



# Dimensional Analysis

Otherwise known as unit conversion

## UNIT CONVERSION

- You need to be able to convert between units**
- within the metric system
  - between the English and metric system

The method used for conversion is called the

Factor-Label Method

or

Dimensional Analysis

- Let your units do the work for you by simply memorizing connections between units.
  - For example: **How many donuts are in one dozen?**
  - We say: “Twelve donuts are in a dozen.”
  - Or: 12 donuts = 1 dozen donuts
- **What does any number divided by itself equal?**
- ONE!
- or...
$$\frac{12 \text{ donuts}}{1 \text{ dozen}} = 1$$

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- This fraction is called a **conversion factor**
- **What does any number times one equal?**
- That number.

- We use these two mathematical facts to do the factor label method
  - a number divided by itself = 1
  - any number times one gives that number back
- **Example:** How many donuts are in 3.5 dozen?
- You can probably do this in your head but let's see how to do it using the Factor-Label Method.

Start with the given information...

$$\cancel{3.5 \text{ dozen}} \times \frac{12 \text{ donuts}}{\cancel{1 \text{ dozen}}} = 42 \text{ donuts}$$

Then set up your unit factor...

See that the units cancel...

Then multiply and divide as needed...

# Factor-Label Method

- Conversion factor

– a ratio, including units, used as a multiplier to change from one system or unit to another

– for example, 1 lb = 453.6 g

– Example: convert 381 grams to pounds

$$381 \cancel{\text{g}} \times \frac{1 \text{ lb}}{453.6 \cancel{\text{g}}} = 0.840 \text{ lb}$$

– Example: convert 1.844 gallons to milliliters

$$1.844 \cancel{\text{ gal}} \times \frac{3.785 \cancel{\text{ L}}}{1 \cancel{\text{ gal}}} \times \frac{1000 \text{ mL}}{1 \cancel{\text{ L}}} = 6980 \text{ mL}$$