

Conversion factors

Spring 2017

We use a lot of different measures to describe aspects of electricity. Specific units help us keep track of these aspects, and help us talk to each other about electricity.

This communication is like people talking about running. If you're a sprinter, you measure your distance in meters. If you run long distances, you measure your race in kilometers.

How long is a "5k," in meters? [a 5k is a 5 kilometer race]

$$5 \text{ kilometers} \times 1,000 \text{ meters/kilometer} = 5,000 \text{ meters}$$

Written in a slightly different style, the same calculation is:

$$5 \text{ kilometers} \times \frac{1,000 \text{ meters}}{\text{kilometer}} = 5,000 \text{ meters}$$

$\frac{1,000 \text{ meters}}{\text{kilometer}}$ is the same as writing 1,000 meters/kilometer, or 1,000 meters = 1 kilometer. These are all the same expression – they describe the same relationship between meters and kilometers. We can also call this relationship a conversion factor – it helps us convert kilometers to meters.

Here's another one: 12 eggs/dozen, or $\frac{12 \text{ eggs}}{\text{dozen}}$. Notice that inverting this expression doesn't change the relationship. Twelve eggs still = one dozen, whether we write it as $\frac{1 \text{ dozen}}{12 \text{ eggs}}$ or $\frac{12 \text{ eggs}}{\text{dozen}}$.

Finally, notice that to convert from one unit (eggs) to a different unit (dozens), the initial unit has to be on the bottom of the conversion factor and the final unit has to be on the top:

$$24 \text{ eggs} \times \frac{1 \text{ dozen}}{12 \text{ eggs}} = 2 \text{ dozen} \text{ (here eggs is the starting unit, dozen is the final unit)}$$

or

$$5 \text{ kilometers} \times \frac{1,000 \text{ meters}}{\text{kilometer}} = 5,000 \text{ meters}$$

Some units are condensed, like how fast your car goes:

$$\text{Miles per hour (mph)} = \text{miles} / \text{hour, also written as: } \frac{\text{miles}}{\text{hour}}$$

Calculations for you to do. Use the format shown above. Show all details of your answers.

1. Convert 10 kilometers into meters.
2. What conversion factor would you use to convert meters into centimeters?
3. At 70 mph, how far will you travel in 6 hours?
4. If a cookie swap needs 10.5 dozen cookies, how many cookies is that?
5. I watched an Olympic track race this summer that was 1,500 meters. How many kilometers is that?
6. What conversion factor would you use to convert minutes into seconds?
7. How many seconds are there in a 90 minute class?