AP Physics 1 Summer Assignment

Welcome to Physics! I am Ms. Goodman, and you can reach me at kgoodman@hpregional.org. I have prepared this assignment for you to complete over the summer, and it is due on the first day of class. I recommend completing these problems the week before school starts so they are fresh in your mind.

AP Physics 1 is a rigorous course that requires solid math skills. This assignment focuses on the math skills you will need to succeed. I have included the answers on the last page. Feel free to work with other students on these problems, but the entire point is that you understand how to do these problems on your own before class starts in September. There will be a quiz on these topics during the first week of school. If you have any questions, please email me. I will be checking my email throughout the summer, but you should expect a delay in my response.

Materials you will need for class:

- Notebook
- Scientific Calculator
- Pen or Pencil

Scientific Notation

Free resource: https://www.khanacademy.org/math/in-in-class-7th-math-cbse/x939d838e80cf9307:exponents-and-powers/x939d838e80cf9307:large-numbers-in-standard-form/v/scientific-notation-old

Express the following numbers in scientific notation:

1. 4,543,000
2. 5439.9
3. .0000000079
4. .00034

Unit Prefixes

5. Fill in the chart below. I have filled in one row as an example. Use Google if needed.

Prefix	Power	Symbol
Giga-		
Mega-		
Kilo-		
Centi-	10^{-2}	c
Milli-		
Micro-		
Nano-		

Dimensional Analysis

Free resource: https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:working-units/x2f8bb11595b61c86:rate-conversion/v/dimensional-analysis-units-algebraically

6. 24 g = _____ kg

7. 94.1 MHz = _____ Hz

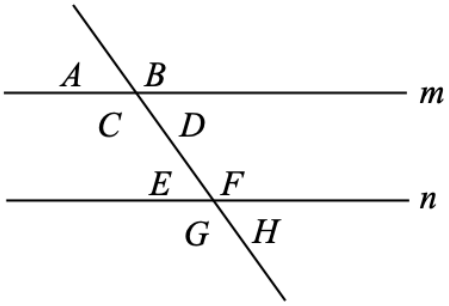
8. 6 Gb = _____ kb

9. 640 nm = _____ m

10. Mary runs at a pace of 3 meters per second. What is her speed in miles per hour? (There are 1609 meters in a mile)

Calculate Unknown Angles

11. *m and n are parallel*



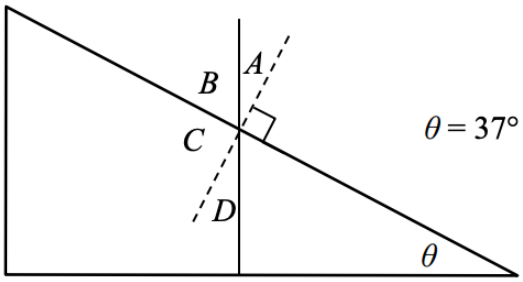
A = 75° B = _____

C = _____ D = _____

E = _____ F = _____

G = _____ H = _____

12.



A = _____ B = _____

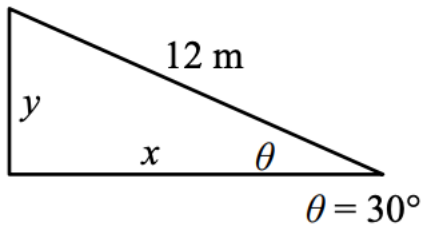
C = _____ D = _____

Trigonometry

Calculate the following unknown values using trigonometry. All of the triangles below are right triangles. (SOH-CAH-TOA!)

Free resource: https://www.khanacademy.org/math/geometry/hs-geo-trig/hs-geo-trig-ratios-intro/v/basic-trigonometry-ii

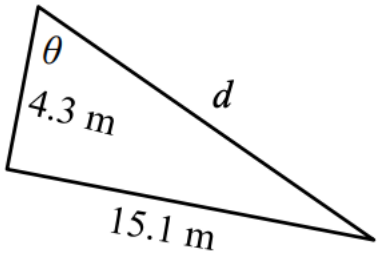
13.



y = _____

x = _____

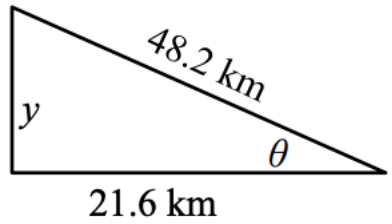
14.



d = _____

Θ = _____

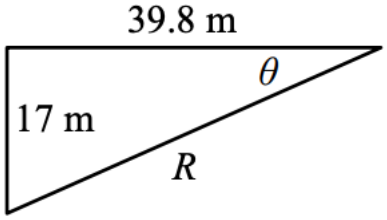
15.



y = _____

Θ = _____

16.

