CollegeBoard AP

AP DAILY VIDEOS

AP Physics C: Electricity and Magnetism

AP Daily is a series of on-demand, short videos—created by expert AP teachers and faculty—that can be used for in-person, online, and blended/hybrid instruction. These videos cover every topic and skill outlined in the AP Course and Exam Description and are available in AP Classroom for students to watch anytime, anywhere.

Unit 1

Video Title	Topic	Video Focus	Instructor
1.1: Daily Video 1	Electrostatics—Charge and Coulomb's Law	An introduction to electrostatic force and Coulomb's law.	Jenny Podel
1.1: Daily Video 2	Electrostatics—Charge and Coulomb's Law	Using Coulomb's law to find a location where a third charge can be placed to experience zero force.	Jenny Podel
1.1: Daily Video 3	Electrostatics—Charge and Coulomb's Law	Using Coulomb's law to find the net force on a particle in a three-particle configuration in two dimensions.	Jenny Podel
1.1: Daily Video 4	Electrostatics—Charge and Coulomb's Law	A review of charge conservation and the transfer of charge; charging by friction and charging by contact.	Jenny Podel
1.1: Daily Video 5	Electrostatics—Charge and Coulomb's Law	How charged objects interact with some neutral objects; a review of the subtle differences in insulators and conductors.	Jenny Podel
1.1: Daily Video 6	Electrostatics—Charge and Coulomb's Law	The concept of charging by induction (featuring several examples).	Jenny Podel
1.1: Daily Video 7	Electrostatics—Charge and Coulomb's Law	Comparing the strength of the electrostatic force to the strength of the gravitation force at an atomic level.	Jenny Podel
1.2: Daily Video 1	Electrostatics—Electric Field and Electric Potential	An introduction to electric fields and how fields are diagrammed; how to calculate a field from a point charge.	Jenny Podel
1.2: Daily Video 2	Electrostatics—Electric Field and Electric Potential	Several practice problems about charges in static equilibrium inside uniform fields.	Jenny Podel
1.2: Daily Video 3	Electrostatics—Electric Field and Electric Potential	Particles undergoing projectile motion while inside of a uniform field.	Jenny Podel
1.3: Daily Video 1	Electrostatics—Electric Potential Due to Point Charges and Uniform Fields	A review of gravitational potential energy; defining electrical potential energy due to point charges, with electrical potential energy of four charges at the corners of a square as an example.	Roger Siegel
1.3: Daily Video 2	Electrostatics—Electric Potential Due to Point Charges and Uniform Fields	Using conservation of energy in electrical systems to determine the speed of charged particles after moving apart.	Roger Siegel
1.3: Daily Video 3	Electrostatics—Electric Potential Due to Point Charges and Uniform Fields	Charges create electric fields and a potential field; potential is modeled as a potential surface and with equipotential lines.	Roger Siegel
1.3: Daily Video 4	Electrostatics—Electric Potential Due to Point Charges and Uniform Fields	Movement of a charge parallel to an electric field involves work and a change of potential; movement perpendicular to the field does not.	Roger Siegel
1.3: Daily Video 5	Electrostatics—Electric Potential Due to Point Charges and Uniform Fields	Three practice problems exploring the concept of electric field and electric potential being related but different.	Roger Siegel

Video Title	Topic	Video Focus	Instructor
1.4: Daily Video 1	Electrostatics—Gauss's Law	An introduction to Gauss's law and electric flux.	Jenny Podel
1.4: Daily Video 2	Electrostatics—Gauss's Law	Using Gauss's law to derive the electric field a small distance away from a line of charge.	Jenny Podel
1.4: Daily Video 3	Electrostatics—Gauss's Law	Using Gauss's law to find the electric field a small distance away from a uniformly charged plate.	Jenny Podel
1.4: Daily Video 4	Electrostatics—Gauss's Law	Using Gauss's law for a charged insulating sphere; using integration of a uniform charge density to find the charge enclosed within the gaussian.	Jenny Podel
1.5: Daily Video 1	Electrostatics—Fields and Potentials of Other Charge Distributions	Defining an electric dipole; showing the field around a dipole; learning how to calculate the field from a dipole.	Jenny Podel
1.5: Daily Video 2	Electrostatics—Fields and Potentials of Other Charge Distributions	Using integration to derive the electric field from a charged rod.	Jenny Podel
1.5: Daily Video 3	Electrostatics—Fields and Potentials of Other Charge Distributions	Using integration techniques to find the electric field from a semi-circle of charge.	Jenny Podel

