

# DIMENSIONAL ANALYSIS (FACTOR LABEL METHOD)

Name \_\_\_\_\_

Using this method, it is possible to solve many problems by using the relationship of one unit to another. For example, 12 inches = one foot. Since these two numbers represent the same value, the fractions 12 in/1 ft and 1 ft/12 in are both equal to one. When you multiply another number by the number one, you do not change its value. However, you may change its unit.

**Example 1:** Convert 2 miles to inches.

$$2 \text{ miles} \times \frac{5,280 \text{ ft}}{1 \text{ mile}} \times \frac{12 \text{ inches}}{1 \text{ ft}} = 126,720 \text{ in}$$

(Using significant figures,  
2 mi = 100,000 in.)

**Example 2:** How many seconds are in 4 days?

$$4 \text{ days} \times \frac{24 \text{ hrs}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{60 \text{ sec}}{1 \text{ min}} = 345,600 \text{ sec}$$

(Using significant figures,  
4 days = 300,000 sec.)

Solve the following problems. Write the answers in significant figures.

- 3 hrs = \_\_\_\_\_ sec
- 0.035 mg = \_\_\_\_\_ cg
- 5.5 kg = \_\_\_\_\_ lbs
- 2.5 yds = \_\_\_\_\_ in
- 1.3 yrs = \_\_\_\_\_ hr (1 yr = 365 days)
- 3 moles = \_\_\_\_\_ molecules (1 mole =  $6.02 \times 10^{23}$  molecules)
- $2.5 \times 10^{24}$  molecules = \_\_\_\_\_ moles
- 5 moles = \_\_\_\_\_ liters (1 mole = 22.4 liters)
100. liters = \_\_\_\_\_ moles
50. liters = \_\_\_\_\_ molecules
- $5.0 \times 10^{24}$  molecules = \_\_\_\_\_ liters
- $7.5 \times 10^3$  mL = \_\_\_\_\_ liters