

For Physics 200: Math refresher (see Appendix B in S&J)

Be sure you have command of these skills (I'll provide a solution by Friday). If you have questions/trouble see the Appendix, me, and/or [www.SOSmath.com](http://www.SOSmath.com)

1. Write the following numbers in scientific notation, i.e. in the form  $Y \times 10^n$  (example:  $0.345 = 3.45 \times 10^{-1}$ ). No calculator here!

a)  $2051 = \mathbf{2.051 \times 10^3}$

b)  $0.00040 = \mathbf{4.0 \times 10^{-4}}$

c)  $12.3 = \mathbf{1.23 \times 10^1}$

2. Calculate the answer to the following:

a)  $\frac{4.56 \times 10^6}{2.0 \times 10^{-2}} = ? = \mathbf{2.28 \times 10^8}$

b)  $5.0 \times 10^{-2} \times 100 = \mathbf{5.0}$

3. Solve the following equations for x (No calculator for a)-b) !):

a)  $5(x-2) + 10 = 14$

$$5x - 10 + 10 = 14$$

$$\mathbf{x = 14/5 = 2.8}$$

b)  $\frac{3}{x} = \frac{4}{9}$

$$4x = 27$$

$$\mathbf{x = 27/4 = 6.75}$$

c)  $4x^2 + 2x - 8 = 0$

quadratic formula gives  $x = \mathbf{1.186, -1.686}$

4. In later chapters we'll arrive at an expression like this:  $\frac{1}{2} m x^2 + mgh = mgy$ . Show that this can be solved for x and simplified into the form:  $x = \pm\sqrt{2g(y-h)}$   
 (By "Show that" I mean show all the algebraic steps to go from the first expression to the final one).

$$\frac{1}{2} mx^2 = mgy - mgh$$

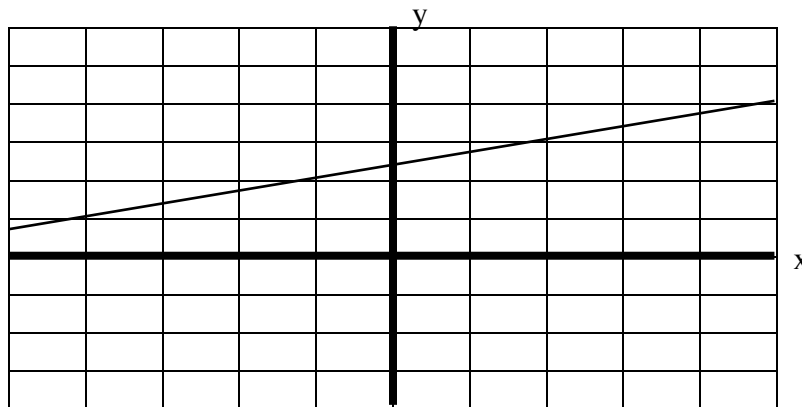
$$\frac{1}{2} mx^2 = mg(y-h)$$

$$\text{divide through by m: } \frac{1}{2} x^2 = g(y-h)$$

$$x^2 = 2g(y-h)$$

$$x = \pm \sqrt{2g(y-h)}$$

5. Draw the line that passes through the points  $x = -1, y = 2$  and  $x = 5, y = 4$ . No calculator here!



b) What is the equation for this line in the form  $y = mx + b$ , where m is the slope and b is the y-intercept? No calculator here!

$$m = \text{slope} = (4-2)/(5- -1) = +1/3$$

$$b = \text{y-intercept} = y \text{ when } x=0 = 2 + 1/3 = 2.3333$$

$$\text{so } y = (1/3)x + 2 \frac{1}{3}$$

6. Solve these two equations simultaneously to obtain values for x and y No calculator here!:

$$2x - 2y = 8$$

$$3x + y = 16$$

multiply eqn 2 by 2:  $2(3x+y = 16)$  gives  $6x + 2y = 32$

add to eqn 1:

$$2x - 2y = 8$$

$$\underline{6x + 2y = 32}$$

$$8x = 40$$

so  $x=5$

which means  $y=16-3x=1$

check:  $2*5-2*1=8$

$$\mathbf{x = 5, y = 1}$$

7. You have a circle of radius  $r$ . Write down an expression for the area of the circle divided by its circumference, and simplify that expression as much as possible. Your final answer should contain nothing except the unknown  $r$  and numerical constant(s). No calculator here!

$$\text{area} = \pi r^2, \text{circumference} = 2\pi r$$

$$\text{divide: } (\pi r^2)/(2\pi r) = r^2/(2r) = r/2$$

8. For the right triangle shown below, find numerical values for the other sides and angles.

