

## Honors Physics Summer Assignments 2018-2019

Welcome to Honors Physics. This year we will be covering a multitude of topics that comprise the foundation of physics. Newtonian mechanics; projectiles; energy; mechanical waves; sound; light; and electricity. To best prepare for the rigor we will need to handle this year, there are some basic math skills you will need to review, dimensional analysis, unit conversions, and basic algebra. Your ability to review this information on your own will be vital to your continued progress in the class.

Attached are practice problems in math, which are due the day you get back. It is expected that you understand and know how to work these problems. If you have forgotten how to do some things, you need to get yourself caught up and you have all of summer to do just that. If you do not know how to do all of the problems, you are already behind. Email me if you have questions. [charles.burge@acsk-12.org](mailto:charles.burge@acsk-12.org)

Please have all of this work prepared to turn in on your first day of class. Print off a copy of this packet and attach your work to it. Also be sure to sign the honor statement below. There will be an exam over the material covered in this packet within the first week of class.

### ***Honor Statement***

*"By signing this agreement I declare all work attached to be my own. I understand that while I am encouraged to discuss these problems with my classmates and use materials that fall within ethical boundaries of use, I at most used these discussions to guide by thinking toward a solution. I further state that I did not, in any capacity, look at or copy the solutions created by anyone else, nor did I allow anyone to look at or copy my solutions. If this statement is found to be false, I understand and accept a punishment that is fair according to guidelines set by this course.*

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Enjoy your summer!

## SUMMER MATH REVIEW

Your work must be legible and linear, and I must be able to follow it easily. Please circle or highlight your answers.

### Significant Figures and Scientific Notation Review

1) How many significant figures do the following numbers have?

a. 6.001 \_\_\_\_\_

c. 206,000 \_\_\_\_\_

b. 0.0080 \_\_\_\_\_

d. 27.00 \_\_\_\_\_

Directions: Find the following. Final answers should be in scientific notation with the correct number of significant figures.

2)  $(5.0 \times 10^{-8})(2.9 \times 10^2)$

3)  $3.25 \times 10^4 + 7.4 \times 10^3$

4) 
$$\begin{array}{r} 6.000 \times 10^{-11} \quad \underline{1.00 \times 10^{26}} \\ - \quad \quad \quad \quad \quad \underline{2.00 \times 10^7} \end{array}$$

5) 
$$\frac{8400}{1.2 \times 10^7}$$

### Unit Conversions Review

6) Finish the SI prefix table below. Follow the example of the centi- prefix. You will need to memorize these.

Symbol	Name	Numerical Equivalent
n		
$\mu$		
m		
c	centi	$10^{-2}$
k		
M		
G		

7) 16.7 kilograms is how many grams?

8) 560 nm is how many meters?

9) 15 years is how many seconds?

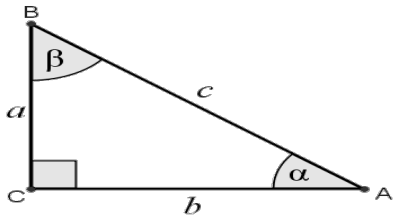
10)  $8.99 \times 10^9$  seconds is how many years?

11)  $2.998 \times 10^8$  m/s is how many kilometers per hour?

### Trigonometry Review

Directions: Use the figure below to answer problems 15-25. Simplify as much as you can.

Use Pythagorean's theorem and SOH CAH TOA for the following questions.



12) Find  $c$  if given  $a$  and  $b$ .

13) Find  $a$  if given  $b$  and  $c$ .

14) Find  $a$  if given  $c$  and  $\alpha$ .

15) Find  $b$  if given  $a$  and  $\alpha$ .

16) Find  $c$  if given  $b$  and  $\alpha$ .

17) Find  $\alpha$  if given  $b$  and  $c$ .

18) Find  $\alpha$  if given  $a$  and  $b$ .

19) If  $a = 2.0$  and  $c = 7.0$ , what is  $b$ ?

20) If  $c = 10.0$  and  $\alpha = 60^\circ$ , what is  $b$ ?

21) If  $a = 12.0$  and  $\alpha = 30^\circ$ , what is  $b$ ?

