

# Exercise 2.2b

## Dimensional Analysis (Factor-Label)

Name: \_\_\_\_\_

Date: \_\_\_\_\_ Per: \_\_\_\_\_

The factor-label method is a way of converting units by using a series of conversion factors that are expressed as fractions and arranged so that units cross cancel from numerator to denominator until only the desired set of units is reached. For example, the measurement 25 grams per liter (g/L) may be converted to kilograms per milliliter (kg/mL) by the following:

$$\frac{25 \text{ grams}}{\text{liter}} \times \frac{1 \text{ liter}}{1000 \text{ milliliters}} \times \frac{1 \text{ kilogram}}{1000 \text{ grams}} = 0.000025 \text{ kilograms/milliliter}$$

Typically, in order to save space and time the symbols rather than the names of the units are used.

$$\frac{25 \text{ g}}{\text{L}} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 0.000025 \text{ kg/mL}$$

**Directions:** Complete the following one-step conversions:

1.  $\frac{1.276 \text{ km}}{\quad} \times \frac{1000 \text{ m}}{1 \text{ km}} = 1276 \text{ m}$

5.  $\frac{12.77 \text{ cm}}{\quad} \times \frac{\quad}{\quad} = \quad \text{m}$

2.  $\frac{4.5 \text{ dL}}{\quad} \times \frac{\quad}{\quad} = \quad \text{L}$

6.  $\frac{1.2008 \text{ kA}}{\quad} \times \frac{\quad}{\quad} = \quad \text{A}$

3.  $\frac{0.0098 \text{ km}}{\quad} \times \frac{\quad}{\quad} = \quad \text{m}$

7.  $\frac{1.125 \text{ cL}}{\quad} \times \frac{\quad}{\quad} = \quad \text{L}$

4.  $\frac{908\,876 \text{ g}}{\quad} \times \frac{\quad}{\quad} = \quad \text{cg}$

8.  $\frac{7.4 \text{ mm}}{\quad} \times \frac{\quad}{\quad} = \quad \text{cm}$

**Directions:** Complete the following two-step conversions:

9.  $\frac{1.276 \text{ km}}{\quad} \times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{100 \text{ cm}}{1 \text{ m}} = 127600 \text{ cm}$

13.  $\frac{12.77 \text{ days}}{\quad} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} = \quad \text{min}$

10.  $\frac{4.5 \text{ kL}}{\quad} \times \frac{\text{L}}{\text{kL}} \times \frac{\text{mL}}{\text{L}} = \quad \text{mL}$

14.  $\frac{12\,008 \text{ sec}}{\quad} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} = \quad \text{hr}$

11.  $\frac{0.0098 \text{ km}}{\quad} \times \frac{\text{m}}{\quad} \times \frac{\quad}{\text{m}} = \quad \text{mm}$

15.  $\frac{1.125 \text{ cL}}{\quad} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} = \quad \text{kL}$

12.  $\frac{8\,876 \text{ min}}{\quad} \times \frac{\text{hr}}{\quad} \times \frac{\quad}{\quad} = \quad \text{day}$

16.  $\frac{7.4 \text{ hm}}{\quad} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} = \quad \text{cm}$

**Directions:** Complete the following conversions:

13 widgets (W) = 230 thingamajigs (TM)

15 thingamajigs (TM) = 20 doohickies (DH)

30 doohickies (DH) = 45 whatchmacallits (WM)

17.  $\frac{176 \text{ W}}{\quad} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} = \quad \text{DH}$

18.  $\frac{127 \text{ WM}}{\quad} \times \frac{\quad}{\quad} \times \frac{\quad}{\quad} = \quad \text{W}$