Designing an Experiment

Variables

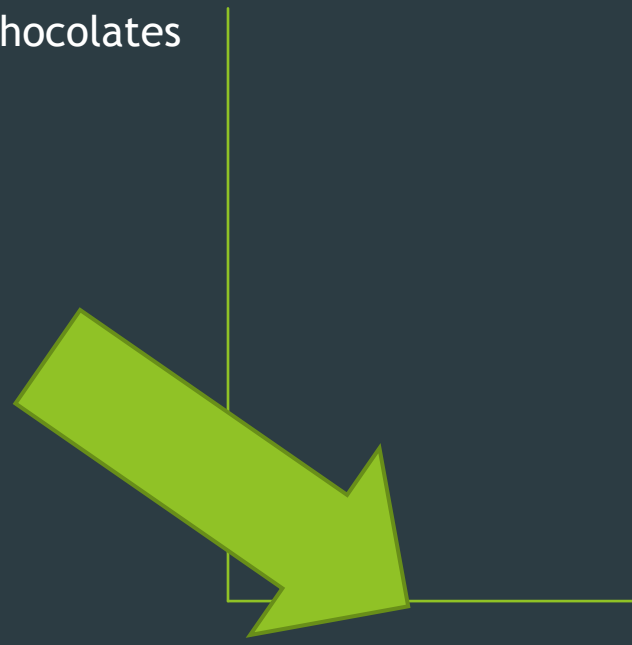
- We call the parts of an experiment that can change **variables**
- There are three different types of Variables
  - Independent
  - Dependent
  - Controls

Independent Variables

- Independent variables are tested but we CANNOT change them over the course of the experiment
  - Ex. Distance, time
- Goes on the y-axis

Dependent Variables

- Dependent variables are tested and we CAN change them over the course of the experiment. These are the results!
  - Ex. Speed, weight, number of chocolates
- Goes on the x-axis



Controls

- Controls are things we keep constant throughout an experiment so that they do not affect results
  - Ex. amount of material you're testing, time the experiment lasts, temperature of testing environment

Let’s experiment with soap…

Measuring and Estimating

Measuring Mass

- Mass is the amount of stuff in an object.
- The more mass an object has the heavier it is
- Measured mostly in grams, kilograms

Triple Beam Balance

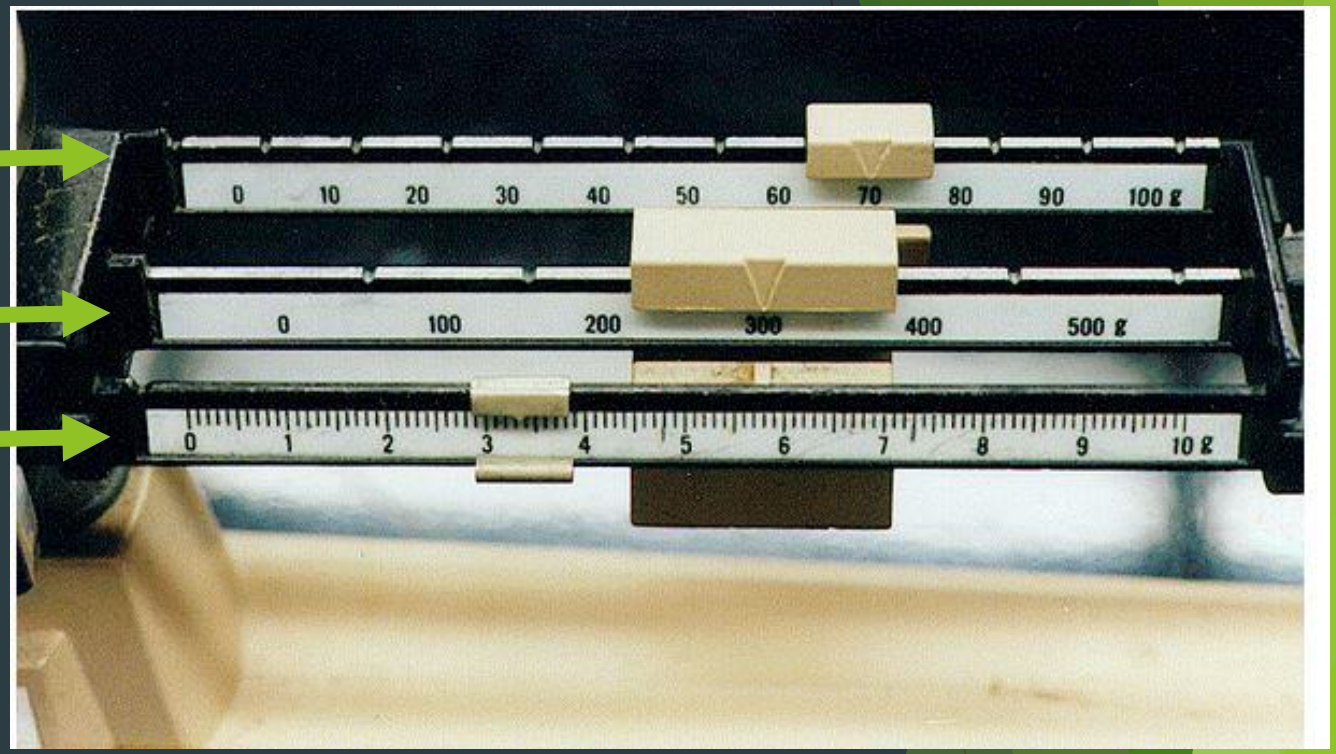
- Move all the weights to zero on each of the three beams- make sure the pointer is straight and level
- Place the object you want to measure carefully on the pan (the flat part of the scale)
- Beginning with the largest weight, the 100 gram beam, move it over one notch at a time.
- When the pointer falls below the level mark move the weight one back to the notch where the pointer was just above the level mark.
- Repeat this process with the middle weight that is on the 10 gram beam.
- Adjust the 1 gram beam one at a time until the pointer is on the level mark.
- Read the mark on each beam and add them together to find the total weight of the object.

