

We will work on converting between metric and U.S. standard measurements.

Measurement: Metric – U.S. Customary Conversion (Section 5.4)

You may be working in metric but instructions come in U.S. standard, or vice versa. We must know how to convert between the two systems. Some of the conversions we are given here are exact whereas some will be approximations. Notice the use of the equal sign (=) versus the approximately equal sign (\approx).

We will see tables of conversion from the book followed by examples. Round to the nearest tenth unless directed otherwise.



Metric–U.S. Customary Length Conversions

1 in. = 2.54 cm ← This is the exact legal definition of the inch.

1 ft = 30.48 cm

1 yd = 0.9144 m

1 mi \approx 1.6093 km

expl 1: Convert 5.6 yd to meters.

We will need past knowledge too.

expl 2: Convert 2.75 in. to millimeters.

Dual Dimensioning:

Some instructions will provide both metric and U.S. units. Notice the notation most often used including the phi (ϕ or ϕ) symbol.

Dual Dimensioning

Some companies involved in international trade use “dual dimensioning” on their technical drawings and specifications. With dual dimensioning, both inch and metric dimensions are given. For example, a part might be labeled like this:

Notice that the metric measurement is written first or on top of the fraction bar. Diameter dimensions are marked with the symbol ϕ .

Weights will be converted using the following conversions. Do take note of the fact that the metric ton (t) uses the same abbreviation as teaspoon and the ton (T) uses the same abbreviation as tablespoon. Usually context will help us tell the difference. Of course, we also have to be aware that there are tons *and* metric tons and they are different!

Metric–U.S. Customary Weight Conversions

1 ounce (oz) \approx 28.35 grams (g)
1 pound (lb) \approx 0.4536 kilogram (kg)
1 ton (T) \approx 907.2 kilograms (kg) \approx 0.9072 metric tons (t)

expl 3: Convert 31 kg/sq m to lb/sq ft.

Metric–U.S. Customary Area Conversions

1 square inch (sq in. or in.²) \approx 6.452 sq cm (or cm²)

1 square foot (sq ft or ft²) \approx 0.0929 sq m (or m²)

1 square yard (sq yd or yd²) \approx 0.836 sq m

1 acre \approx 0.405 hectare (ha)

Metric–U.S. Customary Volume and Liquid Capacity Conversions

1 cubic inch (cu in. or in.³) \approx 16.387 cubic centimeters (cu cm or cm³)

1 cubic yard (cu yd or yd³) \approx 0.765 cubic meters (cu m or m³)

1 teaspoon (t) = 5 milliliters (mL)

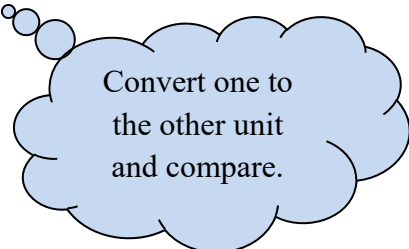
1 tablespoon (T) = 15 mL

1 fluid ounce (fl oz) \approx 29.574 mL (or cu cm)

1 quart (qt) \approx 0.946 liter (L)*

1 gallon (gal) \approx 3.785 L

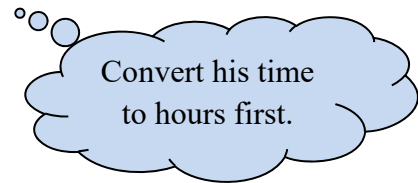
expl 4: Which is performing more efficiently: a car getting 12 km per liter of gas or a car getting 25 miles per gallon of gas?



Convert one to the other unit and compare.

expl 5: Convert 2.85 sq in. to sq cm.

