

## AP Physics 1 Summer Assignment

**PRINT AND COMPLETE THE FOLLOWING QUESTIONS.****THIS ASSIGNMENT IS DUE THE FIRST DAY OF SCHOOL.**

PLEASE GIVE TO YOUR AP PHYSICS TEACHER ON THE FIRST DAY OF SCHOOL REGARDLESS IF YOUR CLASS MEETS ON THE FIRST DAY OF SCHOOL. **Please show all work and staple. No work shown = no credit!**

**Part 1: Note Taking - Keep this in your notebook - do not turn notes in**

Read and take notes on “Giancoli: Physics for Scientists & Engineers” chapter 1.

It is a scanned textbook copy of the chapter is attached.

**Part 2: Unit Conversions and Sig Figs**

Answer the following from the end of chapter 1.

Page 17: Questions 1-7

Pages 18-20: Problems & General Problems 1, 2, 3, 4, 7, 8, 29, 47, 48, 50

**Part 3: Variable Isolation**

A large part of the curriculum and the AP Test involves solving problems for one variable in terms of another variable. You will need to practice re-arranging equations. The subscripts are assigned to specific variables...be careful to keep them together.

Manipulate the following equations algebraically to solve for the specified variable.

a.  $v^2 = v_0^2 + 2a(x-x_0)$ ,  $x =$

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

c.  $F = Gm_1m_2/r^2$ ,  $r =$

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

e.  $x = x_0 + v_0t + \frac{1}{2} at^2$ ,  $a =$

f.  $1/f = 1/d_o + 1/d_i$ ,  $d_i =$

g.  $f' = f(v+v_o)/(v-v_s)$ ,  $v_s =$

h.  $n_i \sin \theta_i = n_r \sin \theta_r$ ,  $\theta_i =$

i.  $P_1V_1/T_1 = P_2V_2/T_2$ ,  $P_2 =$

j.  $Gm_1m_2/r^2 = m_2v^2/r$ ,  $v =$

**Part 4: Relationships**

Let's say that a value A is proportional to x and y such that  $A = x^2/y^3$ . If the values of x and y will be changed as follows, what will happen to the value of A? All changes start off as the regular equation (2 does not use the values from 1, etc.)

1. x is unchanged, y is doubled
2. x is tripled, y is unchanged
3. x is doubled, y is doubled
4. x is unchanged, y is halved
5. x is doubled, y is halved

## Part 5: Units

Many of the problems that we will be solving can be solved more easily if you consider the units being used. This section is to help you practice using units.

This exercise is to reinforce the concept that problems are set up based on UNITS.  
Nonsense words taken from the poem *Jabberwocky* (from Lewis Carroll's *Through the Looking Glass*)

There are 20 tumtum trees in the tulgey wood.  
In each tulgey wood is one frumious Bandersnatch.  
There are 5 slithy toves in 2 borogoves.  
There are 2 mome raths per Jabberwock.  
There are 2 Jubjub birds in 200 tumtum trees.  
There are 200 mome raths in each borogove.  
There are 5 Jubjub birds per slithy tove.