### Algebra Review

Directions: Solve the following equations for the given variable and conditions. Simplify if needed.

Example:  $2x + xy = z$ . Solve for  $x$ .

$$x(2+y) = z \qquad x = z/2+y$$

22)  $v_1 + v_2 = 0$  solve for  $v_1$

23)  $a = v/t$  solve for  $t$

24)  $v_f^2 = v_i^2 + 2ad$

a) solve for  $v_i$

b) solve for  $d$

25)  $d_f = d_i + v_i t + \frac{1}{2} at^2$

a) solve for  $v_1$

b) solve for  $t$ , if  $v_1 = 0$

c) solve for  $t$ , if  $d_i = d_f$

26)  $F = m \frac{v_f - v_i}{t_f - t_i}$

a) solve for  $v_f$ , if  $t_i = 0$

b) solve for  $t_f$ , if  $v_f = 0$  and  $t_i = 0$

27)  $a_c = v_2/r$ , solve for  $v$

28)  $mgsin\theta = \mu mgcos\theta$ , solve for  $\theta$

29)  $\frac{1}{2} mv_f^2 + mgh_f = \frac{1}{2} mv_i^2 + mgh_i$   
a) solve for  $h_f$ , if  $h_i = 0$  and  $v_f = 0$

b) solve for  $v_f$ , if  $h_f = 0$

30)  $Ft = mv_f - mv_i$ , Solve for  $v_f$

31)  $m_1v_{i1} + m_2v_{i2} = (m_1 + m_2)v_f$ ,  
solve for  $v_{i2}$

32)  $m_1v_{i1} + m_2v_{i2} = m_1v_{f1} + m_2v_{f2}$ , Solve for  $v_{f2}$  if  $v_{i1} = 0$

33)  $(F_1\sin\theta)r_1 + (-F_2\sin\phi)r_2 = 0$ , solve for  $r_2$

34)  $-kx + m(-g) = 0$ , solve for  $m$

35)  $F_g = G \frac{m_1m_2}{r^2}$ , Solve for  $r$

36)  $L - L\cos\theta = v^2/2$ , solve for  $L$

37)  $\frac{mv^2}{R} = G \frac{Mm}{R^2}$  Solve for  $v$

38)  $T = 2\pi\sqrt{L/g}$ , Solve for  $g$

39)  $\frac{1}{2} mv_f^2 + \frac{1}{2} kx^2 = \frac{1}{2} mv_i^2 + mgh_i$ , Solve for  $x$  if  $v_f = 0$

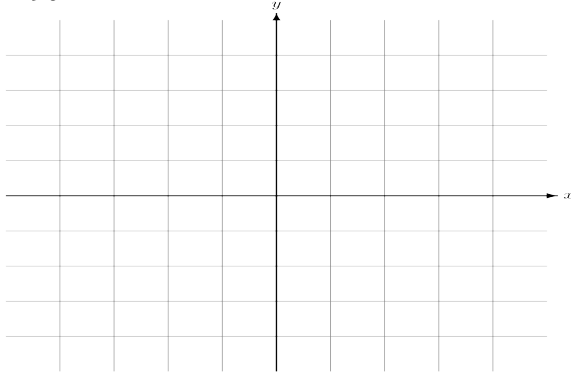
40)  $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$ , Solve for  $R_T$

### Graphing Equations

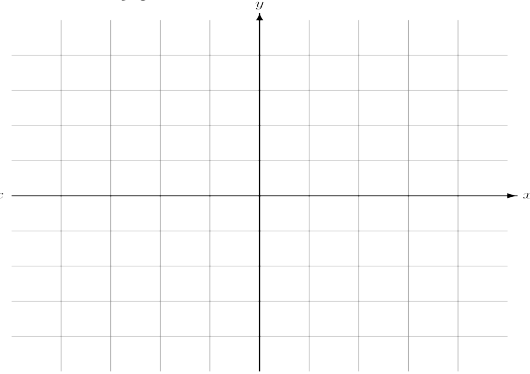
41) If  $r = c - xt$  was graphed on an  $r$  vs.  $t$  graph, what would the following be?  
Slope: \_\_\_\_\_ y-intercept: \_\_\_\_\_

