Unit 1 Review

LAB SAFETY, LAB EQUIPMENT, LAB TECHNIQUES, SIGNIFICANT FIGURES, SCIENTIFIC NOTATION, ROUNDING NUMBERS, RECORDING MEASUREMENTS, ACCURACY & PRECISION, INTERPRETING GRAPHS, AND DIMENSIONAL ANALYSIS

Lab Safety

- **MSDS or SDS** - material safety data sheet
- Hot glass looks like cold glass
- Ask if you get hurt, need help, or don't know
- If teacher assigns pre-lab instructions, **FOLLOW THEM**
- If teacher is explaining procedure, **LISTEN** and ask questions if you don't understand

Beaker

- Not very precise
- Tick marks jump by 20 – 25 ml
- Must use whole numbers
- NO DECIMALS (ex. 75 ml)
- Used to hold solids and liquids
- Can hold chemical reactions

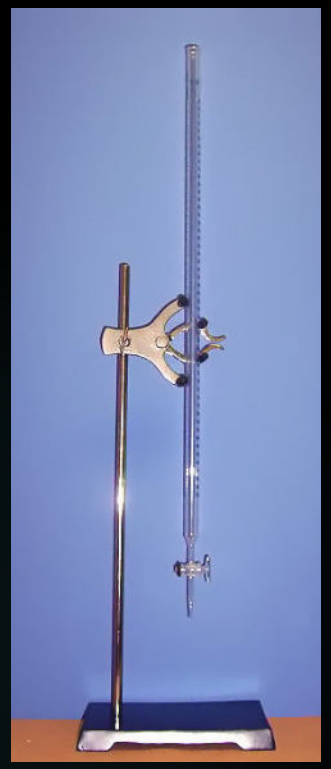
Erlenmeyer Flask

- Not very precise
- Tick marks jump by 20 – 25 ml
- Must use whole numbers
- NO DECIMALS (ex. 75 ml)
- Used to hold solids and liquids
- Can hold chemical reactions
- Narrow opening prevents splashing

Graduated Cylinder

- Precise to 1 decimal place
- Tick marks separated by 1ml
- Must use ONE decimal (25.0 ml)
- Measures volume of liquids
- Measures volume of solids by displacement

Burette



- Precise to 2 decimal place
- Tick marks separated by 0.1ml
- Must use TWO decimal (22.20 ml)
- Measures volume of liquids
- Used for titrating acids and bases

Evaporating Dish

- Shallow white porcelain bowl
- Wide opening with pour spout
- Used to separate solids and liquids
- Liquids turn into gas
- Can be used at room temperature
- Involves passing air over surface
- Can be heating to speed process

Crucible & Lid

- Tall white porcelain bowl with lid
- Heated at high temperatures
- Liquids turn into gas
- Lid fits loosely to let gas escape
- Cooled to measure solids

Wire Gauze

- Thick metal screen
- White insulating circle in center
- Used to SPREAD OUT heat
- Supports GLASS over flame

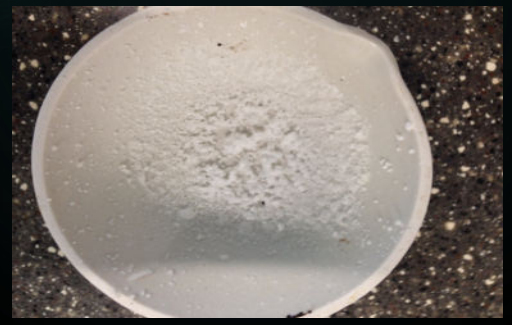
Clay Triangle

- Clay tubes in triangle shape
- Empty in center
- Used for DIRECT heat
- Supports CRUCIBLE over flame

Filtration

- Separates solids from liquids
- Larger **particles** say behind
- **Residue** remains in filter paper
- **Filtrate** leaks into beaker below

Evaporation



- Separates solids from liquids
- Liquids turn into gas
- Solids form crystals as they dry out
- Can occur at room temperature
- Wind speeds up process
- Heat speeds up process

