CHAPTER 2
MEASUREMENTS AND CALCULATIONS

Measurements can be qualitative or quantitative.

Qualitative

Quantitative

Both measurements are types of _____.

Sec. 1 Scientific notation

-

-It expresses a number as a

The sun is 93,000,000 miles from the earth.

easier to write _____ miles

(make sure the digit in front of the decimal is between _____)

0.00023 =

(moving the decimal to the left is +, moving to the right is -)

238,000 =

0.0043=

Sec. 2 Units

_____ must accompany a quantitative measurement. The number:

Boil the pasta for 10.

English system and the Metric system _____is preferred for science.

A standardized system was developed in 1960 and is based on the metric system. _____

Table 2.1 pg. 18. mass = kg , length = m , temp.= K

Prefixes are used to:

Table 2.2 pg. 19 Know these:
kilo, deci, centi, milli

Ex. 1 km =
100 cg =

Sec. 3 Length, volume, and mass

Length is commonly measured in _____. (not always convenient, cm, mm are smaller)

Volume is:

A cube 1 m in length on each side has a volume of _____. This cube can be divided into _____ equal cubes. These cubes have a volume of _____.

1 dm^3 = _____

Liter is the common unit for _____. Sometimes changed to:

The _____ can be divided into:

These cubes have a volume of _____.

1 cm^3 = _____

(_____ measures volume)

Mass is:

This is measured in _____. This unit is too large for laboratory measurements:

1 kg = _____

(_____ is used to measure mass)

Table 2.5 and 2.6 pg. 21-22

Sec. 4 Uncertainty in measurement

Each measurement has an _____. (last)

Pg. 24

The length of the pin is _____ The 2 and 8 are _____, and the 5 is the _____, or _____ digit.

every measurement has an uncertain digit

The number of digits in the measurement will depend:

_____ digits in a measurement (certain and uncertain) are called "_____"

Sec. 5 Significant Figures

AKA = sig figs

Significant figures are important in _____ as well as in _____. We will look at rules concerning sig figs in this section.

Which digit(s) is(are) called sig figs?

Rules:

1. All _____ are significant figures
   Ex.
2. Zeros
   A. Zeros that _____ all nonzero digits are _____ called sig figs. (_____ zeros)
      Ex.
      These zeros are_____, they tell the magnitude of the measurement but are not actually _____ numbers.
      This number has ___ sig figs
   B. _____, zeros between nonzero numbers _____ significant figures.
      Ex.
      This zero is _____ and ____ significant, thus _____.
   C. _____, zeros at the right of the number _____ counts as sig figs if there is a _____ in the number.
   Ex.
   These zeros are _____ and there is a decimal in the number thus they are significant figures and __ are in this number. Ex.
   ___ sig figs
   Ex.
   ___ sig fig

3. _____ numbers have an _____ number of sig figs.

Obtained by _____.

Ex.

Obtained by _____.

Ex.

These numbers _____ limit the significance in a _____.

Do these:

1. 0.0108 g vitamin C
2. 0.0050060 g of hair
3. 5.030×10^3 ft
4. 110 riders in a rodeo

Rounding:

Same as you learned in previous math classes, using the ___ as your guide up or down.

Ex. 4.348 Round to two significant figures.

4.3

Ex. 2.2937×10^2 Round to three sig figs.

2.29×10^2

Determining the number of sig figs in calculations.
For rounding when doing a series of calculations:

Rules:

<u>Multiplication and Division</u>

The answer has the _____ of sig figs as the number in the _____ with the _____ sig figs. (An _____ can only be as _____ as the _____ precise measurement.)

count significant figures

Ex. 4.56 x 1.4 =

8.315 ÷ 298 =

<u>Addition and Subtraction</u>

The _____ measurement is the one with the fewest _____. (Look at the decimal places to round.)

place location

Ex. 12.11 (___digits after the dec.)
18.0 (___ digit after the dec.)
+ 1.013 (___ digits after the dec.)

Round to the _____ with the _____ digits _____ the decimal. That would be the zero in 18.0.
_____ is the correct rounded answer.

Calculations involving multiple functions
When doing calculations involving _____ addition/subtraction and multiplication/division _____ must occur _____ each _____ to give the _____ answer.
Ex. 2.67 + (3.2 x 6.94) =
(Do _____ of operations and round at _____ step using the correct _____ rule.)

1) 3.2 x 6.94 =
2) 2.67 + 22 =

Sec. 6 Problem Solving and Dimensional Analysis
Converting from one _____ to _____ is done a lot in chemistry.

2 dozen doughnuts =
(1 dozen =_____)

To change from 1 unit to another you need a_____.

Conversion factor is the _____ of the _____ parts of the statement that _____ the two _____. (Equality)

2.85 cm = ? in
(2.54 cm = 1 in)

(When doing _____ analysis, conversion factors _____ affect sig. figs. Look at the _____ in your _____ to determine sig. figs. in the _____.)

Conversion factors can be _____ depending on which _____ you want your _____ to have.

Ex. $\frac{1 \text{ in}}{2.54 \text{ cm}}$ or

Ex. 7.00 in = ? cm

_____ look at your _____ to make sure it makes _____.
Changing units using conversion factors is called:

Ex. 2.7 pg. 33

1. Make sure you include _____ throughout the _____.
2. Make sure _____ has _____ units.
3. Check that answer has _____ # _____.
4. See if answer makes _____.

Sec. 7 Temperature Conversions

Read through the section.

	Fahrenheit	Celsius	Kelvin
(water)			
boils			
freezes			

Fahrenheit based on freezing point of_____.
Celsius based on freezing point of _____.
Kelvin based on _____ zero, point where all motion _____.

Know these:

K =

°C =

Ex. 100 K = ? ° C

°C =

°C =

Sec. 8 Density

This is the amount of _____ in a certain _____.

Mass per unit volume. Can be used to _____ a substance.

Density = $\frac{\text{mass}}{\text{volume}}$ =

Ex. 2.13 Student finds 23.50 mL of a liquid weighs 35.062 grams. What is the density?

Because 1 mL = _____, the answer could also be 1.492

Do example 2.14 pg. 43 Is the medallion platinum or silver?