

Welcome to AP Physics 1, a rigorous but exciting algebra-based college physics class! This summer assignment is designed to act as a review of some math concepts that you will need throughout this course. If you encounter any difficulties, I encourage you to search the topic name on Khan Academy – they have a lot of great math videos, as well as a nice AP Physics 1 subject area. Please try your hardest with these topics; I want to see what you know! This will be the first grade of the school year, worth 20 points. It should take you no longer than 45 minutes to complete this assignment. This will be due on the first day of class.

Directions:

Show your work on a separate paper.

Label each part of the assignment and include your name on the top of each page.

Each problem should be clearly labeled, and work should be easy to follow.

I look forward to teaching you this Fall!

-Ms. Galvan

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PART 1 – Solving Symbolically (Solving Literal Equations)

During class and on the AP exam, problems will be worked with variables only. Solve for the variable indicated—don't let the different variables confuse you; we will develop these mathematical relationships in class.

Manipulate/**rearrange** these equations algebraically as though they were numbers. For example:

Example 1:Solve for Q :

$$U = \frac{kQ}{r^2}$$

Multiply r^2 to both sides:

$$r^2 * U = \frac{kQ}{r^2} * r^2$$

Divide both sides by k :

$$\frac{r^2 * U}{k} = \frac{kQ}{k}$$

$$Q = \frac{r^2 * U}{k}$$

Example 2:Solve for r :

$$U = \frac{kQ}{r^2}$$

Multiply r^2 to both sides:

$$r^2 * U = \frac{kQ}{r^2} * r^2$$

Divide both sides by U :

$$\frac{r^2 * U}{U} = \frac{kQ}{U}$$

Take the square root of both sides:

$$\sqrt{r^2} = \sqrt{\frac{kQ}{U}}$$

$$r = \sqrt{\frac{kQ}{U}}$$

[REMINDER: The work for this section must be shown on **separate** paper - and labeled.]

- | | | | |
|---------------------------|------------------------------------|---------------------------|----------------------------------|
| 1. Solve for v . | $mgh = \frac{1}{2}mv^2$ | 6. Solve for t . | $a = (v_f - v_0)/t$ |
| 2. Solve for T . | $pV = nRT$ | 7. Solve for v_f . | $a = (v_f - v_0)/t$ |
| 3. Solve for t . | $x = x_0 + v_0t + \frac{1}{2}at^2$ | 8. Solve for g . | $T = 2\pi\sqrt{\frac{l}{g}}$ |
| 4. Solve for r . | $B = \frac{\mu_0 I}{2\pi r}$ | 9. Solve for θ_c . | $\sin\theta_c = \frac{n_1}{n_2}$ |
| 5. Solve for Δx . | $v = \sqrt{2a\Delta x}$ | 10. Solve for r . | $F = G \frac{m_1 m_2}{r^2}$ |

PART 2 - Solving Formulas (Algebraic Manipulation)

After you have practiced how to solve equations symbolically, put this skill to use in more complex scenarios. Often in this course you will need to set up and solve equations using a variety of algebraic strategies. Review your algebra knowledge and skills below.

[REMINDER: The work for this section must be shown on **separate** paper - and labeled.]

Solve for the variable specified:

1. Find: v_f

$$v_f = v_o + at$$

Given that:

- $v_o = 0$
- $t = 4$
- $a = 3.2$

2. Find: v_o

$$x_f = x_o + v_o t + \frac{1}{2}at^2$$

Given that:

- $x_o = 0, x_f = 25$
- $t = 2$
- $a = 10$

3. Find: μ

$$f = \mu N$$

Given that:

- $f = mg \sin \theta$
- $N = mg \cos \theta$
- $\theta = 30^\circ$

4. Find: ρ_1

$$\rho_1 V_1 g = \rho_2 V_2 g$$

Given that:

- $V = A * h$
- $A_1 = A_2$
- $h_1 = 2h_2$
- $\rho_2 = 10$

5. Find: t

$$x_{f1} = 5 - 2t$$

$$x_{f2} = -1 + \frac{1}{2}t$$

Given that:

- $x_{f1} = x_{f2}$

6. Find: T, a_1

$$a_1 = \frac{T}{3m}$$

$$a_2 = \frac{mg - T}{m}$$

Given that:

- $a_1 = a_2$
- $m = 5$
- $g = 10$

PART 3 - Operations with Units

[REMINDER: The work for this section must be shown on **separate** paper - and labeled.]

