AP Physics 1 3436

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Conference Period: 3rd Period, M–F, 10:22 – 11:13 a. m.
Tutorial Hours: Tuesdays & Wednesdays, 4:00 – 5:00 P.M. **(or by appointment)**

Course Description

AP Physics 1 is designed to be equivalent to the first semester of an introductory college-level algebra-based physics course. This course is useful for potential engineering, pre-med, science and computer science majors as well as anyone interested in Physics. It is also a fantastic college preparatory course. As AP Physics 1 is taught over a full school year, there is time for thorough, in-depth, student centered inquiry activities allowing students to carry out careful experiments and design laboratory practical work to answer real world questions. AP Physics 1 covers the study of Classical Mechanics which includes: Kinematics, Projectile Motion, Newton's Laws, Circular Motion, Gravitation & Kepler's Laws, Work & Energy, Momentum & Impulse and Torque & Rotational Dynamics. Additionally, students will study Electrostatics & basic DC Circuits, Simple Harmonic Motion and Mechanical Waves. AP Physics culminates with the AP Physics 1 examination in May.

Course Prerequisites

Unlike AP Physics C, no physics pre-requisite is recommended for AP Physics 1. Students should have completed geometry and be concurrently taking Algebra II or an equivalent course.

Resources and Materials

- Students are required to keep a Binder (3 ring) in which all graded and non-graded classwork, lab reports, notes, handouts will be kept. This notebook and my website (address given below) will be students' primary sources of study material for their tests/quizzes. **NOTE: Colleges may require students to present their laboratory materials from AP science courses before granting college credit for laboratory, so students are encouraged to retain their laboratory notebooks, reports, and other materials.**
- TI (Texas Instruments) 83+ graphing calculator
- Text book: None. Students will rely mainly on their class notes and my website: https://www.smcisd.net/Page/2697
- If you are struggling in this class I am here to help you and am your first recourse. Otherwise, the internet is full of great stuff as well. Below are a few of my favorites sites:
  - Khan academy: https://www.khanacademy.org/
  - AP Physics C video lessons: http://www.aplusphysics.com/courses/ap-c/videos/APCVidIndex.html
  - Viren's videos: http://apphysicslectures.com/AP_Mechanics_Videos.html#Unit_A
  - http://www.brightstorm.com/science/physics/ This website is full of videos and tutorials.
  - http://www.youtube.com/user/onlearningcurve/playlists Youtube channel with instruction on AP level physics.
  - www.physicsclassroom.com A great site. Click on tutorial & you can get info on about any physics topic
  - http://ocw.mit.edu/courses/physics/ This is MIT's site for released physics content.
  - http://hyperphysics.phy-astr.gsu.edu/hbase/hph.html#mechcon This is an interactive VIEN diagram,
  - http://www.khanacademy.org/ This are instructional videos, scroll down to physics to view a video.
  - http://www.learnapphysics.com/ Good site for practice prob. and lessons.
  - www.learnerator.com Practice problems

Course Outline

First Semester *(16 Weeks)*

Summer Work, Intro, and Math Concepts (1 Week)
- Unit Conversion & Dimensional Analysis
- Algebraic manipulation & Trigonometry
- Vector mathematics
- Problem Solving

Kinematics (3.5 Weeks)
- Position, displacement, distance, speed, velocity, and acceleration
- Kinematic equations for uniform acceleration
- Graphical analysis of kinematics
- Kinematics of Falling Objects
- Vector addition and subtraction
- Components of vectors
- Two-dimensional motion/Projectile motion
- Relative motion (Frame of Reference)

Dynamics, Forces, Newton's Laws (2.5 Weeks)
- Force and free-body diagrams
- Equilibrium and Non-Equilibrium situations
- Newton's three laws of motion
- Properties of friction
- Coefficients of staring and sliding friction
- Fluid friction
- Drag forces and terminal velocity

Circular Motion and Gravitation (2 weeks)
- Centripetal force & acceleration
- Banked curves
- Vertical circular motion
- Universal Gravitation
- Satellites and Kepler's Laws
- Apparent weightlessness and Artificial Gravity