Chromatography

- Chroma = Color
- Pigment = ink color
- Uses a solvent
- Solubility = dissolved

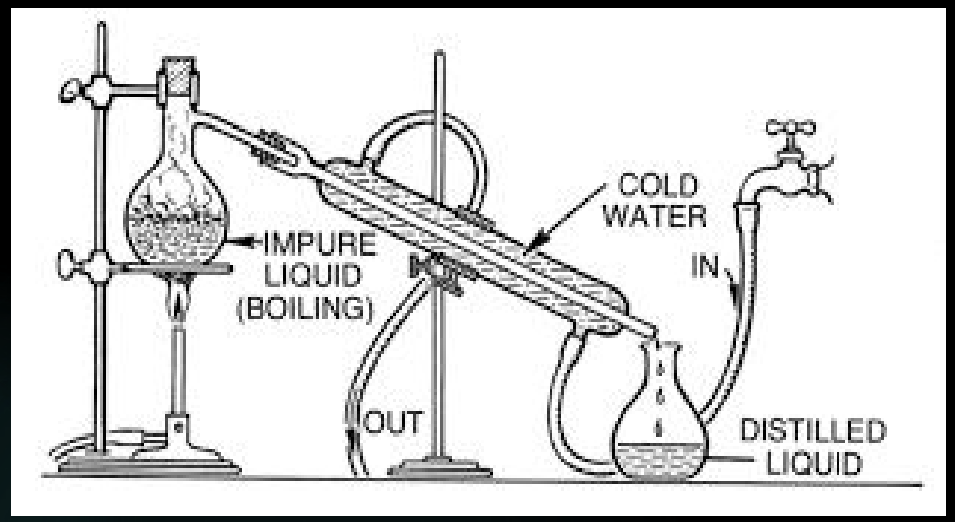
- Solids are separated based on solubility
- More soluble solids travel higher up filter paper

Decanting

- Separates based on **DENSITY**
- Separates solids from liquids
- Separates liquid from liquid
- It's the act of **POURING**

- A **glass stir rod** can be used to help direct the top liquid into the other beaker

Distillation



- Uses heat to separate **homogeneous liquids**
- Separates liquids based on **different boiling points**

- **Lower boiling point** evaporates first
- Distilled gas **condenses** and liquid is collected in new container

Significant Figures

- Numbers **1 – 9** are **ALWAYS**
- Zeros **IN FRONT** of a number are **NEVER**
- Zeros **IN BETWEEN** are **ALWAYS**
- Zeros **AT THE END** are **ONLY IF** it has a **DECIMAL**

Sig Figs & Scientific Notation

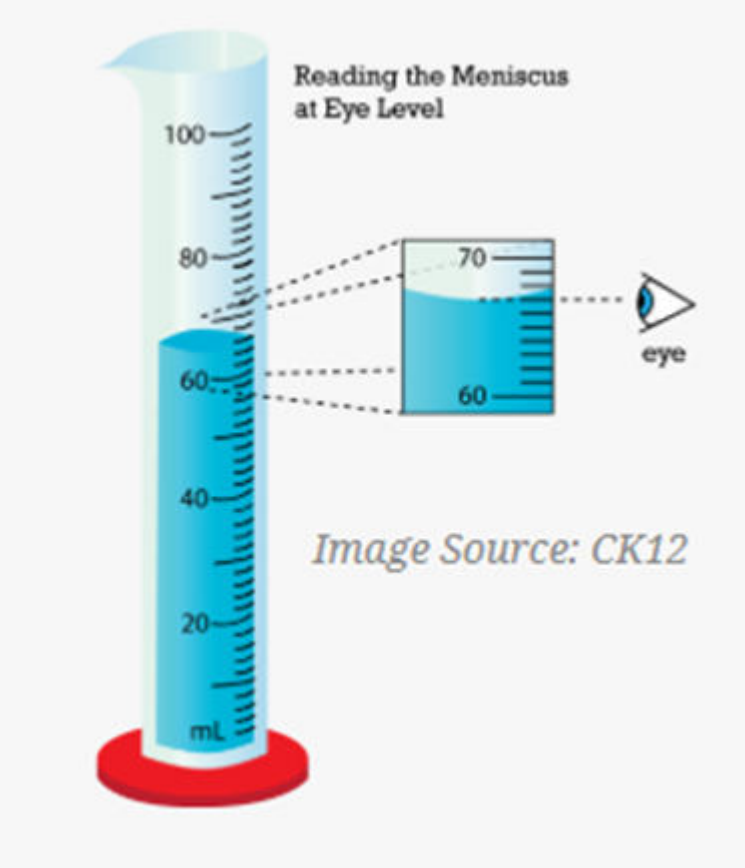
Original	Sig Figs	Scientific Notation
56789		
0.001		
2020		
0.05090		
830000		

Rounding to 3 Sig Figs

Original	Cutoff	Rounded
56739		
0.3899		
130.785		
0.02634		
3995		

Recording Measurements

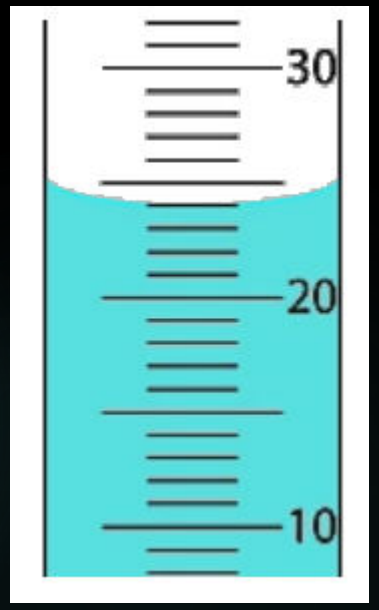
- Record **tick marks** you can see and add **1 more**!



