Physics Summer Assignment Worksheet

(all physics levels)

Name: _____ **Period:** _____ **Date:** _____

Score: _____

Welcome to Physics! Please complete this math review in preparation for the class. All of the math concepts found in this packet resemble what we will be using every day in class. This assignment will be graded on effort and completeness as a homework assignment due the first Friday of when we return. There are videos at the end of each section to help you.

Instructions: Show all work for full credit. Round answers to the nearest hundredth unless otherwise noted. Use a scientific calculator. No credit will be given for answers without supporting work.

Section 1: Metric Conversions

Convert each number below into the equivalent unit. Write your answers in both Standard Form and Scientific Notation.

	Convert to Standard Form	Convert to Scientific Notation
5000 mg	_____ **g**	_____ **g**
5000 mg	_____ **kg**	_____ **kg**
10.2 km	_____ **m**	_____ **m**
10.2 km	_____ **cm**	_____ **cm**
590 cm	_____ **m**	_____ **m**
1.09 kg	_____ **g**	_____ **g**
8 mm	_____ **cm**	_____ **cm**
8 mm	_____ **m**	_____ **m**

If you would like to review this topic, here is a great video on Khan Academy to watch: https://www.khanacademy.org/math/geometry-home/geometry-volume-surface-area/geometry-volume-rect-prism/v/conversion-between-metric-units

Section 2: Unit Conversions & Dimensional Analysis

Conversion Factors

1 km = 1000 m 1 hr = 3600 s 1 mile = 1.609 km 1 kg = 1000 g	1 N = 1 kg·m/s² 1 hp = 746 W cal = 4.184 J

1. Convert 5.5 hours to seconds.
   Answer: _____

2. A force of 450 N acts on an object. Convert this force to pounds. (1 N = 0.2248 lb)
   Answer: _____

3. An engine produces 250 horsepower. Convert to watts.
   Answer: _____

4. A mass of 2.5 kg is attached to a spring. Convert the mass to grams and to milligrams.
   Grams = _____
   Milligrams = _____

5. Convert 72 km/h to m/s.
   Answer: _____

6. Convert 9.8 m/s to km/h.
   Answer: _____

7. A car travels 60 miles per hour. Convert this speed to m/s.
   Answer: _____

8. A light year is approximately 9.461×10^{15} m. How many kilometers is this?
   Answer: _____

9. A room has an area of 120 ft². Convert to m². (1 ft = 0.3048 m)
   (Hint: You must square the conversion factor.)
   Answer: _____

10. Water flows through a pipe at 3.0 L/s. Convert this to m³/s. (1 L = 0.001 m³)
    Answer: _____

Here is a video on dimensional analysis, if you need a reference:

https://www.youtube.com/watch?v=vWovdihteqs

Section 3: Algebra

You will frequently need to manipulate an equation to solve for an unknown. Often, the "givens" in Physics will not be numbers; rather, they will be variables (letters). You must know how to solve for any variable in an equation.

1. Solve for m $F = m \cdot a$	2. Solve for t $v = \frac{d}{t}$
3. Solve for a $y = x + at$	4. Solve for t $y = x + at$
5. Solve for x $y = x + at$	6. Solve for a $x = vt + \frac{1}{2}at^2$
7. Solve for v $x = vt + \frac{1}{2}at^2$	8. Solve for t $x = vt + \frac{1}{2}at^2$

9. Solve for y $\quad y^2 = x^2 + 2aD$	10. Solve for x $\quad y^2 = x^2 + 2aD$
11. Solve for M $\quad v = \sqrt{\frac{GM}{R}}$	12. Solve for R $\quad v = \sqrt{\frac{GM}{R}}$
13. Solve for v_f $\quad m_1 v_1 + m_2 v_2 = (m_1 + m_2)v_f$	14. Solve for m_1 $\quad m_1 v_1 + m_2 v_2 = (m_1 + m_2)v_f$