**The question is: If there are 5 frumious Bandersnatches, how many Jabberwocks are there?**

**You should use a dimensional analysis setup to show your work!**

***HINT: What information above is a conversion factor and what information is not?***

Dimensional analysis even works with nonsense units. In this case, it is the

***procedure*** you are practicing - - see if you REALLY know how to do this!

$$28 \text{ yipyaps} = 1 \text{ foop}$$

$$12 \text{ foops} = 1 \text{ zark}$$

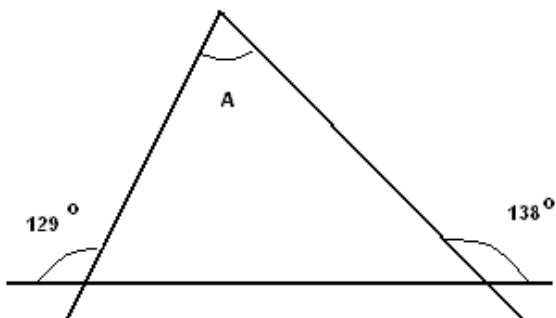
$$1 \text{ zark} = 20 \text{ neeks}$$

$$1 \text{ neek} = 50 \text{ blips}$$

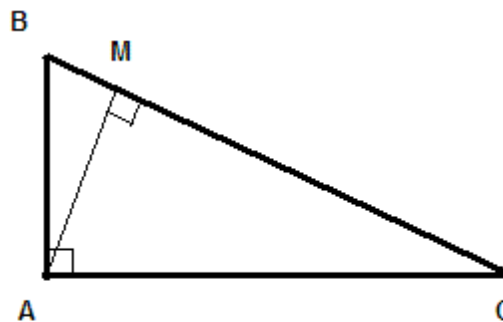
1. How many blips are in one yipyap?
2. How many foops are in 3 neeks?
3. How many neeks are in 5 foops?

## Part 6: Geometry

Solve the following geometric problems.



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- a. solve for angle  $A$  on the figure at top left.
- b.  $ABC$  is a right triangle.  $AM$  is perpendicular to  $BC$ . The size of angle  $ABC$  is equal to  $55$  degrees. Find the size of angle  $MAC$ . This is the figure at top right.

## Part 7: Trigonometry

Solve each problem.

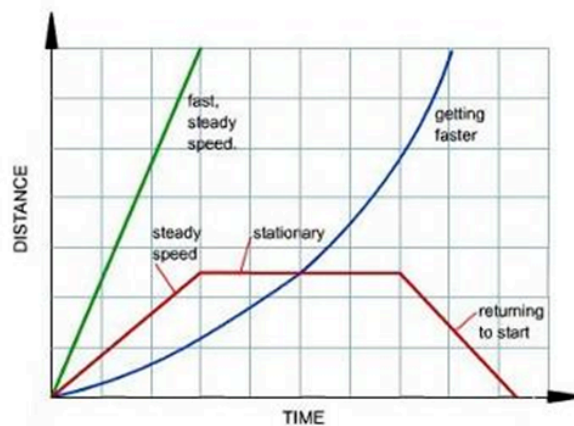
- A right triangle has a hypotenuse of 19 units and is elevated at an angle of 41 degrees above the horizontal. Find the other angle and both legs.
- A right triangle has a vertical leg of 17 units and a hypotenuse that is 33 degrees from vertical. Find the other angle, the other leg and the hypotenuse.
- A right triangle has a hypotenuse of 7 units and a vertical leg of 12 units. Find the horizontal leg and each angle.
- A right triangle has a horizontal leg of 21 units and a vertical leg of 17 units. Find the hypotenuse and each of the angles.

## Part 8: Graphs

### GRAPHING SPEED

#### INTERPRETING GRAPHS-

In physics, a graph is "worth a thousand numbers". A great deal of information can be obtained by looking and interpreting graphs describing motion (displacement, speed, velocity, and acceleration).

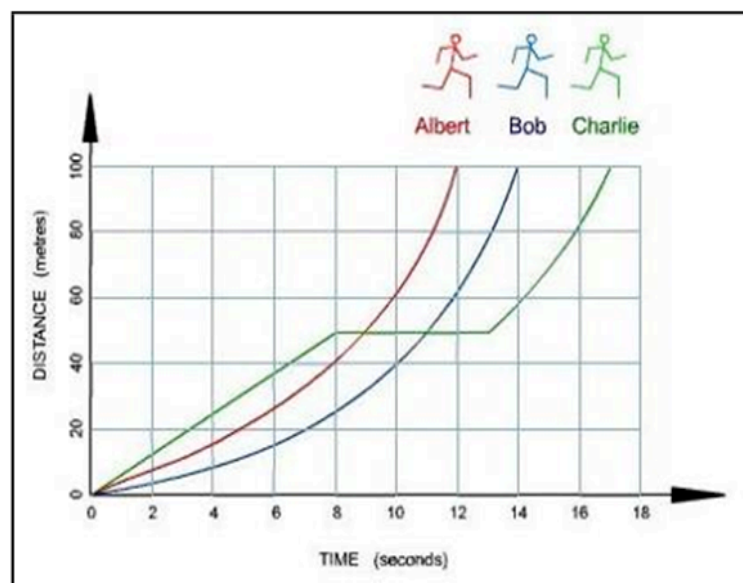


**Distance vs. Time Graphs-** To the right is a typical graph displaying Distance vs. Time. One or more objects may be graphed at one time, so you can compare the relative positions, speeds and displacement as they relate to each other.

