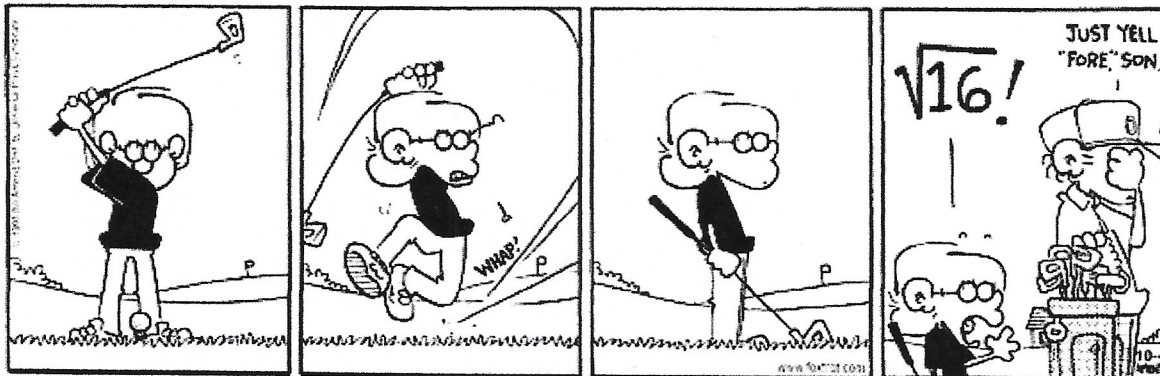


Name _____

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. $x = v_0t + \frac{1}{2}at^2$ Solve for v_0

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

4. $a = \frac{v_f - v_0}{t}$ Solve for t

5. $a = \frac{v_f - v_0}{t}$ Solve for v_f

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6. $F = k \frac{m_1 m_2}{r^2}$ Solve for r

7. $F = k \frac{m_1 m_2}{r^2}$ Solve for m_2

8. $T = 2\pi \sqrt{\frac{L}{g}}$ Solve for L

9. $T = 2\pi \sqrt{\frac{L}{g}}$ Solve for g

10. $\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$ Solve for d_i

11. $qV = \frac{1}{2}mv^2$ Solve for v (not V and v are not the same quantity)

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In each case make the specified variable the subject of the formula:

a) $h = c + d + 2e,$ e

b) $S = 2\pi r^2 + 2\pi rh,$ h

c) $Q = \sqrt{\frac{c+d}{c-d}},$ c

d) $\frac{x+y}{3} = \frac{x-y}{7} + 2,$ x

PART II. SCIENTIFIC NOTATION

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

1. $T_s = 2\pi \sqrt{\frac{4.5 \times 10^{-2} \text{ kg}}{2.0 \times 10^3 \text{ kg/s}^2}} =$

2. $K = \frac{1}{2} (6.6 \times 10^2 \text{ kg}) (2.11 \times 10^4 \text{ m/s})^2 =$

3. $F = 9 \times 10^{-9} \frac{\text{N} \cdot \text{m}^2}{\text{C}^2} \left(\frac{(3.2 \times 10^{-9} \text{ C})(9.6 \times 10^{-9} \text{ C})}{(0.32 \text{ m})^2} \right) =$

4. $\frac{1}{R_p} = \frac{1}{4.5 \times 10^2 \Omega} + \frac{1}{9.4 \times 10^2 \Omega}$ $R_p =$

5. $e = \frac{(1.7 \times 10^3 \text{ J}) - (3.3 \times 10^2 \text{ J})}{(1.7 \times 10^3 \text{ J})} =$

Name _____

6. $(1.33)\sin 25.0^\circ = (1.50)\sin \theta$ $\theta =$ _____

7. $K_{\max} = (6.63 \times 10^{-34} \text{ J} \cdot \text{s})(7.09 \times 10^{14} \text{ s}^{-1}) - (2.17 \times 10^{-19} \text{ J}) =$ _____

8. $\gamma = \frac{1}{\sqrt{1 - \frac{2.25 \times 10^8 \text{ m/s}}{3.00 \times 10^8 \text{ m/s}}}} =$ _____

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, 3×10^8 m/s, to km/day.

6. Convert 823 nm to m

7. 8.8×10^{-8} m to mm

8. 1.5×10^{11} m to μm

9. 7.6 m^2 to cm^2

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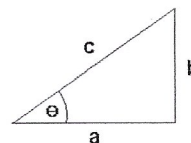
10. 8.5 cm^3 to m^3

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



$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

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

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

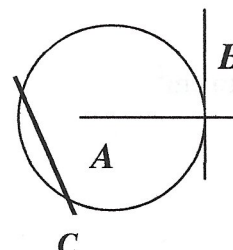
2. $\theta = 45^\circ$ and $a = 15 \text{ m/s}$, solve for b and c .

