

Significant Digits

① Counting - certain digits + the one uncertain digit

$$122.507 \text{ g} \sim 6 \text{ sd}$$

$$\underline{1.000007} \text{ m} \sim 7 \text{ sd}$$

$$0.00071 \text{ g} \sim 2 \text{ sd}$$

$$6.02 \times 10^{23} \text{ g} \sim 3 \text{ sd}$$

$$52 \text{ m} \sim 2 \text{ sd}$$

$$26000 \text{ km} \sim 2 \text{ sd}$$

Exact #s → counting #s (5 books)
 → conversion factors or definitions
 (1 ft = 12 inches)
 (1 kg = 1000 g)
 ↑
 don't worry about sds

② Calculations

Adding/Subtracting - least precise place value

$$15.2 \text{ g} + 1.0085 \text{ g} + \underline{4} \text{ g} = 20.2085 \text{ g}$$

$$\underline{2.0 \times 10^1} \text{ g} \quad 20 \text{ g}$$

↳ better

Multiplying/Dividing - least number of sds.

$$2.31 \text{ m} \times \underline{4.5} \text{ m} \times 0.8594 \text{ m} = \underline{8.933463} \text{ m}^3$$

3sd 2sd 4sd 2sd

$$\approx 8.9 \text{ m}^3$$

Note about rounding with 5's:

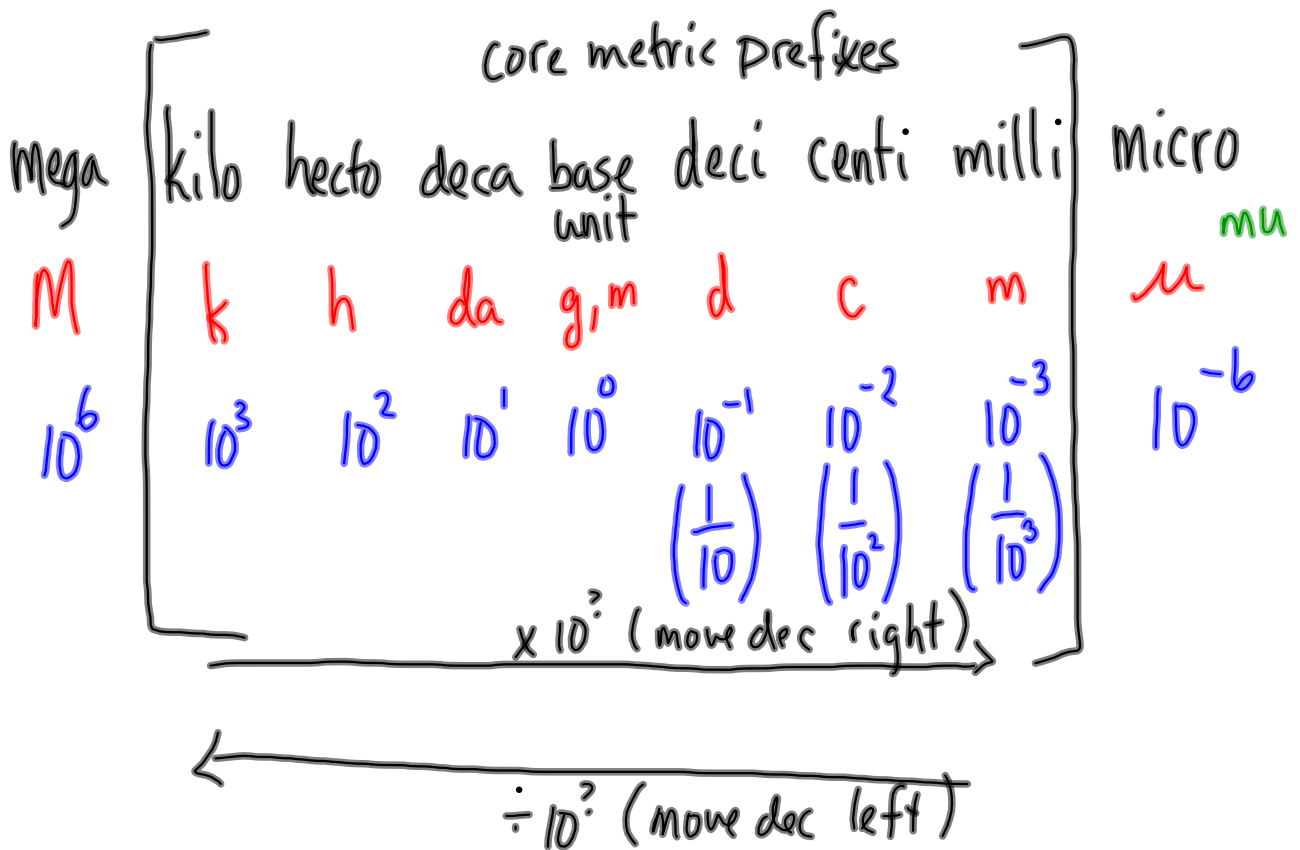
$$8.\underline{3}5 \text{ m} \rightarrow 8.4 \text{ m} \text{ (round up)}$$

$$8.\underline{2}5 \text{ m} \rightarrow 8.2 \text{ m} \text{ (round down)}$$

↳ Round to the even number.

