

AP Physics C: Electricity and Magnetism Scope & Sequence

Days	Unit	Standard(s)/Outcome(s)	Essential/Guiding Questions
14	Unit 8: Electric Charges, Fields, and Gauss's Law <i>Students will begin the study of electric force to help them understand the role electrostatics plays in common devices.</i>	<u>BIG IDEAS:</u> • Force Interactions • Fields <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	Why does hair stand up after brushing it with a plastic comb? How does a charged rubber rod bend a stream of water? How might it be possible to get a balloon to stick to the wall? Why don't cell phones work in concrete buildings? Why can a bird land safely on a high voltage wire?
12	Unit 9: Electric Potential <i>Students are introduced to the concept of electric potential between charged systems.</i>	<u>BIG IDEAS:</u> • Conservation <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	What is the difference between electric potential and electric potential energy? Why do different voltage batteries exist? What is the difference between a 1.5 V AA battery and a 9 V battery? Why is a car battery more dangerous than a 9 V battery? Why are high voltage power lines dangerous?

10	Unit 10: Conductors & Capacitors <i>Students will examine how an electric charge can be stored and how the behavior of charges is impacted by electric fields.</i>	<u>BIG IDEAS:</u> • Force Interactions • Fields • Conservation <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	Why does the little red light on the TV stay on for a second after the TV is turned off? How does a camera flash used for photography work? How can energy be stored for later use?
14	Unit 11: Electric Circuits <i>Students will learn how and why simple electronic devices function by exploring the nature and importance of electric currents, circuits, and resistance.</i>	<u>BIG IDEAS:</u> • Change • Conservation <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	How does a house's wiring design account for a flipped circuit breaker to cause electricity to go off in some rooms but stay on in other rooms? Why do warming bulbs take several minutes to shine brightly? Why does the electric company charge by kilowatt-hour instead of electrons used? How does touching a conductor to a capacitor before removing it from a circuit protect you?

12	Unit 12: Magnetic Fields and Electromagnetism <i>Students are introduced to magnetism and how magnetic fields are generated, behave, and relate to electricity.</i>	<u>BIG IDEAS:</u> • Force Interactions • Fields <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	Why are large-scale, charged-particle accelerators, such as those at CERN, in the shape of a circle? How does a guitar pickup work? Why does an electric current deflect the needle of a compass? Why does the deflection of a pair of parallel conducting wires depend on the direction of current in the wires?
12	Unit 13: Electromagnetic Induction <i>Students examine electromagnetism through the concept of electromagnetic induction and the application of Maxwell's equations.</i>	<u>BIG IDEAS:</u> • Change • Fields • Conservation <u>SCIENCE PRACTICES:</u> • Creating Representations • Mathematical Routines • Scientific Questioning and Argumentation	How does an electric motor work? How does pushing the doorbell produce a sound inside the house? How does an antenna work? How are sound waves generated by your headphones or speakers from a digital recording of a song? How does a Wi-Fi internet connection work?