Conversions

A quantity we measure

- A quantity we measure consists of a number and a unit.
- Sometimes we are given a quantity in one set of units, but we want it expressed in another set of units.
- So, we must use a conversion factor.

Conversion factor

- The conversion factor itself is equal to one.
- So, multiplying by the conversion factor is multiplying by one (the multiplicative identity element).
- The numerator is expressed in the desired (resultant) units; the denominator is expressed in the undesired (given) units.

Example

- Given 3 minutes time we want seconds.
- Conversion factor (seconds over minute).
- 3 min (60 sec/1 min) = 180 sec
- Please note that min cancels out and the result is in seconds.

Example

- Given 9 inches we want centimeters.
- Conversion factor is 2.54 cm per inch
- 9 inches (2.54 cm/1 inch) = 22.86 cm

Example

- Given 75 inches we want meters.
- Conversion factor (2.54 cm/1 inch)
- 75 inches (2.54 cm/1 inch) = 190.5 cm
- Conversion factor (1 meter/100 cm)
- 190.5 cm (1 meter/100 cm) = 1.9 m

Example

- Given 2.3 milligrams to kg.
- Conversion factor (1 gram/1000 mg)
- 2.3 mg (1 gram/1000 mg) = 0.0023 g
- Conversion factor (1 kg/1000 g)
- 0.0023 g (1 kg/1000 g) = 0.0000023 kg
- = 2.3 x 10^(-6) kg

1 mph to m/s

- 1 mile (5280 feet/mile)(12 inches/1 foot)(2.54 cm/one inch)(1 meter/100 cm) = 1609 m
- 1 hour (60 min/1 hour)(60 sec/1 min) = 3600 s
- 1 mph = 1609 m/3600 s = 0.447 m/s
- (55 mph = 24.6 m/s; 30 mph = 13.4 m/s)