SUMMER ASSIGNMENT - AP PHYSICS 1 & 2

Welcome to AP Physics!

Please follow the instructions *carefully*. The assignment consists of 3 parts as detailed below.

The first two parts require you to buy supplies and memorize things and, therefore, have no written components. The third part should have your name on it and the pages should be stapled together. The third part of this assignment will be collected at the beginning of the first class and it will be graded for a lab grade. It must be neat! Do not forget to bring it in at the beginning of the class. (Do not leave it in your locker, on the kitchen table, etc.) If it is not available to be handed in at the beginning of the class, it will be marked as late. No excuses, please! If you are confused about something, email Mr. Caligiuri at jcaligiuri@hhh.k12.ny.us but do your best to figure things out on your own.

Fair Warning: Please be aware that this is a reasonably demanding course. If you want to succeed you must be willing to work hard for the entire year. If you are a senior who plans on working only until you are accepted into a college, this is *not* the course for you. The course becomes more demanding as the year progresses and I will not give any slack to someone who stops working after a college acceptance has been received. Before you begin the year, either commit to working for a very extended period of time or take a less demanding course. I don't want to sound harsh but I think you should be aware of the class requirements.

I promise that if you have curiosity, adequate math skills, and you devote a reasonable amount of time to the class, you will look at the world in a new manner by the end of next year. Hopefully, we will even have a few laughs along the way.

I hope you have a great summer and I look forward to meeting you in September!

Part I: Supplies

You will need the following supplies for this class:

Scientific calculator (TI-30XIIS is fine, TI-84, etc is fine, too).
3 ring binder (you will need a few by the time the year is over).
Clear metric ruler.
Clear Protractor (the cheaper the better – I'll tell you why later). The protractors that are approximately 6" in length with individual degree marks are the best. The protractors with the movable degree markers are NOT preferred.)
Pencils, pens, etc.
Stapler (keep this at home).
You may need graph paper for your labs or you can create the graphs for your labs on a computer. If you don't know how to make graphs on a computer, buy graph paper.

Part II: Memorization

Unfortunately, you must memorize all of the equations we will use – and there are many, many equations. If you try to memorize them right before a test, they will not be solid in your memory. This may work for the first few chapters but eventually this strategy will catch up with you and life will become difficult. Try to memorize the equations at the very beginning of each chapter so that you are practicing with the equations during each homework assignment and then, when it is time to take the test, you won't be panicking about the equations.

Let's get a head start and memorize the first few equations of motion, listed below.

There will be a quiz on these equations the *second* day of school. You must know them *very well*. You will be given a bare minimum amount of time to write them down. If you have to think for a few seconds to recall the equations, you don't know them well enough. In addition, you must know what each of the variables represents and the units of measurement for each variable. Don't worry if you don't understand some of the units of measurement (especially for acceleration) right now. Memorizing the equations is ***a must***.

EQUATIONS	VARIABLES AND THEIR UNITS OF MEASUREMENT
$\bar{v} = \frac{\Delta d}{\Delta t}$	$\bar{v}$ = average velocity or speed (meters per second or m/s) d = distance or displacement (in meters) $\Delta d = d_2 - d_1$ = change in distance or displacement (in meters) $\Delta t = t_2 - t_1$ = change in time (in seconds)
$a = \frac{\Delta v}{\Delta t}$	a = acceleration (in m/s/s = (m/s)/s = m/s^2) $\Delta v = v_2 - v_1$ = change in velocity (in m/s) $\Delta t = t_2 - t_1$ = change in time (in seconds)
$v_f = v_i + at$	v_f = final velocity (m/s) v_i = initial velocity (m/s) a = acceleration (in m/s/s = (m/s)/s = m/s^2) t = time (in seconds)
$d = \frac{1}{2}at^2 + v_i t$	
$v_f^2 = v_i^2 + 2ad$	
$\bar{v} = \frac{1}{2}(v_f + v_i)$	

Part III: Calculation Lab

Your math skills will be critical to your success in AP Physics. The following page is a Calculation Lab to help sharpen your math skills. Hand this in the first day of school.

Print out the lab and complete the calculations. Your name must be NEATLY PRINTED on the front page. Write everything NEATLY or type everything. There should be no unusual 'gifts' for me like jelly stains, a footprint on the paper, etc. If you mess things up by spilling something on the paper, do the whole assignment over neatly. Don't worry about significant figures. It will count as your first lab grade. This will be my first impression of you – make it a good one.

Note that your calculator must be in "degree mode" when performing trig functions such as those required in problem "f ."

Please turn to the next page…

CALCULATION LAB

NAME _____

1. The following are ordinary physics problems. Place the answer in scientific notation when appropriate and simplify the units. (Use your judgment when using scientific notation. For instance, 200 is easier to write than $2.00x10^2$, but $2.00x10^{11}$ is easier to write than 200,000,000,000). Do your best to cancel units, and attempt to show the simplified units in the final answer. You do not have to show work - just record your final answers below.
2. NEATNESS COUNTS!!!

a) $T_s = 2\pi\sqrt{\frac{4.5x10^{-2}kg}{2.0x10^3 kg/s^2}}$ T_s = _____

b) $K = \frac{1}{2}(6x10^4 kg)(200\frac{m}{s})^2$ K = _____

c) $F = (9.0x10^9 \frac{N\cdot m^2}{C^2})\frac{(3.2x10^{-9}C)(9.6x10^{-9}C)}{(0.32m)^2}$ F = _____

d) $\frac{1}{R_P} = \frac{1}{4.5x10^2\Omega} + \frac{1}{9.4x10^2\Omega}$ R_P = _____

e) $(v_f)^2 = \left(2.3\frac{m}{s}\right)^2 + 2\left(-9.81\frac{m}{s^2}\right)(-21m)$ v_f = _____

f) $1.33\sin(22^0) = n_2 \sin(13^0)$ n_2 = _____

g) $20N\cdot m = 3.2N(13m)\sin\Theta$ Θ = _____

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

a) $\bar{v} = \frac{\Delta d}{\Delta t}$ Δt = _____

b) $U = \frac{1}{2}kx^2$ x =_____

c) $T_P = 2\pi\sqrt{\frac{l}{g}}$ g = _____

d) $F_g = \frac{Gm_1m_2}{r^2}$ r = _____

e) mgh = ½ mv² v = _____

f) $v_f = v_i + at$ t =_____

g) $B = \frac{\mu_0}{2\pi}\frac{I}{r}$ r = _____

h) $x_m = \frac{m\lambda L}{d}$ d = _____

i) PV = nRT T =_____

j) $n_1\sin\theta_c = n_2\sin 90^0$ θ_c =_____

k) $qV = \frac{1}{2}mv^2$ v = _____

l) $v = f\lambda$ λ = _____

m) Refer to the diagram below. X and Y are perpendicular axes. The angle between line A and Y is 70°. A is reflected about the Y-Axis to create line B. ***Neatly draw and label line B in the diagram.*** If line B is perpendicular to line C, what is Θ, the angle between C and the negative Y-axis? _____