AP Physics 1 Name _____

Summer Assignment Date _____ Per _____

Fall 2016 – Spring 2017

We have read the policies and expectations for the AP Physics course on the class website. We understand and accept these policies.

Student Signature: _____ Date _____

Parent / Guardian Name (print) _____

Parent / Guardian Signature: _____ Date _____

I. *As is evident in the AP Physics 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 Chapters 1& 2, in the textbook and a math review to brush up on valuable skills, and perhaps a means to assess whether you are correctly placed in Advanced Placement Physics.*

II. *Physic, and AP Physics 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. 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. **Signed Class Expectations Sheet**
   1. **Read the above statements.**
   2. **Complete the section at the top of this form and obtain appropriate signatures.**

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

C. **AP Physics Textbook Assignment**

Check out the Physics Text (by Giancoli) at the end of end of this year or at registration.

- **Read & Outline sections 1-2, 1-4 & 1-5 in Chapter 1 "Introduction & Measurement".**
- **At the back of each chapter is a set of Questions followed by a set of Problems. Do Questions # 1, 3, 5, 6, & 7(Q 1,3,5,6,7) on page 16 and do Problems # 1, 2, 3, 6, 8, 9, 26, 27, & 28 (P 1, 2,3,6,8,9,26,27,28) on page 16-17 at the back of Chapter 1. Be sure to show all your work when completing the Problems.**
- **Read & Outline sections 2-1 to 2-6 in Chapter 2 "Kinematics in One Dimension". (Make sure to include the Problem Solving section on page 28.)**
- **At the back of each chapter is a set of Questions followed by a set of Problems. Do Questions # 1 to 6 (Q 1-6) on page 38 and do Problems # 1 to 14 (P 1-14) on page 39 at the back of Chapter 2. Be sure to show all your work when completing the Problems.**

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 $2.00\text{x}10^2$, but $2.00\text{x}10^8$ 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. $K_{max} = \left(6.63\times10^{-34}\,J\cdot s\right)\left(7.09\times10^{14}\,s\right) - 2.17\times10^{-19}\,J =$ _____

   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 a good dictionary and look under "measure" or "measurement". Or the Internet? 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

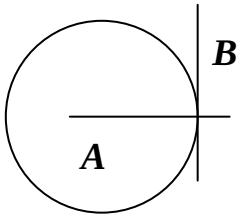
l. 40.0 *cm* = _____ *m*

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.



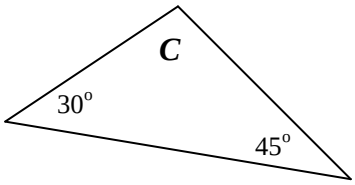
i. What is line ***B*** in reference to the circle?

_____

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

_____

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



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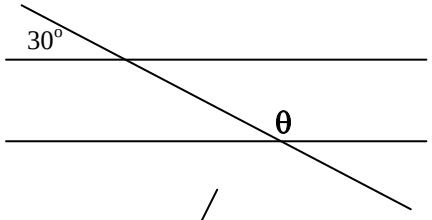
c. What is angle θ ?



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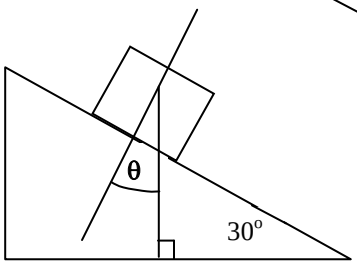
d. How large is *θ*?



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

i. What is the circumference in meters?

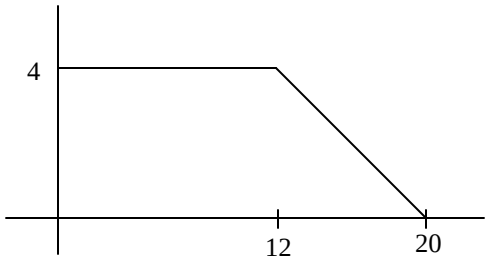
_____

ii. What is its area in square meters?

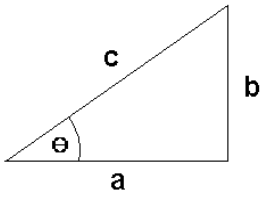
_____

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.

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