AP Physics I

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Class Description

Physics is everywhere. In other science courses you may have learned about various topics, regurgitated the required information on tests, and then more than likely forgot everything. In physics, you will learn how to **think**. The entire course can be summed up by a handful of basic principles, yet it will take you an entire year to learn how to **think** and use those principles to attack new and unfamiliar situations. This process will be difficult for some who unfortunately continue learning in the same manner that they have for many years past, but if you truly wrestle with and internalize the concepts you **will succeed**. In this course we will investigate these principles through extended, practical laboratory exercises. Students must have a strong mathematical ability (fluency in algebraic manipulations, geometric relations, trigonometric functions, etc.)

Cultivate your mistakes and learn from them.

Supplies

- Scientific Calculator (***required)*** – The calculator must be able to perform simple +,-,×, ÷, and trigonometric operations (sine, cosine, tangent). Calculators that can perform more advanced operations are optional.
- Notebook – It is highly recommended that you keep a notebook to record your progress throughout the semester and to help prepare for quizzes and exams.
- **NO PENS ARE ALLOWED** – Due to a fundamental design flaw, mistakes are difficult to correct with pens. You will be making numerous mistakes throughout this course.

Classroom expectations

Be on time. Be prepared. Be respectful. Do your best. ***Believe in yourself.***

- Be professional (I like to be impressed). Ask questions. Help each other.
- Restrict your technology usage. ***Cell phones, ear buds, and other electronic devices are not permitted at any time for any reason. Place your devices in the hanging caddie or put them completely away (not in your pocket). Having any electronic device for any reason out will result in an automatic detention.***
- **NO EATING OR DRINKING IS ALLOWED IN THE CLASSROOM –** eating/drinking will result in detention. Drinking water is acceptable. Please throw away or leave your food/drink items on the table as you enter, otherwise place those items in your book bag.
- No one is permitted to leave the class during the ***first and last 15 minutes***.

Lab Safety

When you are doing laboratory exercises, you will be expected to follow all safety procedures given. Safety procedures will always include the following:

- **NO HORSEPLAY. BE SAFE. USE COMMON SENSE.**
- Wear safety gear (face shields, aprons, etc.) when instructed.
- Read **ALL** directions before proceeding.
- Clean up your lab station so that it is neat for the next group to use it. Failure to do so will result in severe grade deductions for that lab activity.
- Do not remove any laboratory materials from the classroom.

Failure to perform any of the above safety guidelines will result in after-school disciplinary consequences.

Grading

All grades will be reported in Sapphire. Quarter grades will be determined as follows:
60% - Assessments
30% - Labs / Projects
10% - Homework / Classwork
Each marking period is worth 20% of a student's overall grade and the final exam is worth 20% of a student's overall average:
Quarter 1 20%

Quarter 2 20%
Quarter 3 20%
Quarter 4 20%
Final Exam 20%
The final exam will be composed of a traditional, written final exam (60%) and a final exam project (40%). The combined performance on both parts will be used to determine the final exam grade.

Homework
Homework will be assigned in class and through the course website (the website will be given during the first couple of classes). **All homework is due at the beginning of class. Late work will receive a 10% penalty for each calendar day that it is late. Homework that is more than four days late will receive a zero grade.** If you are absent, your homework will be due by the next time class meets with no penalty, but it is **your** responsibility to remember to turn it in. If you are sick, please check the website, speak to a friend, or contact me about what you missed. It is imperative that you stay current with the class. **THERE WILL BE THE POSSIBLITY OF NEW HOMEWORK ASSIGNMENTS ON SNOW DAYS!**

Course Textbook
We will be using "College Physics" by Serway and Vuille (Brooks/Cole, 2012). Digital copies of the book will be available online and hard copies will be available during class. Directions on how to access the textbook and Canvas can be found at the website at the top of the previous page.

Tardy Policy
Class starts promptly. To be on time, you must be ***in your seat***, ***ready to work***, ***when the bell rings***. **Any variation from the previous description will be considered as tardy and the appropriate disciplinary action will be taken**.
If you arrive late to class, it is ***your responsibility*** to sign the "late arrival" clipboard to have your absence changed to a tardy.