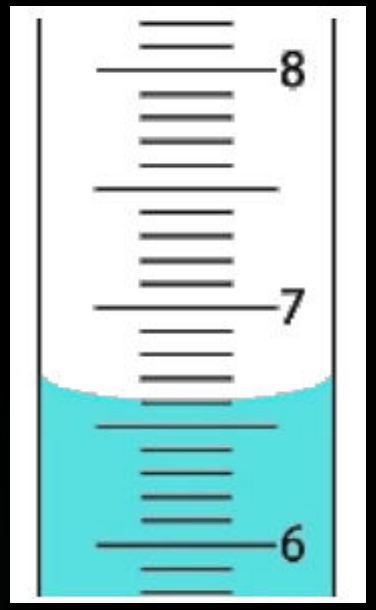
- You can see the **67th** tick mark, so you must record to the measurement to 67.**0** ml
- You know the **accuracy** of the front digits, but you must guess the **precision** of the last digit

Recording Measurements

- Graduated Cylinders

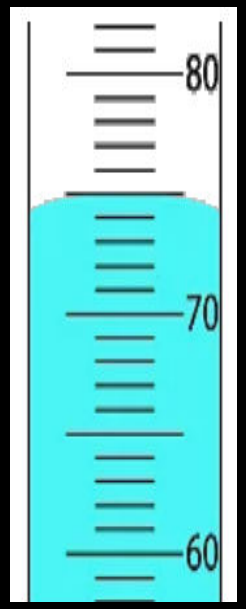


24.0 ml

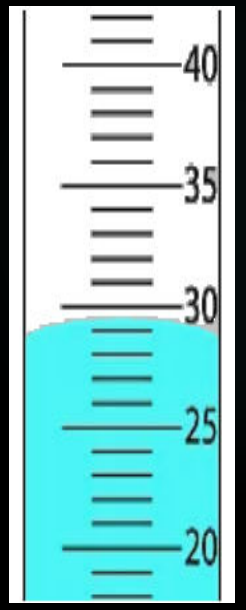


6.60 ml

Thermometers



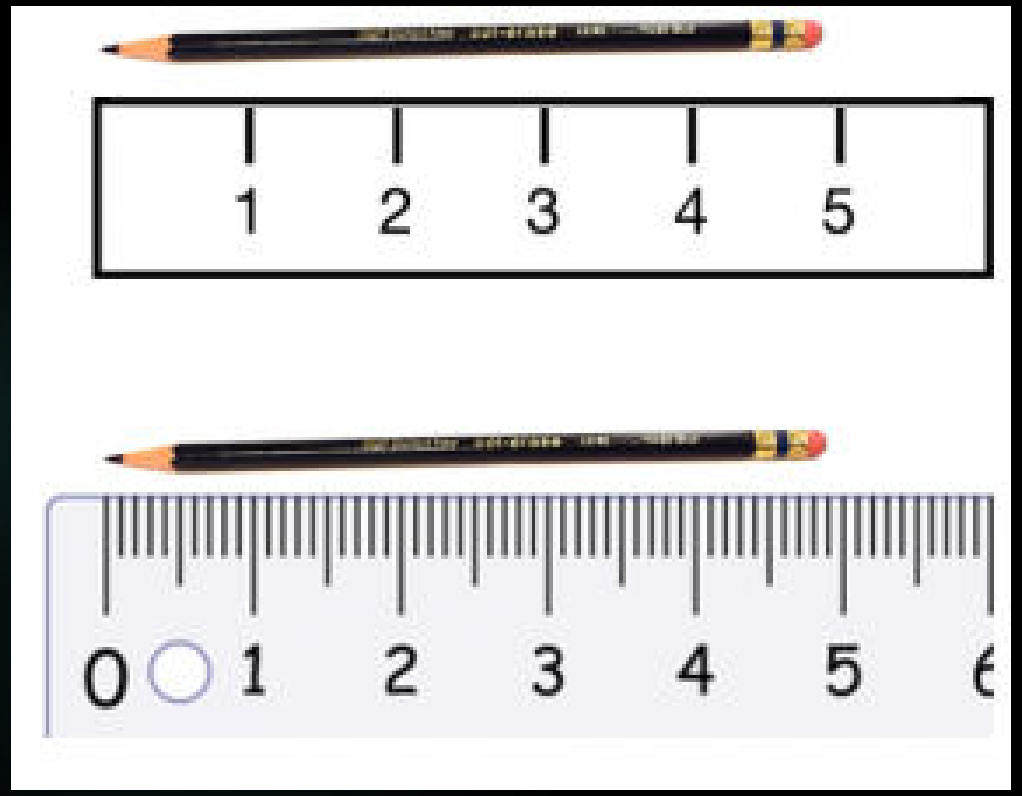
75.0 °



29.5 °

Recording Measurements

- When using a ruler, measure in centimeters (cm).