42) On the  $y$  vs  $x$  graphs below, sketch the relationships given

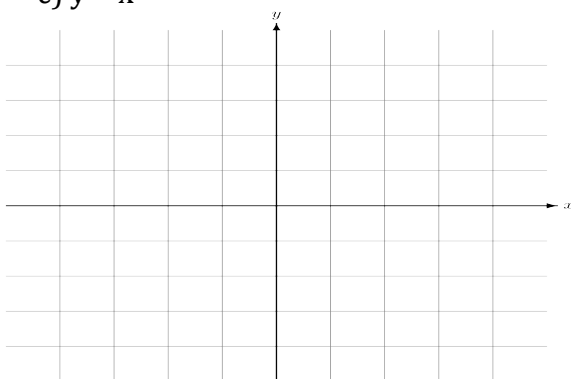
a)  $y = mx + b$ , if  $m > 0$  and  $b = 0$



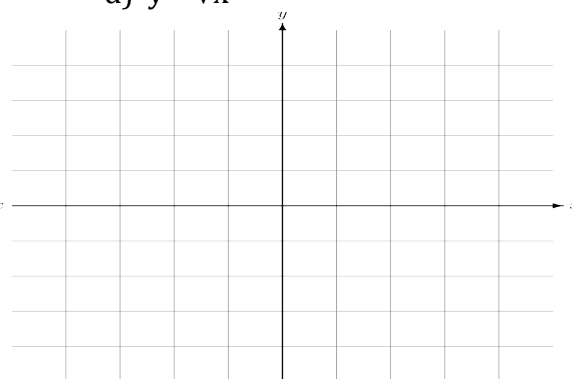
b)  $y = mx + b$ , if  $m < 0$  and  $b > 0$



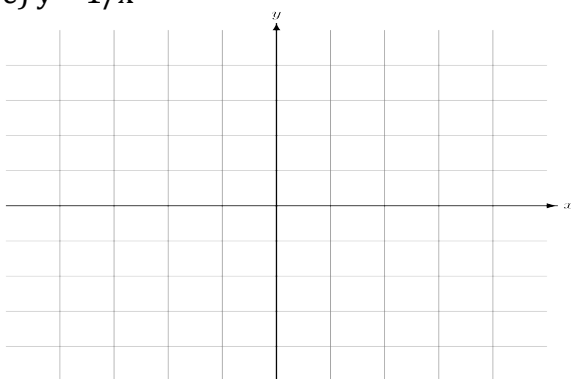
c)  $y = x^2$



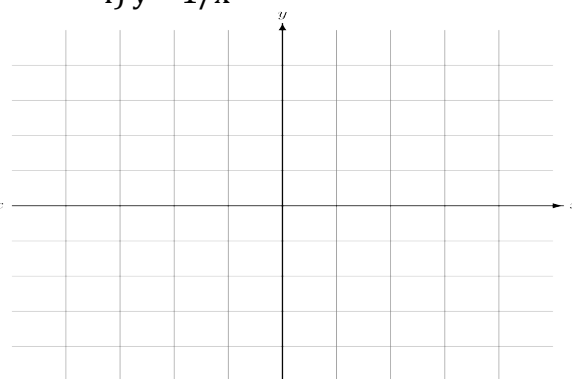
d)  $y = \sqrt{x}$



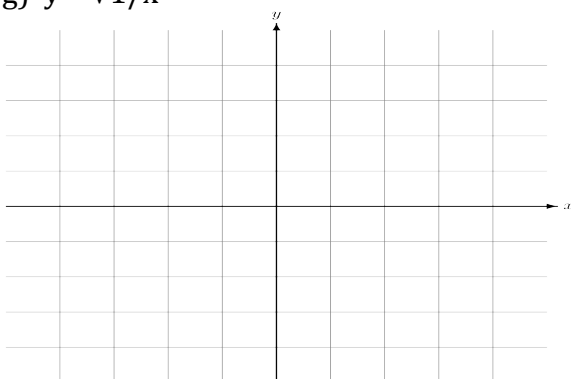
e)  $y = 1/x$



f)  $y = 1/x^2$



g)  $y = \sqrt{1/x}$



h)  $y = \sin(x)$