Bathroom Passes
The most appropriate time to use the bathroom or the water fountain is prior to the start of class. If you need to make an emergency bathroom or water fountain visit during class, **please choose an appropriate time.** If you choose an inappropriate time (in the middle of a lecture or discussion, during a test, etc.), I will not allow you to go. Abuse of this privilege will result in the suspension of bathroom and/or water fountain visits. If you have a legitimate medical excuse, please contact me privately.

Detentions
Detentions must be served immediately after school until 3:00. Failure to arrive by 2:35 means you have missed detention for that day. You have three days to complete a detention once it is assigned. Failure to complete a detention will result in an automatic disciplinary referral.

Just A "Few" Words About Labs…

(1) **Turn in Requirements for Labs:**
All lab work must be ready and turned in **at the beginning of class**. A lab write-up printed at the beginning of class will be considered as late (no excuses whatsoever). *Under no circumstances should you email me your lab!* **The same late policy for homework described above also applies to labs.** Except for dire emergencies, such things as family trips, school trips, and personal work are not excuses for late labs/assignments. If you have a problem, work with me in ADVANCE. If you come to me in advance, I can usually work something out for you. The key word is **"ADVANCE"!**
NOTE: This course may require your presence during Spartan periods to catch up on your lab work.

(2) **Group Work During Individual Lab Write-Ups:**
During the write-up of required labs you may collect and analyze data in groups to your heart's content. In fact, I recommend it, however, for individual write-ups do not help your buddies ***write*** the lab. The help must stop at the completion of the data analysis. Any individual write-ups that are obviously similar will be returned to be rewritten with appropriate/severe grade deductions. Each member of the group MUST have a complete set of data and results (you may not reference each others' papers).

(3) **Appearance of Long-Term Materials:**
I DEMAND NEAT WELL-WRITTEN REPORTS. All formal lab write-ups must be typed on 8 1/2 x 11 inch

paper with 1 inch margins, in Times New Roman (size 12 font), and double-spaced. I am picky about graphs. Put extra effort into them. You will receive further instructions very soon. Neatness is extremely important. Keep your work clean and simple. If the paper is messy or is "thrown together," you will have detrimental grade deductions.

(4) **Lost Data:**

During the data processing stage of a lab, BE SURE TO HAVE AT LEAST TWO COPIES OF THE DATA. There is nothing more frustrating than having to do the lab again because you lost the only copy or because the only person with data is out of town. Never discard the original data or rough write-up. There is at least one time during the year when data from a prior lab can be used again. Do not delete old files.

Assessments

If you are absent, it is your responsibility to stop by during Spartan Period or before/after school the following day to seek assistance from Mr. Deyton. You will be responsible for taking quizzes and tests on their assigned dates, even you if are absent the class before the test. Mr. Deyton will be respectful in that he will not cover additional, new material the class prior to a test. If you are absent the day of a quiz or test, you will make it up immediately in class upon your return. Tests not made up within two classes of your return will receive a zero.

Missed Classes and Tests

From page 32 of the student handbook:

"Assignments During Absence - When a student is absent from school it is the student's responsibility to communicate with their teachers via email or check assignments posted on the teacher website. The main office no longer collects or gathers student's assignments for absences. Although students are encouraged to keep up with assignments while absent, ***the student has two school days upon returning to make up any work missed***. It is the student's responsibility to take the initiative in arranging for make-up work. However, if a student is absent on the day of a test and he or she has not been absent for work covered on the test, he or she is expected to be prepared to take the test upon returning."

Communication

This class utilizes "Remind" as a way to communicate with students. Please be sure to sign up at www.remind.com using the access code "foozle".

Academic Dishonesty vs. Collaboration

Collaboration between or amongst students is not permitted unless explicitly stated by the teacher. Students are expected to work individually unless instructed otherwise. Teachers will inform students of expectations related to collaboration between students (or groups of students) on homework, projects, essays, assessments, laboratory reports, classwork, and all other assignments when collaboration is permitted.

Student Interest Survey
(to be completed by the student)

Five years from now I want to …

I love when …

I hate when …

Tell me about a good movie/book you've seen/read recently and why you liked it.

The title of a book about my life would be…

My heroes are…

Hamburger, hotdog, or veggie-burger?

