

PHYS 2211

Look over:
Chapter 1 Sections 1-7
and Appendix E
Sample Problems 1 and 2

PHYS 1111

Look over:
Chapter 0, Sections 1-7
Chapter 1 Sections 1-6,
Examples 1 and 2

TOPICS TO KNOW

- 1)What is Physics.
- 2)Metric or SI units.
- 3)Power of Ten or Scientific Notation.
- 4)Converting from one set of units to another.

WHAT IS PHYSICS?

Physics is the study of **matter** and its **interactions**

Matter is anything that takes up space.

Interactions is how objects make each other move.

All other sciences use physics in one way or another. So Physics is the bedrock of science.

WHAT ARE THE FOUR INTERACTIONS (OR FORCES) OF MATTER?

1) **The Gravitational Interaction**-This is the weakest of the four interactions. Acts on all matter.

2) **The Electromagnetic Interactions**- Acts between all objects that have **Charge**.

3) **The Weak Interaction**-Causes certain types of radioactive decay. Acts on all matter.

4) **The Strong Interactions**-Holds atomic nuclei together. Acts only on hadrons.

THE METRIC SYSTEM

We will be using the Metric System for measuring physical properties. The metric system is based on multiples of *10*.

The British system

$1 \text{ inch} = 1 \text{ in}$

$1 \text{ ft} = 12 \text{ in}$

$1 \text{ mile} = 5280 \text{ ft}$

The Metric system

$1 \text{ centimeter} = 1 \text{ cm}$

$1 \text{ meter} = 1 \text{ m} = 100 \text{ cm}$

$1 \text{ kilometer} = 1 \text{ km}$
 $= 1000 \text{ m}$

HANDY METRIC PREFIXES

Power	Prefix	Abbreviation	Power	Prefix	Abbreviation
10^{-12}	pico	<i>p</i>	10^{-1}	deci	<i>d</i>
10^{-9}	nano	<i>n</i>	10^3	kilo	<i>k</i>
10^{-6}	micro	<i>m</i>	10^6	mega	<i>M</i>
10^{-3}	milli	<i>m</i>	10^9	giga	<i>G</i>
10^{-2}	centi	<i>c</i>	10^{12}	tera	<i>T</i>

THE BASE UNITS IN PHYSICS

There are 7 base units in Physics. All other units will be built upon these

Length is measured in Meters (m)

$$1m = 3.28 ft$$

MASS

Mass is measured in kilograms (kg)

On Earth:

On the Moon:

$$1kg = 2.2lbs$$

$$1kg = 0.367 lbs$$

TIME

Time is measured in seconds (s)

$$1 \text{ hr} = 3600 \text{ s}$$

FOUR OTHERS

Electric Current

is measured in amperes (A)

Temperature

is measured in Kelvin (K)

Amount of a Substance

is measured in moles (mol)

Brightness

of an object is measured in candela (cd)

EXAMPLE 1

- 1) Express *75 miles per hour*
 - a) In units of *km/hr*.
 - b) In units of *m/s*.

SCIENTIFIC OR POWER OF TEN NOTATION

In physics we will be dealing with very small

$$.0000000000 \quad 67 \frac{N \cdot m^2}{kg^2}$$

or very large numbers

$$3000000000 \quad \frac{m}{s}$$

To make these numbers easier to handle, we use **Scientific Notation** (or **Power of Ten Notation**).

SIGNIFICANT FIGURES

Rules for Significant Figures:

- ✓ Leading zeros are never significant.
- ✓ Imbedded zeros are always significant.
- ✓ Trailing zeros are significant only if the decimal point is specified. (Hint: Change the number to scientific notation. It is easier to see.)

Addition or Subtraction:

- ✓ The last digit retained is set by the first doubtful digit

Multiplication or Division:

- ✓ The answer contains no more significant figures than the least accurately known number.

EXAMPLE 2

- 2) The speed of light in a vacuum is $3.00 \times 10^8 \text{ m/s} = 186000 \text{ mi/s}$.
- a) Use this fact to find the number of kilometers in a mile.
 - b) The weight of 1.00 ft of water is 62.4 lb , and $1.00 \text{ ft} = 30.5 \text{ cm}$. use this information and the fact that 1.00 cm^3 of water has a mass of 1.00 g to find the weight in pounds of a 1.00 kg mass.

WHAT TO DO IF YOU WANT TO PASS

- 1) Do the homework.
- 2) Start the homework as soon as it is assigned.
- 3) Do not try to memorize problems but try to understand how to go about solving them.
- 4) If you get stuck on a problem stop by my office and I will be happy to try and help you. But do not stop by just before the homework is due.
- 5) Study every night, Cramming the night before a test will not work.
- 6) Have fun.
- 7) Do the homework

SUMMARY OF CHAPTER 1

- Measurements can never be exact; there is always some uncertainty. It is important to write them, as well as other quantities, with the correct number of significant figures.
- The most common system of units in the world is the SI system.
- When converting units, check dimensions to see that the conversion has been done properly.