Unit 2

Video Title	Topic	Video Focus	Instructor
2.1: Daily Video 1	Conductors, Capacitors, Dielectrics—Electrostatics with Conductors	We examine the behavior of excess charges on conductors, electric fields in and around conductors, and the effect that this has on the potential in and around the conductor.	Roger Siegel
2.1: Daily Video 2	Conductors, Capacitors, Dielectrics—Electrostatics with Conductors	This video looks at spherical conducting shells. We'll use an AP Exam question from 1990 to derive that the inner and outer surfaces of a conductor have the same potential.	Roger Siegel
2.1: Daily Video 3	Conductors, Capacitors, Dielectrics—Electrostatics with Conductors	In this video, we'll use an AP Exam question from 1988 about a concentric shell. We'll also define the term "ground."	Roger Siegel
2.1: Daily Video 4	Conductors, Capacitors, Dielectrics—Electrostatics with Conductors	In this video, we'll review what happens when two charged conductors touch each other.	Roger Siegel
2.2: Daily Video 1	Conductors, Capacitors, Dielectrics—Capacitors	This video will cover the definition of capacitance and its dependence on the geometry of the plates of a parallel-plate capacitor.	Santosh Madhavan
2.2: Daily Video 2	Conductors, Capacitors, Dielectrics—Capacitors	This video will derive the geometrical factors that affect the capacitance of parallel- and cylindrical-plate capacitors.	Santosh Madhavan
2.2: Daily Video 3	Conductors, Capacitors, Dielectrics—Capacitors	This video derives the energy stored in a capacitor and the energy density in an electric field.	Santosh Madhavan
2.2: Daily Video 4	Conductors, Capacitors, Dielectrics—Capacitors	This video reviews problems based on the structure and physical properties of capacitors.	Santosh Madhavan
2.3: Daily Video 1	Conductors, Capacitors, Dielectrics—Dielectrics	This video will explain the physical properties of a dielectric when placed in an external electric field and examine how a dielectric affects the properties of the capacitor.	Santosh Madhavan
2.3: Daily Video 2	Conductors, Capacitors, Dielectrics—Dielectrics	This video will explore how dielectrics affect the energy of capacitors.	Santosh Madhavan

Unit 3

Video Title	Topic	Video Focus	Instructor
3.1: Daily Video 1	Electric Circuits—Current and Resistance	This video introduces conventional current, shows the basic properties of a circuit and works with Ohm's Law	Jenny Podel
3.1: Daily Video 2	Electric Circuits—Current and Resistance	This video explores microscopic definition for current. We will also look at the relationship of current and electric field with in circuits.	Jenny Podel
3.1: Daily Video 3	Electric Circuits—Current and Resistance	This video explores the relationship between resistance and physical properties of the resistor.	
3.2: Daily Video 1	Electric Circuits—Current, Resistance, Power	This video goes through the derivation of the three equations used for electrical power in a circuit and covers a practice problem.	Jenny Podel
3.3: Daily Video 1	Electric Currents—Steady-State Direct-Current Circuits with Batteries and Resistors only	This video investigates the properties and behavior of series circuits composed of only resistors.	Marsha Hobbs
3.3: Daily Video 2	Electric Currents—Steady-State Direct-Current Circuits with Batteries and Resistors only	This video explores the properties and behavior of parallel circuits composed of only resistors.	Marsha Hobbs
3.3: Daily Video 3	Electric Currents—Steady-State Direct-Current Circuits with Batteries and Resistors only	This video focuses on solving problems with circuits which have resistors in series and parallel.	Marsha Hobbs
3.3: Daily Video 4	Electric Currents—Steady-State Direct-Current Circuits with Batteries and Resistors only	This video will explain the conservation laws in circuits using Kirchhoff's loop and junction rules and solve circuit problems with more than one battery.	Marsha Hobbs
3.3: Daily Video 5	Electric Currents—Steady-State Direct-Current Circuits with Batteries and Resistors only	This video discusses internal resistance of a battery with a graphical explanation. Practice is provided through an FRQ.	Marsha Hobbs
3.4: Daily Video 1	Capacitors in Circuits	This video investigates the behavior of capacitors in series and parallel circuits	Marsha Hobbs
3.4: Daily Video 2	Capacitors in Circuits	This video introduces RC circuits and goes through the derivation of quantities in a charging circuit element as a function of time	Marsha Hobbs
3.4: Daily Video 3	Capacitors in Circuits	This video continues the discussion of RC circuits. The equations for the discharge of an RC circuit are derived and a sample problem is worked on.	Marsha Hobbs
3.4: Daily Video 4	Capacitors in Circuits	This video will work on using previous knowledge to solve a free response question from an AP Exam.	Marsha Hobbs

