

Factor-Labeling Method (Dimensional Analysis)



DISCOVER • LEARN
Learning Commons

- Step 1: Identify the GIVEN quantity (unit)
Step 2: Identify the WANTED quantity (unit)
Step 3: Determine the CONVERSIONS needed to get from the given unit to the wanted unit
Step 4: SET UP THE PROBLEM so that the units that have to be cancelled are in a numerator and in a denominator
Step 5: CANCEL the unwanted units in the numerators and denominators to isolate the wanted unit
Step 6: MULTIPLY the numerators, and MULTIPLY the denominators and then DIVIDE the numerator by the denominator.

Example 1:

How many meters are in 8 feet?

Given: 8 feet

Wanted: Meters

Conversions: 1m = 3.28 feet

$$8 \text{ ft} \times \frac{1\text{m}}{3.28 \text{ ft}} = ? \text{ m}$$

$$8 \text{ ft} \times \frac{1\text{m}}{3.28 \text{ ft}} = \frac{8}{3.28} \text{ m} = 2.44 \text{ m}$$

Example 2:

Convert 5 gallons to milliliters

Given: 5 gal

Wanted: ml

Conversions: 1 gal = 3.79L
1L = 1000ml

$$5 \text{ gal} \times \frac{3.79\text{L}}{1 \text{ gal}} \times \frac{1000 \text{ ml}}{1\text{L}} = ? \text{ ml}$$

$$5 \text{ gal} \times \frac{3.79\text{L}}{1 \text{ gal}} \times \frac{1000 \text{ ml}}{1\text{L}} = \frac{5 \times 3.79 \times 1000}{1} \text{ ml} = 18950 \text{ ml}$$

Example 3

A doctor orders 250mg of amoxicillin, which comes in a suspension of 25mg/ml. You need to give the dose in teaspoons (tsp). How many teaspoons of the suspension should you give?

Given: 250mg

Wanted: teaspoons

Conversions: Given 25mg = 1 ml
1 tsp = 5ml

$$250\text{mg} \times \frac{1\text{ml}}{25\text{mg}} \times \frac{1\text{tsp}}{5\text{ml}} = ? \text{ tsp}$$

$$250\text{mg} \times \frac{1\text{ml}}{25\text{mg}} \times \frac{1\text{tsp}}{5\text{ml}} = \frac{250 \times 1 \times 1}{25 \times 5} \text{ tsp} = \frac{250}{125} \text{ tsp} = 2 \text{ tsp}$$

Example 4

A doctor prescribes 10,000 units of heparin added to 500 ml of D₅W at 1,200 units/hour. How many drops per minute should you administer if the I.V. tubing delivers 10 gtt/ml?

Given: $\frac{500 \text{ ml}}{10,000 \text{ units}}$ $\frac{1200 \text{ units}}{\text{hour}}$ $\frac{10 \text{ gtt}}{\text{ml}}$

Wanted: $\frac{\text{gtt}}{\text{minute}}$

Conversions: $\frac{1 \text{ hour}}{60 \text{ min}}$

$$\frac{10 \text{ gtt}}{1 \text{ ml}} \times \frac{500 \text{ ml}}{10,000 \text{ units}} \times \frac{1200 \text{ units}}{1 \text{ hour}} \times \frac{1 \text{ hour}}{60 \text{ minutes}} = ? \frac{\text{gtt}}{\text{minute}}$$

$$\frac{10 \text{ gtt}}{1 \text{ ml}} \times \frac{500 \text{ ml}}{10,000 \text{ units}} \times \frac{1200 \text{ units}}{1 \text{ hour}} \times \frac{1 \text{ hour}}{60 \text{ mins}} = ? \frac{\text{gtt}}{\text{minute}} = \frac{10 \times 500 \times 1200}{10,000 \times 60} =$$

$$\frac{6,000,000 \text{ gtt}}{600,000 \text{ minute}} = \frac{10 \text{ gtt}}{\text{minute}}$$