Work, Energy, and Power (2 Weeks)
- Work with a constant and variable force
- Mechanical energy (kinetic and potential)
- Work/Energy Theorem
- Conservative and non-conservative forces
- Power

Linear Momentum and Collisions (2 Weeks)
- Center of mass
- Linear momentum
- Conservation of linear momentum
- Impulse and momentum
- One-and two dimensional elastic collisions, inelastic col.
- Frame of reference

Rotational Kinematics (3 Weeks)
- Rotational mechanics
- Linear vs. angular variables (displacement, velocity, and acceleration)
- Rotational Kinematics formulas
- Center of gravity, Torque, Rotational inertia
- Rotational kinetic energy, rolling, translation vs rotation
- Angular momentum

Second Semester *(17 Weeks)*

Oscillations & Harmonic Motion (2 weeks)
- Simple harmonic motion
- Reference circle
- Displacement, velocity, acceleration
- Amplitude, frequency, period
- Energy of an oscillating system
- Pendulums
- Resonance

Mechanical Waves & Sound (4.5 Weeks)
- Nature of waves
- Periodic waves
- Speed of a wave
- The nature of sound, speed of sound, sound intensity
- Doppler Effect
- Principle of superposition & interference
- Constructive and destructive interference
- Beats
- Standing waves
- Transverse and Longitudinal Waves
- Diffraction

Electrostatics (1.5 Week)
- Charged objects & electric force
- Conductors & insulators
- Coulomb's Law
- Electric Field, Field lines, magnitude
- Shielding

Direct Current Electrical Circuits (3 Weeks)
- EMF; current, resistance
- Ohm's Law
- Resistance & resistivity
- Electric power
- Circuits, Series, Parallel, Combination
- Kirchhoff's rules

AP Test Review (3 Weeks)
- Review for the AP Physics exam will be conducted during normal instructional time
- and during two after school study sessions prior to the exam date.

Post AP (3 Weeks)
- Science movies, physics challenges, problem based learning projects

Attendance and Tardiness. Class meets for a ~50 minute period Monday-Friday. Students are expected to attend class as outlined in school policies. Students not in the room when the bell rings will be marked tardy and will not be able to complete the warm-ups (Firestarters), which are bonus point activities at the beginning of regular class days. Continued tardiness will result in a detention and then parent-contact, followed by the policy outlined for tardiness in the Student-Parent handbook.

Attendance is of paramount importance in AP Physics 1. Collective in-class activities, labs, discovery learning experiences, and discussions cannot be replicated at home or at a later date in class. Thus, when a student is absent he/she misses valuable interchange and concept formation that cannot be made up or encapsulated by reading over a classmate's class notes.

Conduct & Academic Dishonesty

- Students must comply with teacher norms, classroom procedures, and the Student Code of Conduct as outlined at: https://drive.google.com/file/d/0BwmQXslIWDj_elhiR3hXU3YySEU/view.
  Students violating behavioral guidelines will have "three strikes before they are out":
  - **STRIKE 1:** verbal warning,
  - **STRIKE 2:** teacher assigned consequence (after school or lunch detention, lab duty, etc.),
  - **STRIKE 3:** parent contact via email or phone call.

  Being "out" means getting a written office referral as per the Student-Parent Handbook. Based on the gravity of the offense, the teacher reserves the right to skip steps. Students who deliberately or recklessly vandalize/break classroom materials will have to pay the school to replace them.
- Students must also comply with the Science Department Safety Rules and Regulations contract, esp. when doing lab work.
- **Academic dishonesty/cheating** shall be defined as giving or receiving unauthorized information or help on an assignment, possession of any unauthorized material prior to or during an evaluation, copying another student's assignment, submitting duplicate work, plagiarizing, or having someone else complete an assignment on behalf of a student. The determination that a student has engaged in academic dishonesty shall be based on the judgment of the classroom teacher or other supervising professional employee, taking into consideration written materials, observation, or information from students. Students found to have engaged in academic dishonesty shall be given a zero on the work and be subject to consequences as outlined in the SMCISD Student Code of Conduct.

