Measurement and Metric Conversions

Quantity	Name	Abbreviation
Length		
Mass		
Time		
Amount of substance		
Temperature		
Electric current		
Luminous intensity		

SI Prefixes

Factor	Prefix		Abbreviation
10^{18}	exa	1 Em = 1,000,000,000,000,000,000m	E
10^{15}	peta	1 Pm = 1,000,000,000,000,000 Pm	P
10^{12}	tera	1 Tm = 1,000,000,000,000 m	T
10^{9}	giga	1 Gm = 1,000,000,000 m	G
10^{6}	mega	1 Mm = 1,000,000 m	M
10^{3}	**kilo**	**1 km = 1000 m**	**k**
10^{2}	hecto	1 hm = 100 m	h
10^{1}	deka	1 dam = 10 m	da
10^{-1}	deci	10 dm = 1 m	d
10^{-2}	**centi**	**100 cm = 1m**	**c**
10^{-3}	**milli**	**1000 mm = 1m**	**m**
10^{-6}	**micro**	**1,000,000 μm =1m**	**μ**
10^{-9}	**nano**	**1, 000,000,000 nm =1m**	**n**
10^{-12}	pico	1,000,000,000,000 pm =1m	p
10^{-15}	femto	1,000,000,000,000,000 fm = 1m	f
10^{-18}	atto	1,000,000,000,000,000,000 am = 1m	a

Note: The items in bold print are the ones you will use most in chemistry.

Base Units

Derived Units

Tools for measuring

Mass

Length

Time

Volume

Tools have limits!

Uncertainty

Rules for Significant Figures

1)

2)

3)

4)

5)

Working with Significant Figures

Addition:

27.26 g
6.5 g
4.025 g

Subtraction:

20.63 cm
11.4 cm

Multiplication: 9.25 m x 0.52 m =

Division: 45.32 m / 3.15 s =

Math for Chemistry

Significant Digit Practice:

How many Sig Figs are in the following numbers?

A) 101 _____ B) 97 _____ C) 1010 _____

D) 970.0 _____ E) 0.007 _____ F) 0.0070 _____

G) 0.00701_____ H) 12 _____ I) 15.0 _____

J) 10 _____

Rounding Practice

Round the following numbers to 3 significant digits:

A) 732.3 _____ B) 732.5 _____

C) 0.2314 _____ D) 0.007667 _____

E) 1578 _____ F) 157800 _____

Exponents

In general:

A) $10^a \times 10^b =$ _____

B) $10^a/10^b =$ _____

C) $(10^a)^b =$ _____

Let's do some math:

A) 10^2 _____ E) $10^4 \times 10^7$ _____

B) 10^3 _____ F) $10^9/10^3$ _____

C) 10^{-3} _____ G) $10^4/10^7$ _____

D) $10^2 \times 10^3$ _____ H) $10^{-3} \times 10^{-8}$ _____

Scientific Notation

Mantissa Exponent

A) 700 = _____

B) 7100 = _____

C) 0.007 = _____

D) 0.000 760 = _____

E) 963, 000, 000 = _____

Math with Significant Digits

Addition/Subtraction

25.25 125.22
+35.373 – 25.2

Multiplication/Division

23.0 x 52.25 = _____

562/63 = _____

Working with Scientific Notation

$(2.00 \times 10^{5})(3.00 \times 10^{4})$

$(6.0 \times 10^{4}) / (2.0 \times 10^{1})$

$(2.00 \times 10^{3})(7.50 \times 10^{5})$

$(2.50 \times 10^{5}) / (5.0 \times 10^{9})$

Math in the real world

1) The Bravo swimming pool measures 15.0 m by 25.00 m. What is the area of the pool?

2) What is the perimeter of the pool?

3) If the pool is 5 m deep, what is its volume?

4) A block has a length of 10.00 cm, a width of 7.50 cm, and a thickness of 5.00cm. What is the volume of the block?

5) A block has a volume of 500. cm^3. It has an area of 400. cm^2. What is the thickness of the block?

6) What is the volume of a sphere whose radius is 3.00 m?

Density Lecture

What is density?

Density Columns, Aluminum Foil Boats, and other neat tricks

How do we calculate density?

What else?

Which is heavier a pound of feathers or a pound of lead?

What is the density of water?

mL or cubic centimeters?

What floats in water? What sinks?

Ever seen a block of steel float? I have. How is that possible?

Practice Problems (Sig Figs rule!)

1) What is the density of an object whose mass is 50.00 g and whose volume is 25.00 mL?

