Honors Physics – Summer Work Reference Sheets

I have included the tables of information in this packet for you to refer to as you work through the basic science skills part of your summer assignment. We will use the information contained in this reference packet throughout the year! You need to become familiar with it so that you know what I'm talking about in class and on homework, labs, quizzes, tests, etc. While there is no practice work for this section at this time, you should acquaint yourself and memorize these tables.

Greek Letters

In physics, we use variables to denote a variety of unknowns and concepts. Many of these variables are letters of the Greek alphabet. If you are not familiar with these letters, you should become so. You need to have this exposure so that when class starts and you see "μ" on the board, you don't call it, "*that funny looking m-thing*". These variables have specific names and I will be using these names – you need to do the same.

Greek Letter	Name	Commonly Used For
α	alpha (lowercase)	angular acceleration, radiation particle
β	beta (lowercase)	radiation particle
Δ	delta (uppercase)	showing a change in quantity
ε	epsilon (lowercase)	permittivity
Φ	phi (uppercase)	magnetic flux
ϕ	phi (lowercase)	work function
γ	gamma (lowercase)	radioactivity, relativity
λ	lambda (lowercase)	wavelength
μ	mu (uppercase)	coefficient of friction
π	pi (uppercase)	mathematical constant
θ	theta (uppercase)	angle measures, angular displacement
ρ	rho (uppercase)	density, resistivity
Σ	sigma (uppercase)	showing the sum of numbers
τ	tau (uppercase)	torque
ω	omega (uppercase)	angular velocity
ξ	xi (uppercase)	electromotive force, induced voltage

The Metric System

Everything in physics is measured using the metric system. The only time that you will see English units is when you convert them to metric units. The modern form of the metric system is called SI (from the French, "*Système International*").

SI Base Quantities and Units		
Quantity	**Unit**	**Unit Abbreviation**
length	meter	m
time	second	s
mass	kilogram	kg
electric current	ampere	A

Metric (SI) Prefixes		
Prefix	**Abbreviation**	**Value**
nano-	n	10^{-9}
micro-	μ	10^{-6}
milli-	m	10^{-3}
centi-	c	10^{-2}
kilo-	k	10^{3}
mega-	M	10^{6}
giga-	G	10^{9}

Significant Figures - You must know what significant figures are and how to determine the number of significant figures in a measurement. I have included the rules for determining the number of sig figs in a measurement below in case you have not encountered this in any of your math or science classes yet.

What are significant figures?
In scientific work, all numbers are assumed to be derived from measurements and, therefore, the last digit in each number is uncertain. All certain digits plus the first uncertain digit are significant figures. Only numbers determined by definition or by counting are exact. Numbers determined by definition or counting are said to have an infinite number of significant figures.

Four Rules for Determining the Number of Sig Figs in a Measurement:

1. **Nonzero digits are always significant.**
   - *(Ex. There are 3 sig figs in 568 cm and 2 sig figs in 1.4 seconds.)*
2. **All final zeros after a decimal point are significant.**
   - *(Ex. There are 4 sig figs in 2.300 sec.)*
3. **Zeros between two other significant digits are always significant.**
   - *(Ex. There are 3 sig figs in 203 m/s and 4 sig figs in 2.002 cm.)*
4. **Zeros solely used a placeholder are NOT significant.**
   - *(Ex. There are 2 sig figs in 26,000 grams and only 1 sig fig in 0.000005 km)*

You must know how to determine the number of significant figures that should be in your answer.

Rules for Determining the Number of Sig Figs in an Answer When Adding and/or Subtracting:

1. Determine the **precision** of each measurement. (Precision means how many places after the decimal for each measurement. Ex. 1.0 = one decimal place, 1.12 = two decimal places)
2. Make a note of the lowest number of decimal places. This is the least precise measurement.
3. Now add or subtract the measurements.
4. Round your answer so that it matches the precision of the measurement with the lowest number of decimal places.

Ex.
Add 1.02 s + 0.0003 s + 26.022 s = ?

1.02 has 2 decimal places

0.0003 has 4 decimal places

26.022 has 3 decimal places

So, 1.02 s is the least precise with only two decimal places – our answer must match this.

Add to find the answer:

1.02 s + 0.0003 s + 26.022 s = *27.0423 s*

Round to two decimal places:

So, our answer with the correct amount of sig figs is **27.04 s**

Rules for Determining the Number of Sig Figs in an Answer When Multiplying and/or Dividing:

1. Determine the **# of sig figs** in each measurement. (Use the rules above.)
2. Make a note of the lowest number of sig figs.
3. Now multiply or divide the measurements.
4. Round your answer so that it has the same number of sig figs as the measurement with the least amount.

Ex.
Multiply 1.02 m x 0.0003 m x 26.022 m = ?

1.02 has 3 sig figs 0.0003 has

1 sig fig

26.022 has 5 sig figs

Note the lowest amount of sig figs: 1 sig fig

Multiply to find the answer:

1.02 m x 0.0003 m x 26.022 m = *0.007962732 m3*

Round so that the answer only has 1 sig fig:

So, our answer with the correct amount of sig figs is

0.008 m3