Converting Units within the Metric System

Calculation within the metric system are based on powers of 10. Most metric conversions can be done by just moving the decimal point.
The most common metric prefixed are arranged in order from largest to smallest, accompanied by their numerical interpretations:

kilo	hecto	deka	base unit	deci	centi	milli
(k)	(h)	(da)	(g,m,l)	(d)	(c)	(m)
1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

The main metric units are the meter for length, liter for volume, and gram for mass a represented below by the symbol u for unit:

Kilo Hector Deka U Deci Centi Milli

Kathy Had Doubts Until Dudley Converted Metrics

Each term is ten times the value of the next term to the right.

Examples:

1. Convert 0.85 kiloliters to hectoliters.

(liters)

k h da l d c m

answer: 8.5 hL

2. Convert 785 milligrams to grams.

(grams)

k h da g d c m

answer: 0.785 g

3. Convert 3 dekameters to centimeters.

(meters)

k h da m d c m

answer: 3000 cm

4. Convert 5800 meters to kilometers.

(meters)

k h da m d c m

answer: 5.8 km

Converting Units by Dimensional Analysis

1. How many feet are in 30 inches?

$$(30 \text{ inches}) \bullet \left(\frac{1 \text{ foot}}{12 \text{ inches}}\right) = 2.5 \text{ feet}$$

2. Three yards is how many centimeters?

$$3 \text{ yards} = (3 \text{ yards}) \bullet \left(\frac{3 \text{ feet}}{1 \text{ yard}}\right) \bullet \left(\frac{12 \text{ inches}}{1 \text{ foot}}\right) \bullet \left(\frac{2.54 \text{ centimeters}}{1 \text{ inch}}\right)$$

$$= 274.32 \text{ centimeters}$$

3. How many radians are in 3 complete revolutions?

$$(3 \text{ revolutions}) \bullet \left(\frac{2\pi \text{ radians}}{1 \text{ revolution}}\right) = 6\pi \text{ radians}$$

4. A train is traveling at 60 miles per hour. The brakes are applied and the train comes to a complete halt in 30 seconds. Find the rate of deceleration in feet per second squared.

$v = v_0 + at$ *(the formula to use)*

$$0 = \left(\frac{60 \text{ miles}}{1 \text{ hour}}\right) + a \bullet (30 \text{ seconds})$$ *(solving for a in this equation yields)*

$$a = -\left(\frac{60 \text{ miles}}{1 \text{ hour}}\right) \bullet \left(\frac{1}{30 \text{ seconds}}\right)$$

$$a = -\left(\frac{60 \text{ miles}}{1 \text{ hour}}\right) \bullet \left(\frac{1}{30 \text{ seconds}}\right) \bullet \left(\frac{5280 \text{ feet}}{1 \text{ mile}}\right) \bullet \left(\frac{1 \text{ hour}}{60 \text{ minutes}}\right) \bullet \left(\frac{1 \text{ minute}}{60 \text{ seconds}}\right)$$

$$a = -2.93 \text{ ft/s}^2$$

5. Liquid mercury has a density of 13.6 gram per milliliter at 20 degrees Celsius. Find the mass in kilograms of 804 liters of mercury at 20 degrees Celsius.

$\text{mass} = (\text{density}) \bullet (\text{volume})$ *(replacing the given values into this formula yields)*

$$= \left(\frac{13.6 \text{ grams}}{1 \text{ milliliter}}\right) \bullet \left(\frac{804 \text{ liters}}{1}\right)$$

$$= \left(\frac{13.6 \text{ grams}}{1 \text{ milliliter}}\right) \bullet \left(\frac{804 \text{ liters}}{1}\right) \bullet \left(\frac{1000 \text{ milliliters}}{1 \text{ liter}}\right) \bullet \left(\frac{1 \text{ kilogram}}{1000 \text{ grams}}\right)$$

$$= 10{,}934.4 \text{ kg}$$