**Directions:** Answer the following questions as they apply to the Motions graphs and diagrams.

#### Graph1: Questions 1-7

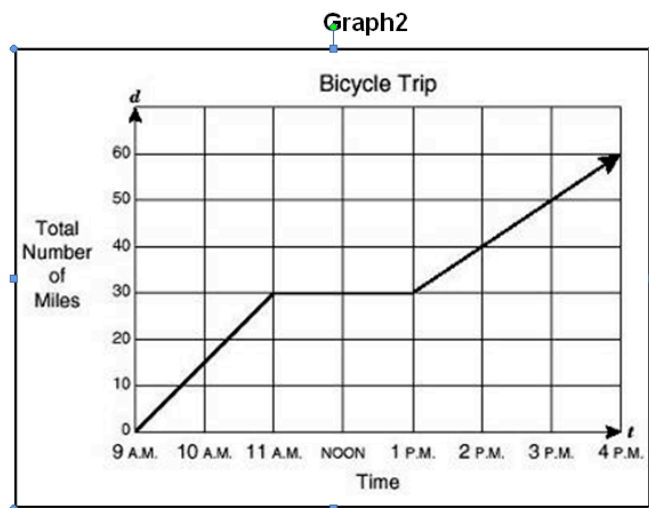
1. What does the slope of each line on the graph tell you?



2. Which runner completed the 100m race in the least amount of time? What was his time?
3. Which runner started out the fastest?
4. What was Charlie doing between 8 seconds and 10.5 seconds?
5. What does a straight line on this graph tell you? A curved line?
6. At what distance and time did Albert overtake Bob?

**Graph2: Questions 8-13**

7. What is happening between 9 AM and 11 AM?
8. What do you think bicyclist is doing between 11 AM and 1 PM?
9. What was the total distance covered by 11 AM, 1 PM, and 4 PM?



10. What was the average speed of the bicyclist between 9 AM and 11 AM?
11. Is the speed a positive or negative number? Could speed ever be a negative number?

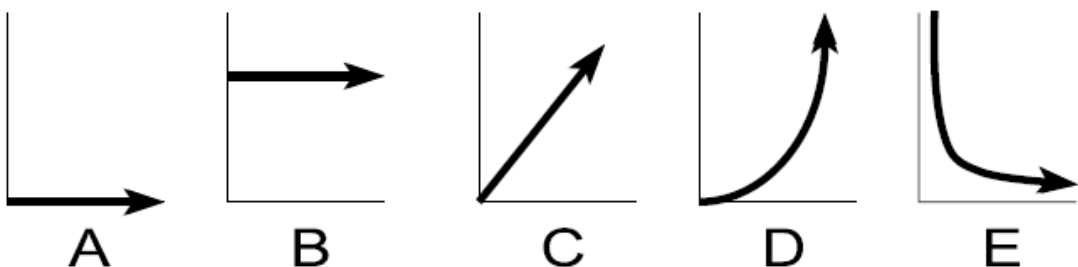
1. What does the slope of a distance vs. time graph indicate about an object's motion?

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2. What does the slope of a speed vs. time graph indicate about an object's motion?

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Questions 3 - 8 refer to the following generic graph shapes. Write the letter corresponding to the appropriate graph in the blank at the left of each question.



\_\_\_\_\_ 3. Which shape fits a **distance** vs. time graph of an object moving at constant (non-zero) speed?

\_\_\_\_\_ 4. Which shape fits a **speed** vs. time graph of an object moving at constant (non-zero) speed?

\_\_\_\_\_ 5. Which *two* shapes fit a **distance** vs. time graph of a motionless object?

\_\_\_\_\_ 6. Which shape fits a **speed** vs. time graph of a motionless object?

\_\_\_\_\_ 7. Which shape fits a **distance** vs. time graph of an object that is speeding up at a steady rate?

\_\_\_\_\_ 8. Which shape fits a **speed** vs. time graph of an object that is speeding up at a steady rate?

\_\_\_\_\_ 9. Which of the following units is equivalent to (meters per second) per second?

- a) m                      b) m/s                      c)  $m/s^2$                       d)  $m/s^3$

\_\_\_\_\_ 10. Which of the following units correspond to the slope of a distance vs. time graph?