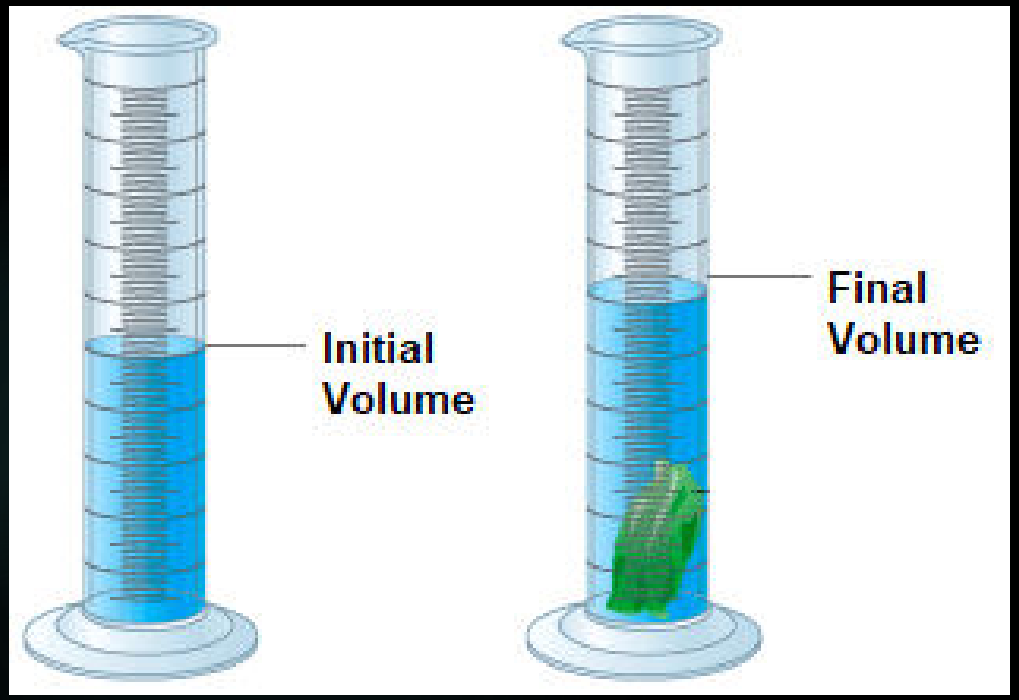
4.9 cm

4.90 cm

Notice that you can only see the **4** on the top ruler but on the bottom ruler you can see the **4** and the **.9** tick marks. You must add **1 digit** to show the level of precision.

