Announcements

Tuesday, January 20, 2009

Intro/Ch1 assignment in MasteringChemistry was due before class today - you can still finish it but any submissions after the due date will be deducted 10% per day late.

Ch 2 MC assignment is due Wed, Jan 28. Please work on it this week!

See me in my office (E224) if you have any trouble logging in to MasteringChemistry or D2L.

Quiz 1 on names and symbols of common elements is on Monday, Feb 2. See the course webpage for the handout of elements you need to have memorized.

Experiment 1 in lab next week. Have the prelab done before you come to lab!

1. Multiplying or dividing:
   a. find the value with the fewest sig figs
   b. round answer to that number of sig figs

You travel 20.0 miles in 3.0 hours. What is your average speed in miles per hour?

$$\frac{20.0 \text{ mi}}{3.0 \text{ hr}} = 6.666667 \text{ mi/hr}$$

2 sf

round to 2 sf

6.7 mi/hr

100.00 cm / 5 pieces = 20 cm from calc

5 sf exact 5 sf

20.000 cm or 2.0000×10^{1} cm

4.873×10^{2} cm x 9.2×10^{-4} cm =

2 sf

4.873 E 2 x 9.2 E -4 =

0.45 cm^2

4.5×10^{-1} cm^2

2. Adding and subtracting:
   a. Find the value with the fewest number of decimal places (numbers to right of decimal point)
   b. Answer is rounded to that number of decimal places

142.1 cm + 2.108 cm + 28.32 cm =

142.1 cm 1 dp
2.108 cm 3 dp
+ 28.32 cm 2 dp
172.528 cm → 172.5 cm (1 dp)

	Answer limited by
Multiplying or dividing	fewest sig figs
Adding or subtracting	fewest decimal places

Only round **once** at the end of a series of calculations!

Keep track of significance in intermediate calculations by underlining the last significant digit.

$$\frac{(14.\underline{3}\ \text{g} + 125\ \text{g})}{(1.3\ \text{cm} \times 2.86\ \text{cm})} = \frac{139.3\ \text{g}}{3.718\ \text{cm}^2}$$

(14.3 g + 125 g): 1 dp + 0 dp; (1.3 cm x 2.86 cm): 2 sf

$139.3\ \text{g}$: 3 sf; $3.718\ \text{cm}^2$: 2 sf

$= 37.46437\ \text{g/cm}^2$

↓ 2 sf

$\boxed{37\ \text{g/cm}^2}$

On your own...

$(17.236 - 17.1) \times (2.338 \times 1.53) =$

$0.136 \times 3.57714 = 0.48649$

0.136: 1 sf; 3.57714: 3 sf

↓ round to 1 sf

$\boxed{0.5}$

The **SI units** are a part of the metric system.

English system: feet, inches, pounds, etc.

Basic SI units:

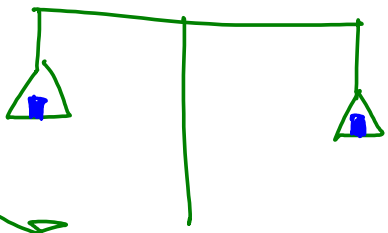
length: meter (m)

mass: kilogram (kg)

temp: kelvin (K)

mass: measure of the amount of matter present
measured on a balance

weight: amount of gravitational force
measured on a scale



digital balance

kg (SI unit): mass of brick

g (gram): mass of paper clip

for any metric unit

SI prefixes change the size of a unit by a power of 10

prefix	abbrev.	power of 10 (definition)
kilo	k	$10^3 = 1000$
centi	c	$10^{-2} = 1/100 = 0.01$
milli	m	$10^{-3} = 1/1000 = 0.001$

