Dear Student:

I am excited to have you next school year in AP Physics 1. It is a fun, though difficult class.

The AP Physics course you have signed up for is designed to prepare you for a superior performance on the AP test. While the course is quite conceptual, some basic Algebra and Trig skills are critical to your success.

No textbook is needed to complete the assignment. This summer assignment is due on the first day of class and worth 40 homework/classwork points. It should be turned as a paper copy with your name and period included.

Note if insufficient work is shown because it was all done on your calculator, your calculator will be credited with half the points for the summer assignment.

I will occasionally check my e-mail during the summer break; you may contact me by e-mail (jnaumann@vcs.net) to arrange to meet if you are having problems with the assignment. You should aim to start the assignment as soon as possible and to complete it before August 1st. Don't try to do it all in one sitting, but rather work one section at a time.

In addition to Algebra, knowing how to perform unit conversions, properly graphing and linearizing data by hand are very important. Please watch the following videos and answer the appropriate questions as part of your assignment.

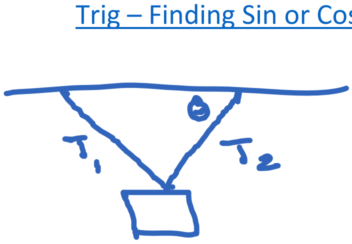
Scientific notation

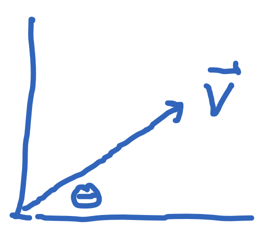
- Introduction
- Examples

Unit conversion

1. What is the first step in unit conversion? _________________
2. What was the final example he used ? ___________________

Trig – Finding Sin or Cos?





1. How would you calculate the Vertical component of tension T2? $T_{2y} =$

2. What represents the horizontal component of velocity $\vec{v}$?

Graphing

1. What example did Bozeman use in his video? ______________________
2. Which axis, horizontal or vertical, is used for the variable that is changed ? (Independent variable) __________________
3. How did he determine how to scale the axis? ________________________ What was his vertical scale factor? ______________
4. What is a line of fit? __________________________________

Linearizing data

1. What is a linear function? _______________________
2. What does it mean to linearize a graph? _______________________________
3. What real life example did he use that was not linear ? ______________
4. What is the theoretical relationship T = _________________?
5. What are the steps to linearization

- Step 1: _______________________
- Step 2: _______________________
- Step 3: _______________________. Make the equation look like ? ________________
- Step 4: _______________________
- Step 5: _______________________
- Step 6: _______________________
- Step 7: _______________________

6. Do you use data points to determine slope of a line? __________________

7. The following theoretical model below represents the distance travelled vs time given a constant acceleration.

$$y = \frac{1}{2} a\, t^2$$

Map this equation to the equation of a line $y = mx + b$.

$y =$

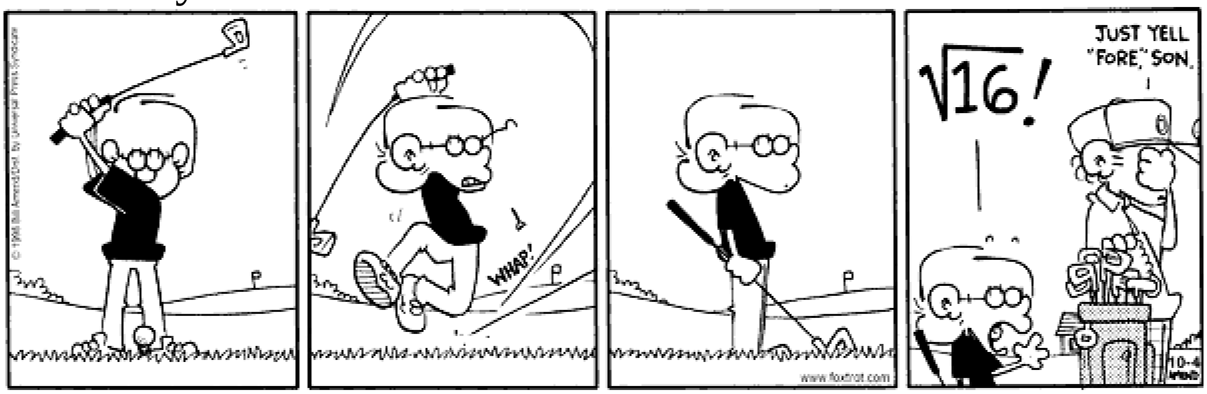
$m =$

$x =$

Find a in terms of the slope m. In other words $a = f(m)$

Name

1. AP Physics – math review



PART I. SOLVING EQUATIONS

Solve the following equations for the quantity indicated.

