1. **Physics 121C Prof Derek Storm (storm@u.washington.edu)**

2. **Administrative details: See website (http://faculty.washington.edu/storm/121C/)**

3. **Introduce Lab and Tutorial teachers – give rules for labs and tutorials**

4. **Tycho, lab and tutorial sections:**

   a) **If you are registered for the course you should have an entry on Tycho. If you have problems, contact Helen Gribble, following instructions on Tycho page. (linked from course website).**

   b) **Go to the lab and tutorial section you have registered for. You *must* go to the first tutorial. If you aren't registered for one or the other, go to one of your choice and try to get registered.**

   c) **You should check your lab and homework grades on Tycho regularly.**

Clicker operation

First, open the battery case and copy down the last 3 digits of the serial number, which is hidden behind the battery.

You must point the clickers at one of the receivers. It is more important to have a receiver aligned toward you than one close to you.

Push a letter (A thru E) and the light on top of the clicker will turn red during transmission and will turn green if the transmission was successful.

You can push the letter a number of times if you are not sure the transmission succeeded.

When answering a question, your 3 digits will appear in a box (always in the same place) on the screen.

You may change your answer (select a different letter) twice.

Clicker participation will be graded, and you will have to register your clickers to get the grade. Next week…

Clicker questions:

1. **Experience with physics. Which best describes how far you have gone in physics?**

   A. No previous physics

   B. High school physics, but not AP

   C. High school AP physics class

   D. College level physics without calculus

   E. College level physics like this course

2. **Experience with math. Which best describes how far you have gone in math?**

   A. Highschool course in calculus

   B. Differential and integral calculus completed one or more quarters at college.

   C. Taking first quarter of calculus now

3. **Experience at UW**

   A. Starting first year at UW

   B. Completed one or more years at UW

Chapter 1 of Tipler & Mosca, sections 1-5

1. **Description of what physics is. Read it.**

2. **Units: Base units (S.I.) Length, Mass, Time (meter, kilogram, second) (m, kg, s). Describe.**

   a.) **English Units: Length, Force, Time (foot, pound, second)**

   b.) **Foot = 12 inch; inch = 2.54 cm = 2.54 x 10^{-2} m (exact)**
   2.2 Pounds (force) = approx weight of 1 kg. Will see exact definition later. (need to understand relationship between force, weight and mass)

   c.) **Units have evolved with technology. "English system" now based on S.I.**

   d.) **Other units expressed in terms of base units,**
   e.g. speed, volume. (m/s or m^3)
   Some have their own name. e.g. liter for volume, but are still defined in terms of base units.

   e.) **Prefixes: See list in textbook, with abbreviations. Beware of *M* (Mega) and *m* (milli).**

3. Conversion of units.

a.) Always carry units along and check dimensions

b.) Example: Given volume in in^3 how to get it in cm^3 ?

1 in = 2.54 cm so

$$1 = \frac{2.54\ cm}{1\ in}$$

can always multiply (or divide by 1) without changing value.

imagine you have 100 in^3 – how many cm^3 is it?

e.g. 100 in^3 x $\frac{2.54\ cm}{1\ in}$ **x** $\frac{2.54\ cm}{1\ in}$ **x** $\frac{2.54\ cm}{1\ in}$

= 100 in^3 $(2.54)^3$ cm^3/in^3

(see how in^3 / in^3 cancels)

= 100 $(2.54)^3$ cm^3

How many liters is this? 1 liter = 10^3 cm^3

$$1 = \frac{10^3\ cm^3}{1\ liter}$$

must divide by 1 to get desired units:

100 in^3 = 100 $(2.54)^3$ cm^3 / (10^3 cm^3/liter)

= 0.1 $(2.54)^3$ liter

4. Dimensions Combine L, T, and M to get dimensions.

a.) Adding:

A cm + B inches = nonsense

must have common dimensions to add

recall $1 = \frac{2.54}{1}\frac{\text{cm}}{\text{in}}$ **so**

A cm /(2.54 cm/in) + B in = C in

or

A cm +B in x 2.54 cm/in = C cm

b.) Multiplying: combined units should match:

Volume = area x height (for cylinder)

cm^3 = cm^2 x cm

Speed = distance / time

m/s = m / s

5. Significant figures.

a.) Examples

0.025 has 2 significant figures. (leading 0's are not significant)

25. has 2

25.0 has 3 (trailing 0's are significant)

250. has 3. If you mean 2, write it as 2.5×10^2 or if you really mean 3, write it as 2.50×10^2

b.) Arithmetical operations must give a result without non-significant figures:

Examples:

25. + 0.2 = 25. (tens and units are signif. tenths not, since first number has unknown tenths)

$A = \pi r^2$ with r = 2.5 inches

use $\pi = 3.14$ to avoid error

$A = 20$ in^2 (even though calculator said 19.635) – why?

c.) Exception. Some numbers are exact, so basically have more significant figures than others in the problem.

E.g 2.54 cm = 1 inch. (definition)

If I have 100.023 in, then I have

2.54 x 100.023 = 254.058 cm

(six significant figures)

Think 2.54000… cm = 1.00000 inch

5 (continued) Scientific Notation and Order of magnitude estimates

Examples:

a. Conversion of mi/hr to m/s

b. Volume of this room.