

## **AP Physics 1 Summer Assignment 2018-2019**

Expect to be challenged! This is a college level course where you will be using your knowledge and understanding of everything you have learned in all of your classes to solve problems, analyze situations, arrange materials, compare data, and design labs. That is physics!

You cannot expect to acquire the understanding you need to do well on an AP Exam by merely attending class and listening to the teacher. You have to become INVOLVED. YOU have to participate. If you get stuck, see ME, or other students! Ask for HELP. Your classmates will be your new best friends. You must study regularly. Students who study regularly have a good foundation to build on for new topics.

This will pay off! If you are unorganized or inconsistent, things may start to fall apart – and nobody wants that to happen. Show some self-discipline and do what I ask you to do regularly! Especially the homework!!

Homework => Practice => Success

You will be busy. You will be busy. You will be busy. An AP course does that to you. You signed up for it.

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)

Summer Work: (NO LATE WORK WILL BE ACCEPTED)

1) Math Practice (Due First Day Of School)

2) Do not copy work from another student for your own integrity and for your own benefit because all AP Physics 1 students will take a quiz with problems similar to (if not exactly like) those found on this review the first week of school.

AP Physics will be a lot of work, but you are now an AP Physics student and that's why you signed up... because you are the few, the proud, the best of the best and can handle this type of work.

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?

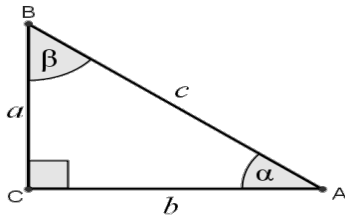
10)  $8.99 \times 10^9$  seconds is how many years?

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  $v_i$

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

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  $R_T$

**Miscellaneous**

Directions: simplify without using a calculator. Remember to show all of your work.

41)  $\frac{1}{4} + \frac{1}{6}$

42)  $\frac{1}{3} + \frac{1}{18}$

43) Consider  $z = x/y$ ,  $c = ab$ ,  $l = m - n$ , or  $r = s^2/t^2$

- a) As x increases and y stays constant, z \_\_\_\_\_
- b) As y increases and x stays constant, z \_\_\_\_\_
- c) As x increases and z stays constant, y \_\_\_\_\_
- d) As a increases and c stays constant, b \_\_\_\_\_
- e) As c increases and b stays constant, a \_\_\_\_\_
- f) As b increases and a stays constant, c \_\_\_\_\_
- g) As n increases and m stays constant, l \_\_\_\_\_
- h) As l increases and n stays constant m \_\_\_\_\_
- i) As s is tripled and t stays constant, r is multiplied by \_\_\_\_\_
- j) If t is doubled and s stays constant, r is multiplied by \_\_\_\_\_

**Systems of equations**

Conceptual Question:

- 44) How many equations are needed to solve...
- a) for 1 unknown variable? \_\_\_\_\_
  - b) for 2 unknown variables? \_\_\_\_\_
  - c) for 3 unknown variables? \_\_\_\_\_

Use the equations in each problem to solve for the specified variable in the given terms Simplify.

45)  $F_f = \mu F_N$  and  $F_N = mg \cos \theta$ . Solve for  $\mu$  in terms of  $F_f$ ,  $m$ ,  $g$ , and  $\theta$  (four answers)

46)  $F_1 + F_2 = F_T$  and  $F_1 \times d_1 = F_2 \times d_2$  Solve for  $F_1$  in terms of  $F_T$ ,  $d_1$ , and  $d_2$

47)  $F_c = ma_c$  and  $a_c = v^2/r$ , Solve for  $r$  in terms of  $F_c$ ,  $m$ , and  $v$

48)  $T = 2\pi\sqrt{L/g}$  and  $T = 1/f$ , Solve for  $L$  in terms of  $\pi$ ,  $g$ , and  $f$

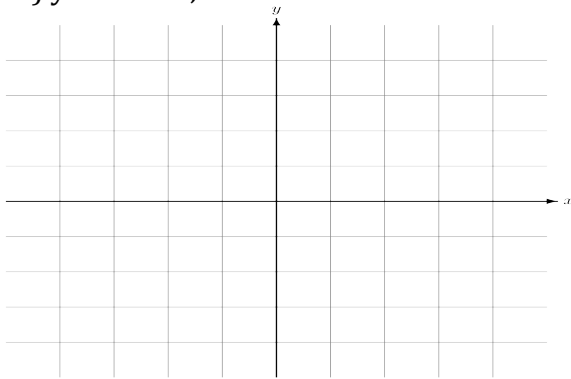
### Graphing Equations

49) If  $r = c - xt$  was graphed on an  $r$  vs.  $t$  graph, what would the following be?

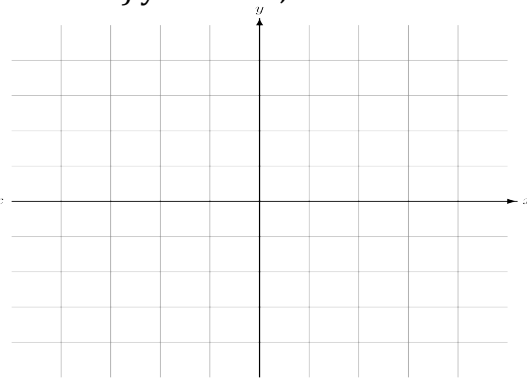
Slope: \_\_\_\_\_ y-intercept: \_\_\_\_\_

