

### To Be Completed in the Month of August

- Check your email near the beginning of August for a message from me with login information and an access code for our AP Classroom. This email will also explain which videos to watch and which problems, if any, I want you to do before school starts.
- Access your online textbook
  - o Go to [openstax.org](https://openstax.org)
  - o Find the drop-down menu labeled "Subjects". Choose "Science".
  - o You should see a new screen. Find "College Physics for AP Courses 2e".
  - o Explore the book. Click through a few pages to get a feel for the way the book is laid out. You may choose to download it or not. You may choose to explore the associated resources or not. Whatever you decide, make sure that you are comfortable with accessing the book and finding information in it. Print copies are available from the publisher. As of writing this assignment, they were about \$60.00 each on Amazon.
  - o Read all of Chapter 1. You do NOT need to do the problems. You DO need to be familiar with the units and the prefixes used in the metric system. You do NOT need to worry too much about significant figures. In Physics 1, the College Board doesn't place a lot of emphasis on sig figs, so I don't, either.
  - o Read Chapter 2 Sections 1 – 3 and 8. **Take notes!** This selection corresponds with the first few lessons we'll have when we get into Unit 1.
- Complete the attached math review.
  - o These are just algebra and basic trig review problems. They are intended to help you brush up on your math skills before the beginning of the school year.
  - o We will be correcting this review in class during the first week of classes. This will be one of the first homework assignments that goes into the gradebook for first quarter.



Name: \_\_\_\_\_

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AP Physics 1 Summer Work 2026

(Adapted with permission from "Pretty Good Physics" <https://prettygoodphysics.wikispaces.com/home> )

The exercises below are a review of the math skills that you will need to be successful in AP Physics 1. Make sure to read all directions throughout the packet. All work must be shown on the pages below in the area provided. If you make a mistake or need more space, you may continue on lined paper. The use of calculators should be avoided when possible. Final answers may be in fractions and in terms of mathematical constants ( $\pi$ ,  $e$ ,  $i$ , etc.).

Your work needs to be legible and I must be able to follow it easily. Please box your final answers.

Your completed summer work is due the first full day of class. Do not copy work from another student for your own integrity and for your own benefit because all AP Physics 1 students usually take a quiz with problems similar to (if not exactly like) those found on this review during the first week or so of school. You may use the internet or other resources for reference. No physics is needed for this packet. If you have difficulty, please do not hesitate to email me at [elizabethmaitner@grcatholiccentral.org](mailto:elizabethmaitner@grcatholiccentral.org) at any point throughout the summer.

**Unit Conversions Review (Stoichiometry)**

1.) Finish the SI prefix table below. Follow the example of the centi- prefix. **You will need to memorize this information.**

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

2.) 16.7 kilograms is how many grams?

3.) 560 mm is how many meters?

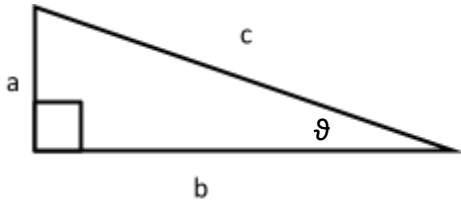
4.) 15 years is how many seconds?

5.)  $8.99 \times 10^9$  seconds is how many years?

6.)  $2.998 \times 10^8$  m/s is how many kilometers per hour?

### Trigonometry Review

Directions: Use the figure below to answer problems 7 - 16. Simplify as much as you can. Some answers will be in terms of variables. Other answers will be numeric.



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

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

8.) Find  $a$  if given  $c$  and  $\theta$ .

13.) Find  $b$  if given  $a$  and  $\theta$ .

9.) Find  $c$  if given  $b$  and  $\theta$ .

14.) Find  $\theta$  if given  $b$  and  $c$ .

10.) Find  $\theta$  if given  $a$  and  $b$ .

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

11.) If  $c = 10.0$  and  $\theta = 60^\circ$ , what is  $b$ ?

16.) If  $a = 12.0$  and  $\theta = 30^\circ$ , 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  $x$ .

$$x(2 + y) = z$$

$$x = \frac{z}{2 + y}$$

22.)  $v_1 + v_2 = 0$ . Solve for  $v_1$ .

23.)  $a = \frac{v}{t}$ . Solve for  $t$ .

24.)  $v_f^2 = v_i^2 + 2ax$

A.) Solve for  $v_f$ .

B.) Solve for  $x$ .

25.)  $x_f = x_i + v_o t + \frac{1}{2} a t^2$

A.) Solve for  $v_o$ .

B.) Solve for  $t$ , if  $v_o = 0$ .