Grading Policy. Grades in the AP Physics 1 course will be broken down as follows:

- ***Summative Grades (60% of your grade):*** Major grades that include tests/quizzes and/or special projects equivalent to test grades.
- ***Formative Grades (40% of your grade):*** include notebooks checks, problems of the day, HW quizzes, labs, oral presentations, test/quiz reviews, & daily assignments

Major grades. Tests and quizzes are almost exclusively multiple choice (no partial credit) and/or free response (partial credit given) to accustom students to the AP exam format as well as the final exams. As students will not be able to use their notes on the AP test, their tests/quizzes in class will also be without notes. Students will have formula sheets for their tests/quizzes just as in the AP Exam. Three-four traditional tests/quizzes per quarter will be assigned which will generally fall on Thursdays. Both quizzes and tests will be graded like real AP tests with real problems from old published AP tests. The AP curve will also be used to assign grades on these assessments. One long term group project, equal to a test grade, may be assigned during each quarter which helps buffer students' grade if they are not good test takers. For sure, one will be given each semester.

Students not satisfied with their test/quiz grades will be given one opportunity for a retake (different assessment with similar questions) per assessment which must be done on their own time (before/after school or during lunch time). This retake test/quiz must be done before the next assessment date and/or end of the three-week marking period (progress report or report card). Students can improve their original grade on that particular assessment by 50%. **EX:** If they scored a 50% on the original test, for

example, their grade can go up to a 75%. Students will only have to work out problems like the ones they missed, not retake the whole assessment.

Minor grades. Students can expect to have graded work almost every day in class. Some of these assignments may receive completion grades while others will be graded for quality. Students can expect 20 – 30 minutes of homework every night but the homework is given out on a weekly basis and will be "due" on Wednesdays. Homework is generally NOT graded and the answer keys are generally available online at my website so students can check their work; however, students will be given HW quizzes over the homework on a weekly basis as an incentive to do their OWN homework. Labwork will also be a major portion of students' daily grades and familiarity with lab work and procedures is expected for the AP exam. Because ample opportunities for daily bonus points are given throughout any given quarter, **extra credit work is not given**.

Weighted grading scale. Students need to be aware that AP exams are not graded on a linear grading scale. In other words, in order to get a grade of 5, one need not get 100% of the problems right. As a matter of fact, historically, students who answer more than 65% of the questions right on the AP Physics C test, can get a 5. To accustom students to this grading scale, it will be implemented from the very beginning of the school year. Students final practice tests before May, which will be comprehensive, will also be graded with this graduated grading scale.

Late Work & Makeup Work

Students who miss class are required to make arrangements with the instructor to complete missed assignments, tests, or quizzes. All make-up work needs to be completed in a timely manner meaning before the summative test date on the material (in the case of a missed test, before the subsequent test) or before the three-week marking period (be it progress report or report card). Students will receive the same or an equivalent assignment as make-up depending on teacher discretion and whether the assignment has already been graded and the answers have already been shared. Failure to turn in late or make up work will result in a zero on the assignment.

Most assignments, missed notes, handouts, and review materials are hyperlinked at my website at https://www.smcisd.net/Page/2697. Students need look for the unit that we are on and they can access the materials/assignments they've missed and print them out or get them from me in class.

Electronic Devices

Students may NOT use portable electronic devices (P.E.D.s) during lectures or labs with two exceptions: students who have made the change to taking electronic notes and, when approved by the teacher, for content-related activities (EX: using on-line graphing calculator, Kahoot, timing, filming). Abuse of this privilege by using P.E.D.s for other reasons during on-task times will result in the revocation of the privilege.

By SMHS policy, students are not allowed to use their electronic devices to play music. This includes when taking quizzes and tests. Initial warnings will be given for electronics used at inappropriate times and then penalties for inappropriate use of the devices will follow *school policy* according to the Student-Parent Handbook.

Remember:
→ *All games have rules.*
→ *All games are fun.*
→ *Physics has rules.*
→ *Therefore, physics is fun!* ☺