memorize these

makes unit larger

make unit smaller

1 kg = 10^3 g = 1000 g

1 cm = 10^{-2} m = $\frac{1}{100}$ m = 0.01 m

1 m = 10^2 cm = 100 cm

larger # w/ smaller unit

1 mL = 10^{-3} L = $\frac{1}{1000}$ L = 0.001 L

1 L = 10^3 mL = 1000 mL

larger

0.1234 m

= 1.234 dm

= 12.34 cm

= 123.4 mm

unit gets smaller

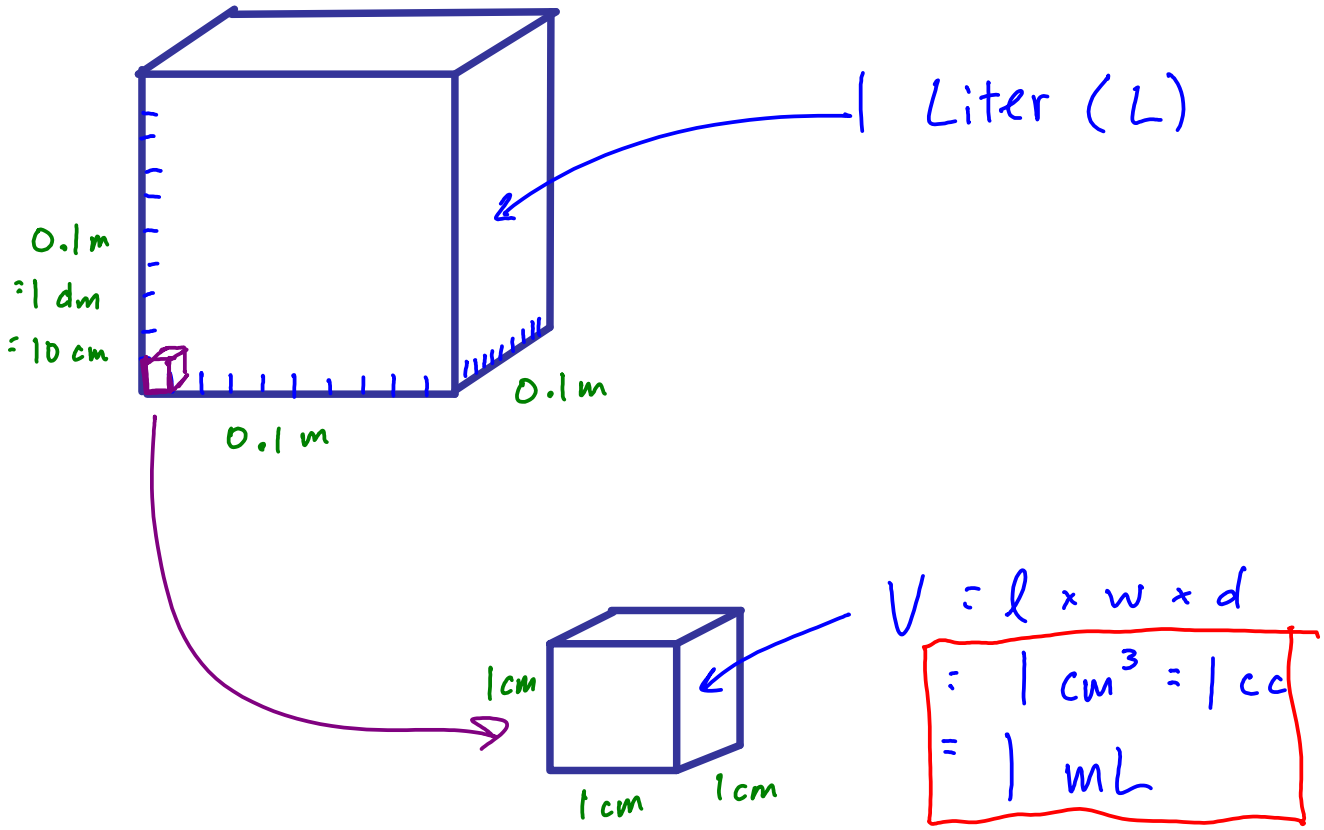
deci

($d = 10^{-1}$)

$c = 10^{-2}$

$m = 10^{-3}$

Volume is the amount of space occupied



$$m = 10^{-3} = \frac{1}{1000}$$

$$1\ mL = \frac{1}{1000}\ L$$

$$1\ L = 1000\ mL$$

Dimensional analysis is a process of unit conversion that works by cancelling unwanted units.

Say you're throwing a party. You prepare for:

15 guests — single value to start w/

3 drinks per guest — 3 drinks / guest

"per 1" — 3 drinks : 1 guest

In dimensional analysis, we use:
- 1 single given value to start with
- conversion factors
  - 2 units "per" "/"
  - equation (2.54 cm = 1 in)

(usu 1 unit only)

Start with the single value...

3 drinks = 1 guest

$$\frac{15 \text{ guests}}{(1)} \times \frac{3 \text{ drinks}}{1 \text{ guest}} = 45 \text{ drinks}$$

...then mult. by conversion factor fraction so original unit cancels.

Dimensional analysis

remember…
$k = 10^3$
$c = 10^{-2}$
$m = 10^{-3}$

1 km = 1000 m
100 cm = 1 m
1000 mm = 1 m

43.2 m = ? cm

$$43.2\ \cancel{m} \times \frac{100\ cm}{1\ \cancel{m}} =$$

4320 cm

217 in = ? km (start with a roadmap)

Give the answer with the correct number of sig figs and in scientific notation.