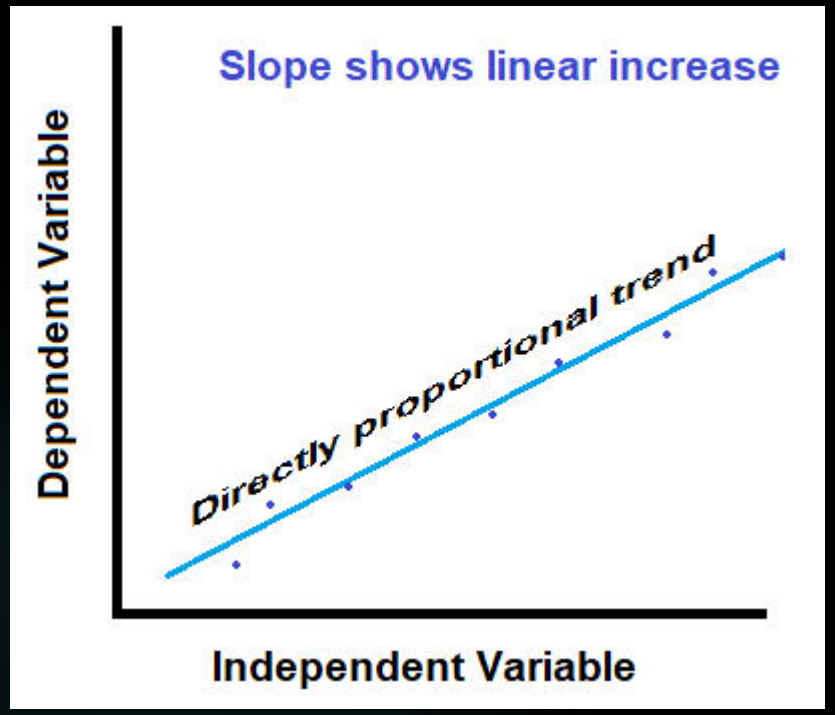
Density by Displacement

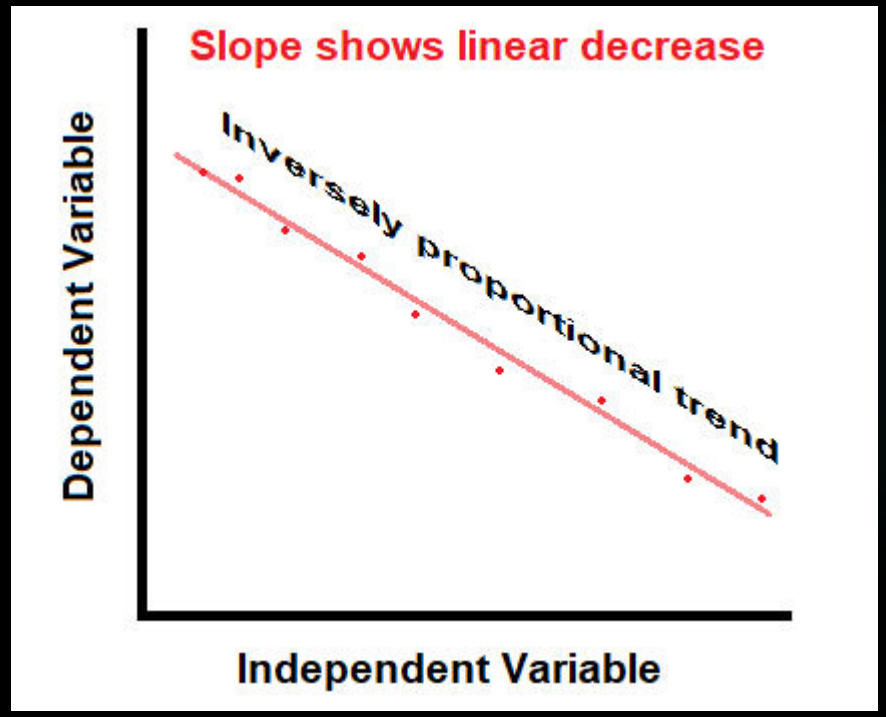
- Volume of **solid = final** volume of liquid **– initial** volume of liquid



- Remember to record tick marks you see plus add **1 more digit**.
- For **Honors Test**, you choose intervals! Do you want to count by 1's, 5's, or 10's, etc.
- **Number of decimals** required depends on type of interval.

