

DIMENSIONAL ANALYSIS

- ❑ A systematic way to convert measurements from one type of unit to another.
- ❑ **Conversion Factor** is an equality that relate two units. Can be written as two fractions

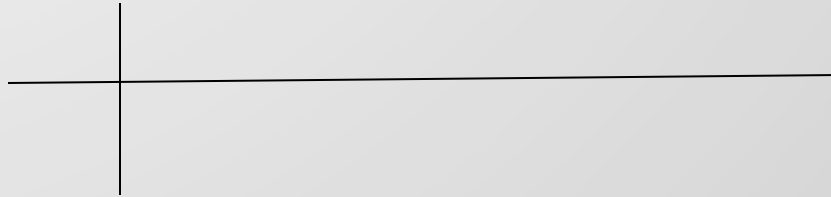
Ex. $1 \text{ min} = 60 \text{ sec}$

Metric System

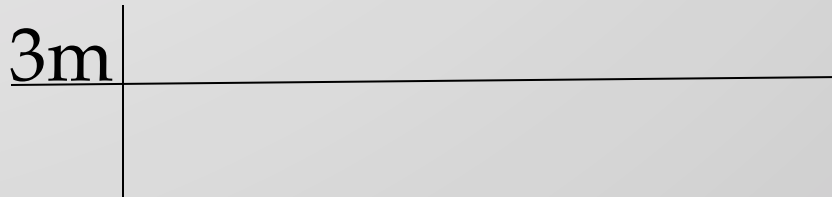
- ▣ Know the following prefixes:
kilo, centi, milli, micro
- ▣ $K \rightarrow H \rightarrow D \rightarrow \text{base} \rightarrow d \rightarrow c \rightarrow m \rightarrow \mu$
- ▣ Metric conversions (same is true for any base):
 - $1000 \text{ g} = 1 \text{ Kg}$
 - $100 \text{ cg} = 1 \text{ g}$
 - $1000 \text{ mg} = 1 \text{ g}$
 - $1 \times 10^6 \mu\text{g} = 1 \text{ g}$

Problem: How many inches are in 3 m?

- ▣ Step 1: Determine what is known and what is unknown.
 - Known: 3m Unknown: ? in
- ▣ Step 2: Write a horizontal line with one hash mark at the left.



- ▣ Step 3: Put known in the top left corner.



Problem: How many inches are in 3 m?

- ▣ Step 4: Determine what conversion factor is known

$$1\text{ in} = 2.54\text{ cm}$$

- ▣ Step 5: Start step by step, adding into the boxes, so that unwanted units cancel out.

3m	100 cm	1 in
	1 m	2.54 cm

- ▣ Step 6: Do the math and add correct unit.
(think of it as a giant fraction!)

$$(3 \times 100)/2.54 = 118\text{ in}$$

How many seconds are in one day?

How many seconds are in one day?

$$\begin{array}{c|c|c|c} 1 \text{ day} & 24 \text{ hr} & 60 \text{ min} & 60 \text{ sec} \\ \hline & 1 \text{ day} & 1 \text{ hr} & 1 \text{ min} \end{array} = 86,400 \text{ sec}$$

Convert 33 mi/h to m/min.

Challenge question

- ▣ The concentration of carbon monoxide in an urban apartment is $48 \mu\text{g}/\text{m}^3$. What mass in grams is present in a room measuring $11.0 \text{ ft} \times 11.5 \text{ ft} \times 20.5 \text{ ft}$?
- ▣ (Hint: convert to g/ft^3 first)
- ▣ $1 \text{ in}^3 = (2.54)^3 \text{ cm}^3$
- ▣ $12^3 \text{ in}^3 = 1\text{ft}^3$