



# Concepts and Examples

# Measuring Weight and Temperature

Based on power point presentations by Pearson Education, Inc.  
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# Learning Objectives

1. Memorize units of weight in the U.S. Measuring System and use dimensional analysis to change units.
2. Memorize units of weight in the Metric Measuring System and use dimensional analysis to change units.
3. Change to and from the Metric Measuring System.
4. Convert between Fahrenheit and Celsius Temperatures

# 1. Weight in the U.S. Measuring System (1 of 2)

**You must memorize the following measures.**

Symbol	Unit	Meaning
1 oz	ounce	
1 lb	U.S. pound	16 oz
1 T	ton	2000 lb

**Please note that ounce is both a unit of weight and of liquid capacity!  
However, we usually try to say “fluid ounce” when discussing liquids.**

# Weight in the U.S. Measuring System (2 of 2)

Example 1:

Change 76 ounces to U.S. pounds using dimensional analysis.

First, we'll write the original measure as the fraction  $\frac{76 \text{ oz}}{1}$ .

We memorized that 1 U.S. pound contains 16 ounces. We express this as a unit ratio in which the new unit of measure (lb) is in the numerator and the original unit of measure (oz) is in the denominator.

$$\frac{1\text{lb}}{16\text{oz}}$$

Now, we'll multiply the original measure in fraction form with the unit ratio:

$$\frac{76\cancel{\text{oz}}}{1} \left( \frac{1\text{lb}}{16\cancel{\text{oz}}} \right) = \frac{76(1)\text{lb}}{16} = 4.75\text{lb}$$

We find that 76 ounces equal 4.75 U.S. pounds.

## 2. Weight in the Metric Measuring System (1 of 2)

The milligram the gram, the metric pound, and the kilogram are the most commonly used metric measures. **You must memorize them.**

Symbol	Unit	Meaning
1 mg	milligram	
1 g	gram	1000 mg
1kg	kilogram	1000 g

### **Less commonly used metric units of weight:**

1 centigram (cg) = 10 milligrams (mg)

1 decigram (dg) = 10 centigrams (cg)

1 dekagram (dkg) = 10 grams (g)

1 hectogram (hg) = 10 dekagrams (dkg)

# Weight in the Metric Measuring System (2 of 2)

Example 2:

Change 659 grams to kilograms using dimensional analysis.

First, we'll write the original measure as the fraction  $\frac{659 \text{ g}}{1}$ .

We memorized that 1 kilogram contains 1000 gram. We express this as a unit ratio in which the new unit of measure (kg) is in the numerator and the original unit of measure (g) is in the denominator.

$$\frac{1 \text{ kg}}{1000 \text{ g}}$$

Now, we'll multiply the original measure in fraction form with the unit ratio:

$$\begin{aligned} \frac{659 \text{ g}}{1} \left( \frac{1 \text{ kg}}{1000 \text{ g}} \right) &= \frac{659 \text{ kg}}{1(1000)} \\ &= 0.659 \text{ kg} \end{aligned}$$

We find that 659 grams equals 0.659 kilograms.

## 4. Convert to and from the Metric Measuring System (1 of 2)

**You must memorize the following conversions.**

1 ounce (oz) $\approx$ 28.35 gram (g)
This is an approximation!
1 U.S. pound (lb) $\approx$ 453.59 gram (g)
This is an approximation!
1 kilogram (kg) $\approx$ 2.2 U.S. pounds (lb)
This is an approximation!

# Convert to and from the Metric Measuring System (2 of 2)

Example 3:

Change 3.4 U.S. pounds to kilograms using dimensional analysis.

First, we'll write the original measure as the fraction  $\frac{3.4 \text{ lb}}{1}$ .

We memorized that 1 kilogram is approximately equal to 2.2 U.S. pounds. We express this as a unit ratio in which the new unit of measure (kg) is in the numerator and the original unit of measure (lb) is in the denominator.

$$\frac{1 \text{ kg}}{2.2 \text{ lb}}$$

Now, we'll multiply the original measure in fraction form with the unit ratio:

$$\frac{3.4 \cancel{\text{ lb}}}{1} \left( \frac{1 \text{ kg}}{2.2 \cancel{\text{ lb}}} \right) \approx 1.55 \text{ kg}$$

We find that 3.4 U.S. pounds equal approximately 1.55 kilograms.



# 3. Convert between Fahrenheit and Celsius Temperatures

(1 of 3)

The U. S. temperature measure is called the **Fahrenheit scale**. Most European countries use the **Celsius scale**. The freezing point for water on the Fahrenheit scale is 32° F (degrees), and on the Celsius scale it is 0° C (degrees).

The formula for converting from a Fahrenheit temperature **F** to a Celsius temperature **C** is:

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

The formula for converting from a Celsius temperature **C** to a Fahrenheit temperature **F** is:

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

# Convert between Fahrenheit and Celsius Temperatures (2 of 3)

Example 4:

Change 212° Fahrenheit to Celsius.

Substitute 212 for  $F$  in the formula  $C = \frac{5}{9}(F - 32)$ .

$$C = \frac{5}{9}(212 - 32)$$

Using the *Order of Operations*, we'll work inside the parentheses first. That is,

$$C = \frac{5}{9}(180) = 100$$

We find that 212° F equals 100° C.

# Convert between Fahrenheit and Celsius Temperatures (2 of 3)

Example 5:

Change 25° Celsius to Fahrenheit.

Substitute 25 for **C** in the formula  $F = \frac{9}{5} C + 32$ .

$$F = \frac{9}{5} (25) + 32$$

Using the *Order of Operations*, we'll multiply first. That is,

$$F = \frac{225}{5} + 32$$

Lastly, we add. We must convert 32 to a fraction.

$$\begin{aligned} F &= \frac{225}{5} + \frac{160}{5} \\ &= \frac{385}{5} = 77 \end{aligned}$$

We find that 25° c equals 77° F.