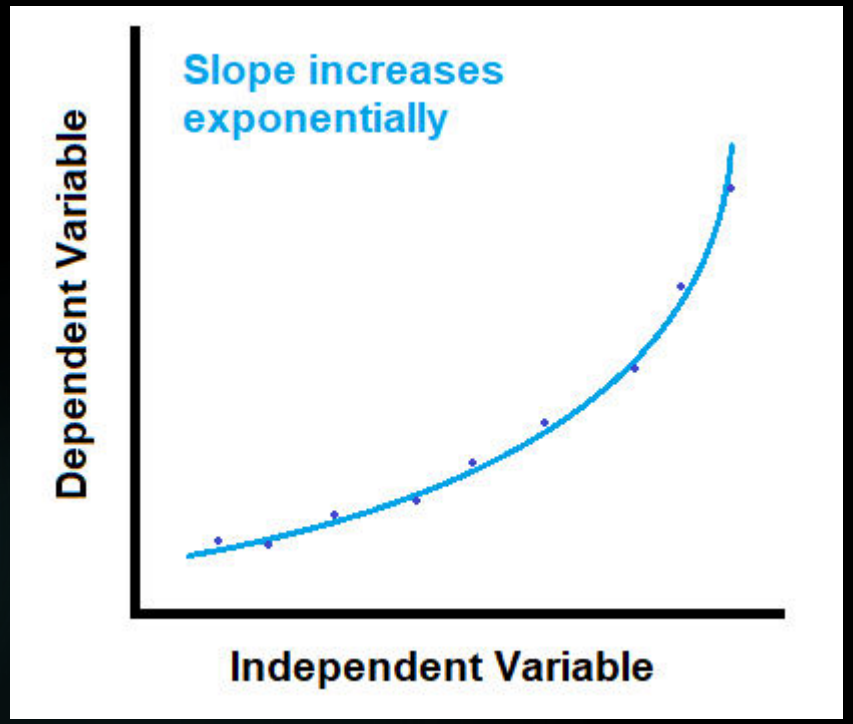
Interpreting Graphs

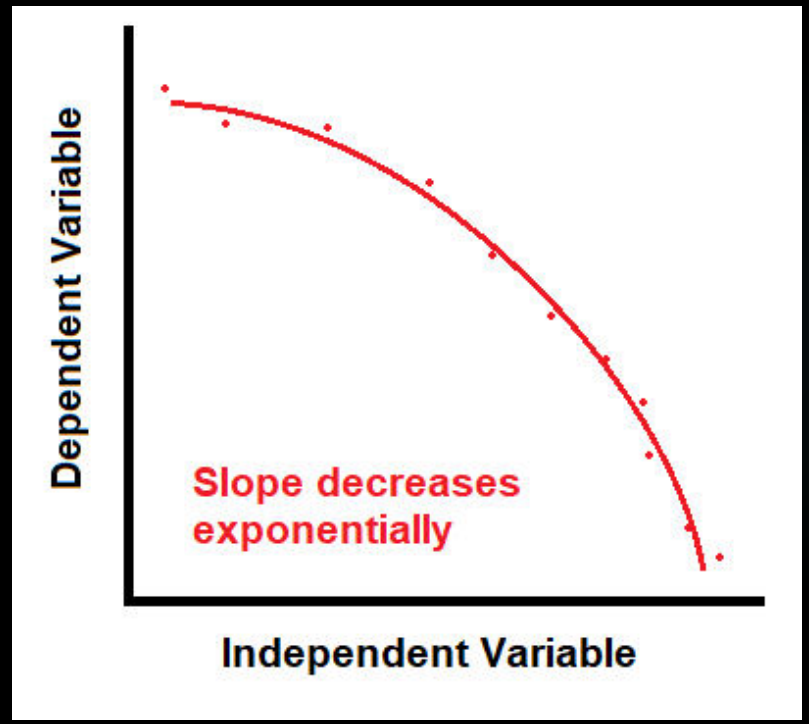




Linear means **constant** rate of change.
Trend line is based on **y = mx + b.**

Interpreting Graphs



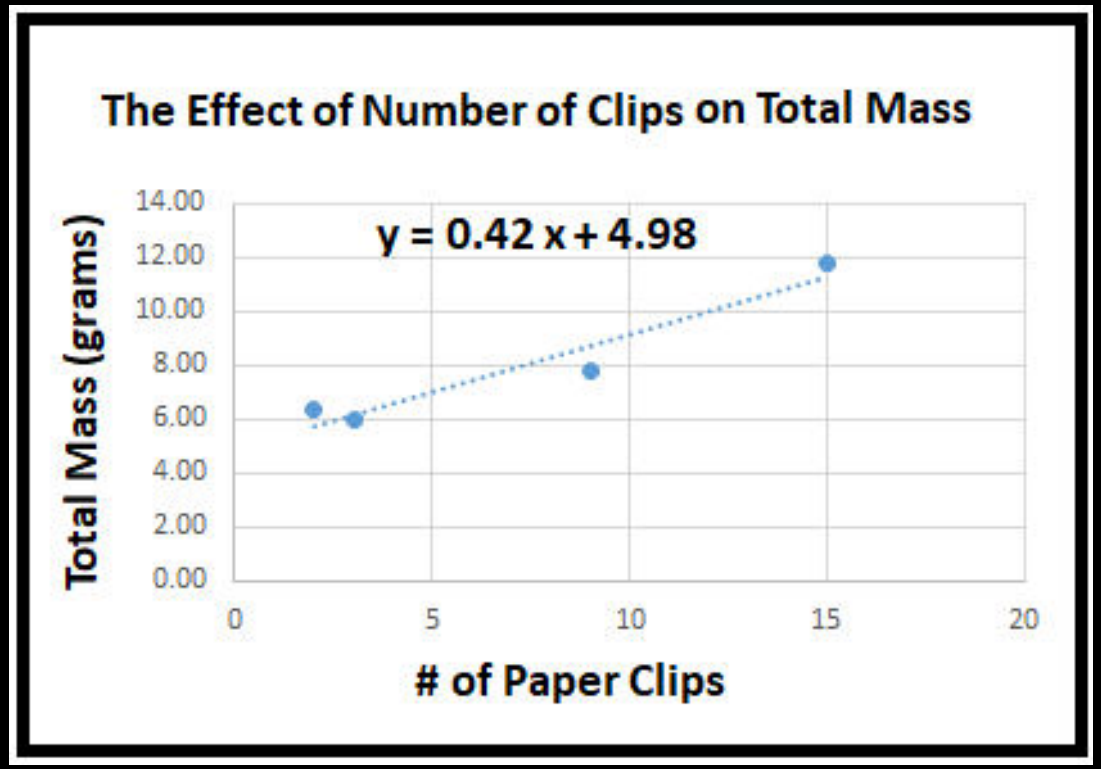


Non- linear means **varying** rate of change.
Trend line is based on **exponential curve**.

Interpreting Graphs

What does the slope represent?