Reading a triple beam balance

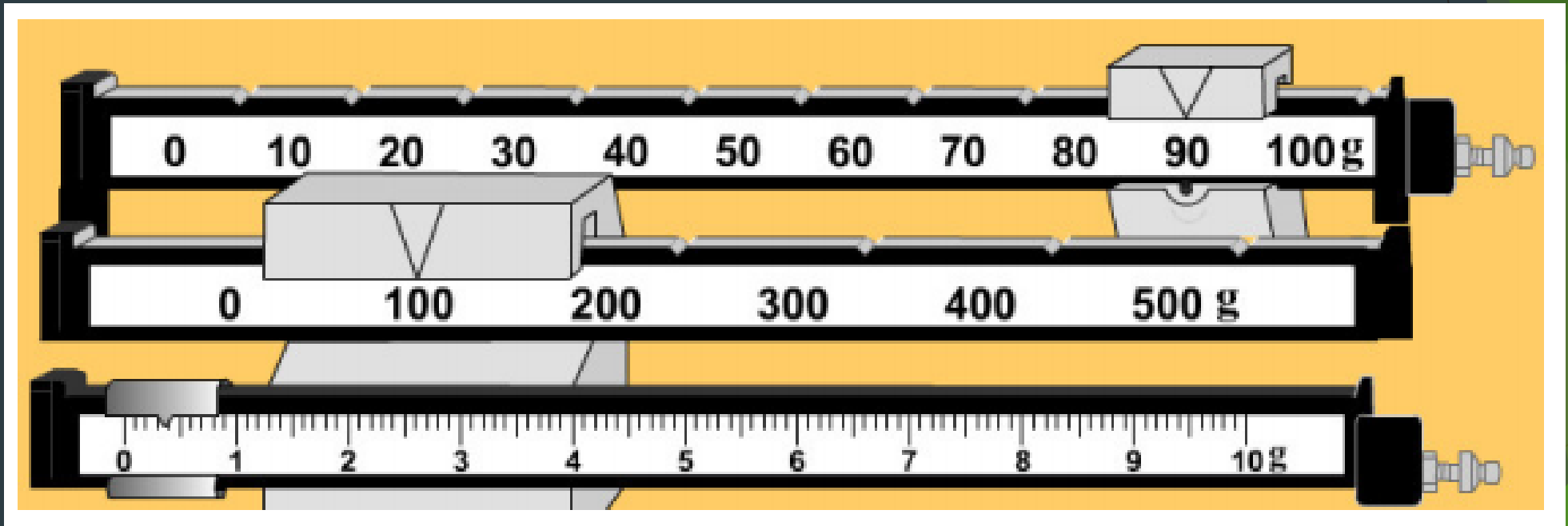
Adjust this one **second**

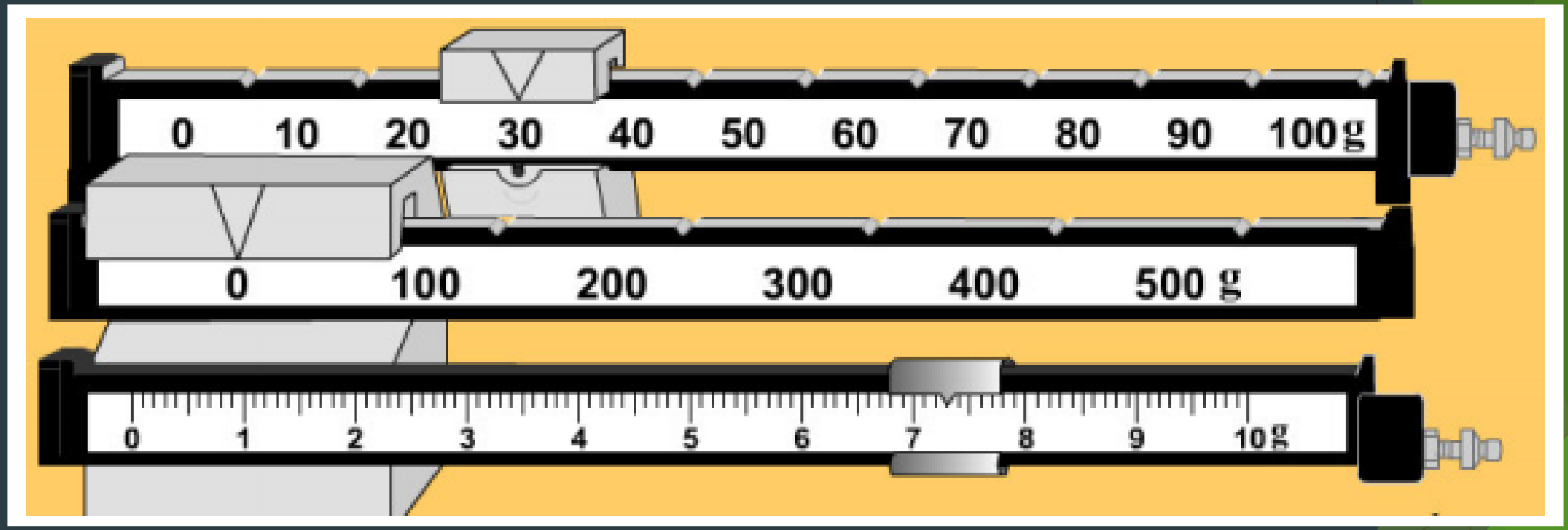
Adjust this one **first**

Adjust this one **third**