In each topic you will experience physical quantities with specific units. You will need to grow comfortable with recognizing and manipulating expressions with each of these units.

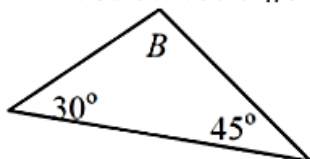
Simplify the expressions of units:			
1. $\frac{\frac{m}{s}}{s}$	2. $\frac{\frac{kg \cdot m}{s}}{\frac{m}{s^2}}$	3. $\frac{kg \cdot m}{s^2} * s$	4. $\frac{\frac{kg \cdot m}{s^2} * m}{s}$
Refer power of ten prefixes and conversions to answer the following questions:			
5. How many <i>cm</i> are in a <i>m</i> ?	6. How many <i>mL</i> in a <i>L</i> ?	7. How many <i>cm</i> in a <i>km</i> ?	8. How many in μm a <i>mm</i> ?
9. How many <i>cm</i> ² are in <i>m</i> ² ?	10. How many <i>mL</i> ³ in a <i>L</i> ³ ?	11. How many <i>cm</i> ² in a <i>km</i> ² ?	12. How many μm ² in a <i>mm</i> ² ?

PART 4 - Geometry Review

[REMINDER: The work for this section must be shown on **separate** paper - and labeled.]

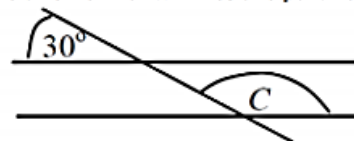
In this class you will find yourself analyzing physical scenarios and diagrams. Recall your geometry coursework in answering the following questions.

1. What is the value of angle B?



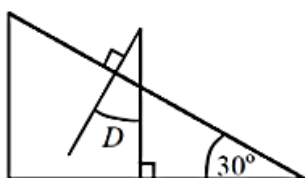
2. The radius of a circle is 5.5 cm. Determine the
- area*
- in square meters.

3. The two horizontal lines are parallel.



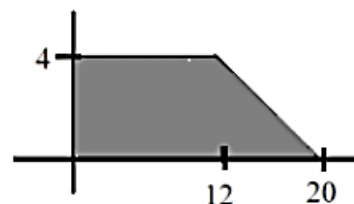
What is the value of angle C?

4. How large is angle D?



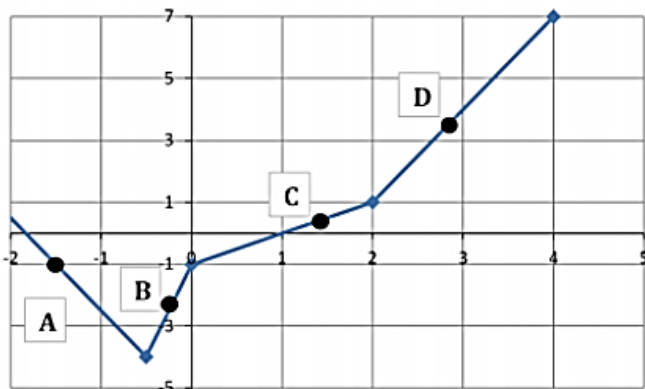
5. The radius of a circle is 5.5 cm. Determine the
- circumference*
- in meters.

6. Determine the area of the shaded region.

**PART 5** - Graphing Review

[You may do work for activities 1 and 2 entirely on this sheet.]

