Physics 100 Math/Units Pretest

July 18, 2014

1. Rearrange this equation to give it in the form "$x =$"

$$y = mx + b \tag{1}$$

2. (a) Rearrange this equation to give it in the form "$T =$"

$$a\,T + b = c\,T + d \tag{2}$$

   (b) Verify that your solution is correct if $a = 0.1$, $b = 4$, $c = 0.5$, and $d = 3$. (So use your previous answer to calculate a value for T and then show that the original equation is satisfied.)

3. Solve for Δt in equation 3. There are two possible solutions.

$$-4.9(\Delta t)^2 + 7.5\Delta t = 2.5 \tag{3}$$

   The quadratic equation is

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{4}$$

   (you can also try to derive the quadratic equation from $ax^2 + bx + c = 0$)

4. Solve the following system of equations for x and y

$$0.6x + 0.4y = 7.2 \tag{5}$$
$$-0.3x + 0.3y = -4.5 \tag{6}$$

   You should be able to solve by

   (a) Substitution

   (b) Elimination

   (c) And approximately by graphing. (Hint: put the equations into $y = mx + b$ form and look at the intercept of the two lines.)

5. Consider the right-angled triangle in Fig. 1. The side "adjacent" to the angle labelled θ has a length of 6.4 and the side "opposite" to θ has a length of 3.0. Give θ in degrees and give the length of the hypotenuse.

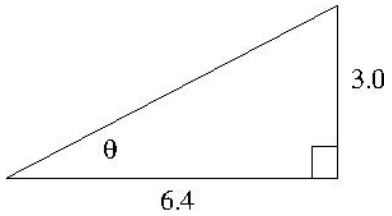

Figure 1: Figure for question 5.

6. $|\overline{AO}| = 0.19$. Give the x and y coordinates of point A in Figure 2.

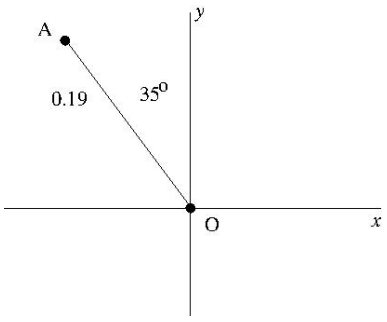

Figure 2: Figure for question 6.

7. Calculate
$$\frac{3.0 \times 10^{-4}}{1.5 \times 10^{-6}} \tag{7}$$
using your calculator and without using your calculator.

8. (a) Convert 3.5 kg to grams.
   (b) Convert 85 km/h to cm/s.
   (c) Although we use metric for many things you probably know your height and weight in British units. Convert your height and weight to metric units if 2.2 pounds (lbs) "=" 1 kg and 1 inch=2.54 cm. (a pound is a unit of force and a kilogram is a unit of mass so they can't really be equal. It is is more correct to say that at the earth's surface an object with a mass of 1 kg experiences a gravitational force of 9.8 Newtons or 2.2 pounds.)

Partial Answers

1.
$$x = \frac{y - b}{m} \tag{8}$$

2.
$$T = \frac{b - d}{c - a} \tag{9}$$
$T = 2.5$ with the values given.

3. $\Delta t = 0.765 \mp 0.275$

4. $x = 13.2$ and $y = -1.8$

5. $\theta = 25.1^{\circ}$ and $c = 7.07$

6. $x = -0.11$ and $y = 0.16$

7. 2.0×10^2. If you are having trouble use the "Exp" or "EE" button on your calculator for scientific notation NOT x^y with 10 and the exponent.

8. (a) 3.5×10^3 g
   (b) 2.4×10^3 cm/s
   (c) I am 5' 8.5" and 178 lbs which converts to 174 cm and 80.7 kg.