Dimensional Analysis
(AKA the Factor-Label method)

Ladders/Staircases vs. Bridges

Fill in the Missing Numbers

1 foot = __12__ inches

1 meter = __100__ centimeters

1 pound = __16__ ounces

1 minute = __60__ seconds

1 hour = __60__ minutes

1 mile = __5280__ feet

Unit conversion factor

- A <u>unit conversion factor</u> is a fraction whose numerator and denominator are equivalent measures. Some common unit conversion factors are given below. You can also use the reciprocal of these.

$\dfrac{1\ ft}{12\ in.}$	$\dfrac{1\ yd}{3\ ft}$	$\dfrac{1\ mi}{5{,}280\ ft}$	$\dfrac{1\ lb}{16\ oz}$	$\dfrac{1\ pt}{2\ c}$	$\dfrac{1\ qt}{2\ pt}$	$\dfrac{1\ gal}{4\ qt}$	$\dfrac{1\ hr}{60\ min}$	$\dfrac{1\ min}{60\ s}$	$\dfrac{1\ m}{100\ cm}$	$\dfrac{1\ km}{1{,}000\ m}$

Choose a unit conversion factor that…

- Introduces the unit you want in the answer

- Cancels out the original unit so that the one you want is all that is left.

Convert 8 yards to feet…

Make a decision: What conversion factor will you use?

$$\frac{\textbf{8 yards}}{\textbf{1}}$$

$$\frac{3 \text{ ft}}{1 \text{ yd}} \text{ or } \frac{1 \text{ yd}}{3 \text{ ft}}$$

Set up the problem: Multiply the measurement by the conversion factor.

$$8 \text{ yd} \times \frac{3 \text{ ft}}{1 \text{ yd}}$$

Hint!
Use the one that will *cancel out* the units you want to change

Solve the problem: Perform the multiplication

$$8 \text{ yd} \times \frac{3 \text{ ft}}{1 \text{ yd}} = \frac{8 \text{ yd}}{1} \times \frac{3 \text{ ft}}{1 \text{ yd}} = \frac{24 \text{ ft}}{1} = 24 \text{ ft}$$

A bucket holds 16 quarts. How many gallons of water will fill the bucket? Use a unit conversion factor to convert the units.

What are the two conversion factors comparing quarts and gallons?

$$\frac{4 \text{ qt}}{1 \text{ gal}}$$ $$\frac{1 \text{ gal}}{4 \text{ qt}}$$

Which one will "cancel" quarts?

LENGTH MEASUREMENTS
English System - to - Metric System

1 inch	=	2.54 centimeters
0.39 inch	=	1 centimeter
1 foot	=	30.48 centimeters
3.28 feet	=	1 meter
1 yard	=	0.91 meters
1.09 yards	=	1 meter
1 mile	=	1.61 kilometers
0.62 miles	=	1 kilometer

WEIGHT MEASUREMENTS
English System - to - Metric System

1 ounce	=	28.35 grams
0.035 ounces	=	1 gram
1 pound	=	0.45 kilograms
2.21 pounds	=	1 kilogram
1 ton	=	0.91 metric tons
1.10 tons	=	1000 kilograms