

AP Physics C: Mechanics Scope & Sequence

Days	Unit	Standard(s)/Outcome(s)	Essential/Guiding Questions
11	Unit 1: Kinematics <i>Students are introduced to the study of motion by exploring the idea of acceleration and teaching students how representations can be used to model and analyze scientific information.</i>	<u>BIG IDEAS:</u> - Change <u>SCIENCE PRACTICES:</u> - Creating Representations - Mathematical Routines - Scientific Questioning and Argumentation	How can the motion of objects be predicted and/or explained? 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”?
14	Unit 2: Force and Translational Dynamics <i>Students are introduced to the concept of force, where they analyze and come to understand a variety of physical phenomena by building upon the representations presented in Unit 1.</i>	<u>BIG IDEAS:</u> - Force Interactions <u>SCIENCE PRACTICES:</u> - Creating Representations - Mathematical Routines - Scientific Questioning and Argumentation	Why do we feel pulled toward Earth but not a pencil? Why does the swirling motion continue after you’ve stopped stirring a cup of coffee? If you apply the same amount of “push” to a car as you would a shopping cart, why doesn’t the car move? Why must you push backward to make a skateboard move

			forward? How do you determine which team wins the tug-of-war: The team that pulls harder on the rope or the team that pushes harder on the ground?
10	Unit 3: Work, Energy, and Power <i>Students will be introduced to the idea of conservation as a foundational principle of physics, along with the concept of work as the primary agent of change for energy.</i>	<u>BIG IDEAS:</u> • Force Interactions • Conservation <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	Does pushing an object always change its energy? If energy is conserved, why are we running out of it? How much money can you save by charging your phone at school instead of at home? Why does a stretched rubber band return to its original length? Why does it seem easier to carry a large box up a ramp rather than a set of stairs?
9	Unit 4: Linear Momentum <i>Students are introduced to the relationships between force, time, impulse, and linear momentum via calculations, data analysis, designing experiments, and making predictions.</i>	<u>BIG IDEAS:</u> • Change • Conservation <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	Why does water move a ship forward when its propellers push water backward? Why are cannon barrels so much longer and heavier than cannonballs? Why might a person land in the water instead of on the dock when trying to exit a canoe?

12	Unit 5: Torque and Rotational Dynamics <i>Students reinforce the Unit 2 ideas of force and linear motion by introducing them to the rotational analogs of torque and rotational motion.</i>	<u>BIG IDEAS:</u> • Force Interactions • Change <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	Why does a curveball take less time to reach the plate than a fastball? Why is it easier to balance a bicycle when it's in motion? Why are long wrenches more effective? Why does it matter where a door handle is placed?
11	Unit 6: Energy and Momentum of Rotating Systems <i>Students will apply their knowledge of energy and momentum to rotating systems.</i>	<u>BIG IDEAS:</u> • Conservation <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	What keeps a bicycle balanced? Why do planets move faster when they travel closer to the sun? What do satellites and projectiles have in common? How would figure skating be different if angular momentum wasn't conserved?
10	Unit 7: Oscillations <i>Students will apply previously encountered models and methods of analysis to simple harmonic motion.</i>	<u>BIG IDEAS:</u> • Fields • Force Interactions <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	How can oscillations be used to make our lives easier and more comfortable? How can an astronaut be "weighed" in space? How could you measure the length of a long string with a stopwatch? What do a child on a swing, a

			beating heart and metronome have in common?
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