

# Hutchison High School AP Physics 1

## Spring Semester

This Booklet Belongs to: \_\_\_\_\_

**Replacement Cost = \$10.00**



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# AP Physics 1 Syllabus

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## Text:

*College Physics* – 7<sup>th</sup> Edition. Wilson, J. and Buffa, A. San Francisco, CA: Addison-Wesley.

## Course Overview:

AP Physics 1 is a college level introductory physics course covering the general topics of kinematics, Newtonian mechanics, impulse and momentum, work, energy, circular motion and gravitation, rotational motion, electrostatics (including basic resistor circuits), harmonic motion (pendulums and spring systems), and mechanical waves (such as sound). Juniors who enjoy AP Physics 1 are strongly encouraged to take AP Physics 2 their senior year. All students are encouraged to take the AP Physics 1 test at the end of the school year. High scores can be applied to many colleges for credit.

AP Physics 1 requires a thorough understanding of algebra 2 and trigonometry. The course is recommended for students who are planning to be pre-med majors in college, as a foundation course for students who are planning to be engineering or physics majors and will take a calculus-based physics course as college freshmen, or for non-physics majors who want to get some core college science credits in high school so that they can take other classes as college freshmen. This course will be covered in a full year. The emphasis of this course is to understand the concepts of physics, and use them to formulate and solve real world problems. Hands-on inquiry based lab work is presented as an integral part of this course. A topical unit assessment completes each unit. There is a cumulative final exam at the end of each semester.

Physics class will typically meet 4 days a week, for approximately 270 minutes total. Collaboration between students, including peer teaching and review, is strongly emphasized. Students are encouraged to work together on homework assignments, labs, and projects.

Course goals include developing each student's intuition, creativity, and investigative skills to:

- A. Read, understand, and interpret physical information.
- B. Use the scientific method to analyze a particular physical phenomenon or problem.
- C. Use mathematical reasoning in a physical situation or problem.
- D. Perform experiments, interpret the results of observations and communicate results, including error analysis.

## Grading Policy: Approximate Point Percentage Scale.

Assessments (Tests & Quizzes)	35%
Labs	25%
Homework	15%
Projects	10%
Final Exam	15%
Total:	100%

Grade	Percent
A	90% - 100%
B	80% - 89%
C	70% - 79%
D	60% - 69%

## Assessments (Tests and Quizzes):

There will be several unit tests each semester, as well as proficiency quizzes covering concepts within individual units.

I allow students to use the Resource section of their Booklets, and any notes contained therein.

### **Labs:**

1. All labs require data acquisition and written responses made in your Lab Notebook (provided). I will check your lab work off when I collect Booklets at the end of a unit.

2. Some labs are more detailed and require a more formal product turned in to me. The details of these products will be given in every lab where they occur.

For any lab, I will offer a question and answer session after all groups have finished their data collection, and before the lab is due. This most likely will occur at the start of next class.

### **Homework Checks:**

Daily Booklet Homework: 3 to 8 problems follow a section of notes, and are scored at the end of a unit. I will forewarn all students before collecting or checking Booklets. Early Booklets receive extra credit. Students are welcome to ask questions on specific problems the day after they're assigned.

Unit Review Problems: students should work on them during the course of the unit, and fill in the bubble sheet once the questions have been answered. On the due date, I will collect booklets and scan them. I will indicate which ones were missed and write down scores, then return Booklets.

If a student is late submitting answers to a Unit Review Problem set, there is a 50% reduction in score. Also, if work is not shown on problems, an incomplete fee will be assessed per problem.

### **Projects:**

All students must do one project during the spring semester, which will be outside the lab environment, and focus on specific learning objectives. The intention is to allow students to apply physics and gather data in real world scenarios, and to compare their findings with other students. When different topics are studied, students will present their findings to the class and be critically assessed by others.

### **Semester Final:**

The comprehensive semester final is worth 15% of your grade. You can use your Booklet, as well as any hand-written notes you have taken during the semester.