Activity 1: Four points are labeled on the following graph. Rank the slopes of the curve at each of the labeled points. Explain your reasoning.



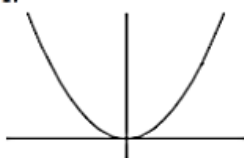
Smallest
Slope

Largest
Slope

Explain:

Activity 2: Below each graph, correctly write the equation of the function that corresponds each graph.

1.



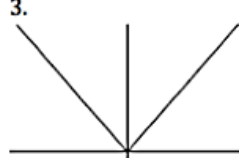
$f(x) =$

2.



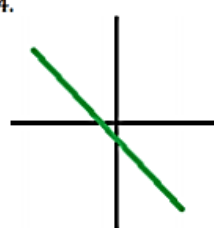
$f(x) =$

3.



$f(x) =$

4.



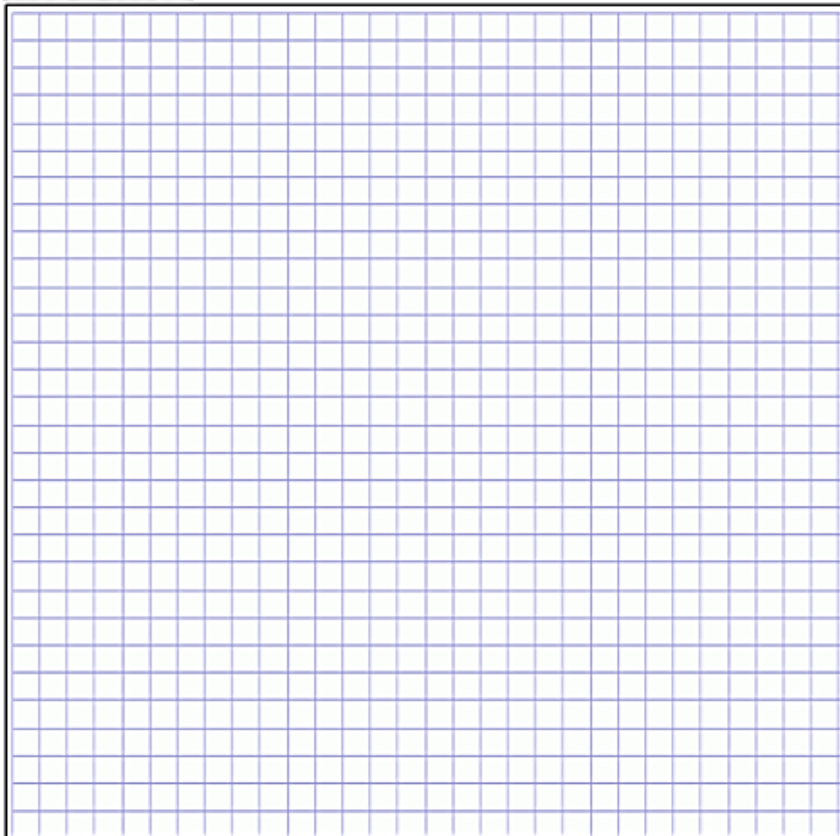
$f(x) =$

[You may do work for this activity entirely on this sheet.]

Activity 3: Evan and Anna are taking measurements of a toy car traveling across the classroom. Evan calls out each one second interval. Anna records the location of the car as Evan calls out each time interval.

Plot their data below (be careful with 'x' and 'y') - or plot on DESMOS if you know how. Include a snip/print of the final graph if you use DESMOS.

GRAPH TITLE:



X Time(s)	Y Distance (m)
1	3
2	15
3	25
4	49
5	76
6	108
7	150
8	195

1. What type of function is this (linear, exponential, quadratic...)? Explain how you know.
2. Is the distance traveled greater between 0 and 1 seconds or 3 and 4 seconds?
3. Is the slope of the curve greater between seconds 1 and 2 or 3 and 4?