Units and Equivalences

Length	Weight
12 inches (in) = 1 foot (ft) 3 feet = 1 yard (yd) 5280 feet = 1 mile (mi)	16 ounces (oz) = 1 pound (lb) 2000 pounds = 1 ton (T)
Liquid Volume	**Time**
8 fluid ounces (oz) = 1 cup 3 teaspoons (tsp) = 1 tablespoon (Tbsp) 16 tablespoons (Tbsp) = 1 cup (c) 2 cups (c) = 1 pint (pt) 2 pints = 1 quart (qt) 4 quarts = 1 gallon (gal)	60 seconds (sec) = 1 minute (min) 60 minutes = 1 hour (hr) 24 hours = 1 day 7 days = 1 week 52 weeks = 1 year 365 days = 1 year

Metric System

Kilo	Hecto	Deka	Base Unit	Deci	Centi	Milli
km	hm	dam	**Length** Meter (m)	dm	cm	mm
kg	hg	dag	**Weight** Gram (g)	dg	cg	mg
kL	hL	daL	**Volume** Liter (L)	dL	cL	mL

Conversions Between System

Length	Weight	Volume
2.54 cm = 1 in 1 m = 3.28 ft 1.61 km = 1 mi	28.3 g = 1 oz 2.2 lb = 1 kg	1.06 qt = 1 L 3.79 L = 1 gal

How to go from Equivalences to Conversion factors

From one equivalence we can get two conversion factors.

Ex: Starting with 1 foot (ft.) = 12 inches (in.), we can make the conversion factors

$$\frac{1\text{ ft}}{12\text{ in}} \text{ and } \frac{12\text{ in}}{1\text{ ft}}$$

Conversion factors can be used to switch between different units.
Using them is described on the back side of this page.

How to Make a Unit Conversion

The key is to **focus on the units**, not the numbers.

STEP1: Select a unit conversion factor.

Which unit conversion factor we use depends on the units we start with and the units we want to end up with.

Unit conversion factor: $\dfrac{\text{units we want}}{\text{units to eliminate}}$ ← **Numerator** / ← **Denominator**

For example, if we want to convert minutes into seconds, we want to eliminate minutes and end up with seconds. Therefore, we would use $\frac{60 \text{ sec}}{1 \text{ min}}$. However, if we want to convert seconds into minutes, we want to eliminate seconds and end up with minutes. Therefore, we would use $\frac{1 \text{ min}}{60 \text{ sec}}$.

Note: Unit conversion factors are always equal to **1**. Therefore, when we multiply any measurement by a unit conversion factor, we are not changing the value of the measurement, only the units.

STEP 2: Multiply the original unit by the unit conversion factor.

For example, to change 5 minutes into seconds:

$$5 \text{ min} = \frac{5 \cancel{\text{min}}}{1} \times \frac{60 \text{ sec}}{1 \cancel{\text{min}}} = 300 \text{ sec}$$

However, to change 300 seconds into minutes:

$$300 \text{ sec} = \frac{300 \cancel{\text{sec}}}{1} \times \frac{1 \text{ min}}{60 \cancel{\text{sec}}} = 5 \text{ min}$$

In the above examples, we cross canceled the like unit from the numerator and denominator, just like we would cancel common factors when reducing fractions. This makes it easy to see which units we end up with.

For example, to convert 21 feet into yards:

$$21 \text{ ft} = \frac{21 \cancel{\text{ft}}^{7}}{1} \times \frac{1 \text{ yd}}{3 \cancel{\text{ft}}_{1}} = 7 \text{ yd}$$

Also, we may need to use more than one unit conversion factor if there is not a direct conversion factor.

For example, to change 3 gallons to cups:

$$3 \text{ gal} = \frac{3 \cancel{\text{gal}}}{1} \times \frac{4 \cancel{\text{qt}}}{1 \cancel{\text{gal}}} \times \frac{2 \cancel{\text{pt}}}{1 \cancel{\text{qt}}} \times \frac{2 \text{ cups}}{1 \cancel{\text{pt}}} = 48 \text{ cups}$$