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

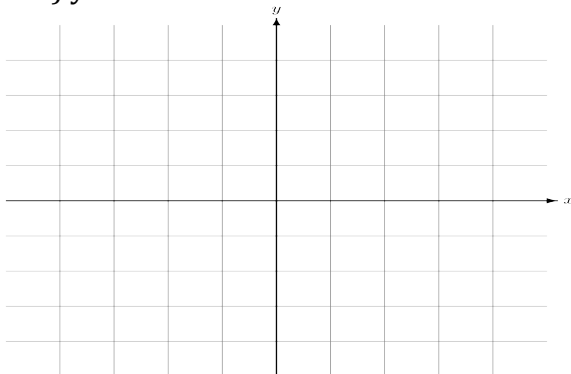
a)  $y = mx + b$ , if  $m > 0$  and  $b = 0$



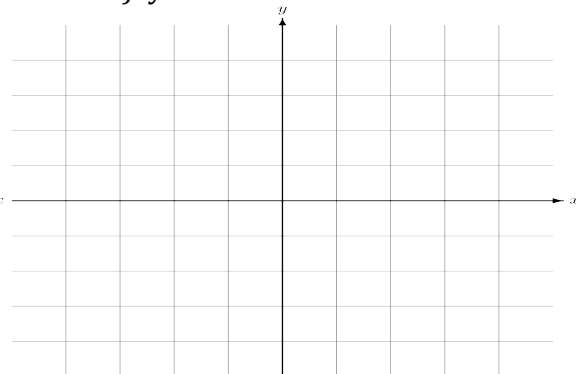
b)  $y = mx + b$ , if  $m < 0$  and  $b > 0$



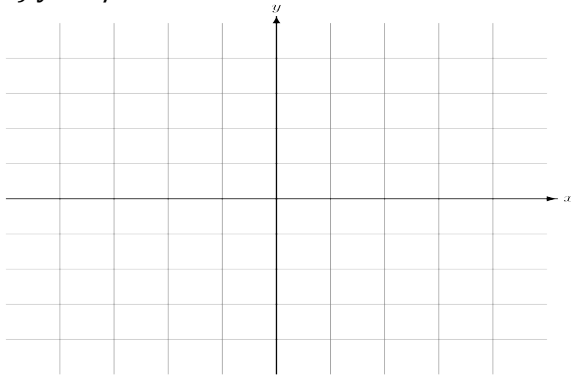
c)  $y = x^2$



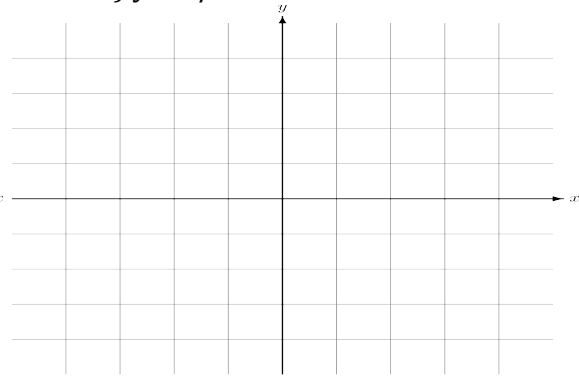
d)  $y = \sqrt{x}$



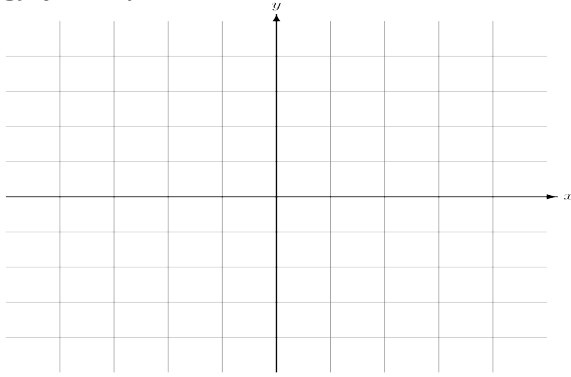
e)  $y = 1/x$



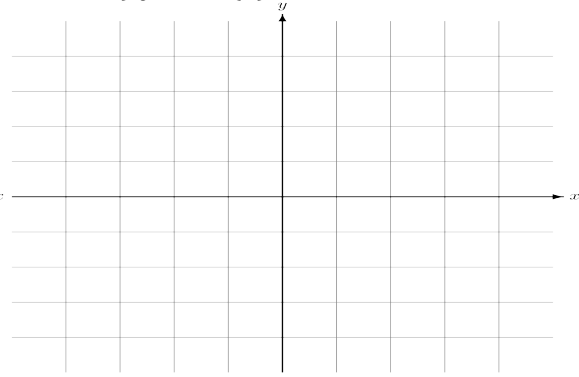
f)  $y = 1/x^2$



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

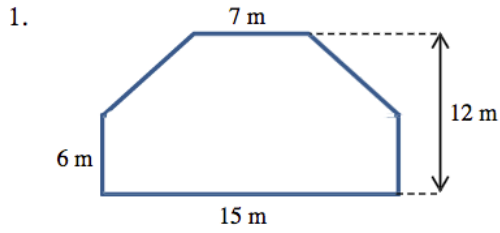


h)  $y = \sin(x)$

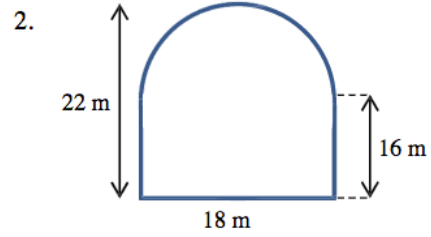




Calculate the area of the following shapes. It may be necessary to break up the figure into common shapes.



Area = \_\_\_\_\_



Area = \_\_\_\_\_

Calculate the unknown angle values for questions 3-6.

