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.

1. 3 hrs = _____ sec
2. 0.035 mg = _____ cg
3. 5.5 kg = _____ lbs
4. 2.5 yds = _____ in
5. 1.3 yrs = _____ hr (1 yr = 365 days)
6. 3 moles = _____ molecules (1 mole = 6.02×10^{23} molecules)
7. 2.5×10^{24} molecules = _____ moles
8. 5 moles = _____ liters (1 mole = 22.4 liters)
9. 100. liters = _____ moles
10. 50. liters = _____ molecules
11. 5.0×10^{24} molecules = _____ liters
12. 7.5×10^{3} mL = _____ liters

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