

Unit conversions

$$7 \times 1 = 7$$

$$12 \times 1 = 12$$

⋮

$$\frac{2}{2} = 1 \quad \frac{3}{3} = 1 \quad \dots$$

Convert 15 feet into
yards.

$$1 \text{ yd} = 3 \text{ ft}$$

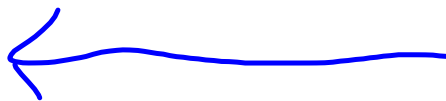
$$\frac{1 \text{ yd}}{3 \text{ ft}}$$

$$= 1$$



$$\frac{3 \text{ ft}}{1 \text{ yd}}$$

$$= 1$$



conversion
factors

Conversion factor -

written as a fraction
but is actually equal
to 1.

Convert 15 ft to yd

$$15 / 3 = 5 \quad \checkmark$$

$$15 \times 3 = 45 \quad \times$$

convert 15 ft to yd

$$\frac{15 \cancel{\text{ft}}}{1} \left(\frac{1 \text{ yd}}{3 \cancel{\text{ft}}} \right) = 5 \text{ yd}$$

$$1 \text{ yd} = 3 \text{ ft}$$

length : meter ^{unprefixed}

Mass : gram

(SI base unit kg)

Metric Prefixes

deca	da	10	1×10^1
hecto	h	100	1×10^2
kilo	k	1000	1×10^3

Mega M 1,000,000 1×10^6

Giga G 1,000,000,000 1×10^9

Tera T 1,000,000,000,000 1×10^{12}

deci d $\frac{1}{10}$ 0.1 1×10^{-1}

centi c $\frac{1}{100}$ 0.01 1×10^{-2}

milli m $\frac{1}{1,000}$ 0.001 1×10^{-3}

Micro μ $\frac{1}{1,000,000}$ 0.000001
 1×10^{-6}

nano n $\frac{1}{1,000,000,000}$
0.000000001 1×10^{-9}

Pico p $\frac{1}{1,000,000,000,000}$
0.0000000000001
 1×10^{-12}

Convert 146 centimeters into meters.

$$1 \text{ cm} = 1 \times 10^{-2} \text{ m}$$

$$1 \text{ m} = 100 \text{ cm} = 1 \times 10^2 \text{ cm}$$

$$\frac{146 \text{ cm}}{1} \left(\frac{1 \times 10^{-2} \text{ m}}{1 \text{ cm}} \right) = 1.46 \text{ m} \text{ by calc.}$$

$$\text{By hand: } 146 \times 10^{-2} \text{ m}$$

↓

$$1.46 \times 10^0 \text{ m}$$

$$= 1.46 \times 1 \text{ m} = 1.46 \text{ m}$$

Convert 21.7 centimeters to millimeters.

$$\frac{21.7 \cancel{\text{cm}}}{1} \left(\frac{? \text{ mm}}{? \cancel{\text{cm}}} \right)$$

What are the numbers that go in front of these units?

$$21.7 \text{ cm} \rightarrow ? \text{ mm}$$

$$\text{cm} \rightarrow \text{mm} \quad ???$$

$$\text{cm} \rightarrow \text{m} \rightarrow \text{mm}$$

$$\frac{21.7 \text{ cm}}{1} \left(\frac{1 \times 10^{-2} \text{ m}}{1 \text{ cm}} \right) \left(\frac{1 \text{ mm}}{1 \times 10^{-3} \text{ m}} \right)$$

$$= 217 \text{ mm}$$

By hand:

$$21.7 \times$$

$$\frac{10^{-2}}{10^{-3}}$$

$$10^{-2 - (-3)}$$

$$10^{-2 + 3}$$

$$10^1$$

$$21.7 \times 10^1$$

$$\rightarrow 2.17 \times 10^2$$