Class Schedule

1st Period	2nd Period	3rd Period	4th Period
A (Odd)	A	A	A
B (Even)	B	B	B

Student Information Sheet
*Please **print** clearly*
(to be completed by parent/guardian and signed by parent and student)

Student: Last Name _____ First Name _____ Middle I. ___

Home Phone_____ Emergency Phone _____

Parent or Guardian _____ Relationship: _____

Parent or Guardian _____ Relationship: _____

Parent or Guardian Work Phone: _____ Parent or Guardian E-mail: _____

Home Address
_____

City _____ State _____ Zip Code _____

If your child has personal information (IEP, 504, vision, medical, etc.) that I should be aware of, or if you have any other questions/ concerns, please list them here:

_____
_____

_____
_____

Statement of Understanding Class Policies

We have read and understood the policies addressed in the AP Physics I syllabus.

Student signature _____

Parent signature _____ Date _____

WELCOME TO AP Physics I

Dear AP Physics I Student:

AP Physics I is one of the most challenging AP classes at Southern Lehigh and perhaps one of the most challenging courses that you will ever take. Despite the enhanced difficulty of the course, I want you know to that I am here to support you and I gauge my success as a teacher on your success as a student. I am committed to working side-by-side with you throughout the year to help you meet your learning goals. In order to meet these goals, you will need to develop new thinking and analysis skills beyond mere memorization, requiring you to understand the course topics at a truly fundamental level. If you work hard and seek help when you need it, you will succeed!

The following packet is our Summer Assignment, which is a review of basic math operations and an introduction to simple motion. Please read the instructions on the front page of the assignment to know exactly what needs to be done. The assignment is due the first day of class. We will have a **quiz during the first week of school** on the material covered in the assignment, including the online lessons. The course is much easier if you have a support system. I encourage you to form a small (2-3 people), productive study group and begin by working on the summer assignment together. Also, you might want to consider purchasing an AP Physics review book such as "Cracking the AP Physics I Exam" published by Princeton Review (used books are just fine and significantly cheaper). Our main textbook will be in electronic form, so if you are the type of person who prefers a physical book in hand, then you might want to strongly consider acquiring a review book of some kind.

Remember, this assignment is a review of common math operations that will be used throughout the course. If you are feeling overwhelmed, you may want to talk to me about the pacing and structure of the course to see if it is a good fit for you. You may email me at deytonj@slsd.org if you have questions regarding the assignment (I will check my email periodically throughout the summer).

Have a great summer! Work hard and you will succeed!

Mr. Deyton

AP Physics 1 Summer Assignment

I. *As is evident in the AP Physics I Syllabus, we must cover a large number of topics before the test in May. This necessitates a very fast pace. This summer homework will allow us to start on the Physics subject matter immediately when school begins. This assignment is an introduction to Chapter 2 in the textbook and a math review to brush up on valuable skills, and perhaps a means to help assess whether you are correctly placed in Advanced Placement Physics I.*

II. *Physics, and AP Physics I in particular, requires an exceptional proficiency in algebra, trigonometry, and geometry. In addition to the science concepts Physics often seems like a course in applied mathematics. The following assignment includes mathematical problems that are considered routine in AP Physics I. This includes knowing several key metric system conversion factors and how to employ them.*

III. *The attached pages contain a brief review, hints, and example problems. It is hoped that combined with your previous math knowledge this assignment is merely a review and a means to brush up before school begins in the fall. Please read the text and instructions throughout.*

IV. **What is due the first day of school?**

A. **Problems 1 to 5 of the Math Skills Worksheet (next 3 pages of this packet).**

• Write your answers on the "Answer Sheet" provided at the end of the packet. You will be graded for correctness on these problems.

B. **Complete the AP Physics I Introduction to Kinematics**

Go to the Physics Classroom website. Search the "Physics Tutorial" section to the left for the "1D-Kinematics" introduction. You can find the website by following this link: http://www.physicsclassroom.com/Physics-Tutorial/1-D-Kinematics

• Once you have found the 1-D Kinematics Tutorial website, carefully work through the first three lessons:

∗ Lesson 1 -Describing Motion with Words
∗ Lesson 2 -Describing Motion with Diagrams
∗ Lesson 3 -Describing Motion with Position vs. Time Graphs
∗ As you go through the lessons, it is recommended that you write down your work for all of the "Check Your Understanding" exercises at the end of each section. Bring these exercises to class the first day of school so that we may review them during Spartan Period and before/after school to provide clarity as quickly as possible.