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

4. Line **B** touches the circle at a single point. Line **A** extends through the center of the circle.

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

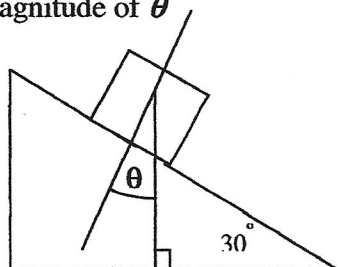
How large is the angle between lines **A** and **B**?



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What is line C ?

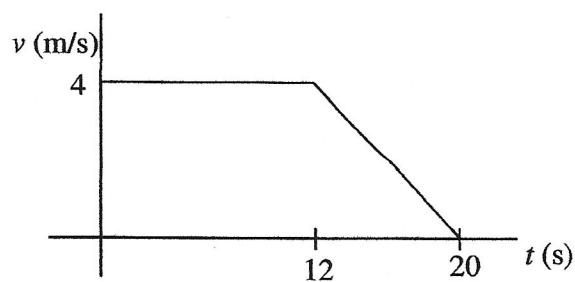
5. Write down the magnitude of θ



6. The radius of a circle is 5.5 cm,
a. What is the circumference in meters?

b. What is its area in square meters?

7. What is the area under the curve below? Show your work and include the appropriate units.



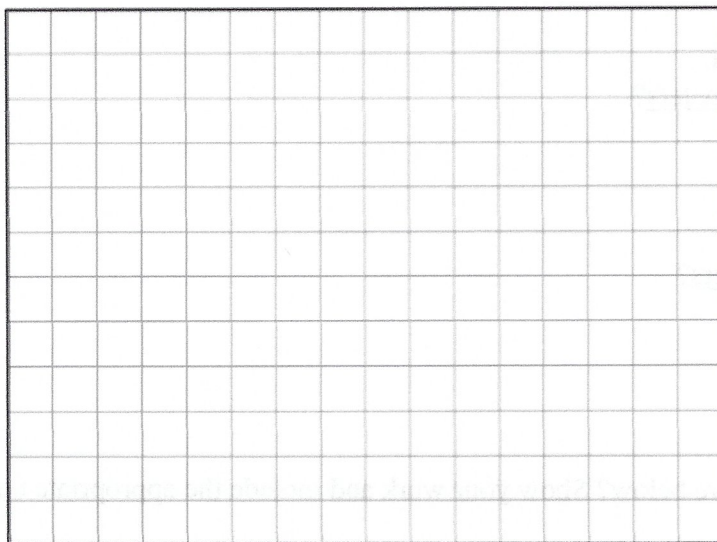
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PART V. GRAPHING TECHNIQUES

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:



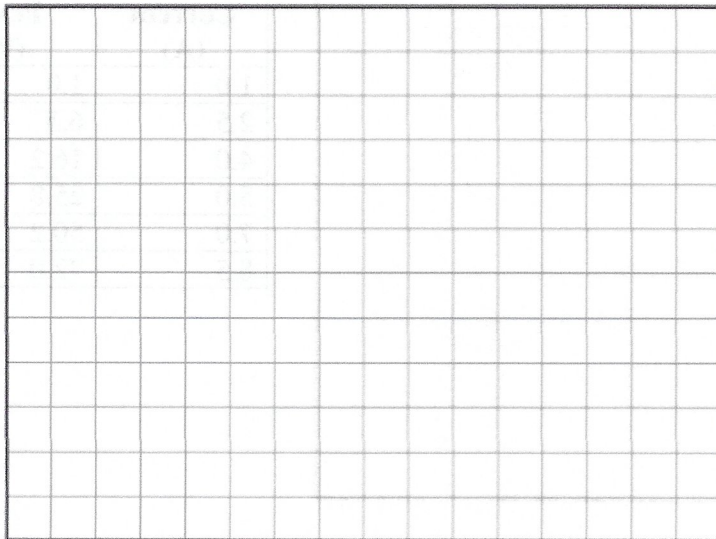
Velocity (ft/s)	Time (s)
32	1
63	2
97	3
129	4
159	5
192	6
225	7

- 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?

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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:



Frequency (kHz)	Wavelength (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?

Name

Part VI Solving quadratic equations:

Solve each of the following quadratic equations. Obtain your answers in surd, ^{or} ~~not~~ decimal, form.

(example $\sqrt{2}$ or 1.41 is fine for final answer)

1. $x^2 + 8x + 1 = 0$ 2. $x^2 + 7x - 2 = 0$ 3. $x^2 + 6x - 2 = 0$

4. $4x^2 + 3x - 2 = 0$ 5. $2x^2 + 3x - 1 = 0$ 6. $x^2 + x - 1 = 0$

7. $-x^2 + 3x + 1 = 0$ 8. $-2x^2 - 3x + 1 = 0$ 9. $2x^2 + 5x - 3 = 0$

10. $-2s^2 - s + 3 = 0$ 11. $9x^2 + 16x + 1 = 0$ 12. $x^2 + 16x + 9 = 0$