ● Fields ● Force	How can the properties of internal and gravitational mass be experimentally verified to be the same?

	explore force, which is the interaction of an object with another object.	Interactions ● Change **SCIENCE PRACTICES:** ● Modeling ● Mathematical Routines ● Experimental Methods ● Data Analysis ● Argumentation ● Make Connections	How do you decide what to believe about scientific claims? How does something we cannot see determine how an object behaves? How do objects with mass respond when placed in a gravitational field? Why is the acceleration due to gravity constant on Earth's surface? Are different kinds of forces really different? How can Newton's laws of motion be used to predict the behavior of objects? Why does the same push change the motion of a shopping cart more than the motion of a car?
7	**Unit 3: Circular Motion and Gravitation** *You'll build on your understanding of motion and force as you study more*	**BIG IDEAS:** ● Systems ● Fields ● Force Interactions ● Change **SCIENCE PRACTICES:**	How does changing the mass of an object affect the gravitational force? Why is a refrigerator hard to push in space? Why do we feel pulled toward Earth but

	complex models of motion, such as the circular path of a satellite orbiting a planet.	• Modeling • Mathematical Routines • Experimental Methods • Data Analysis • Argumentation • Make Connections	not toward a pencil? How can the acceleration due to gravity be modified? How can Newton's laws of motion be used to predict the behavior of objects? How can we use forces to predict the behavior of objects and keep us safe? How is the acceleration of the center of mass of a system related to the net force exerted on the system? Why is it more difficult to stop a fully loaded dump truck than a small passenger car?
19	**Unit 4: Energy** *You'll learn the definitions of and relationships between energy, work, and power.*	**BIG IDEAS:** • Force Interactions • Change • Conservation **SCIENCE PRACTICES:** • Modeling • Mathematical Routines • Experimental	How does pushing something give it energy? How is energy exchanged and transformed within or between systems? How does the choice of system influence how energy is stored or how work is done?

		Methods ● Data Analysis ● Argumentation ● Make Connections	How does energy conservation allow the riders in the back car of a rollercoaster to have a thrilling ride? How can the idea of potential energy be used to describe the work done to move celestial bodies? How is energy transferred between objects or systems? How does the law of conservation of energy govern the interactions between objects and systems?
12	**Unit 5: Momentum** *You'll explore the relationship between force, time, and momentum and learn to use the law of conservation of momentum to analyze physical situations.*	**BIG IDEAS:** ● Force Interactions ● Change ● Conservation **SCIENCE PRACTICES:** ● Modeling ● Mathematical Routines ● Scientific Questioning ● Experimental Methods ● Data Analysis	How does pushing an object change its momentum? How do interactions with other objects or systems change the linear momentum of a system? How is the physics definition of momentum different from how momentum is used to describe things in everyday life? How does the law of the conservation of momentum govern interactions between

		• Argumentation • Make Connections	objects or systems? How can momentum be used to determine fault in car crashes?
2	**Unit 6: Simple Harmonic Motion** *You'll use the tools, techniques, and models you've learned in previous units to analyze a new type of motion: simple harmonic motion.*	**BIG IDEAS:** • Force Interactions • Conservation **SCIENCE PRACTICES:** • Modeling • Mathematical Routines • Experimental Methods • Data Analysis • Argumentation • Make Connections	How does a restoring force differ from a "regular" force? How does the presence of restoring forces predict and lead to harmonic motion? How does a spring cause an object to oscillate? How can oscillations be used to make our lives easier? How does the law of conservation of energy govern the interactions between objects and systems? How can energy stored in a spring be used to create motion?
12	**Unit 7: Torque and Rotational Motion** *You'll explore the motion of an object rotating around an axis and you'll study*	**BIG IDEAS:** • Force Interactions • Change • Conservation	How does a system at rotational equilibrium compare to a system in translational equilibrium? How does the choice of system and

	torque, the measure of a force that can cause rotational motion.	**SCIENCE PRACTICES:** ● Modeling ● Mathematical Routines ● Scientific Questioning ● Experimental Methods ● Data Analysis ● Argumentation ● Make Connections	rotation point affect the forces that can cause a torque on an object or a system? How can balanced forces cause rotation? Why does it matter where the door handle is placed? Why are long wrenches more effective? How can an external net torque change the angular momentum of a system? Why is a rotating bicycle wheel more stable than a stationary one? How does the conservation of angular momentum govern interactions between objects and systems? Why do planets move faster when they travel closer to the sun?
3	**Unit 8: Electric Charge and Electric Force** *You'll begin your exploration of electricity by learning*	**BIG IDEAS:** ● Systems ● Force Interactions ● Conservation ● Waves	How does electric charge change the way that something interacts with its surroundings? How do you decide what to believe about scientific claims?

	about the electric force and the properties and interactions of electric charges.	**SCIENCE PRACTICES:** ● Modeling ● Mathematical Routines ● Argumentation ● Make Connections	How does something we cannot see determine how an object behaves? How do charges exert forces on each other? How does the conservation of charge help us understand how charged objects behave? Why can you stick a balloon on the ceiling, if rubber is an insulator?
9	**Unit 9: DC Circuits** *You'll continue your study of electricity by examining electric circuits and the interactions between current, resistance, and voltage.*	**BIG IDEAS:** ● Systems ● Conservation **SCIENCE PRACTICES:** ● Modeling ● Mathematical Routines ● Experimental Methods ● Data Analysis ● Argumentation ● Make Connections	How do you decide what to believe about scientific claims? How does something we cannot see determine how an object behaves? How do the laws of conservation of charge and energy allow us to light our homes and businesses? How does the conservation of charge govern interactions between objects and systems? How does the law of conservation of

			energy govern the interactions between objects and systems?
11	**Unit 10: Mechanical Waves and Sound** *You'll get introduced to the properties and behavior of waves that travel through a medium such as air or water.*	**BIG IDEAS:** ● Waves **SCIENCE PRACTICES:** ● Modeling ● Mathematical Routines ● Scientific Questioning ● Experimental Methods ● Data Analysis ● Argumentation ● Make Connections	How can data be used to help us create models of phenomena we see around us? Why does a police siren sound different when it is moving toward you than when it is moving away from you? What happens when two waves meet? How is resonance responsible for the Tacoma Narrows Bridge collapse? How is sound produced?