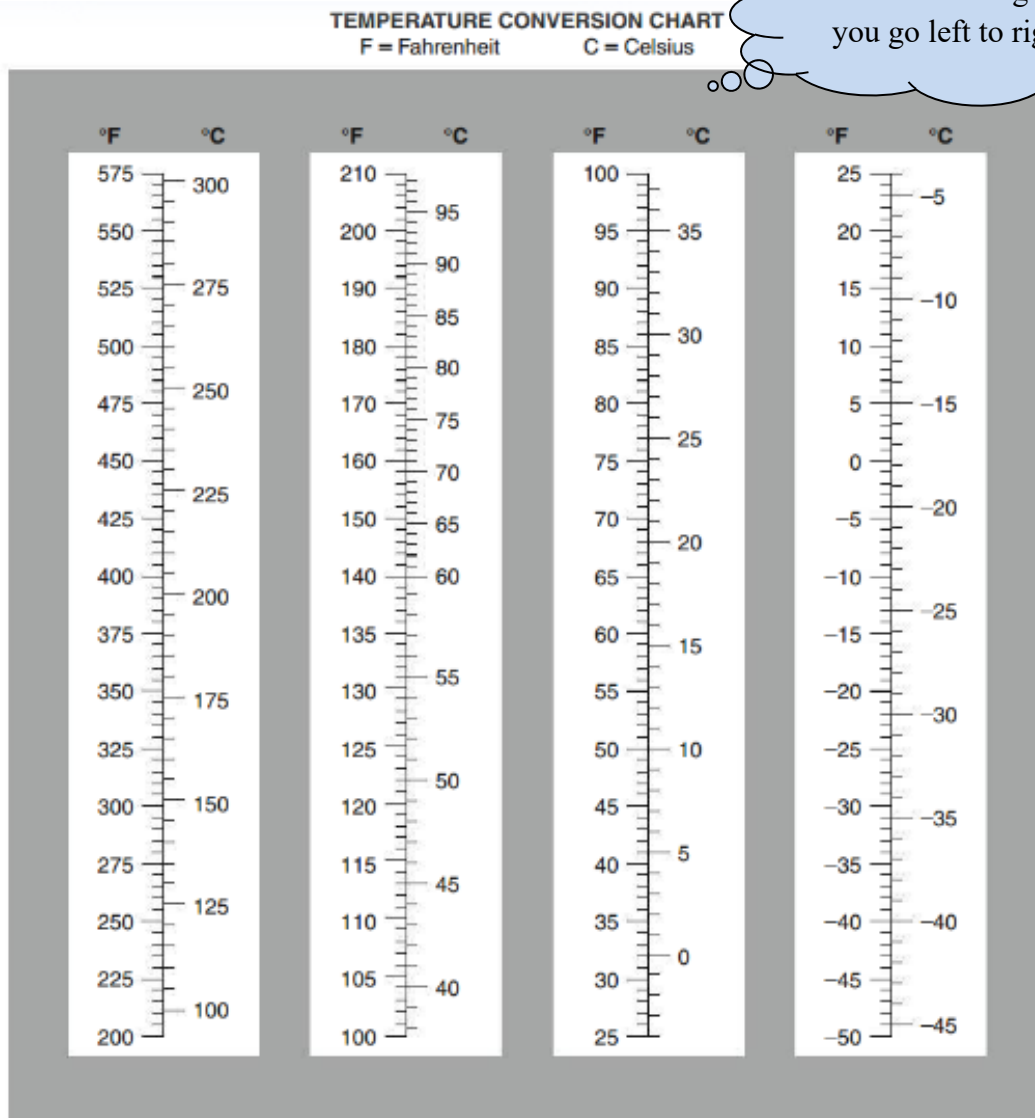
expl 6: At the 2016 Olympics, the 26.2-mile men's marathon was won with a time of 2 hr 8 min 44 sec. What was his average speed in mph and km/h? Round to the nearest tenth.



Fahrenheit-Celsius Conversions:

There exists a formula that is used to convert between the Fahrenheit and Celsius scales of temperature. Since that uses algebra, we will get to that later and opt for this method for now.

Here is a rather complete thermometer showing the equivalent temperatures between the two scales. A similar one was used in an earlier section.



expl 7: A casserole should bake in a 275° F oven for 45 minutes. Determine the equivalent temperature on the Celsius scale. Round to the nearest 5 degrees.