V. Expectations for the first three days...

- *Mr. Deyton will grade and return your Summer Assignment Math Skills Worksheet, allowing you to assess your readiness for the course. You, the student, will need to seek assistance immediately if you feel that you are not adequately prepared for the coursework ahead. Help from Mr. Deyton can be obtained during Spartan Periods and before/after school.*

- *You will receive a quiz on introductory Kinematics.*

Math Skills Worksheet

1. The following are ordinary physics problems. Place the answer in scientific notation when appropriate and simplify the units (Scientific notation is used when it takes less time to write than the ordinary number does. As an example 200 is easier to write than 2.00×10^{2}, but 2.00×10^{8} is easier to write than 200,000,000). Do your best to cancel units, and attempt to show the simplified units in the final answer.

   a. $T_s = 2\pi\sqrt{\dfrac{4.5\times10^{-2}\,kg}{2.0\times10^{3}\,kg/s^2}} =$ _____

   b. $F = \left(9.0\times10^{9}\,\dfrac{N\cdot m^2}{C^2}\right)\dfrac{\left(3.2\times10^{-9}C\right)\left(9.6\times10^{-9}C\right)}{\left(0.32m\right)^2} =$ _____

   c. $\dfrac{1}{R_p} = \dfrac{1}{4.5\times10^{2}\,\Omega} + \dfrac{1}{9.4\times10^{2}\,\Omega}$ $R_P =$ _____

   d. $K_{max} = \left(6.63\times10^{-34}\,J\cdot s\right)\left(7.09\times10^{14}\,s^{-1}\right) - 2.17\times10^{-19}\,J =$ _____

   e. $\gamma = \dfrac{1}{\sqrt{1-\dfrac{2.25\times10^{8}\,m/s}{3.00\times10^{8}\,m/s}}} =$ _____

2. Often problems on the AP exam are done with variables only. Solve for the variable indicated. Don't let the different letters confuse you. Manipulate them algebraically as though they were numbers.

   a. $K = \dfrac{1}{2}kx^2$, $x =$ _____

   b. $T_p = 2\pi\sqrt{\dfrac{\ell}{g}}$, $g =$ _____

   c. $F_g = G\dfrac{m_1 m_2}{r^2}$, $r =$ _____

   d. $mgh = \dfrac{1}{2}mv^2$, $v =$ _____

   e. $x = x_o + v_o t + \dfrac{1}{2}at^2$, $t =$ _____

   f. $B = \dfrac{\mu_o}{2\pi}\dfrac{I}{r}$, $r =$ _____

   g. $x_m = \dfrac{m\lambda L}{d}$, $d =$ _____

   h. $pV = nRT$, $T =$ _____

   i. $\sin\theta_c = \dfrac{n_1}{n_2}$, $\theta_c =$ _____

   j. $qV = \dfrac{1}{2}mv^2$, $v =$ _____

   k. $\dfrac{1}{f} = \dfrac{1}{s_o} + \dfrac{1}{s_i}$, $s_i =$ _____

3. Science uses the ***KMS*** system (***SI***: System Internationale). ***KMS*** stands for kilogram, meter, second. These are the units of choice of physics. The equations in physics depend on unit agreement. So you must convert to ***KMS*** in most problems to arrive at the correct answer.

kilometers (*km*) to meters (*m*)	minutes (*min*) to seconds (*s*)	gram (*g*) to kilogram (*kg*)
centimeters (*cm*) to meters (*m*)	hours (*hr*) to seconds (*s*)	Celsius (^oC) to Kelvin (*K*)
millimeters (*mm*) to meters (*m*)	days (*d*) to seconds (*s*)	atmospheres (*atm*) to Pascals (*Pa*)
nanometers (*nm*) to meters (*m*)	years (*yr*) to seconds (*s*)	liters (*L*) to cubic meters (m^3)
micrometers (μm) to meters (*m*)		

Other conversions will be taught as they become necessary.