$$\begin{aligned} 3\text{sd} \rightarrow 42.8 \text{ g} &= \underline{48.08988764} \text{ g} \\ 2\text{sd} \rightarrow 0.89 \text{ mL} &= 48 \text{ g/mL} \end{aligned}$$

Metric Conversions



Ways to do Metric Conversions

1. Slide the decimalOK, but sometimes might not be convenient.

$$\overset{0000}{\underbrace{\hspace{1.5cm}}} 52.8 \text{ mg} = 0.0000528 \text{ kg}$$

$$0.\overset{00}{\underbrace{792}} \text{ km} = 79200 \text{ cm}$$

$$\overset{000000}{\underbrace{\hspace{1.5cm}}} 425 \text{ nm} = 0.000000425 \text{ m} \quad (4.25 \times 10^{-7} \text{ m})$$

core
base d c m } n n
m

2. Use the prefix (if you are converting to the base unit)

$$685 \text{ n} \text{ m} = 685 \times 10^{-9} \text{ m}$$

$$\begin{matrix} \uparrow \\ n = 10^{-9} \end{matrix} = 6.85 \times 10^{-7} \text{ m}$$

$$85.3 \text{ T} \text{ m} = 85.3 \times 10^{12} \text{ m}$$

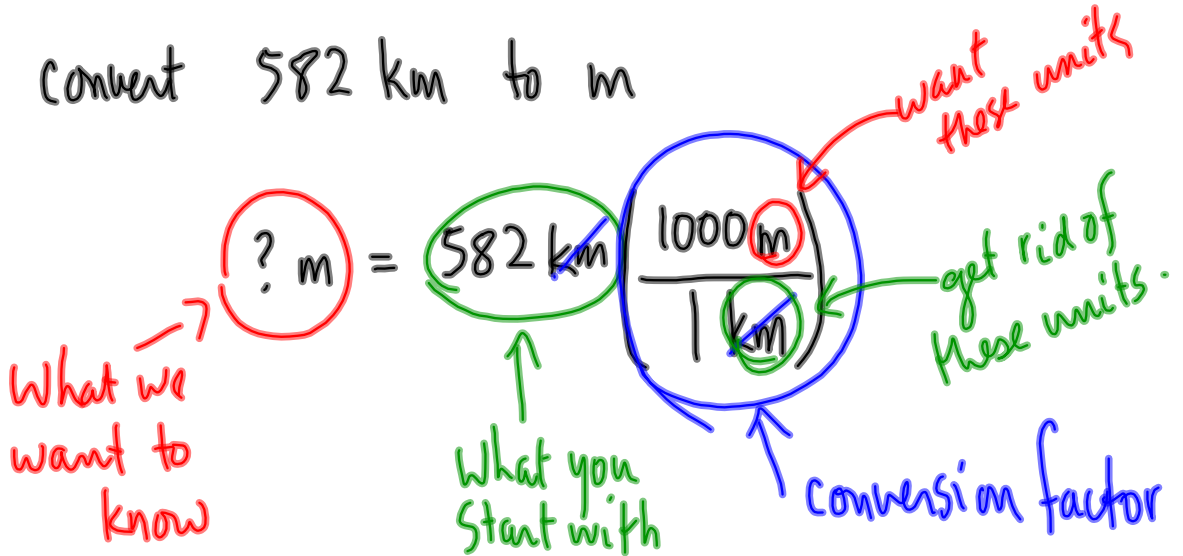
$$\begin{matrix} \uparrow \\ 10^{12} \end{matrix} = 8.53 \times 10^{13} \text{ m}$$

$$0.00291 \text{ m} \text{ C} = 0.00291 \times 10^{-6} \text{ C}$$

$$\begin{matrix} \uparrow \\ 10^{-6} \end{matrix} = 2.91 \times 10^{-9} \text{ C}$$

3. Factor Label Method (use conversion factors)

convert 582 km to m



$$? \text{ m} = 582000 \text{ m}$$

Example

381 km to [?]cm

$$? \text{ cm} = 381 \text{ km} \left(\frac{1000 \text{ m}}{1 \text{ km}} \right) \left(\frac{100 \text{ cm}}{1 \text{ m}} \right)$$

$$? \text{ cm} = 38100000 \text{ cm}$$