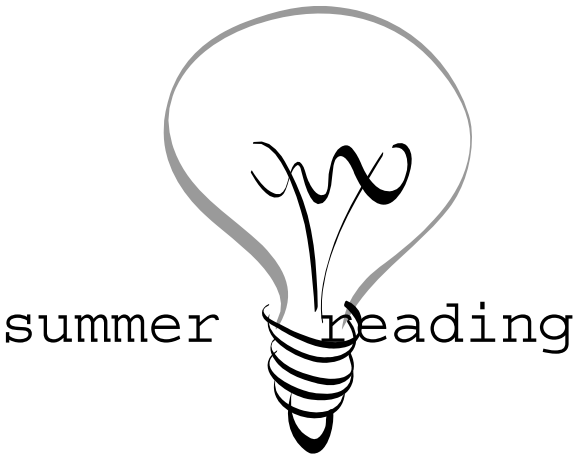
STANDARD PHYSICS SUMMER '09 WORK PACKET

Welcome to the world of Standard Physics.
The first semester is the most conceptually and mathematically challenging. This work packet is designed to give you a jump-start towards understanding the math required to solve physics problems. The more effort you put forward now the easier first semester will be for you.
This packet will be graded as your first homework assignment.
IN ADDITION the required summer reading for Physics should be chosen from the following list. You may choose *Nanotechnology, QED the Play, What is Science?, or Observations on the Reliability of the Space Shuttle,* which are located at Richard R. Feynman's web page at www.Feynman.com under Life and Science.

Good Luck,
Your Physics Teacher

It is okay to find it difficult just do your best.
Everything in this packet will be covered in class!!!

Scratch Paper



Name _____
Period _____ Teacher _____
SUBJECT _____

ARTICLE JOURNAL FORM

Directions: You will read an article of 1 or more full pages. You will write 1 journal, keeping in mind that you need to show your teacher what you can do.

Your journal Complete the publishing information for your article, and then complete a journal entry. should be two parts:

- ½ page summary of the article about which you are writing
- ½ page reaction to the article. You can answer any of the following questions or write your own:
  - What did you think?
  - What would you do
  - How did it relate to you? To the world? To the course?
  - Did it change your thinking in any way?

Publishing Information:

Author (ex. Associated Press): _____
Article Title (ex. "Tornadoes tear across Midwest"): _____
Magazine/Newspaper/Website (MSNBC):_____
Date of Publication/Copyright (March 13, 2006): _____
Website Address: _____

Journal Entry:

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Name: _____

Date: _____ **Pd:** ____

Use the attached resource pages and the internet to complete and/or derive the following problems. Record answers in this packet and attach all work on a separate piece of paper.

S.I. Units

1.	2×10^{-3} seconds	=	2 milliseconds	= 2 ms
2.	3.4×10^{-9} grams	=	_____	= _____
3.	6.0×10^{-6} seconds	=	_____	= _____
4.	7.5×10^{6} meters	=	_____	= _____
5.	1.2 μL	=	1.2 microliters	= 1.2×10^{-6} liters
6.	8 cm	=	_____	= _____
7.	9.1 Mg	=	_____	= _____
8.	4.6 nm	=	_____	= _____

PREFIX WORD PLAY

9.	M tons = 10^{6} ton	=	mega ton
10.	μ scope = 10^{-6} scope	=	_____
11.	c pede = 10^{-3} pede	=	_____
12.	d mate = 10^{-1} mate	=	_____
13.	T pins = 10^{12} pins	=	_____
14.	G lo = 10^{9} lo	=	_____
15.	p boo = 10^{-12} boo	=	_____

Scientific Notation ~ Express each number in scientific notation.

1.	456,000,000	=	4.56×10^{8}
2.	0.000020	=	_____
3.	0.045	=	_____
4.	60,000	=	_____
5.	0.000000235	=	_____

Standard Notation ~ Express each number in standard notation.