Unit 4

Video Title	Topic	Video Focus	Instructor
4.1: Daily Video 1	Magnetic Fields—Forces on Moving Charges in Magnetic Fields	This video will explore the properties of magnets and magnetic fields.	Marsha Hobbs
4.1: Daily Video 2	Magnetic Fields—Forces on Moving Charges in Magnetic Fields	This video is focused on the force on a moving charge in a magnetic field. This video also introduces the cross product and the right-hand rule.	Marsha Hobbs
4.1: Daily Video 3	Magnetic Fields—Forces on Moving Charges in Magnetic Fields	This video will derive the relationship of a charged particle moving perpendicular to a magnetic field in circular motion.	Marsha Hobbs
4.1: Daily Video 4	Magnetic Fields—Forces on Moving Charges in Magnetic Fields	This video will solve a free-response question on a mass spectrometer from a previous AP Exam.	Marsha Hobbs
4.2: Daily Video 1	Magnetic Fields—Forces on Current-Carrying Wires in Magnetic Fields	In this video, the magnetic force on a current-carrying wire will be derived and applied to questions similar to those on previous exams.	Marsha Hobbs
4.2: Daily Video 2	Magnetic Fields—Forces on Current-Carrying Wires in Magnetic Fields	This video focuses on the forces and torque experienced by a loop of current placed in a magnetic field.	Marsha Hobbs
4.3: Daily Video 1	Magnetic Fields—Fields of Long Current-Carrying Wires	In this video, we will calculate the magnitude and direction of the magnetic field around a long, straight, current-carrying wire.	Michelle Strand
4.3: Daily Video 2	Magnetic Fields—Fields of Long Current-Carrying Wires	In this video, we will use the vector addition to calculate the magnetic field at a point from several current-carrying wires.	Michelle Strand
4.3: Daily Video 3	Magnetic Fields—Fields of Long Current-Carrying Wires	In this video, we will show how to determine the magnitude and direction of the magnetic force between two parallel current-carrying wires.	Michelle Strand
4.4: Daily Video 1	Magnetic Fields—Biot-Savart Law and Ampère's Law	In this video, we will define an Amperian loop, define current density, and use Ampère's law to derive the equation for the magnetic field around a long, straight, current-carrying wire.	Michelle Strand
4.4: Daily Video 2	Magnetic Fields—Biot-Savart Law and Ampère's Law	In this video, we will use Ampère's law to derive the equation for the magnetic field inside and outside a solenoid.	Michelle Strand
4.4: Daily Video 3	Magnetic Fields—Biot-Savart Law and Ampère's Law	In this video, we will use Ampère's law to solve for the magnetic field inside and outside a coaxial cable.	Michelle Strand
4.4: Daily Video 4	Magnetic Fields—Biot-Savart Law and Ampère's Law	In this video, we will use the Biot-Savart law to determine the magnetic field from a small piece of current-carrying wire.	Michelle Strand
4.4: Daily Video 5	Magnetic Fields—Biot-Savart Law and Ampère's Law	In this video, we will use the Biot-Savart law to determine the magnetic field at the center of a coil of current-carrying wire.	Michelle Strand
4.4: Daily Video 6	Magnetic Fields—Biot-Savart Law and Ampère's Law	In this video, we will use the Biot-Savart law to determine the magnetic field around a long, straight, current-carrying wire.	Michelle Strand

Unit 5

Video Title	Topic	Video Focus	Instructor
5.1: Daily Video 1	Electromagnetism—Electromagnetic Induction (Including Faraday's Law and Lenz's Law)	In this video, we will define magnetic flux and calculate its value in particular physical situations.	Michelle Strand
5.1: Daily Video 2	Electromagnetism—Electromagnetic Induction (Including Faraday's Law and Lenz's Law)	In this video, we will derive Faraday's Law to show how a changing magnetic flux can induce a current in a wire.	Michelle Strand
5.1: Daily Video 3	Electromagnetism—Electromagnetic Induction (Including Faraday's Law and Lenz's Law)	In this video, we will explain Lenz's Law and how it's used to find the direction of an induced current.	Michelle Strand
5.1: Daily Video 4	Electromagnetism—Electromagnetic Induction (Including Faraday's Law and Lenz's Law)	In this video, we will determine situations that create a net force and a net torque on a conductive loop.	Michelle Strand
5.1: Daily Video 5	Electromagnetism—Electromagnetic Induction (Including Faraday's Law and Lenz's Law)	In this video, we will use Newton's Second Law, Faraday's Law, and Lenz's Law to analyze a conductive bar's motion on rails.	Michelle Strand
5.1: Daily Video 6	Electromagnetism—Electromagnetic Induction (Including Faraday's Law and Lenz's Law)	In this video, we will show how differential equations can be used to solve for the terminal velocity of a conductive rail in a magnetic field.	Michelle Strand
5.2: Daily Video 1	Electromagnetism—Inductance (Including LR circuits)	In this video, we will discuss what an inductor is and define inductance.	Michelle Strand
5.2: Daily Video 2	Electromagnetism—Inductance (Including LR circuits)	In this video, we will derive equations used to analyze LR circuits using Kirchhoff's loop rule.	Michelle Strand
5.2: Daily Video 3	Electromagnetism—Inductance (Including LR circuits)	In this video, we will analyze LR circuits.	Michelle Strand
5.2: Daily Video 4	Electromagnetism—Inductance (Including LR circuits)	This video will review an LC circuit. An element of circuitry that includes an inductor and a capacitor.	Jenny Podel
5.3: Daily Video 1	Electromagnetism—Maxwell's Equations	This video will introduce displacement current, which is Maxwell's addition to Ampere's law.	Jenny Podel
5.3: Daily Video 2	Electromagnetism—Maxwell's Equations	This video will review Maxwell's equations in integral and derivative form. We will practice a few multiple choice questions.	Jenny Podel
5.3: Daily Video 3	Electromagnetism—Maxwell's Equations	The story ends here! This video takes us through the mathematical derivation of the speed of light using the fact that light is an electromagnetic wave.	Jenny Podel