Units and Significant figures

Common Units

Discussion: List some common units of measurement we use on a daily basis. How did these units originate?

Quantity measured	Familiar Unit

Mass

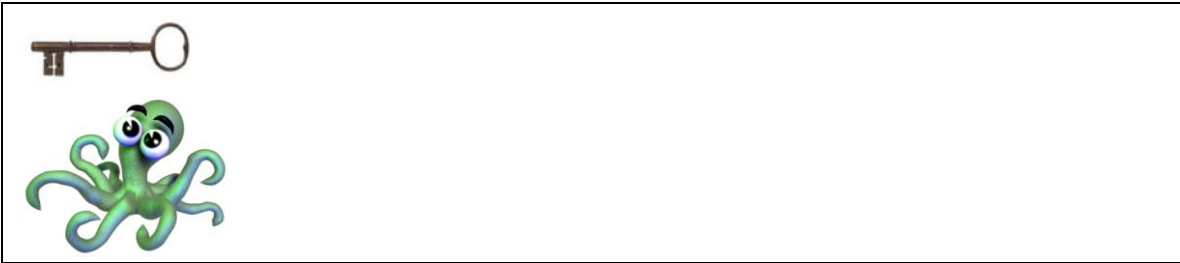Question: What are the 'metric' (S.I.) versions of the everyday units listed above?

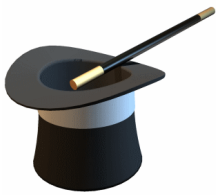| Quantity measured	Fundamental S.I. Unit (**base** unit)	Symbol

Notes: SI base units are used to determine derived S.I. units, as discussed below. **Some S.I. base units feature a *decimal prefix* – which one(s)?**

Discussion: Why do scientists prefer the S.I. system?

Derived S.I. Units

Insert appropriate S.I. base units into an equation that defines the respective derived S.I. unit. Example:

Area = length x length = m x m = m^2

$\Rightarrow$ the *derived* S.I. unit for area is m^2

Determine derived S.I. units for the following quantities

Quantity measured	Math involving S.I. base units	Derived S.I. unit
Volume		
Velocity (speed)		
Density		
Force*		
Energy*		

*These are harder examples. To solve them start by inserting appropriate S.I. base units into an equation that defines the quantity sought.

Is the S.I. unit of volume (m^3) reasonable for everyday applications? Why?
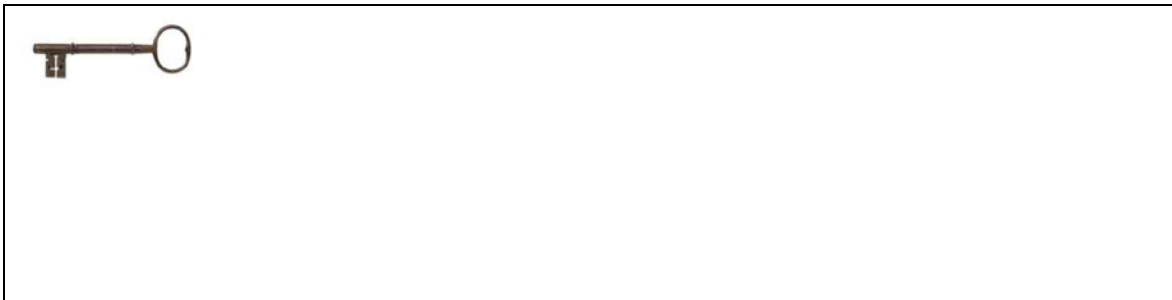
What unit of volume do chemists prefer? Why?

More detail on the chemist's volume unit

Significant Figures and Rounding Off

Question: What are significant figures?

Task: Measure the length of your pencil (or some other object) in cm using a standard ruler. To how many sig. figs can you determine this value?

Object	Size of measures (cm)	Number sig. figs.

Let's figure out the rules for sig. figs. What is:

1.002 to   3 sig. figs.

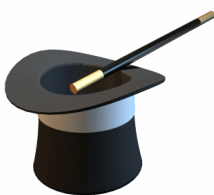   1 sig. fig.

569.74 to   3 sig. figs.

                4 sig. figs.
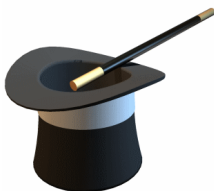
                1 sig. fig.

0.00017 to   1 sig. fig.

Zeros *before* **the first number are** *NOT* **counted as significant**

Zeros *after* **the first number** *ARE* **counted as significant**

Round UP if the number after the last significant digit is > 5

Quote numbers in SCI notation if number sig. figs. < digits before decimal point.

Multiplication and division (99% of your work is either one and/or the other)

The result of any multiplication or division has the same number of sig. figs. as the measurement with the lowest number of sig. figs. Example: A sample of lead has a mass of 2.105 g and a volume of 0.11 mL. What is the density of lead?

Answer:

Another example: What is the area (in ft^2) of a 12.5 ft x 24 ft room?

What common mistake was made in the determination of length here?