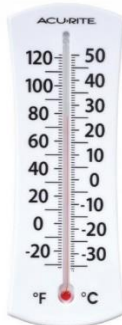# Conversions

Let's think about this... what do the following have in common?

each have 2 different units

Warm up: Let's think back to when we learned how to multiply numbers...

Multiplying

a) $6 \times 1 =$ __6__

b) $0.25 \times 1 =$ __0.25__

c) $\frac{2}{7} \times 1 =$ __$\frac{2}{7}$__

d) $623 \times$ __1__ $= 623$

e) $0.87 \times$ __1__ $= 0.87$

f) $\frac{1}{5} \times$ __1__ $= \frac{1}{5}$

- We learned that multiplying anything by __one__ will give back the same amount

- When we are converting, we are NOT changing the amount of that "something". Instead, we are just expressing that amount with a different unit of measurement.
- When we are converting, we are constantly multiplying by "1".

Example 1: Convert the following within the metric system

a) 314 cm to m   *final unit in numerator*

$1m = 100 \text{ cm}$
$\frac{1}{100}m = 1 \text{ cm}$

$\frac{314 \text{ cm}}{1} \times \frac{1 \text{ m}}{100 \text{ cm}}$

$= \frac{314}{100} \text{ m}$

$\therefore 314 \text{ cm} = 3.14 \text{ m}$

b) 0.045 kg to g

$\frac{0.045 \text{ kg}}{1} \times \frac{1000 \text{ g}}{1 \text{ kg}}$

$= 45 \text{ g}$

Example 2: Convert the following within the imperial system

a) 314 ounces to pounds

$\frac{314 \text{ oz}}{1} \times \frac{1 \text{ lb}}{16 \text{ oz}}$

$= 19.625 \text{ lb}$

b) 0.045 miles to yards

$\frac{0.045 \text{ miles}}{1} \times \frac{1760 \text{ yards}}{1 \text{ mile}}$

$= 79.2 \text{ yards}$

Example 3: Convert between the given units.

a) 3.2 feet to cm

$$\frac{3.2 \ \cancel{ft}}{1} \times \frac{30.4 \ cm}{1 \ \cancel{ft}}$$

$$= 97.28 \ cm$$

b) 4.7 lb to kg

$$\frac{4.7 \ \cancel{lb}}{1} \times \frac{0.454 \ kg}{1 \ \cancel{lb}}$$

$$= 2.1338 \ kg$$

Example 4: Convert 100 km/h to mi/min

$$\frac{100 \ \cancel{km}}{1 \ \cancel{hr}} \times \frac{1 \ mile}{1.609 \ \cancel{km}} \times \frac{1 \ \cancel{hr}}{60 \ min} = 1.04 \ mi/min$$
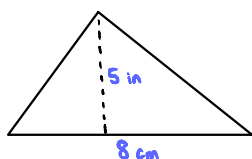
Example 5: Convert 623 cm² to m²

$$\frac{623 \ \cancel{cm^2}}{1} \times \frac{1 \ m}{100 \ \cancel{cm}} \times \frac{1 \ m}{100 \ \cancel{cm}} = 0.0623 \ m^2$$

Example 6: Convert 2 L to cm³

$$\frac{2 \ \cancel{L}}{1} \times \frac{1000 \ \cancel{mL}}{1 \ \cancel{L}} \times \frac{1 \ cm^3}{1 \ \cancel{mL}} = 2000 \ cm^3$$

Example 7: Determine the area of a triangle with a base of 8 cm and a height of 5 inches

must convert all units to the same

convert h to cm

$$\frac{5 \ \cancel{in}}{1} \times \frac{2.54 \ cm}{1 \ \cancel{in}}$$

$$= 12.7 \ cm$$

$$A_{triangle} = \frac{bh}{2}$$

$$= \frac{8(12.7)}{2}$$

$$= 50.8 \ cm^2$$

∴ Area of the triangle is 50.8 cm².

Now let's try it yourself! Convert to the units indicated accurate to 3 decimal places if necessary.

a) 6.7 feet (ft) to inches (in)

b) 4235 pounds (lb) to kilograms (kg)

c) 5.32 kilometers (km) to meters (m)

d) 42500 centimeters (cm) to kilometers (km)

e) 13.5 pounds (lb) to grams (g)

f) 5 feet 10 inches (ft & in) to centimeters (cm)

g) 1638 square feet (ft²) to square meters (m²)

h) 8836 cubic centimeters (cm³) to liters (L)

Answers: a) 80.4 in   b) 1922.69 kg   c) 5320 m   d) 0.425 km   e) 6129 g   f) 177.4 cm   g) 151.377 m²   h) 8.836 L

Measurement Systems Conversion Factors

Length		
Metric System	Imperial System	Conversions (rounded)
10 mm = 1 cm	12 inches = 1 foot	1 inch = 2.54 cm
100 cm = 1 m	3 feet = 1 yard	1 foot = 30.40 cm
1000 m = 1 km	1760 yards = 1 mile	1 yard = 0.9144 m
	5280 feet = 1 mile	1 mile = 1.609 km

Volume		
Metric System	Imperial System	Conversions (rounded)
1000 mL = 1L	16 fluid ounces = 1 pint	1 fluid ounce = 29.574 mL
1000 mm^3 = 1cm^3	2 pints = 1 quart	1 pint = 0.473 L
1 cm^3 = 1 mL	4 quarts = 1 gallon	1 galloon = 3.785 L

Mass		
Metric System	Imperial System	Conversions (rounded)
1000 g = 1 kg	16 ounces = 1 pound	1 ounce = 28.35 g
1000 kg = 1 t (metric)	2000 pounds = 1 ton (US)	1 pound = 0.454 kg
		1 ton = 0.907 t (metric)