**Leon High School**

**Advanced Placement Physics 1 – 2003421**

**Mr. Aley 2019-20**

Advanced Placement (AP) Physics 1 is an algebra-based, introductory college-level physics course that explores topics such as Newtonian mechanics, dynamics, circular motion, energy, electrostatics, DC circuits, mechanical waves and sound.

Both problem solving skills and concept understanding will be addressed throughout the course. Student progress and assessment will be determined through text assignments, student presentation, worksheets, laboratory work, quizzes, and varied-form tests for each unit. Laboratory work will correlate with current topics and will involve both traditional and inquiry based activities.

**Text**

College Physics for AP® Courses, Open Stax © 1999-2017, Rice University

<https://cnx.org/contents/jQSmhtXo@14.60:6pB5TgBD@4/Connection-for-AP-Courses>

<https://cnx.org/donate/download/8d04a686-d5e8-4798-a27d-c608e4d0e187%4014.60/pdf>

**Additional Resource**

Serway, Raymond A. *College Physics*. Pacific Grove, CA: Thomson-Brooks/Cole, 2006.

"Physics Tutorial." *Physics Tutorial*. N.p., n.d. Web.

Serway, Raymond A., and Jerry S. Faughn. *Holt Physics*. Orlando: Holt, Rinehart and Winston, 2009. Print.

**Syllabus**

**Mechanics**

1. Kinematics (CB Big Idea 3)
   1. One dimension
      1. Manipulate four kinematics equations to solve for unknown variables (i.e. displacement, velocity, acceleration, and time).
      2. Determine unknown variables (i.e. displacement, velocity, acceleration, and time) from graphical representations of motion.
   2. Two dimension
      1. Manipulate four kinematics equations to solve for unknown variables (i.e. displacement, velocity, acceleration, and time) of projectiles.
      2. Apply vector addition in solving for displacement, velocity and acceleration.
2. Dynamics (CB Big Idea 1,2,3,4)
   1. Apply laws of motion in analyzing the motion of a particle.
      1. Analyze the motion of an object with uniform linear motion.
      2. Relate the forces acting on an object on an incline to the objects motion.
      3. Include frictional forces in an object’s motion.
      4. Determine motion of a system of masses and pulleys.
   2. Express the forces acting on an object through free-body diagrams.
   3. Apply Hooke’s law in analyzing the motion of an oscillating spring.
3. Rotation/Gravity
   1. Uniform Circular Motion
      1. Calculate centripetal acceleration.
      2. Calculate centripetal force.
      3. Represent with vectors the velocity, acceleration, and force of an object undergoing uniform circular motion.
   2. Gravity
      1. Apply the Universal Law of Gravitation.
      2. Describe orbital motion quantitatively.
      3. Apply Kepler’s Laws of Planetary Motion.
4. Energy
   1. Work
      1. Determine the work done in moving an object.
         1. Calculate work done from force applied and displacement.
         2. Graphically analyze work done from a graph of work vs. displacement.
   2. Energy
      1. Calculate Kinetic Energy
      2. Calculate Gravitational Potential Energy
   3. Work-Energy
      1. Apply the work-energy theorem in analyzing a system.
   4. Law of Conservation of Energy
      1. Apply conservation principles to systems
         1. General
         2. Pendulum motion
         3. Spring oscillations
   5. Power
      1. Calculate power
5. Momentum
   1. Define and calculate impulse
   2. Define and calculate momentum
   3. Apply Impulse-Momentum theorem
   4. Law of Conservation of Momentum
      1. Apply Law of Conservation of Momentum to describe collisions.
      2. Identify collisions as elastic or inelastic. /
6. Simple Harmonic Motion
   1. Define and identify simple harmonic oscillation
   2. Analyze simple pendulum motion.
   3. Apply energy and momentum relationships to simple harmonic oscillators
7. Torque and Rotational Motion
   1. Transition between linear and angular quantities.
   2. Apply rotational kinematic equations.
   3. Calculate the torque acting on a system.
   4. Determine rotational inertia and rotational momentum for a rotating system.

8) Electrostatics

a. Identify the source of electric charge.

i. Relate to basic atomic model

b. Describe the characteristics of electric charge.

i. Apply the law of electrostatics

ii. Differentiate between induction and conduction

c. Determine the electrostatic force between multiple charged particles.

d. Determine the electric field surrounding a point charge.

e. Represent the electric field surrounding a single point charge and multiple point charges.

f. Identify equipotential lines in an electric field

g. Charged particle

i. Determine the electric potential of a charged particle in an electric field.

ii. Determine the force and resulting motion of a charged particle in an electric field.

9) DC Circuits

a. Define current, resistance, and voltage.

b. Apply Ohm’s law for a current carrying wire.

c. Resistors

i. Relate resistance to physical characteristics

ii. Determine heat produced in a resistor

d. Series and parallel circuit analysis

i. Determine EMF

ii. Apply Ohm’s law

iii. Apply Kirchoff’s law.

iv. Meters

A) Effect of introduction.

B) Proper application

10) Waves & Sound

a. Identify the main characteristics of waves

b. Analyze wave characteristic using the wave equation

c. Describe reflection of waves

d. Analyze standing waves

i. Identify nodes and anti-nodes

e. Relate basic wave characteristics to sound

f. Apply standing wave characteristics to identify resonance in open and

closed pipes.

g. Apply the Doppler Effect to sound.