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Unit Conversion

Why do we need to convert one unit to another?

People in different countries use some different units. When an American friend tells you that he just pumped 20 gallons of gas into his car, you won't know what he is talking about since we use litres as a unit for measuring gas in Canada. Because one gallon is 3.785411784 liters, we can calculate that your friend is using about 75 litres of gas. How do we calculate that 75 litres? Read on! Another example of different units is that in many countries, people use metres to measure their height, but in the U.S. feet and inches are used. Canada, of course, is officially metric, but many older people are still more comfortable with the imperial system. They may still struggle with conversions. You can probably think of many other instances when you need to convert units of measurement!



How to convert units

It is not difficult to know the equivalent relationship between two units, but a lot of people get confused about whether to multiply or divide. The following example will show you how to convert a present unit to another desired unit.

Example A lot of men would like to be 1.83 metres tall. Convert 1.83 metres to feet.

Step one: Choose the right equivalent relationship between two units from the

unit conversion table (link: http://en.wikipedia.org/wiki/Conversion_of_units).

1 metre = 3.281 feet

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Step two: Change the equivalent relationship by division to obtain a fraction/ ratio

$$\frac{\text{desired unit}}{\text{present unit}} .$$

$$\frac{1 \text{ metre}}{\text{metre}} = \frac{3.281 \text{ feet}}{\text{metre}} \quad (\text{divide both sides of the equation by metre})$$

$$\frac{\cancel{1} \text{ metre}}{\cancel{\text{metre}}} = \frac{3.281 \text{ feet}}{\text{metre}} \quad (\text{cancel out km on the left side of the equation})$$

$$1 = \frac{3.281 \text{ feet}}{\text{metre}}$$

In our example about desired height, we want to convert metres to feet so “meter” is the present unit and “feet” is the desired unit. Therefore, in this step, we aim to get ratio $\frac{\text{ft}}{\text{meter}}$.

Step three: Multiply the present quantity by the ratio.

$$\begin{aligned} & 1.83 \text{ meter} \times \frac{3.281 \text{ feet}}{\text{metre}} \\ &= 1.83 \cancel{\text{metre}} \times \frac{3.281 \text{ feet}}{\cancel{\text{metre}}} \quad (\text{Cancel out the two same units, one at numerator and the other one at denominator.}) \\ &= 1.983 \times 3.281 \text{ feet} \\ &= 6.00 \text{ feet} \end{aligned}$$

Therefore, a lot of men would like to be 6 feet tall.

Be reasonable!

If we follow the above three steps for conversion of units, we won't divide a conversion ratio where we should multiply. However, everybody makes mistakes. That is why it is good to have a rough check of our work. We can always apply this rule “If the containers are smaller, we need more of them. Similarly, if the units are smaller, the numbers should be larger. “. If we

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convert a smaller unit to a larger unit, the desired number should be smaller than the given/present quantity. Likewise, if a larger unit is converted to a smaller unit, the desired number should be larger than the given number. Back to the above example, a metre is longer than a foot, so we expect to convert 1.83 metres to a larger number of feet. If you ended up with an answer 0.05 feet, you would know you have made a mistake.

Conversion of compound units

Now you know how to convert single/simple units. What about the conversion of more complex units like converting kilometre per hour to metre per second? We apply the same three steps. The only difference is that we need to do the conversion for each single unit. The following example will take you through the process of converting compound units.

Example If you are driving from North Bay to Toronto at an average speed of 120 km/hr (You might get caught by a policeman.), what is your average speed of metre per minute? (i.e. You need to convert 120 km/hr to m/min.)



In this example, we have two conversions to do: km to m and hr to min.

Step 1: Select the right equivalent relationship between km and m, and hr and sec.

$$1 \text{ km} = 1000 \text{ m} \quad 1 \text{ hr} = 60 \text{ min}$$

Step 2: Change the equivalent relationship respectively by division to obtain a fraction/ratio

$$\frac{\text{desired unit}}{\text{present unit}} .$$

Convert km to m: $1 \text{ km} = 1000$

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$$\frac{1 \text{ km}}{\text{km}} = \frac{1000 \text{ m}}{\text{km}} \quad (\text{divide both sides of the equation by km})$$

$$\frac{\cancel{1 \text{ km}}}{\cancel{\text{km}}} = \frac{1000 \text{ m}}{\text{km}} \quad (\text{cancel out km on the left side of the equation})$$

$$1 = \frac{1000 \text{ m}}{\text{km}}$$

Convert hr to min: 1 hr = 60 min

$$\frac{1 \text{ hr}}{\text{hr}} = \frac{60 \text{ min}}{\text{hr}} \quad (\text{divide both sides of the equation by hr})$$

$$\frac{\cancel{1 \text{ hr}}}{\cancel{\text{hr}}} = \frac{60 \text{ min}}{\text{hr}} \quad (\text{cancel out hr on the left side of the equation})$$

$$1 = \frac{60 \text{ min}}{\text{hr}}$$

Step three: Multiply the present quantity by the two ratios. Be careful that the conversion ratio $\frac{60 \text{ min}}{\text{hr}}$ is at the bottom of the whole fraction.

$$120 \text{ km/hr}$$

$$= \frac{120 \text{ km}}{1 \text{ hr}}$$

$$= \frac{120 \cancel{\text{ km}} \times \frac{1000 \text{ m}}{\cancel{\text{ km}}}}{120 \cancel{\text{ hr}} \times \frac{60 \text{ min}}{\cancel{\text{ hr}}}}$$

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$$= \frac{120 \times 1000 \text{ m}}{60 \text{ min}}$$

$$= 2000 \text{ m/min}$$

Therefore, 120km/hr is equal to 2000m/min.

Now, you know how to convert units of measurement. If you want to convert units more quickly, you can make online conversions at <http://www.digitaldutch.com/unitconverter/>. However, you still need to know how to convert units by hand/on paper when computers and the internet are not available or not allowed to be used.