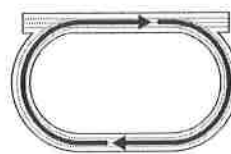# Converting Between SI and English Measurement Systems
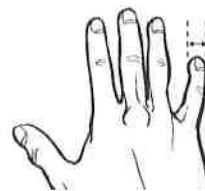
READK

Even though the United States adopted the metric system in 1884, most Americans still use the English system (feet, pounds, gallons, etc.) in our daily lives. Because almost all other countries in the world and many professions (medicine, science, photography, and auto mechanics among them) use the metric system, it is necessary to convert between the two systems.

It is useful to be familiar with standard examples of measurements in both systems. Most people in the U.S. are very familiar with English system units due to household tasks and what is taught in elementary schools. Some examples of measurements in the metric system are:

One kilometer (1 km) is about two and a half times around a standard running track.

One centimeter (1 cm) is about the width of your little finger.

One kilogram (1 kg) is about the mass of a full one-liter bottle of drinking water.

One gram (1 g) is about the mass of a paper clip.

One liter (1 l) is a common size of a small bottle of drinking water.

One milliliter (1 mL) is about one droplet of liquid.

When precise conversions between the two systems are necessary, you will need to know the correct conversion factors given in the table below.

Measurement	Equivalents
Length:	1 inch = 2.54 centimeters
	1 kilometer ≈ 0.62 mile
Volume:	1 liter ≈ 1.06 quart
Mass:	1 ounce ≈ 28 grams
	1 kilogram ≈ 2.2 pounds

EXAMPLES ▷

- We will use ratios and dimensional analysis to convert from one system to the other. How many inches are equivalent to 50 centimeters?

  (1) Restate the question: 50 centimeters = _____ inches

  (2) Find the conversion factor from the table: 1 in = 2.54 cm.

  (3) Multiply the ratios. Make sure the units cancel correctly to produce the desired type of unit in the answer.

  $$\frac{50\ \cancel{cm}}{1} \cdot \frac{1\ in}{2.54\ \cancel{cm}} = \frac{50\ in}{2.54} = 19.68504\ in \approx 20\ in$$

- If we need to know the mass of a 5 pound bag of flour in kilograms, we take the following steps:

  (1) Restate the question: 5 lbs _____ kg

  (2) Find the conversion factor from the table: 1 kg ≈ 2.2 lb   (Note: *pounds* is abbreviated *lb*.)

  (3) Multiply the ratios making sure that the unwanted units cancel, leaving only the desired units (kilograms) in the answer:

  $$\frac{5\ \cancel{lb}}{1} \cdot \frac{1\ kg}{2.2\ \cancel{lb}} \approx 2.2727\ kg \approx 2\ kg$$

- How many inches are equivalent to 3.00 meters?

  (1) Restate the question: 3.00 meters = _____ inches

  (2) Convert units within one system if necessary: Since the conversion factor from the table is 1 inch = 2.54 centimeters, it would be easier to convert centimeters to inches than converting meters to inches. Fortunately, it is relatively simple to convert meters to centimeters (multiply by 100). 3 meters = 300 centimeters. Now we need to convert: 300 cm ≈ _____ in

  (3) Multiply the ratios making sure that the unwanted units cancel, leaving only the desired units (inches) in the answer:

  $$\frac{300\ \cancel{cm}}{1} \times \frac{1\ in}{2.54\ \cancel{cm}} = \frac{300\ in}{2.54} = 118\ in$$

SKILL and PRACTICE

1.1

PRACTICE

1. 1,500 g ≈ _____ oz.

2. 18 quarts ≈ _____ liters

3. 28 kg ≈ _____ lbs.

4. How many centimeters are equivalent to 22 inches?

5. How many inches are equivalent to 95 centimeters?

6. Maria ran a 4 mile race last Saturday. How many kilometers did she run?

7. About how many centimeters long is an average 12-inch ruler? (No peeking!)

8. The weight of an average human brain is about 3.3 pounds. What is its mass in grams?

9. Remember that a kiloliter is one thousand liters. You have 1.00 kiloliters. How many gallons is this? (Hint: there are four quarts in a gallon.)

10. A sign for a roller coaster ride at a carnival says you must be 107 centimeters tall to ride without an adult. About how tall is this in feet and inches?