1.	3.03×10^{-7}	=	_____
2.	9.7×10^{10}	=	_____
3.	1.6×10^{3}	=	_____
4.	4.8×10^{-3}	=	_____
5.	4.0×10^{-8}	=	_____

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Use the attached resource pages and the internet to complete and/or derive the following problems. Record answers in this packet and attach all work on a separate piece of paper.

Significant Digits ~State the number of significant digits in each measurement

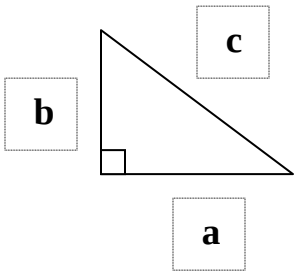
1. 1405 m ___4___
2. 2.50 km _____
3. 0.0034 m _____
4. 12.007 kg _____
5. 5.8×10^6 kg _____
6. 3.03×10^{-5} mL _____
7. 100,500.1 m _____
8. 9834.05 m _____
9. 2.3550 s _____
10. 10,000 g _____

Rounding Numbers ~ Round each number to the number of significant digits shown in parentheses.

1. 1405 m (2) = __1400_m_
2. 2.51 km (2) = _____
3. 0.0034 m (1) = _____
4. 12.007 kg (3) = _____
5. 100,500.1 m (4) = _____
6. 10.000 g (3) = _____
7. 2.35500 s (2) = _____
8. 0.05000 s (3) = _____
9. 0.000657030 m (2) = _____
10. 9834.05 m (3) = _____

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

Solve for the unknown information
Round to the nearest tenth.



1. a = 9, b = 9, c = _____
2. a = 4 , b = _____, c = 12
3. a = 4 , b = 6, c = _____
4. a = _____, b = 20, c = 25
5. a = _____, b = 10, c = 13

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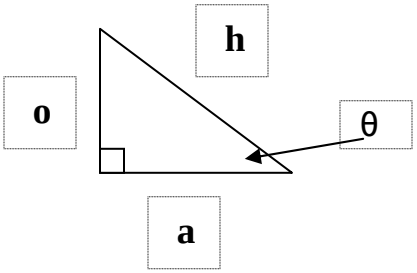
Use the attached resource pages and the internet to complete and/or derive the following problems. Record answers in this packet and attach all work on a separate piece of paper.

Trigonometry ~ Solve for the unknown. Round to the nearest tenth.



SOH CAH TOA

$\sin\theta = \frac{o}{h}$ $\cos\theta = \frac{a}{h}$ $\tan\theta = \frac{o}{a}$

$o = h\sin\theta$ $a = h\cos\theta$ $o = a\tan\theta$

$h = \frac{o}{\sin\theta}$ $h = \frac{a}{\cos\theta}$ $a = \frac{o}{\tan\theta}$

1. $\theta = 50^0$, o = _____, a = 10, h = _____

   $o = 10\tan 50^0 = 11.9$

   $h = \frac{10}{\cos 50^0} = 15.6$

2. $\theta = 60^0$, o = _____, a = _____, h = 2
3. $\theta = 37^0$, o = 6, a = _____, h = _____
4. $\theta = 50^0$, o = _____, a = _____, h = 13
5. $\theta = 53^0$, o = _____, a = 12, h = _____
6. $\theta = 18^0$, o = _____, a = _____, h = 10
7. $\theta = 56^0$, o = 6, a = _____, h = _____
8. $\theta = 21^0$, o = 9, a = _____, h = _____
9. $\theta = 22^0$, o = _____, a = _____, h = 10
10. $\theta = 45^0$, o = _____, a = _____, h = 17

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Resource Information

SI UNITS

SI Units are the standard units of measurements accepted in science.
Below are three of the base units used in Physics.