### **Redo Policy:**

Students have the option of redoing any incorrect answers on Booklet assignments, Unit Review Problems, and labs for at least 50% credit back. For example, if a student missed six points on an assignment and does all corrections, s/he will earn three points back. Corrections must be done in a different color in your Booklet, and can be turned at any time before the end of the quarter. Please make corrections ASAP.

Tests and quizzes. Students correct all their mistakes on a separate sheet of paper, staple it to the original, and give that to me for correction. Problems must be reworked, and answered completely. For example, don't just write A, B, C, or D for multiple choice, explain your correction thoroughly. Afterwards, they have the right to take another version of the test before the end of the quarter. The best score will be recorded.

### **Late Work:**

You will be told exactly when assignments are due. Work submitted after due dates will be accepted, with a late fee. Late work will not be accepted two weeks after a Unit Test.

### **Attendance:**

It is your responsibility to ask for any work missed due to excused, unexpected absences when you return. Alternatively, if you are keeping track of where we are in the semester in the Semester Plans portion of your Booklet, you'll have a fair idea as to what you'll be missing. Assignments you miss are due upon your return. Missed labs must be made up within two weeks of your return.

### **Class Expectations and Repercussions:**

At this stage in your development, I consider being a student to be your principal occupation, so treat this class as a serious job in which I am your boss:

1. Be in class on time, with all necessary materials.
2. Show respect to all people in the class, as well as the classroom itself.
3. While all school and district rules must be followed, I emphasize:
  - a. No phones.
  - b. No hats, hoods, or headgear,
  - c. Wear school and science lab appropriate clothing,
  - d. Leave all backpacks and large purses in your locker,
  - e. Have a hall pass or an escort to leave the room,
  - f. Computers are permitted **ONLY** if they are used in a scholastic context.

Not meeting expectations will result in the following tracked repercussions:

1. Verbal reminder of what is expected,
2. Second verbal reminder
3. Third verbal reminder and one lunch detention
4. Fourth verbal reminder, two lunch detentions, and guardian contact.
5. Office referral.

### **Supply List:**

School issued: textbook, Homework Booklet, Lab Notebook  
Writing sticks (pens / pencils),  
3-Ring binder with paper OR spiral notebook,  
Scientific Calculator (recommended)

#### **A note on calculators:**

Calculators (but not cell phone ones!) may be used on most tests and quizzes. Also, if you plan on going further academically, consider purchasing your own graphing calculator and use it as long as you have it. Consider it an investment.

A classroom set **MAY** be available, but these must not leave the classroom.

### **Physics Booklet:**

Each semester, students will be provided a Booklet that contains all of the lecture-based problem sets, labs, projects, and resources needed to complete the course. This booklet will periodically be collected for grading homework assignments or labs contained therein. Also, most labs will require the student to produce a more formal written product in an additional Lab Notebook.

Each unit in the Booklet ends with a set of Application Problems, which is pertinent to the unit of study but also draws on physics learned in previous units. This is a means to prepare students for the AP exam (if they choose to take it). Students are placed in groups, and work on the problem set. After a certain

time, each group is assigned a set of problems, which they have to present to the class. The class must respectfully find errors in the presented problems if any exist.

To communicate due dates, point values, and other details, each Booklet assignment has a dialog box. Here is an example showing important point information, as well as correction and scoring data:

<b>AP Physics 1</b>		<b>Lab 2.3 - Practice Equations</b>				
<b>Name:</b>					<b>Correction Credit: Half</b>	
<b>Lab /Hwk Points:</b>	<b>E.C.</b>	<b>Missed:</b>	<b>Late/Incomplete Fee:</b>	<b>First Score:</b>	<b>Corrections:</b>	<b>Final Score:</b>
<b>16</b>	<b>1 2</b>		<b>-4</b>			

**Big Ideas Concept:**

This year, the AP program is launching a new format for Physics that focuses on recurring fundamental themes called Big Ideas. As students progress through different topics, they will be reminded of these themes so they recognize the interworkings of systems in the universe, from the level of the very small to the very large.

The six Big Ideas featured in AP Physics 1 are:

1. Objects and systems have properties such as mass and charge. Systems may have internal structure.
2. Fields existing in space can be used to explain interactions.
3. The interactions of an object with other objects can be described by forces.
4. Interactions between systems can result in changes in those systems.
5. Changes that occur as a result of interactions are constrained by conservation laws.
6. Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.

