



REQUIRED SKILL

Dimensional Analysis

For solving Unit Conversion problems in Physics

The field of Physics deals with many different units (and systems of units). It is often necessary for us to convert information to common units so we can "add apples to apples," as the saying goes.

We sometimes need to convert units within a system (like "how many seconds are there in one year?"). At other times we need to convert units across systems. The most recognized conversions are between the "metric" and "English" systems of measurement. One example of this would be to find the number of meters in 100 yards.

For unit conversion of any kind, we use the following format:

$$\text{(Known Quantity and Units)} \times \text{(Conversion Factor and Units)} = \text{Answer with } \underline{\text{desired units}}$$

Frequently, more than one conversion is needed. However, for any problem you work, make sure that you have units with your answer and that you have boxed it. In the following examples, observe how it is set up so all units cancel out except the ones we want in the final answer.

Dimensional Analysis Example ONE:

Convert one year into seconds.

$$\left(\frac{365 \text{ days}}{1 \text{ year}}\right) \times \left(\frac{24 \text{ hours}}{1 \text{ day}}\right) \times \left(\frac{60 \text{ min}}{1 \text{ hour}}\right) \times \left(\frac{60 \text{ sec}}{1 \text{ min}}\right) = \boxed{31,500,000 \frac{\text{sec}}{\text{year}}}$$

Dimensional Analysis Example TWO:

Convert 100 yards into meters.

$$\left(\frac{100 \text{ yards}}{1}\right) \times \left(\frac{36 \text{ inches}}{\text{yard}}\right) \times \left(\frac{1 \text{ meter}}{39.37 \text{ inches}}\right) = \boxed{91.44 \text{ meters}}$$