

Unit Conversion Examples

Alexandra Watkins

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1 Conversion Between SI/US

To convert a US measurement x into a metric measurement y , multiply by a conversion ratio, c , that has the units of $\frac{\text{metric}}{\text{US}}$. This equation then takes the form of $y = cx$. Example: To convert 5 feet into meters, write the equation $y = c * 5ft$ and set c to be $\frac{0.3048m}{1ft}$. This then produces $y = \frac{0.3048m}{1ft} * 5ft = 1.524m$. Conversion back into US measurements can be done by multiplying by the inverse of c , c^{-1} , which has the units of $\frac{\text{US}}{\text{metric}}$.

Common values for c are:

$$\text{Length} \quad \frac{1.61km}{1mi} \quad \frac{2.54cm}{1in} \quad \frac{0.914m}{1yd} \quad \frac{0.3048m}{1ft}$$

$$\text{Mass} \quad \frac{14.594kg}{1slug}$$

$$\text{Force} \quad \frac{4.448N}{1lb} \quad \frac{0.278N}{1oz}$$

1.1 Chaining Conversions

Conversions between more esoteric quantities, or just quantities for which c is not directly known, can be accomplished by chaining together multiple conversion ratios. For example, to convert x ounces into y kiloNewtons we would use the chained conversion:

$$y = x(oz) * \frac{0.278N}{1oz} * \frac{1kN}{1000N}$$

2 Converting Equations

Before plugging a converted unit into an equation, you must convert the coefficients of that equation to be in the correct units as well. For example, if we have the equation $y = x^4 + 2x^2 - 5x$ where x is in inches and we want to use feet, we have to rewrite the equation to be:

$$y = \left(\frac{12in}{1ft}\right)^4 x + 2\left(\frac{12in}{1ft}\right)^2 x - 5\left(\frac{12in}{1ft}\right) x$$