- a) m                      b) s                      c) m/s                      d)  $m/s^2$

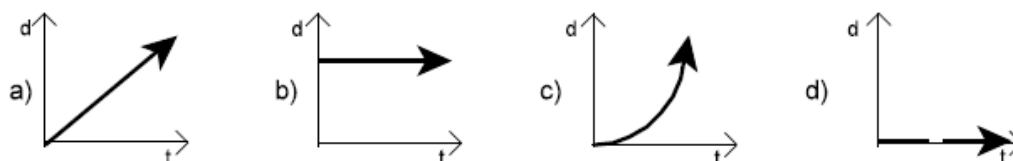
\_\_\_\_\_ 11. Which of the following units correspond to the slope of a speed vs. time graph?

- a) m/s                      b)  $m \cdot s$                       c)  $m/s^2$                       d)  $m^2/s^2$

The table below gives distance and time data for a moving object. Pay attention to how the **time intervals** are changing as the distance rises in 20 m increments.

Distance (m)	Time (s)
0	0
20	4.5
40	6.3
60	7.7
80	8.9
100	10

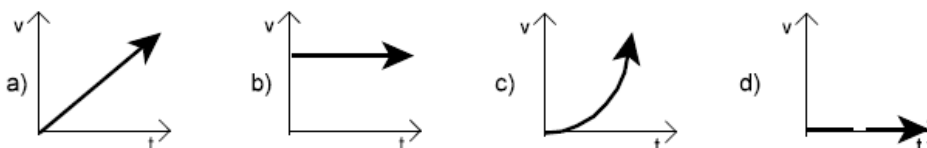
\_\_\_\_\_ 12. Which of the following **distance** vs. time graphs corresponds to the table data?



\_\_\_\_\_ 13. Which of the following descriptions matches the graph you selected in question 12?

- a) A motionless object.
- b) An object moving at a constant speed.
- c) An object undergoing constant, positive acceleration.
- d) An object undergoing constant, negative acceleration.

\_\_\_\_\_ 14. Which of the following **speed** vs. time graphs corresponds to the table data?



\_\_\_\_\_ 15. Which of the following descriptions matches the graph you selected in question 14?

- a) A motionless object.
- b) An object moving at a constant speed.
- c) An object undergoing constant, positive acceleration.
- d) An object undergoing constant, negative acceleration.

**BEWARE:** If your answers to questions 13 and 15 are different from each other, you are claiming that the same object can have two distinct motions simultaneously. Ask yourself, "Is that reasonable?"

16. A woman walks away from a starting point in a straight line.

A distance vs. time graph for her motion is shown at right.

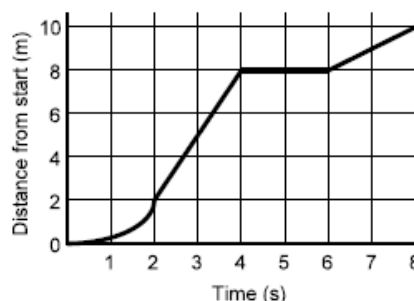
a. Describe the woman's motion between 0 and 2 seconds.

\_\_\_\_\_

\_\_\_\_\_

b. Fill out the table below. You do not *have* to show your work.

Time Interval	Woman's Speed (m/s)
2 to 4 seconds	_____
4 to 6 seconds	_____
6 to 8 seconds	_____



## Part 9: Algebra

Simplify the polynomials in 1-6

1.  $4x^5(9x^3)$

2.  $-7x^5(3x^2)$

3.  $65x^{19}y^{17} / 13x^5y^5$

4.  $(4x^2y^5)^3$

5.  $[(3x^6y^{11})/(10x^2y^5)] \times [(20x^5y^8)/(12x^4y^3)]$

6.  $(3a^2 + 6a)/(3a)$

7. Solve the System:  $XY = 28$ ,  $Y = 3X - 5$ .  $X =$  ,  $Y =$

8. Find the remainder if  $(x^2 + 5x + 6)$  is divided by  $(x+2)$

9. Find the remainder if  $(x^2 - 3x - 10)$  is divided by  $(x+2)^2$

## Part 10: Writing a procedure

Write a procedure (in steps) for a simple task or your choosing. It needs to be detailed enough so that it can be followed. Possible examples are tying a shoe, building an Ikea bookshelf, etc

