

# Measurement

# 8



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## SECTION 8.3

# Unit Analysis III: Weight

# Objectives

- A** Convert between weights using the U.S. system.
- B** Convert between weights using the metric system.



**A** Weights: The U.S. System

# Weights: The U.S. System

The most common units of weight in the U.S. system are ounces, pounds, and tons.

The relationships among these units are given in Table 1.

<b>The relationship between</b>	<b>is</b>	<b>To convert one to the other, multiply by</b>
ounces (oz) and pounds (lb)	$1 \text{ lb} = 16 \text{ oz}$	$\frac{16 \text{ oz}}{1 \text{ lb}}$ or $\frac{1 \text{ lb}}{16 \text{ oz}}$
pounds and tons (T)	$1 \text{ T} = 2,000 \text{ lb}$	$\frac{2,000 \text{ lb}}{1 \text{ T}}$ or $\frac{1 \text{ T}}{2,000 \text{ lb}}$

# Example 1

Convert 12 pounds to ounces.

**Solution:**

Using the conversion factor from the table, and applying the method we have been using, we have

$$\begin{aligned} 12 \text{ lb} &= 12 \cancel{\text{ lb}} \times \frac{16 \text{ oz}}{1 \cancel{\text{ lb}}} \\ &= 12 \times 16 \text{ oz} \\ &= 192 \text{ oz} \end{aligned}$$

12 pounds is equivalent to 192 ounces.



## **B** Weights: The Metric System

# Weights: The Metric System

In the metric system the basic unit of weight is a gram. We use the same prefixes we have already used to write the other units of weight in terms of grams. Table 2 lists the most common metric units of weight and their conversion factors.

TABLE 2		
METRIC UNITS OF WEIGHT		
The relationship between	is	To convert one to the other, multiply by
milligrams (mg) and grams (g)	$1 \text{ g} = 1,000 \text{ mg}$	$\frac{1,000 \text{ mg}}{1 \text{ g}}$ or $\frac{1 \text{ g}}{1,000 \text{ mg}}$
centigrams (cg) and grams	$1 \text{ g} = 100 \text{ cg}$	$\frac{100 \text{ cg}}{1 \text{ g}}$ or $\frac{1 \text{ g}}{100 \text{ cg}}$
kilograms (kg) and grams	$1,000 \text{ g} = 1 \text{ kg}$	$\frac{1,000 \text{ g}}{1 \text{ kg}}$ or $\frac{1 \text{ kg}}{1,000 \text{ g}}$
metric tons (t) and kilograms	$1,000 \text{ kg} = 1 \text{ t}$	$\frac{1,000 \text{ kg}}{1 \text{ t}}$ or $\frac{1 \text{ t}}{1,000 \text{ kg}}$



# Example 3

Convert 3 kilograms to centigrams.

**Solution:**

We convert kilograms to grams and then grams to centigrams.

$$\begin{aligned} 3 \text{ kg} &= 3 \cancel{\text{kg}} \times \frac{1,000 \cancel{\text{g}}}{1 \cancel{\text{kg}}} \times \frac{100 \text{ cg}}{1 \cancel{\text{g}}} \\ &= 3 \times 1,000 \times 100 \text{ cg} \\ &= 300,000 \text{ cg} \end{aligned}$$