1. $y = \frac{1}{2}at^2$ Solve for t

2. $x = v_o t + \frac{1}{2}at^2$ Solve for v_o

3. $v = \sqrt{2ax}$ Solve for x

4. $a = \frac{v_f - v_o}{t}$ Solve for t

5. $a = \frac{v_f - v_o}{t}$ Solve for v_f

Name

PART II. SCIENTIFIC NOTATION
The following are ordinary physics problems. Write the answer in scientific notation and simplify the units.

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

2. $K = \dfrac{1}{2}\left(6.6\times10^{2}\ \text{kg}\right)\left(2.11\times10^{4}\ \text{m/s}\right)^2 =$

3. $F = 9x10^{-9}\ \dfrac{\text{N}\cdot\text{m}^2}{\text{C}^2}\left(\dfrac{(3.2x10^{-9}\,\text{C})(9.6x10^{-9}\,\text{C})}{(0.32\ \text{m})^2}\right) =$

4. $\dfrac{1}{R_p} = \dfrac{1}{4.5\times10^{2}\ \Omega} + \dfrac{1}{9.4\times10^{2}\ \Omega}$ R_p **=**

5. $e = \dfrac{\left(1.7\times10^{3}\ \text{J}\right)\text{-}\left(3.3\times10^{2}\ \text{J}\right)}{\left(1.7\times10^{3}\ \text{J}\right)} =$

Name

PART III. FACTOR-LABEL METHOD FOR CONVERTING UNITS

A very useful method of converting one unit to an equivalent unit is called the **factor-label method** of unit conversion. You may be given the speed of an object as 25 **km/h** and wish to express it in **m/s.** To make this conversion, you must change **km** to **m** and **h** to **s** by multiplying by a series of factors so that the units you do not want will cancel out and the units you want will remain. Conversion: 1000 **m** = 1 **km** and 3600 **s** = 1 ***h***,

$$\left(\frac{25\text{ km}}{\text{h}}\right)\left(\frac{1000\text{ m}}{1\text{ km}}\right)\left(\frac{1\text{ h}}{3600\text{ s}}\right) =$$

What is the conversion factor to convert km/h to m/s?

What is the conversion factor to convert m/s to km/h?

Carry out the following conversions using the factor-label method. Show all your work!

1. How many seconds are in a year?

Name

2. Convert 28 km to cm.

3. Convert 45 kg to mg.

4. Convert 85 cm/min to m/s.

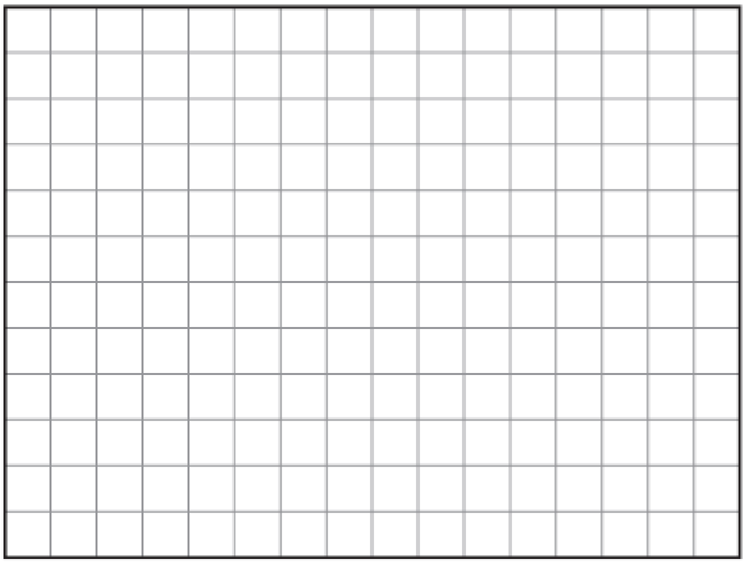
5. Convert the speed of light, $3x10^8$ m/s, to km/day.

Name

PART V. GRAPHING TECHNIQUES

Graph the following sets of data using proper graphing techniques.
The first column refers to the *y*-axis and the second column to the *x*-axis

1. Plot a graph for the following data recorded for an object falling from rest:



Velocity (ft/s)	**Time** (s)
32	1
63	2
97	3
129	4
159	5
192	6
225	7

a. What kind of curve did you obtain?

b. What is the relationship between the variables?

c. What do you expect the velocity to be after 4.5 s?

d. How much time is required for the object to attain a speed of 100 ft/s?

Name

2. The universal gravitational law is given by the equation:

$$F = -G\frac{mM}{r^2}$$

a) What variables should you plot against each other in order to prove that the attractive force (F)is directly proportional to both masses (mM) of the objects?

b) What variables should you plot against each other in order to prove that the attractive force is inversely proportional to the distance squared (r^2) between the objects?