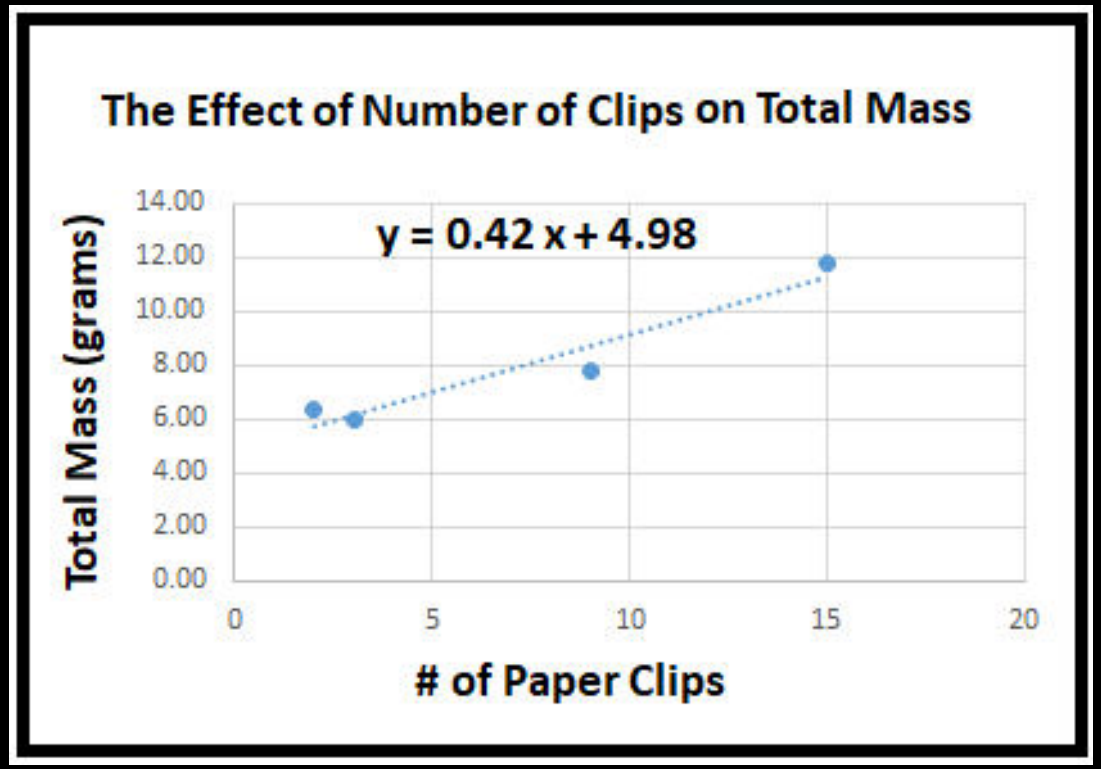
- Slope is the "m" in y = **m**x + b
- Slope = $\frac{y_2 - y_1}{x_2 - x_1}$
- Slope is defined as "**y per x**"
- For this graph, the slope means the **average** mass per 1 paper clip is **0.42**grams



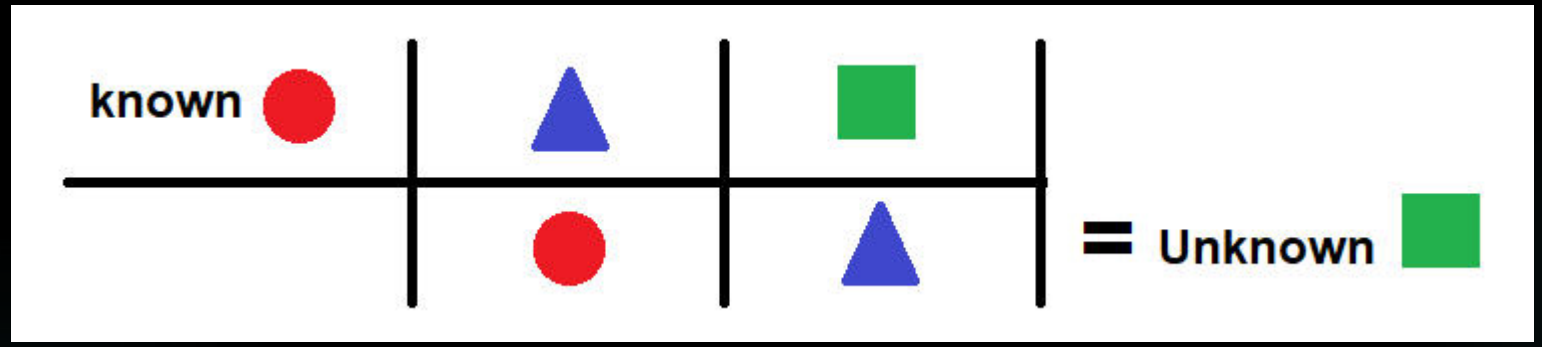
Interpreting Graphs

What does the y-intercept represent?

