

The Metric System

To measure length, volume, and mass using the metric system, we can use the base units of meters (to measure length), liters (to measure volume), and grams (to measure mass) and then put one of the prefixes below in front of these units. To do most conversions in the metric system, all we need to do is move the decimal point.

kilo- hecto- deka- (base) deci- centi- milli-

Example: Convert 5.3 centimeters to an equivalent number of meters.

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Example: Convert 24 kg to an equivalent number of decigrams.

Some Conversion Factors

Some length conversions

1 foot = 12 inches

1 yard = 3 feet = 36 inches

1 mile = 5280 feet

1 inch = 2.54 centimeters

1 foot = 30.48 centimeters

1 yard = 0.9144 meter

1 mile \approx 1.609 kilometers

Some mass conversions

16 ounces = 1 pound

2000 pounds = 1 ton

1 ounce = 28 grams

2.2 pounds \approx 1 kilogram

1 metric tonne = 1000 kilograms

1.1 tons = 1 metric tonne

Some volume conversions

2 cups = 1 pint

2 pints = 1 quart

32 fluid ounces = 1 quart

4 quarts = 1 gallon

1 cup \approx 0.2366 liter

1 quart \approx 0.9464 liter

1 cubic foot \approx 0.03 cubic meter

Dimensional Analysis:

Example 3: Convert 168 fluid ounces to an equivalent number of quarts.

Step 1: Copy down what you're given, and then write a multiplication sign and a fraction bar.

Step 2: Put the units we're converting *from* on the bottom of the fraction.

Step 3: Put the units we're converting *to* on the top of the fraction.

Step 4: Fill in the numbers so that the top of the fraction is equal to the bottom of the fraction.

Step 5: Confirm that the correct units cancel and perform the indicated operations.

Example 4: Convert 4 miles to an equivalent number of yards.

Step 1: Copy down what you're given, and then write a multiplication sign and a fraction bar.

Step 2: Put the units we're converting *from* on the bottom of the fraction.

Step 3: We don't have a conversion factor that lets us go directly from miles to yards, so we can change the miles to feet and then the feet to yards. With this in mind, put feet on top of the fraction.

Step 4: Fill in the numbers so that the top of the fraction is equal to the bottom of the fraction.

Step 5: Since we need to change the feet to yards, write another multiplication sign and a fraction bar.

Step 6: To cancel out the feet, put feet on the bottom of the second fraction.

Step 7: Because we want to end up with yards, put yards on the top of the second fraction.

Step 8: Fill in the numbers so that the top of the fraction is equal to the bottom of the fraction.

Step 9: Confirm that the correct units cancel and perform the indicated operations.

Example 5: Convert 22 cups to an equivalent number of milliliters.

Example 6: Suppose that you have calculated your car uses, on average, one gallon of gasoline to travel 31 miles. How many kilometers will you be able to travel with one liter of gasoline?