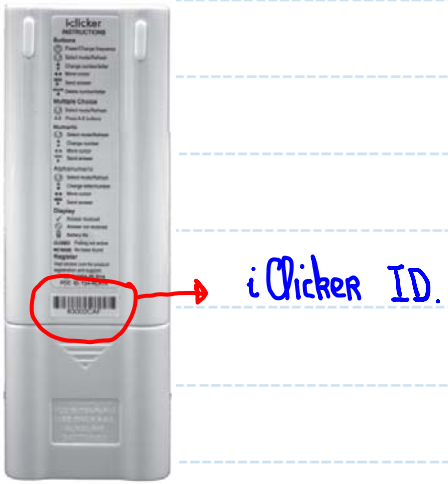
Announcements – Lecture II – Thursday, Sep 10th

1. Class Web Site: www.chem.umass.edu/genchem

2. iClicker for credit starts Thursday , September 17th

   Register your iClicker in Owl (a home work assignment) by Tuesday, September 15th

3. First Lab – Saturday, September 26th … 1-4pm … ISB 155 /160 (A-E)



1.3 Example_1

When 36.456 is added to 74.2 the result is –

A)	110.656
B)	110.6
C)	110
D) ✓	110.7
E)	I have no clue!

36.456

74.2

110.6(56)

↳ 56 > 50

Round up

110.7

When adding and subtracting the resultant should be recorded limited by the number with the fewest decimal places.

1.3 Example_2

When 18.44 is multiplied by 36.1 the answer should be reported to ___ significant figures –

A) 1
B) 2
C) 3 ✓
D) 4
E) I have no clue!

18.44 has 4 significant figures
36.1 has 3 significant figures

When multiplying and dividing the resultant should be recorded limited by the number with the fewest significant figures.

1.3 Example_3

MAIN QUESTION

Question

Carry out the following calculation and report the answer in the correct number of significant figures.

$$(168)\left[\frac{23.56 - 2.3}{1.248 \times 10^3}\right] =$$

(168): 3 sig figs; $23.56 - 2.3$: 3 sig figs; 1.248×10^3: 4 sig figs

Significant figures

A) 1
B) 2
C) 3 ✓
D) 4
E) I have no clue!

In a complex series of manipulations:

a) Addition and subtraction should be performed first.

b) Then do the multiplication and division

$$\begin{array}{r} 23.56 \\ -\ 2.3 \\ \hline 21.2(6) \end{array}$$

↳ 3 sig figs

Note the use of Scientific Notation

1.248×10^3 has 4 sig figs.

100 has 1 sig fig.

1.00×10^2 has 3 sig figs.

1.5 Factor-Label Method – Dimensional Analysis – The Mathematics of Chemistry

What is a Handy Way to Convert from One Unit to Another?

1.5 Example_1

Prior to the metric system, the common unit of weight was the pound (lb). Under the S.I. System, 1 lb = 453.5g. If an old recipe calls for 9 ounces of flour (16 oz = 1 lb), how many grams of flour is this equivalent to?

Real word ... access to the internet !

$$9 \text{ ounces} \left| \frac{g}{\text{ounces}} \right. = ? \text{ g}$$

Google the desired conversion factor !

Exam situation ... no internet! ... no gram to ounces given ∴ ... got to use what is given :

16 ounces = 1 lb : 1 lb = 453.5g

$$9 \text{ ounces} \left| \frac{1 \text{ lb}}{16 \text{ ounces}} \right. = 0.56 \text{ lb}$$

$$0.56 \text{ lb} \left| \frac{453.5 \text{ g}}{1 \text{ lb}} \right. = 255 \text{ g}$$

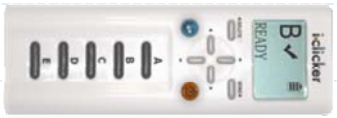
1.5 Dimensional Analysis – The Mathematics of Chemistry

What is a Handy Way to Convert from One Unit to Another?

1.5 Example_2

A field is 100m long by 45m wide. What is the area in cm^2? (1m = 100cm)

To illustrate the power of dimensional analysis, first find the area in m^2 and then do the conversion to cm^2.



A)	4.5×10^5	B)	4.5×10^7 ✓
C)	45	D)	0.45
E)	Oops … I must have made a mistake		

$$\text{Area} = 100\,m \times 45\,m = 4.5 \times 10^3\,m^2$$

$$4.5 \times 10^3\,m^2 = 4.5 \times 10^3\,mm$$

$$4.5 \times 10^3\,mm \left| \frac{100\,cm}{1\,m} \right| \left| \frac{100\,cm}{1\,m} \right| = 4.5 \times 10^7\,cm.cm$$

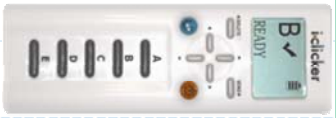
$$= 4.5 \times 10^7\,cm^2$$

1.5 Factor-Label Method – Dimensional Analysis – The Mathematics of Chemistry

What is a Handy Way to Convert from One Unit to Another?

1.5 Example_3

The density of whole blood at 37^{0}C is 1.06 g.cm^{-3}. What is the mass, in grams of a 15.0 cm^3 sample of blood?



A)	15.9g ✓
B)	14.2g
C)	Neither a or b
D)	Tom I am clueless!

Would it help if I told you that : $1.06\,g.cm^{-3} = \frac{1.06\,g}{1\,cm^3}$

$$15.0\,cm^3 \left| \frac{1.06\,g}{1\,cm^3} \right. = 15.9\,g$$

1.5 Example_4

Ammonium Nitrate decomposes explosively according to the following balanced chemical equation:

$2\,NH_4NO_3(s) = 2\,N_2(g) + 4\,H_2O(g) + O_2(g)$ ← Balanced Chemical Equation.

If 3.4 moles (the chemists unit of quantity) decomposes, how many moles of gaseous water are produced.

$$3.4\ \text{mol}\ NH_4NO_3 \times \frac{4\ H_2O}{2\ NH_4NO_3} = 6.8\ \text{mol}\ H_2O$$