

# Reading Public Schools

*Instilling a joy of learning and inspiring the innovative leaders of tomorrow*



## Curriculum Guide

## AP PHYSICS C: Mechanics and Electricity and Magnetism

### Course Description

The Advanced Placement Physics C course utilizes differential and integral calculus to teach students core concepts of Mechanics and Electricity & Magnetism. The class is designed to be the equivalent of two semester-long introductory, calculus-based college courses, especially appropriate for students planning to specialize or major in physical science or engineering. Laboratory experience will be emphasized as a means for delving more deeply into topics such as kinematics, Newton's laws of motion, work, energy and power, systems of particles and linear momentum, circular motion and rotation, and oscillations and gravitation, electrostatics, conductors, capacitors and dielectrics, electric circuits, magnetic fields, and electromagnetism. Students are encouraged to take BOTH Advanced Placement Physics C Exams (Electricity & Magnetism AND Mechanics) offered each year in May. In consultation with the teacher, each student will take either the Advanced Placement Physics C Exam(s) or the class Advanced Placement Physics C final exam. For more information, go to: <https://apcentral.collegeboard.org/courses/ap-physics-c-electricity-and-magnetism?course=ap-physics-c-electricity-and-magnetism>

### Content Standards from AP Physics C Mech and E&M Course at a Glance

#### Mechanics

1. Kinematics: Motion in 1 dimension, Motion in 2 dimensions.
2. Newton's Laws of Motion: First and Second Law, Circular Motion, Third Law
3. Work, Energy and Power: Work-Energy Theorem, Force and Potential Energy, Conservation of Energy, Power
4. Systems of Particles and Linear Momentum: Center of Mass, Impulse and Momentum, Conservation of Linear, Collisions
5. Rotation: Torque and Rotational Statics, Rotational Kinematics, Rotational Dynamics and Energy, Angular Momentum and Its conservation.
6. Oscillations: Simple Harmonic Motion Springs, and Pendula
7. Gravitation: Gravitational Forces, Orbits of Planets and Satellites.

#### Electricity and Magnetism

1. Electrostatics: Charge and Coulomb's Law, Electric field and electric potential, electric potential due to point charges and uniform fields, Gauss's Law, Fields and Potentials of Other Charge Distributions
2. Conductors, Capacitors, Dielectrics: Electrostatics with Conductors, Capacitors, Dielectrics
3. Electric Circuits: Current and Resistance, Power, Steady State Direct Current Circuits with Batteries and Resistors, Gauss's Law
4. Magnetic Fields: Forces on moving charges in magnetic fields, forces on current carrying wires in magnetic fields, fields of long current carrying wires, Biot-Savart Law and Ampere's Law
5. Electromagnetism: Electromagnetic Induction including Faraday's Law and Lenz's Law, Inductance, including LR Circuits, Maxwell's Equations

AP Physics C: Mechanics Course and Exam Description: <https://apcentral.collegeboard.org/pdf/ap-physics-c-mechanics-course-and-exam-description.pdf?course=ap-physics-c-mechanics>

AP Physics C: Electricity and Magnetism Course and Exam Description: <https://apcentral.collegeboard.org/pdf/ap-physics-c-electricity-and-magnetism-course-and-exam-description.pdf?course=ap-physics-c-electricity-and-magnetism>

### Skills—from AP Physics C Course Framework

Science Practices:

1. Visual Representations— Analyze and/or use representations of physical situations, excluding graphs.
2. Question and Method—Determine scientific questions and methods
3. Representing Data and Phenomena—Create visual representations or models of physical situations.
4. Data and Analysis—Analyze quantitative data represented in graphs
5. Theoretical Relationships—Determine the effects on a quantity when another quantity or the physical situation changes
6. Mathematical Routines—Solve problems of physical situations using mathematical relationships
7. Argumentation—Develop an explanation or a scientific argument

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## Curriculum Guide Overview

### Curriculum Guide

Curriculum guides are public documents aligned with the Massachusetts Department of Education Curriculum Frameworks. They focus on the set of standards that students will learn within certain disciplines at appropriate grade levels. Each area of the curriculum is divided into general strands (broad categories) under which the standards fall. When we discuss “standards-based education” we mean that students are measured against their proficiency and growth towards meeting these standards. Curriculum Guides are intended for teachers, parents, and the wider school community as an overview document of the course of study for the year.

### Content Standards

The content standards for Advanced Placement classes at Reading Memorial High School are set by the College Board. For more information please refer to: <https://apcentral.collegeboard.org/courses/ap-physics-c-electricity-and-magnetism?course=ap-physics-c-electricity-and-magnetism>.

### Science and Engineering Practices

The integration of science and engineering practices in high school science courses gives students dynamic and relevant opportunities to refine and communicate science understandings to be well prepared for civic life, postsecondary education, and career success.

### Essential Questions

Essential questions are questions that are not answerable with an easy answer or a simple instruction. The purpose of essential questions is to provide opportunities

### Key Activities

Key Activities identified in Curriculum Guides are not intended to be exhaustive, nor are they intended to be prescriptive. The activities identified may function as a menu of curriculum resources from which educators identify the most appropriate tools to utilize in their classrooms.