

Summer Assignment AP Physics I: Algebra-Based

Directions: Complete the attached assignment.

Due Date: This assignment will be due on the first day of your AP Physics I class.

AP Physics – Math Review









PART I. SOLVING EQUATIONS

Solve the following equations for the quantity indicated.

1. Often problems on the AP exam are done with variables only. Below are various physics formulas. Don't worry about what the variables mean. Just solve for the variable indicated. Don't let the different letters confuse you. Manipulate them algebraically as though they were numbers.

a.
$$v^2 = v_o^2 + 2a(s - s_o)$$
, $a =$

b.
$$K = \frac{1}{2}kx^2$$
 , $x = \frac{1}{2}kx^2$

$$,x=$$

c.
$$T_p = 2\pi \sqrt{\frac{\ell}{g}}$$

d.
$$F_g = G \frac{m_1 m_2}{r^2}$$

e.
$$mgh = \frac{1}{2}mv^2$$
 , $v =$

f.
$$x = x_o + v_o t + \frac{1}{2} a t^2$$
 , $t =$

g.
$$B = \frac{\mu_o}{2\pi} \frac{I}{r}$$
 , $r =$

h.
$$x_m = \frac{m\lambda L}{d}$$
 , $d =$

i.
$$pV = nRT$$
 , $T =$

j.
$$\sin \theta_c = \frac{n_1}{n_2}$$
 , $\theta_c =$

k.
$$qV = \frac{1}{2}mv^2$$
, $v =$

1.
$$\frac{1}{f} = \frac{1}{s_o} + \frac{1}{s_i}$$
 , $s_i =$

PART III. FACTOR-LABEL METHOD FOR CONVERTING UNITS (Dimensional Analysis)

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?

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.

6. Convert 823 nm to m

7. 8.5 cm³ to m³

PART IV. TRIGONOMETRY AND BASIC GEOMETRY

Solve for all sides and all angles for the following triangles. Show all your work.

Example:

SOH CAH TOA



$$\sin \vartheta = \frac{opp}{hvp}$$

$$\sin \vartheta = \frac{opp}{hyp}$$
 $\cos \vartheta = \frac{adj}{hyp}$ $\tan \vartheta = \frac{opp}{adj}$

$$\tan \vartheta = \frac{opp}{adi}$$

Your calculator must be in degree mode! Show all your work.

1.
$$\theta = 55^{\circ}$$
 and $c = 32$ m, solve for a and b

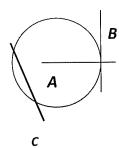
2.
$$\theta$$
 = 45° and a = 15 m/s, solve for b and c .

3.
$$b=17.8$$
 m and $\theta=65^{\circ}$, solve for α and c .

4. Line \boldsymbol{B} touches the circle at a single point. Line \boldsymbol{A} extends through the center of the circle.

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

How large is the angle between lines A and B?



What is line ??

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:

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Velocity	Time
(ft/s)	(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?

2. Plot a graph showing the relationship between frequency and wavelength of electromagnetic waves:

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Frequency	Wavelength						
(kHz)	(m)						
150	2000						
200	1500						
300	1000						
500	600						
600	500						
900	333						

- a. What kind of curve did you obtain?
- **b.** What is the relationship between the variables?

c. What is the wavelength of an electromagnetic wave of frequency 350 Hz?

d. What is the frequency of an electromagnetic wave of wavelength 375 m?