

Table 8-8 Units of Weight

English Units	Metric Units	English/Metric Conversions
16 ounces (oz) = 1 pound (lb)	1 kilogram (kg) = 1,000 grams (g)	1 kg \approx 2.2 lb
2,000 lb = 1 ton (T)	1,000 kg = 1 metric ton (t)	1 oz \approx 28 g

Conversions within the metric system follow the same procedures we learned for converting lengths in [Section 8-1](#). In the English system, our old friend dimensional analysis will do the work for us. We love that guy.

Example 1 Converting Weights in the English System

Let's be clear on one thing: M&Ms rule. You can buy a $2\frac{5}{8}$ lb party bag of regular M&Ms for \$9.98 at Wal-Mart. Or, if you're a theater buff, you can buy a case of 12 movie-sized boxes, each containing 3.4 ounces of chocolatey bliss, for \$18.28 at Sam's Club. Which has more candy? Which is the better buy?

More Candy?

Wal-Mart
 $2\frac{5}{8}$ lb.

$$2\frac{5}{8} = \frac{8 \cdot 2 + 5}{8} = \frac{21}{8} = 2.625 \text{ lb.}$$

Sam's Club

$$12 \left(\frac{3.4 \text{ oz}}{1} \right) \left(\frac{1 \text{ lb}}{16 \text{ oz}} \right) = 2.55 \text{ lb.}$$

\therefore Wal-Mart has more candy
 $2.625 > 2.55$

Better buy? Cheaper?
 unit price - price per unit
 $= \frac{\text{price}}{1 \text{ unit}}$

Find unit price

Wal-Mart: $\frac{\$9.98}{2.625 \text{ lb}} = \frac{x}{1 \text{ lb}}$

$$\frac{2.625 \text{ lb} \cdot x}{2.625 \text{ lb}} = \frac{1 \text{ lb} \cdot \$9.98}{2.625 \text{ lb}}$$

$$x = \$3.80 \rightarrow \text{Wal-Mart} = \frac{\$3.80}{1 \text{ lb}}$$

Sam's Club: $\frac{\$18.28}{2.55 \text{ lb}} = \frac{x}{1 \text{ lb}}$

$$\frac{2.55 \text{ lb} \cdot x}{2.55 \text{ lb}} = \frac{\$18.28 \cdot 1 \text{ lb}}{2.55 \text{ lb}} \quad x = \$7.16$$

\rightarrow Sam's Club $\frac{\$7.16}{1 \text{ lb}}$

\therefore Wal-Mart is Cheaper.

Example 3 Converting Metric Units of Weight

Convert each of the following:

- (a) 150 grams of protein powder to milligrams
- (b) 23 grams of salt to kilograms
- (c) 3 kilograms of chicken to milligrams

$$\begin{aligned} 1000 \text{ mg} &= 1 \text{ g} \\ 1000 \text{ g} &= 1 \text{ kg} \end{aligned}$$

$$a.) 150 \text{ g} \left(\frac{1000 \text{ mg}}{1 \text{ g}} \right) = 150,000 \text{ mg}$$

$$b.) 23 \text{ g} \left(\frac{1 \text{ kg}}{1000 \text{ g}} \right) = .023 \text{ kg}$$

$$c.) 3 \cancel{\text{ kg}} \left(\frac{1000 \cancel{\text{ g}}}{1 \cancel{\text{ kg}}} \right) \left(\frac{1000 \text{ mg}}{1 \text{ g}} \right) = 3,000,000 \text{ mg}$$

Example 4 Converting between English and Metric Units of Weight

- (a) The heaviest amount ever successfully lifted in Olympic competition was in the clean and jerk competition in Athens in 2004: 263.5 kg. How many pounds is that?
- (b) An average adult hummingbird weighs one-eighth of an ounce. How many grams does it weigh?



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$$a.) 263.5 \cancel{\text{ kg}} \left(\frac{2.2 \text{ lb}}{1 \cancel{\text{ kg}}} \right) = 579.7 \text{ lb}$$

$$b.) \left(\frac{1}{8} \cancel{\text{ oz}} \right) \left(\frac{28 \text{ g}}{1 \cancel{\text{ oz}}} \right) = 3.5 \text{ g}$$

Fahrenheit–Celsius Conversions

To convert Celsius to Fahrenheit:

$$F = \frac{9}{5}C + 32$$

To convert Fahrenheit to Celsius:

$$C = \frac{5}{9}(F - 32)$$

Example 6 Converting Celsius to Fahrenheit

In preparing for vacation, Randy and Catalina check the Internet and find that the average temperature over the next week at their destination is predicted to be 28° Celsius. Should they pack coats or bathing suits?

$$F = \frac{9}{5}C + 32$$

$$F = \frac{9}{5}(28^\circ) + 32$$

$$F = 50.4^\circ + 32$$

$$F = 82.4^\circ$$

∴ bathing suit weather
for some people.