

Tutorial: Unit conversion for combined units:

Example 1: Imagine that you are driving your car in Canada. As you're driving along, you notice that the speed limit signs have numbers like 120 (on the highway) and 50 (in the city). As you start to speed up, you realize that the signs are in km/hour. Unfortunately, your speedometer only reads in mi/hour.

Figure out how fast you're allowed to go if the sign says: 120 km/h

Let's go step by step to find the answer:

1. Write down the units you have (when appropriate as fraction)
2. Write down the units you want to end with. Here $\frac{mi}{h}$
3. Determine appropriate conversion factors (in some cases there will be more than one conversion factor for each of the units you have). Since hours stay the same, you only need one factor: km to mi, and you can write $1\text{km} = 0.6214\text{ mi}$
4. Evaluate appropriate arrangement for fractions (that is, what units belong in numerator (top) of fraction? What units need to be in denominator (bottom)? Remember, units cancel when one unit is in numerator and the other is in the denominator. Since km is in the numerator in the original units, km needs to be in the denominator so that we can cancel:

$$\frac{0.6214\text{ mi}}{\text{km}}$$

5. Set up the conversion by writing the fractions in a row with multiplication signs in between:

$$\frac{120\text{ km}}{1\text{ h}} \times \frac{0.6214\text{ mi}}{1\text{ km}}$$

6. Now you can cancel the *km* in the numerator and denominator and multiply the numbers to arrive at

$$\frac{74.6\text{ mi}}{1\text{ h}} = 74.6 \frac{\text{mi}}{\text{h}}$$

Problem 1: Convert 50 km/h to mi/h

Problem 2: Convert 55 mi/h to km/h