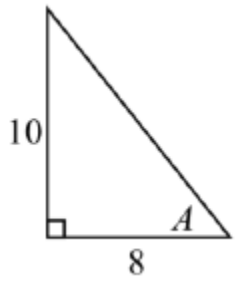
If you would like to review this topic, here is a great video on Khan Academy to watch: https://www.khanacademy.org/math/algebra2/x2ec2f6f830c9fb89:modeling/x2ec2f6f830c9fb89:manipulating-formulas/v/rearrange-formulas-to-isolate-specific-variables

Section 4: Trigonometry & Right Triangles

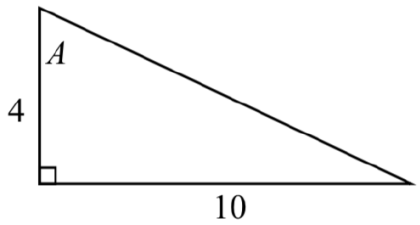
Key Formulas: $\sin\theta = \frac{opp}{hyp}$ $\cos\theta = \frac{adj}{hyp}$ $\tan\theta = \frac{opp}{adj}$

Pythagorean Theorem: $a^2 + b^2 = c^2$

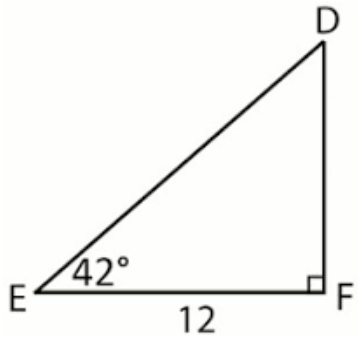
1. Find the angle *A*



2. Find the angle *A*

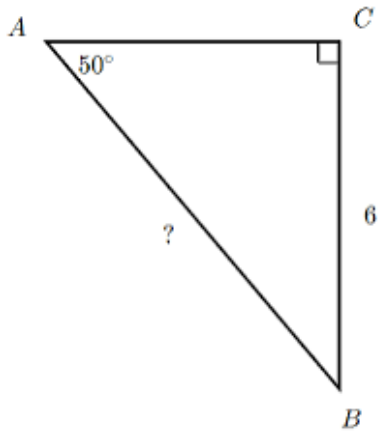


3. Find the length of segment DF

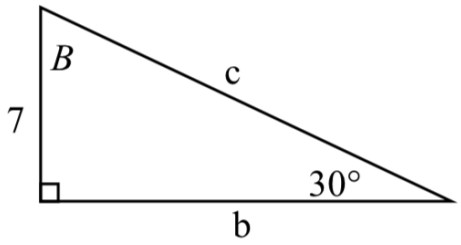


4. Find the length of segment ED above

5. Find the length of segment AB



6. Find all the missing values in the triangle



7. Convert the following angles to find their sine, cosine, and tangent values:

a) 0° *sin* = ____ *cos* = ____ *tan* = ____

b) 30° *sin* = ____ *cos* = ____ *tan* = ____

c) 45° *sin* = ____ *cos* = ____ *tan* = ____

d) 60° *sin* = ____ *cos* = ____ *tan* = ____

e) 90° *sin* = ____ *cos* = ____ *tan* = ____

This is the landing spot for the Khan Academy Trigonometry course. Use the video specific to the area you are looking for additional review.

https://www.khanacademy.org/math/trigonometry

Section 5: Scientific Notation & Metric Prefixes

Prefixes: G (giga) = 10^9 M (mega) = 10^6 k (kilo) = 10^3 c (centi) = 10^{-2}
m (milli) = 10^{-3} μ (micro) = 10^{-6} n (nano) = 10^{-9}

31. Write in scientific notation: 0.000456 m

Answer: _____

32. Write in scientific notation: 93,000,000 miles

Answer: _____

33. Convert 7.2×10^5 cm to standard form.

Answer: _____

34. Add: $(3.2 \times 10^3) + (4.5 \times 10^3)$

Answer: _____

35. Multiply: $(2.0 \times 10^4) \times (3.5 \times 10^3)$

Answer: _____

36. Divide: $(8.4 \times 10^8) \div (2.0 \times 10^3)$

Answer: _____

37. Convert 450 nm (nanometers) to meters using scientific notation.

Answer: _____

38. The mass of a proton is 0.00000000000000000000000000167 kg. Write this in scientific notation and name the prefix for the scale.

Answer: _____