Starting SI Base Units		
Base Quantity	**Base**	**Symbol**
Length	**Meter**	**m**
Mass	**Kilogram**	**kg**
Time	**Seconds**	**s**

Below are the prefixes used with the basic and derived SI units.
Derived units are a combination of base units
such as velocity is meters per second or m/s

Prefixes Used with SI Units			
Scientific Notation	**Prefix**	**Symbol**	**Example**
10^{-15}	femto-	f	femtosecond (fs)
10^{-12}	pico-	p	picometer (pm)
10^{-9}	nano-	n	nanometer (nm)
10^{-6}	micro-	μ	microgram (μ g)
10^{-3}	milli-	m	milliamps (mA)
10^{-2}	centi-	c	centimeter (cm)
10^{-1}	deci-	d	deciliter (dL)
10^{3}	kilo-	k	kilometer (kg)
10^{6}	mega-	M	megagram (Mg)
10^{9}	giga-	G	gigameter (Gm)
10^{12}	tera-	T	terahertz (THz)

Scientific Notation

$M \times 10^n \qquad 1 \leq M < 10$

"M" represents the multiplier
The multiplier is always greater than or equal to one or less than ten.

Mathematically, **10** is the base of the exponent and *"n"* is the exponent.

If *"n"* equal +4 then **10** is raised to the **positive** fourth power.
10^4 is the same as **10 x 10 x 10 x10**
If *"M"* equals 3 and *"n"* equals 4 then
3 x 10^4 equals 3 x **10 x 10 x 10 x10**, which equals **30,000**

If *"n"* equal -4 then **10** is raised to the **negative** fourth power.
10^{-4} is the same as **.1 x .1 x .1 x.1**
If *"M"* equals 3 and *"n"* equal -4 then
3 x 10^{-4} equals 3 x **.1 x .1 x .1 x.1**, which equals **.0003**

Standard Notation

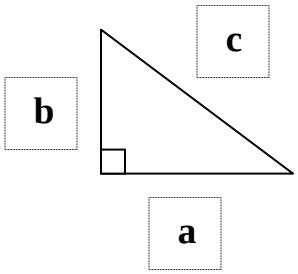
Standard Notation is writing a number in decimal form.

Instead of 8.5 x 10^6 meters in scientific notation this number would be written as 8,500,000 meters in standard notation.

Instead of6.0 x 10^{-2} seconds in scientific notation this number would be written as 0.06 seconds in standard notation.

Pythagorean Theorem

Pythagorean's basic formula
$a^2 + b^2 = c^2$



Example:

a = _____, b = 3, c = 5

$a^2 + (3)^2 = (5)^2$
$a^2 + (9) = (25)$
$a^2 = 16$
$a = 4$

Significant Digits Rules:

1. Nonzero digits ARE significant.
2. Final zeros after a decimal point ARE significant.
3. Zeros between two significant digits ARE significant.
4. Zeros used only as placeholders are NOT significant.

There are two cases in which numbers are considered EXACT, and thus, have an infinite number of significant digits.

1. Counting numbers have an infinite number of significant digits.
2. Conversion factors have an infinite number of significant digits.

Examples:

5.0 g has two significant digits.

14.90 g has four significant digits.

0.0 has one significant digit.

300.00 mm has five significant digits.

5.06 s has three significant digits.

304 s has three significant digits.

0.0060 mm has two significant digits (6 & the last 0)

140 mm has two significant digits (1 & 4)

Rounding Rules:

1. When the leftmost digit to be dropped is < 5, that digit and any digits that follow are dropped. Then the last digit in the rounded number remains unchanged.

   8.7645 rounded to 3 significant digits is 8.76

2. When the leftmost digit to be dropped is > 5, that digit and any digits that follow are dropped, and the last digit in the rounded number in increased by one.

   8.7676 rounded to 3 significant digits is 8.77

3. When the leftmost digit to be dropped is 5 followed by a nonzero number, that digit and any digits that follow are dropped. The last digit in the rounded number increases by one.

   8.7519 rounded to 2 significant digits is 8.8

4. If the digit to the right of the last significant digit is equal to 5, and 5 is followed by a zero or no other digits, look at the last significant digit. If it is odd, increase it by one; if it is even, do not round up.

   92.350 rounded to 3 significant digits is 92.4
   92.25 rounded to 3 significant digits is 92.2