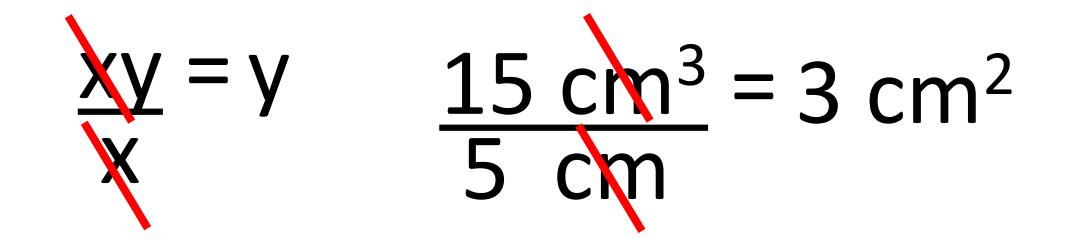
# N2 – Dimensional Analysis Also known as "Unit Conversion" **Target: I can use dimensional analysis** to convert not just the numbers in a measurement but also the units

Link to YouTube Presentation: https://youtu.be/fhj5d5zZa-4

### **Remember - Canceling Units**

One on top cancels with one on the bottom



# **Conversion Factors**

A relationship between how many of one thing equals how many of another thing

#### 12in = 1ft 24hrs = 1,440min 1000m = 1km

You can rewrite as fractions:

| <u>12in</u> =1 | <u>    24hr    </u> = 1 | <u>1km</u> =1 |
|----------------|-------------------------|---------------|
| 1ft            | 1,440min                | <b>1000m</b>  |

# **Conversion Factors**

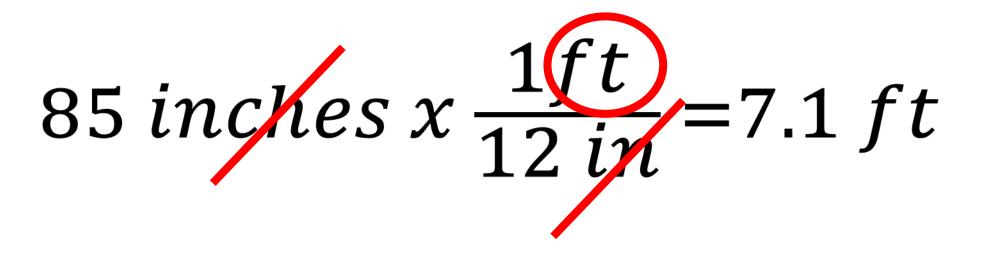
### You can flip conversion factors too

12in = 1ft 24hrs = 1,440min

Just depends on what you are doing

# **Using Conversion Factors**

If you multiply by a conversion factor, you are just multiplying by 1...your answer LOOKS DIFFERENT because of the unit but is the same SIZE MEASURMENT. (12in/1ft or 1ft/12in)



# **Using Conversion Factors**

You can use multiple conversion factors – "a frog hopping across a pond on lily pads"

# Convert 3.6mi into cm. (1cm=0.3937in, 12in=1ft, 1mi=5,280ft) $3.6mi x \frac{5280 ft}{1 mi} x \frac{12in}{1 ft} x \frac{1cm}{0.3937in} = 5.8x10^5 cm$

### You try one...

**Convert 15years into minutes** 

$$15yrs x \frac{365days}{1 year} x \frac{24hrs}{1 day} x \frac{60min}{1hr} = 7.9x10^6 min$$

# Line Method

Keeps work neat, tidy, takes less space, easier to grade, a very typical way to show conversions in chemistry. I will always use the line method!

#### **Convert 15years into minutes**

$$\frac{15 yrs x \frac{365 days}{1 yr} x \frac{24 hrs}{1 day} x \frac{60 min}{1 hr}}{1 hr} = 7.9 x 10^{6} min}$$

$$\frac{15 yrs}{100} \frac{365 days}{100} \frac{24 hr}{100} \frac{60 min}{100} = 7.9 x 10^{6} min}{1 yr}$$

### **Dimensional Analysis with "Derived/Double Units"**

Some units are combinations of two or more other units. Like miles per hour (mi/hr). Fix the top unit, then go back and fix the bottom unit **Convert 20mi/hr into in/sec.** 

20mi5280ft12m1hr1min
$$= 352 \frac{in}{sec}$$
1hr1mi1ft60min60ced

### You try one...

Convert 30km/day into in/min (1m=39.37in)

30km
 1000m
 39.37in
 1day
 1hr
 
$$=$$
 820  $\frac{in}{min}$ 

 1day
 1km
 1m
 24hr
 60min

### Dimensional Analysis - Squared, Cubed (etc) Units

cm<sup>2</sup>

If you have a unit that is raised to a power, then the conversion factors used will also need to be raised to that power. The number AND the unit.

1 in = 2.54cm but  $1in^2 = (2.54cm)^2$ 1 ft = 12in but  $1ft^3 = (12in)^3$ 

$$\frac{5in^2}{(2.54cm)^2} = 32.258$$

### YouTube Link to Presentation

https://youtu.be/fhj5d5zZa-4