Answer on Question #42721-Physics-Other

How do you determine significant figures for the answer when doing dimensional analysis?

Answer

When you are converting units in DA (dimensional analysis), you are either multiplying or dividing. Therefore you use the Sig Fig (significant figures) rule:

<u>In multiplication and division, the result should be rounded off so as to have the same number of significant figures as in the measurement with the least number of significant figures.</u>

Some measurements are exact - they are known with complete certainty. For example, there is exactly 100 cm in 1 meter, exactly 60 minutes in 1 hour and exactly 12 inches in 1 foot. For this reason these measurements have an infinite number of significant figures and should NOT be used to round your answer to the correct number of sig figs. Any conversion factor that has both units in metric (examples: $\frac{1000mL}{1L}$, $\frac{1m}{100cm}$, $\frac{1000mg}{1g}$) or both units in the English System (examples: $\frac{5280ft}{1mi}$, $\frac{1gallon}{4quarts}$, $\frac{3feet}{1yd}$.) should not be used in determining sig figs in your answer.

If you have conversion factors that have units in both metric and English, they generally are used to determine sig figs. Examples: $\frac{3.8L}{1.0gallon}$, $\frac{1.0km}{0.6mi}$, $\frac{39.37inches}{1.0meter}$. This is because there is not exactly 3.8 liters in 1.0 gallon, not exactly 1.0 km in 106 mi...

As a general rule, it is usually (but not always) your given (what you start out with) that determines the number of sig figs in your answer. If you look at the example above where we converted 77.2 years to seconds, we rounded the answer to 3 sig figs because our given (77.2 years) has 3 sig figs.