C.) Solve for  $t$ , if  $x_i = x_f$ .

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.)  $a_c = \frac{v^2}{r}$ . Solve for  $v$ .

28.)  $mg \sin \theta = \mu mg \cos \theta$ . Solve for  $\mu$ .

29.)  $\frac{1}{2} m v_f^2 + m g h_f = \frac{1}{2} m v_i^2 + m g h_i$

A.) Solve for  $h_f$  if  $h_i = 0$  and  $v_f = 0$ .

B.) Solve for  $v_f$  if  $h_f = 0$ .

30.)  $Ft = m v_f - m v_i$ . Solve for  $v_f$ .

31.)  $m_1 v_{i,1} + m_2 v_{i,2} = (m_1 + m_2) v_f$ . Solve for  $v_{i,2}$ .

32.)  $m_1 v_{i,1} + m_2 v_{i,2} = m_1 v_{f,1} + m_2 v_{f,2}$ . Solve for  $v_{f,2}$  if  $v_{i,1} = 0$ .

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.)  $F_g = G \frac{m_1 m_2}{r^2}$ . Solve for  $r$ .

36.)  $L - L \cos \theta = \frac{v^2}{2}$  Solve for  $L$ .

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

38.)  $T = 2\pi \sqrt{\frac{L}{g}}$ . 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  $v_f = 0$ .

**Miscellaneous**

41.) Consider  $z = \frac{x}{y}$ ,  $c = ab$ ,  $l = m - n$ , or  $r = \frac{s^2}{t^2}$ . For each statement, state whether the mentioned variable increases, decreases, or stays the same. For  $i$  and  $j$ , be very specific.

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.) If  $s$  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

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

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

43.)  $F_1 + F_2 = F_T$  and  $F_1 \cdot d_1 = F_2 \cdot d_2$ . Solve for  $F_1$  in terms of  $F_T$ ,  $d_1$ , and  $d_2$ .

44.)  $F_c = ma_c$  and  $a_c = \frac{v^2}{r}$ . Solve for  $r$  in terms of  $F_c$ ,  $m$ , and  $v$ .

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

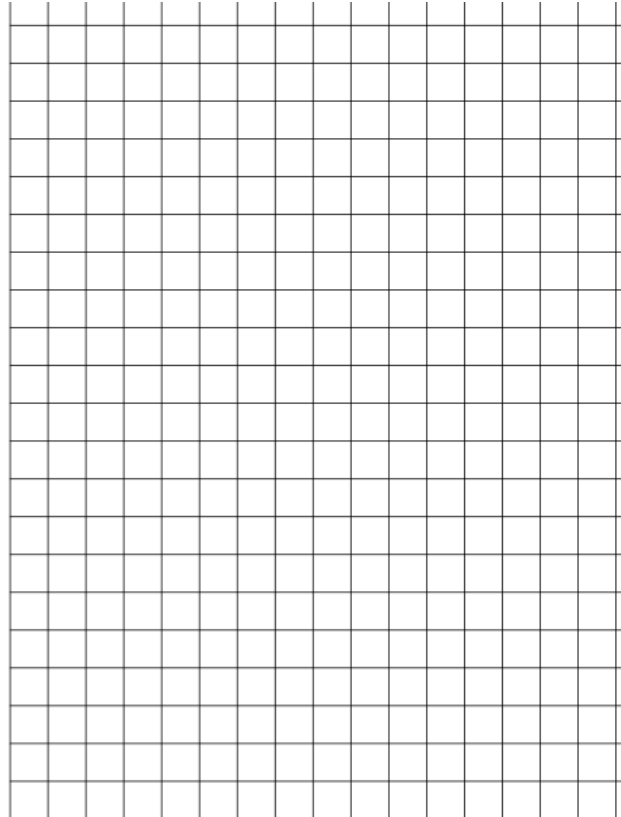
### Marbles in Cylinder Lab

You received a graduated cylinder with three identical marbles and an unknown amount of water already in it. You placed extra identical marbles in the cylinder and obtained the data below. Use the data to graph a best-fit line showing the relationship between the water level and the number of marbles. The y-intercept should be visible on the graph. Label your axes and include units.

From the graph, determine a mathematical formula for the water level for any number of marbles. Lastly, give an explanation of your formula in words. Make sure to give an explanation of the slope and y-intercept of your formula.

46.) Graph below

Number of Marbles in Water	Water level (mL)
3	58
4	61
5	63
6	65
7	68



47.) Formula:

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48.) Explanation of the formula in words: (Include the meaning of the slope and y-intercept).