What if you don't know the conversion factors? Colleges want students who can find their own information (so do employers). Hint: Try an internet search for the above units or use your old science/math class notes. Enjoy!

a. 4008 *g* = _____ *kg*

b. 1.2 *km* = _____ *m*

c. 823 *nm* = _____ *m*

d. 298 *K* = _____ ^oC

e. 0.77 *m* = _____ *cm*

f. 8.8×10^{-8} *m* = _____ *mm*

g. 1.2 *atm* = _____ *Pa*

h. 25.0 μm = _____ *m*

i. 2.65 *mm* = _____ *m*

j. 8.23 *m* = _____ *km*

k. 5.4 *L* = _____ m^3

l. 40.0 *cm* = _____ *m*

m. 6.23×10^{-7} *m* = _____ *nm*

n. 1.5×10^{11} *m* = _____ *km*

4. Solve the following geometric problems.

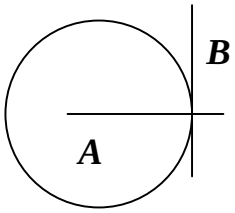
a. Line ***B*** touches the circle at a single point. Line ***A*** extends through the center of the circle.

i. What is line ***B*** in reference to the circle?

_____

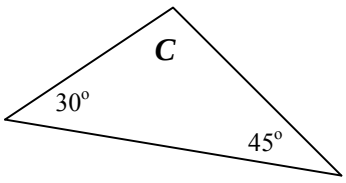
ii. How large is the angle between lines ***A*** and ***B***?

_____



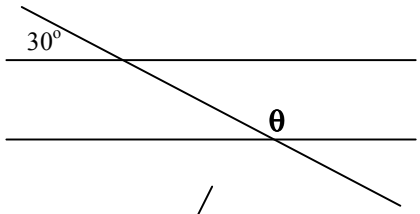
b. What is angle ***C***?

_____



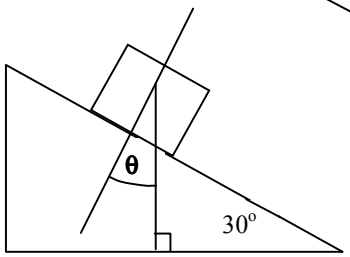
c. What is angle **θ** ?

_____



d. How large is ***θ***?

_____



e. The radius of a circle is 5.5 *cm*,

i. What is the circumference in meters?

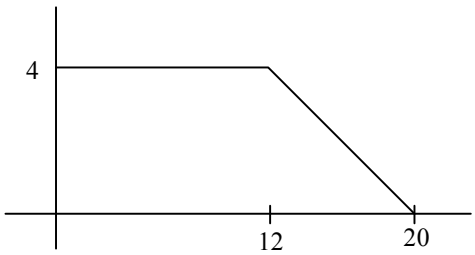
_____

ii. What is its area in square meters?

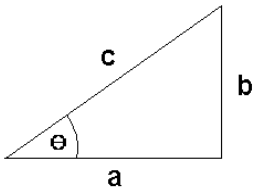
_____

f. What is the area under the curve at the right?

_____



5. Using the generic triangle to the right, Right Triangle Trigonometry and Pythagorean Theorem solve the following. ***Your calculator must be in degree mode.***



g. $\theta = 55^{o}$ and ***c*** = 32 *m*, solve for ***a*** and ***b***.

_____

h. $\theta = 45^{o}$ and ***a*** = 15 *m/s*, solve for ***b*** and ***c***.

_____

i. ***b*** = 17.8 *m* and $\theta = 65^{o}$, solve for ***a*** and ***c***.

_____

j. ***a*** = 250 *m* and ***b*** = 180 *m*, solve for θ and ***c***.

_____

k. ***a*** =25 *cm* and ***c*** = 32 *cm*, solve for ***b*** and θ.

_____

l. ***b*** =65 *cm* and ***c*** = 104 *cm*, solve for ***a*** and θ.

_____

Math Review Answer Sheet NAME _____

Please write your answers neatly in the spaces provided. Provide all units where appropriate.

Section 1 – Calculations with Scientific Notation

a. _____

b. _____

c. _____

d. _____

e. _____

Section 2 – Algebraic Manipulations

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

k. _____

Section 3 – Unit Conversions

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

i. _____

j. _____

k. _____

l. _____

m. _____

n. _____

Section 4 – Geometric Analysis

ai. _____

aii. _____

b. _____

c. _____

d. _____

ei. _____

eii. _____

f. _____

Section 5 – Trigonometric Analysis

g. _____

h. _____

i. _____

j. _____

k. _____

l. _____