## **Course Outline:**

The following list is the expected sequence of topics and assignments that students will experience during the spring semester. Each topic is anchored to one or more of the Big Ideas mentioned earlier.

### **Spring Semester:**

#### **Unit 7 – Work, Energy, Conservation of Energy, Power – Big Ideas 3, 4, and 5**

1. Notes 7.1 – Work: Constant Force  
→ Mousetrapmobile Challenge
2. Notes 7.2 – Work, Variable Force  
→ Mousetrap Spring Lab
3. Notes 7.3 – Kinetic Energy
4. Notes 7.4 – Potential Energy  
→ Work Quiz
5. Notes 7.5 – Conservation of Energy
6. Notes 7.6 – Power  
→ Work & Energy Application Problems  
→ Unit 7 Review Problems  
→ Unit 7 Test and Booklet Check

#### **Unit 8 – Momentum, Impulse, Conservation of Momentum, Collisions – Big Ideas 3, 4, and 5**

1. Notes 8.1 – Momentum
2. Notes 8.2 – Impulse
3. Notes 8.3 – Conservation of Linear Momentum
4. Notes 8.4 – Collisions  
→ Momentum of Colliding Objects Lab
5. Notes 8.5 – Center of Mass  
→ Balancing Can Lab  
→ Momentum Application Problems  
→ Unit 8 Review Problems  
→ Unit 8 Test and Booklet Check

#### **Unit 9 – Rotational Motion and Equilibrium – Big Ideas 3, 4, and 5**

1. Notes 9.1 – Rigid Bodies, Translations, and Rotations
2. Notes 9.2 – Torque, Equilibrium, and Stability  
→ Torque Lab
3. Notes 9.3 – Rotational Dynamics
4. Notes 9.4 – Rotational Kinematics
5. Notes 9.5 – Rotational Energy and Work
6. Notes 9.6 – Conservation of Angular Momentum  
→ Rotational Motion Application Problems  
→ Unit 9 Review Problems  
→ Unit 9 Test and Booklet Check

## **Unit 10 – Electrostatics – Big Ideas 1, 3, and 5**

1. Notes 10.1 – Electric Charge
2. Notes 10.2 – Conservation of Charge
3. Notes 10.3 – Electric Force
4. Notes 10.4 – Electric Fields  
→ Electric Force and Field Lab
5. Notes 10.5 – Conductors, Gauss' Law  
→ Electrostatics Application Problems  
→ Unit 10 Review Problems  
→ Unit 10 Test and Booklet Check

## **Unit 11 – Basic Electric Circuits – Big Ideas 1 and 5**

1. Notes 11.1 – Potential Difference, Batteries, and Direct Current
2. Notes 11.2 – Current
3. Notes 11.3 – Resistance and Ohm's Law  
→ Electrochemical Cell Lab
4. Notes 11.4 – Electric Power  
→ Light Bulb Lab
5. Notes 11.5 – Serial and Parallel DC Circuits (Ohm's Law Applied)
6. Notes 11.6 – Multiloop DC Circuits and Kirchoff's Laws  
→ Resistor Circuit Lab  
→ Electricity Application Problems  
→ Unit 11 Review Problems  
→ Unit 11 Test and Booklet Check

## **Unit 12 – Mechanical Waves and Sound – Big Idea 6**

1. Notes 12.1 – Mechanical Waves
2. Notes 12.2 – Wave Properties
3. Notes 12.3 – Standing Waves and Resonance
4. Notes 12.4 – Sound Waves  
→ Vibrating String Lab
5. Notes 12.5 – Sound Intensity
6. Notes 12.6 – Sound Phenomena, The Doppler Effect
7. Notes 12.7 – Instruments and Sound Characteristics  
→ Tube Acoustics Lab  
→ Sound Application Problems  
→ Unit 12 Review Problems  
→ Unit 12 Test and Booklet Check

## **Heading Down the Backstretch**

- Spring Project Presentations
- Spring Semester Review
- Spring Semester Final Exam