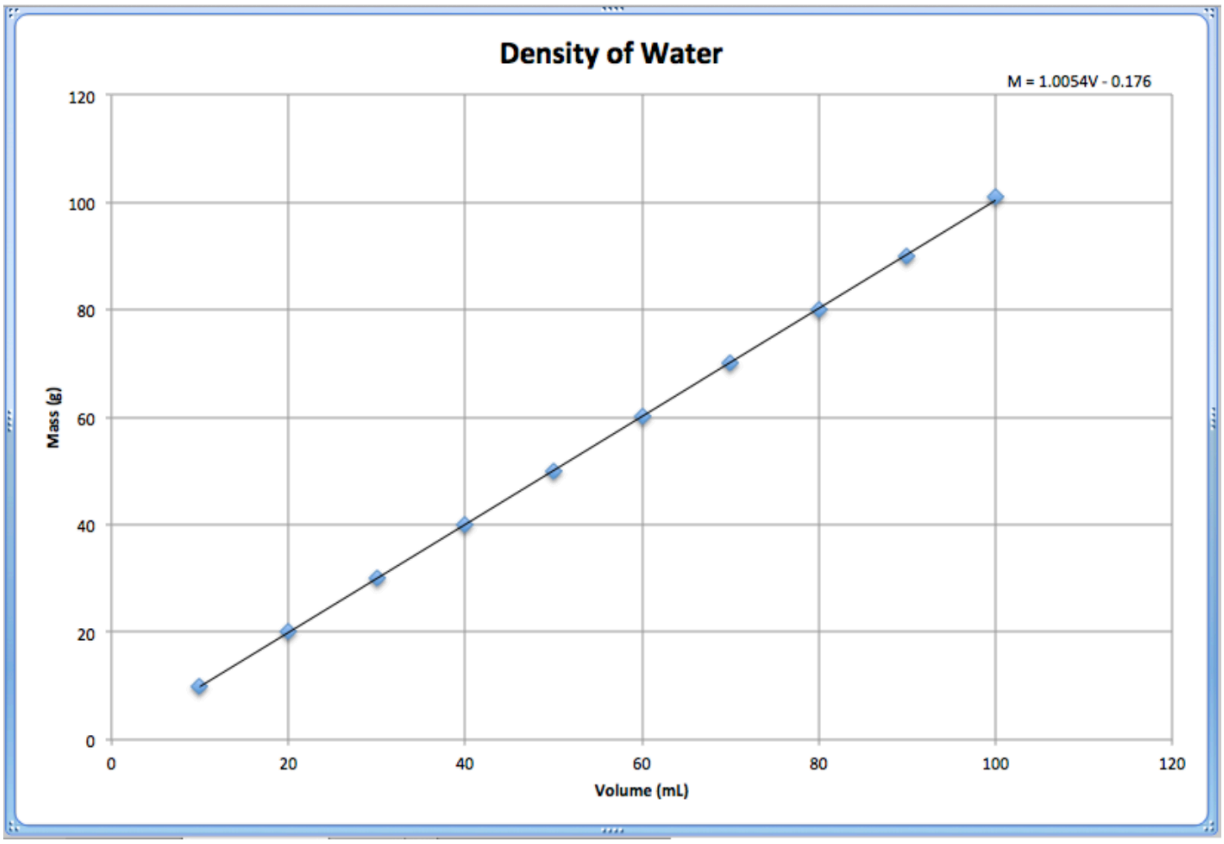
2) What is the mass of 25.00 mL of gold whose density is 19.32 g/mL?

3) What is the volume of sand, density of 3 g/mL if it has a mass of 20.0 g?

4) A solid block of aluminum has a length of 10.00 cm, a width of 5.00 cm, and a thickness of 2.00 cm. If the density of aluminum is 2.70 g/mL, what is the mass of the block?

5) Mercury is used in barometers since it is 13.59 times denser than water. What volume of mercury has a mass of exactly 1000 g?

Graphing



Title

Label axes

Slope intercept form

Dependent and Independent Variable

Slope has meaning

Trend Line and Best Fit Equation

The Factor Label Method

1) How many grams of vitamin C are in a 1500 mg tablet?

a. Start from the number you are given. (1500 mg)

b. Write a fraction with the units you wish to divide out (mg in this case) on the bottom and the base units (the one you want to get this time)— the ones without a prefix — (grams) on the top.

c. Which units are bigger? (grams) Put a big 1 next to them. (1 g)

d. How many of the smaller units does it take to make one of the bigger? (1000 mg make 1 gram) Put this number next to the smaller units.

2) Sparky the Wonder Dog has a mass of 0.629 kg. What is Sparky's mass in centigrams?

3) Red light has a wavelength of 7.0×10^{-7} m. What is this in nm?

4) The area of a square is $325,000\ cm^2$. What is this in square meters?

5) The average locker at Bravo has a $480,000\ cm^3$ volume. How many cubic meters is this?