Unit Conversion Example:

Convert from 65 kilometers/hour to meters/second.

Solution:

1. First, I identify the original unit(s), and I identify the goal units (the units that I want to end up with).

The original units:

- kilometers/hour

The goal units:

- meters/second

2. Next, I write the quantity with the original units (the quantity I wish to convert) as a fraction.

$$\frac{65\ km}{1\ hr}$$

3. Then, I put a multiplication sign after the quantity with the original units.

$$\frac{65\ km}{1\ hr} \times$$

4. Now, I need to find the necessary conversion factor(s) to convert from the original unit(s) to the goal unit(s).

a. In this problem, I need to convert kilometers to meters **AND** hours to seconds. Thus, I need **two conversion factors**, one to convert from kilometers to meters, and the other to convert from hours to seconds.

b. When picking my conversion factor(s), I need to remember the only real rule for a conversion factor is as follows: **any conversion factor must be equal to 1**. That is, the value on the top (in the numerator) of the conversion factor must be equal to the value on the bottom (in the denominator) of the conversion factor.

c. For my first conversion factor, I pick **1,000 meters/1 kilometer** because ***1)*** it is equal to one (the numerator of the conversion factor is equal to the denominator of the conversion factor), ***2)*** the kilometers on the top of the original fraction will cancel with the kilometers on the bottom of the conversion factor, and ***3)*** in the end, I will end up with meters, instead of kilometers, and if you remember, I want meters in my final set of units.

5. Now, I write the first conversion factor to the right of the multiplication sign.

$$\frac{65\ \cancel{km}}{1\ hr} \times \frac{1{,}000\ m}{1\ \cancel{km}}$$

6. Now, I put a multiplication sign after the first conversion factor.

$$\frac{65\ km}{1\ hr} \times \frac{1{,}000\ m}{1\ km} \times$$

7. Then, I write the second conversion factor to the right of the second multiplication sign. I pick the conversion factor **1 hour/3,600** seconds because ***1)*** it is equal to one (the numerator of the conversion factor is equal to the denominator of the conversion factor), ***2)*** the hour on the bottom of the original fraction will cancel with the hour on the top of the conversion factor, and ***3)*** in the end, I will end up with seconds, instead of hours, and if you remember, I want seconds in my final set of units.

$$\frac{65\ km}{1\ hr} \times \frac{1{,}000\ m}{1\ km} \times \frac{1\ hr}{3{,}600\ s}$$

8. Now, I multiply across the top of the fractions.

$$\frac{65\ km}{1\ hr} \times \frac{1{,}000\ m}{1\ km} \times \frac{1\ hr}{3{,}600\ s} = \frac{65{,}000\ m}{}$$

9. I multiply across the bottom of the fractions.

$$\frac{65\ km}{1\ hr} \times \frac{1{,}000\ m}{1\ km} \times \frac{1\ hr}{3{,}600\ s} = \frac{65{,}000\ m}{3{,}600\ s}$$

10. Finally, I divide the top of the resulting fraction by the bottom of the fraction. ***See the result on the next page.***

$$\frac{65{,}000\ m}{3{,}600\ s} = 18.06\ m/s$$