

 **Science Standards**

**AP Physics 1**

**Course Overview:** This course is designed to prepare students for the AP Physics 1 test in May. It is roughly equivalent to a 1st-year physics course in college. This course is designed for seniors who are confident in their math skills and ready for a challenge.

**Bold standads are essential standards that all students will learn as they complete the course.**

**Unit 1: Kinematics**

**Description:** This unit will discuss the mathematical and conceptual description of motion.

**Standards**

1. Students understand how to show work in a physics class.
2. Students understand the meaning of position, velocity, and acceleration.
3. Students understand the relationship between position, velocity, and acceleration.
4. Students can use the major kinematic equations to solve physics problems.
5. Students can solve two-dimensional physics problems.
6. Students can interpret Pvt and Vvt graphs and determine position, velocity, and acceleration from the graph.

**Unit 2: Forces and Dynamics**

**Description:** This unit will discuss the forces that cause motion, and how to calculate values for those forces.

**Standards**

1. Students can use Newton’s Second Law to solve problems.
2. Students understand how forces can balance and can interpret free body diagrams.
3. Students can calculate kinetic and static friction.
4. Students can calculate spring force.
5. Students can use balanced forces to solve for relevant forces.
6. **Students can solve problems with many split forces using free body diagrams.**

**Standards** PS2-1, PS2-2, PS2-3, PS2-6

**Unit 3: Energy**

**Description:** This unit discusses another way to solve physics problems, using an energy paradigm.

**Standards**

1. Students understand that energy can only be conserved, not created or destroyed.
2. Students can calculate values for KE, Ug, Us, and Ef.
3. **Students understand how to solve energy problems using before and after situations.**
4. Students can describe open and closed systems, and how energy entering or leaving the system can be used to solve problems
5. Students can solve problems using energy calculations.
6. Students can describe situations where energy is not the best way to solve problems

**Standards** PS3-1, PS3-2, PS3-3,

**Unit 4: Momentum**

**Description:** This unit discusses how momentum can be applied to physics problems.

**Standards**

1. Students can calculate values for momentum
2. Students can split momentum into two dimensions.
3. Students can relate changes in momentum to forces.
4. Students can define elastic, inelastic, and perfectly inelastic collisions.
5. Students can solve problems using elastic and perfectly inelastic collisions.

**Standards** PS3-5

**Unit 5: Circuits**

**Description:** This unit discusses the basics of electric circuitry.

**Standards**

1. Students can define current, voltage, and resistance in a circuit.
2. Students can diagram circuits.
3. Students can describe how current and resistance behave at junctions.
4. Students understand how to combine and collapse resisters to calculate the current in a circuit.
5. Students understand how resistance varies with the shape or resistors.

**Unit 6: Circular Motion**

**Description:** This unit discusses how circular motion can be described with minor modifications to linear motion.

**Standards**

1. Students understand how to use the circular kinematic equations.
2. Students understand how orbits relate to kinematics.
3. Students understand the role of the centripetal force in calculating the motion of objects.
4. Students can modify gravity at varying distances from the planet.
5. Students can relate circular and linear kinematic terms.

**Standards** PS2-5

**Unit 7: Torque and RKE**

**Description:** This unit discusses how Torques and other circular versions of physics can be used to solve problems.

**Standards**

1. Students can explain how torque relates to forces.
2. Students can relate torques to centers of mass.
3. **Students can draw free torquey diagrams.**
4. Students can use torque to solve force problems.
5. Students can relate torques to circular kinematics.
6. **Students can use RKE to solve energy problems.**

**Unit 8: Waves**

**Description:** This unit discusses simple harmonic motion, a model which uses a restoring force to cause continuous motion as energy travels through a medium.

**Standards**

1. Students can explain how simple harmonic motion behaves.
2. Students can identify the restoring force in simple harmonic motion.
3. **Students can use the SHM equations to describe oscillators.**
4. Students can diagram waves.
5. Students can superposition waves.
6. Students can explain why superposition leads to beats and loud/soft spots.

**Standards** PS4-1, PS4-3,