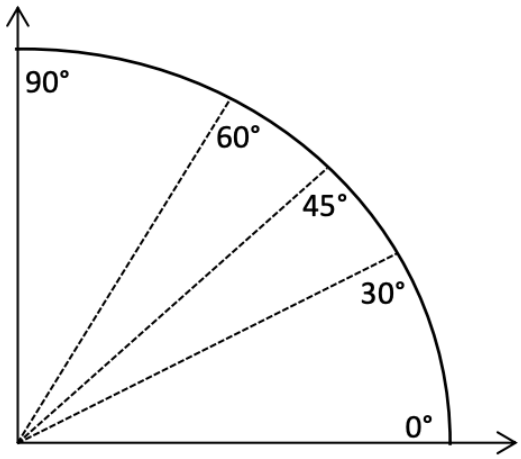


R = _____

Θ = _____

Sin and Cos for Common Angles

17. Fill in the table below



θ	$\cos\theta$	$\sin\theta$
0°		
30°		
45°		
60°		
90°		

18. At what angle is sine at a maximum?

19. At what angle is sine at a minimum?

20. At what angle is cosine at a minimum?

21. At what angle is cosine at a maximum?

22. At what angle are the sine and cosine equivalent?

Solving Literal Equations

Free resource: https://youtu.be/gqSfw2gmMsg

Example:

Solve this equation for v:

$a = \frac{v^2}{r}$

$v^2 = ar$

$v = \sqrt{ar}$

23. Solve this equation for t: $x = \frac{1}{2}at^2$

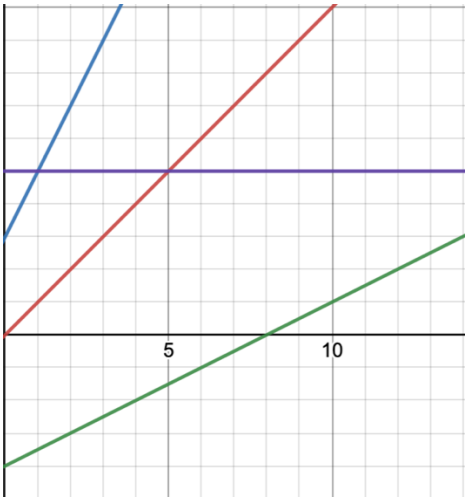
Note: v_0 stands for "initial velocity"

24. Solve this equation for v_0 : $v^2 = {v_0}^2 + 2a(x - x_0)$

25. Solve this equation for θ: $W = Fdcos\theta$

Graphical Analysis:

26. Rank the slopes of the red, blue, purple, and green lines



Greatest: _____

_____

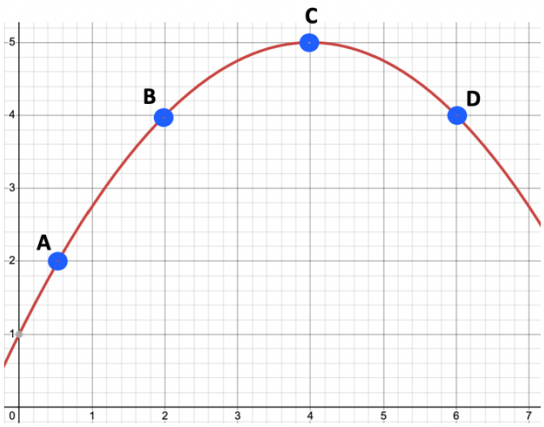
_____

Least: _____

OR circle one:

- They all have the same slope
- They are all zero
- Cannot determine

27. Rank the slopes of the graph at points A, B, and C



Greatest: _____

_____

Least: _____

What is different about the slope at point D when compared to point B?

Answers:

1. 4.543 x 10^6
2. 5.4399 x 10^3
3. 7.9 x 10^{-9}
4. 3.4 x 10^{-4}
5.

Prefix	Power	Symbol
Giga-	10^9	G
Mega-	10^6	M
Kilo-	10^3	k
Centi-	10^2	c
Milli-	10^{-3}	m
Micro-	10^{-6}	μ
Nano-	10^{-9}	n

6. .024 kg
7. 94100000 Hz or 9.41 x 10^7 Hz
8. 6 x 10^6 kb
9. 6.4 x 10^{-7} m
10. $\frac{3\ meters}{sec} * \frac{1\ mile}{1609\ meters} * \frac{3600\ sec}{1\ hour} = \frac{6.7\ miles}{hour}$
11. A,D,E,H are 75°, B,C,F,G are 105°
12. A,D = 37°, B = 53°, C = 90°
13. y = 6, x = 10.39
14. d = 15.7 m, θ = 74.1°
15. y = 43.1 m, θ = 63.4°
16. R = 43.3 m, θ = 23.1°
17.

θ	$\cos\theta$	$\sin\theta$
0°	1	0
30°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$
60°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
90°	0	1

18. 90°
19. 0°
20. 90°
21. 0°
22. 45°
23. $t = \sqrt{\frac{2x}{a}}$
24. $v_0 = \sqrt{v^2 - 2a(x - x_0)}$
25. $\theta = \cos^{-1}\frac{W}{Fd}$
26. Blue > Red > Green > Purple
27. A > B > C, D has the same slope as point B, but it's negative.