

Factor Label (also known as Dimensional Analysis)

- Method used to solve multi-step math problems in chemistry
- Can be used to convert from given units to desired units

3 things required:

- 1) Desired quantity (what are we looking for?)
- 2) Given quantity (what information are we starting with?)
- 3) Conversion factors (constants used for converting between units)

Examples of conversion factors:

1 foot = 12 inches 1 mile = 5,280 feet

1 day = 24 hours 12 = 1 dozen

Every conversion factor can be represented in two ways:

1 foot / 12 inches or 12 inches / 1 foot

This is useful to know when setting up factor label to help you with a problem

Example problem: How many minutes are in 2 days?

- 1) Desired quantity – minutes
- 2) Given quantity – two days
- 3) Conversion factors to use: 1 day = 24 hours; 1 hour = 60 minutes

$$\frac{2 \text{ days}}{1 \text{ day}} \times \frac{24 \text{ hours}}{1 \text{ hour}} \times \frac{60 \text{ minutes}}{1 \text{ hour}}$$

Start with given quantity at the top left. Use the appropriate conversion factor to convert days to hours. Whatever unit you started with (days in this case) should be the unit on the bottom in the first conversion factor. Days cancel out.

Now, to convert from hours to minutes, you use the other conversion factor provided. Since hours are at the top of the first conversion factor, that must be the unit on the bottom of the next conversion factor. Hours cancel out.

The only unit that remains is minutes → our desired quantity.

Multiply all of the numbers on the top

2 X 24 X 60 → numerator

$$2880/1 = 2880 \text{ minutes in 2 days.}$$

Multiply all of the numbers on the bottom

1 X 1 → denominator