M10 - 1.0 - Conversion Factors (Units!)

How many centimeters around a 400m track?

OR

① $\times 400$

$$\frac{?}{400m} = \frac{100cm}{1m}$$

$\times 400$

$$100cm \times 400 = 40000cm$$

② $$400\cancel{m} \times \frac{100cm}{1\cancel{m}} = 40000cm$$

How many inches in 1m?

$$1\cancel{m} \times \frac{100\cancel{cm}}{1\cancel{m}} \times \frac{1in}{2.54\cancel{cm}} = \frac{100in}{2.54} = 39.37in$$

How many square meters (m^2) in 2 km^2?

$$2\cancel{km^2} \times \frac{1000m}{1\cancel{km}} \times \frac{1000m}{1\cancel{km}} = 2000000m^2$$

Notice: choose a conversion factor that allows you to cross off the units given to get the units you want.

$$\square\ 2m = \square\ 200cm$$

$3m$ $\quad$ $300cm$

Unit Rates

$$\frac{3kg}{\$44.85} = \frac{1kg}{\$14.95} = \frac{\$14.95}{1kg} = \frac{0.07kg}{\$1}$$

How many Litres are in 50 Millilitres?

OR

Attach Prefix Exponent to the Base Unit!

$$50\ mL \times \frac{1\ L}{1000\ mL} = 0.05\ L = 5 \times 10^{-2}\ L$$

Scientific Notation

$$50\ mL \times \frac{10^{-3}\ L}{1\ mL} = 0.05\ L = 5 \times 10^{-2}\ L$$

Metric

Distance

$1cm = 10mm$
$1m = 100cm$
$1km = 1000m$

Millimeter (mm)
Centimeter (cm)
Meter (m)
Kilometer (km)

Metric <-> Imperial

$1in = 2.54cm$
$1m = 3.3ft$
$1ft = 30.48cm$
$1yd = 0.9144m$
$1mi = 1.609\ km$

Imperial

$1ft = 12in$
$1yd = 3ft$
$1yd = 36in$
$1mi = 5280\ ft$
$1mi = 1760yd$

Inch (in)
Foot (ft)
Yard (yd)
Mile (mi)

Prefixes

Kilo $= 10^3 = 1000$
Base $= 10^0 = 1$ ie. meters
Centi $= 10^{-2} = \frac{1}{100} = 0.01$
Milli $= 10^{-3} = \frac{1}{1000} = 0.001$

Mass <-> Volume

$1L = 1kg$
$1ml = 1g$
$1cm^3 = 1mL$

Water*

$$\frac{3000mL}{2000g} = \frac{3L}{2kg}$$

Mass

$1kg = 1000g$
$1t = 1000kg$

Grams (g)
Kilogram (kg)
Tonne Metric (t)

$1kg = 2.2lb$
$1oz = 28.35g$
$1lb = 454g$

$1tn = 2000lb$

Pound (lb)
Tonne Imperial (tn)

Volume

$1L = 1000ml$

Millilitre (mL)
Litre (L)

$1L = 1.06qt$
$1L = 0.26gal$

$1qt = 40oz$
$1gal = 4qt$

*Fluid Ounce (fl oz)

Ounce (oz)
Quart (qt)
Gallon (gal)

Time

$1min = 60s$
$1hr = 60min$
$1days = 24hrs$

Second (s)
Minute (min)
Hour (hr)
Days

Rates: DistanceVolumeTime*

$$\frac{m}{s} \quad \frac{km}{hr} \quad \frac{L}{min} \quad \frac{L}{m}$$