- Y-intercept is the "b" in y = mx + **b**
- Y-intercept occurs **when x = 0**
- For this graph, the y-intercept shows mass of **empty container** is **4.98 g**

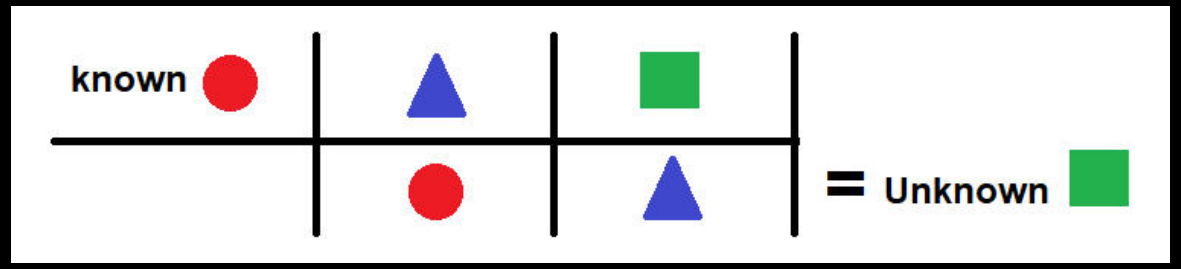


Dimensional Analysis



- Units must cancel **diagonally** to the right
- Same unit goes on the **bottom**.
- New unit goes on the **top**.
- Numbers can only be used **ONCE**!
- If two numbers are the same, they have **different meanings**!!!

Dimensional Analysis



$$\frac{3500\ cm}{1}$$

1 km

100,000 cm

0.035 km

$$\frac{7.20\ km}{1}$$

1,000,000,000 μm

1 km

7.20 x 10⁹ μm

Mega

gap

gap

kilo

hecta

deca

base

deci

centi

milli

gap

gap

micro

nano

pico

Dimensional Analysis

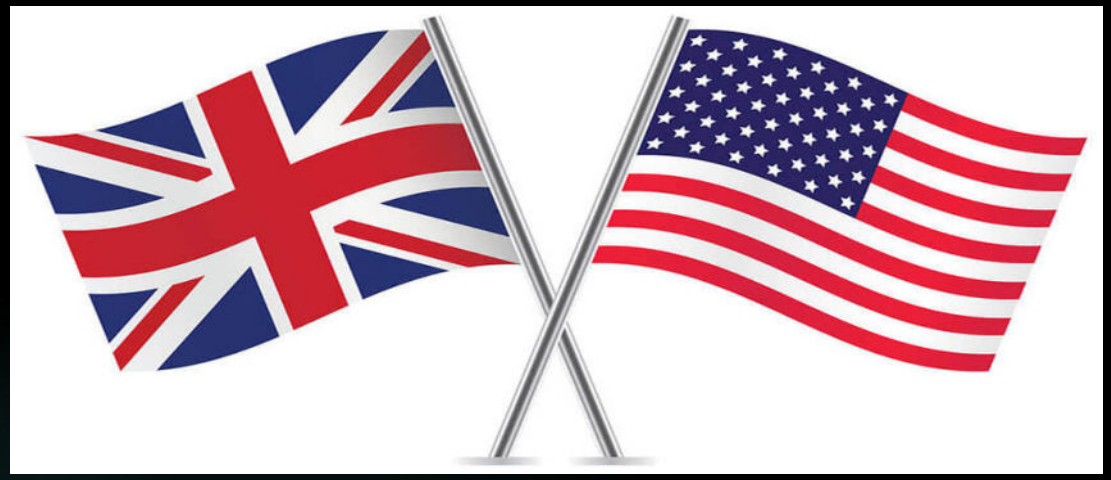
If squaring or cubing units, remember to do it for all conversions!

$$\frac{2.5\ \text{cm}^2}{1}\left|\frac{(1)^2}{(100)^2}\ \frac{(\text{m})^2}{(\text{cm})^2}\right. = 2.5 \times 10^{-6}\ \text{m}^2$$

$$\frac{21.0\ \text{yd}^3}{1}\left|\frac{(3)^3}{(1)^3}\ \frac{(\text{ft})^3}{(\text{yd})^3}\right. = 567\ \text{ft}^3$$

Mega
gap
gap
kilo
hecta
deca
base
deci
centi
milli
gap
gap
micro
nano
pico

Dimensional Analysis



English to Metric Conversions will be given… no need to memorize… just know how to set up the pattern.

How many centimeters are in 1.00 mile? (Hint: 2.54 cm = 1in)

$$\frac{1.00\ \text{mile}}{1} \left| \frac{5,280\ \text{feet}}{1\ \text{mile}} \right. \left| \frac{12\ \text{inches}}{1\ \text{foot}} \right. \left| \frac{2.54\ \text{cm}}{1\ \text{inch}} \right. = 1.61 \times 10^{5}\ \text{cm}$$