Let’s practice reading a triple beam balance…

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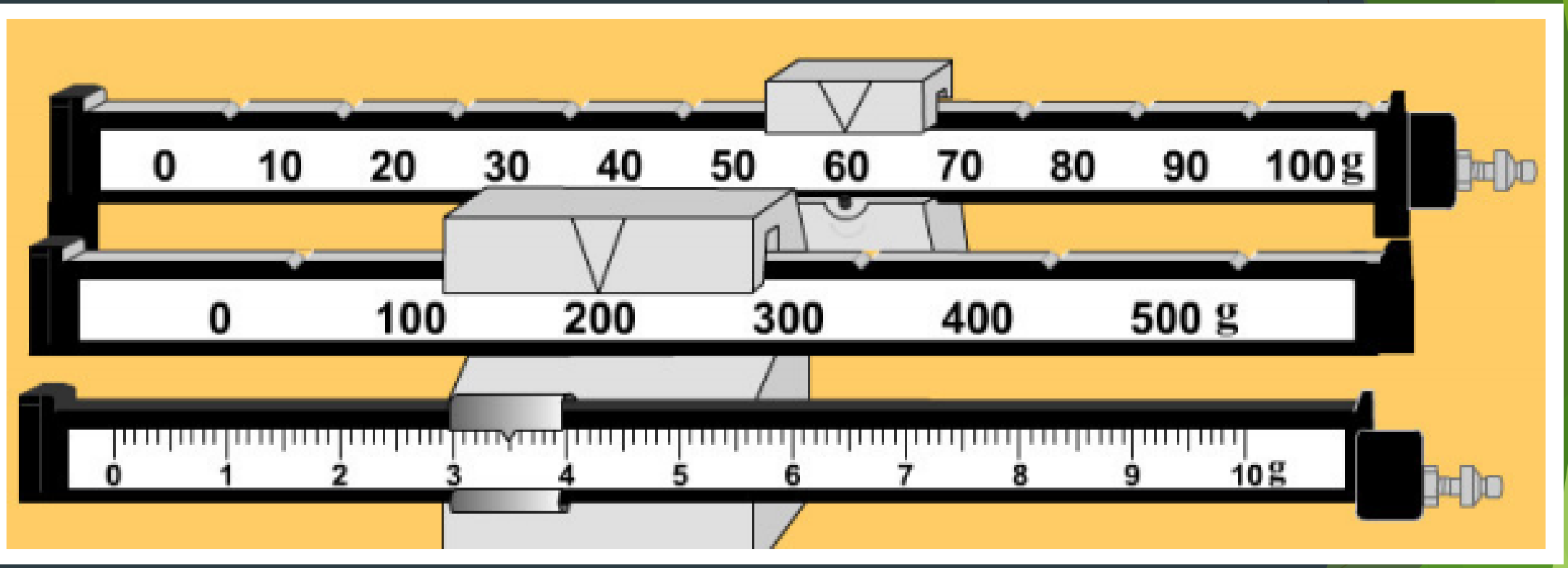
0 100 200 300 400 500 g
0 1 2 3 4 5 6 7 8 9 10 g

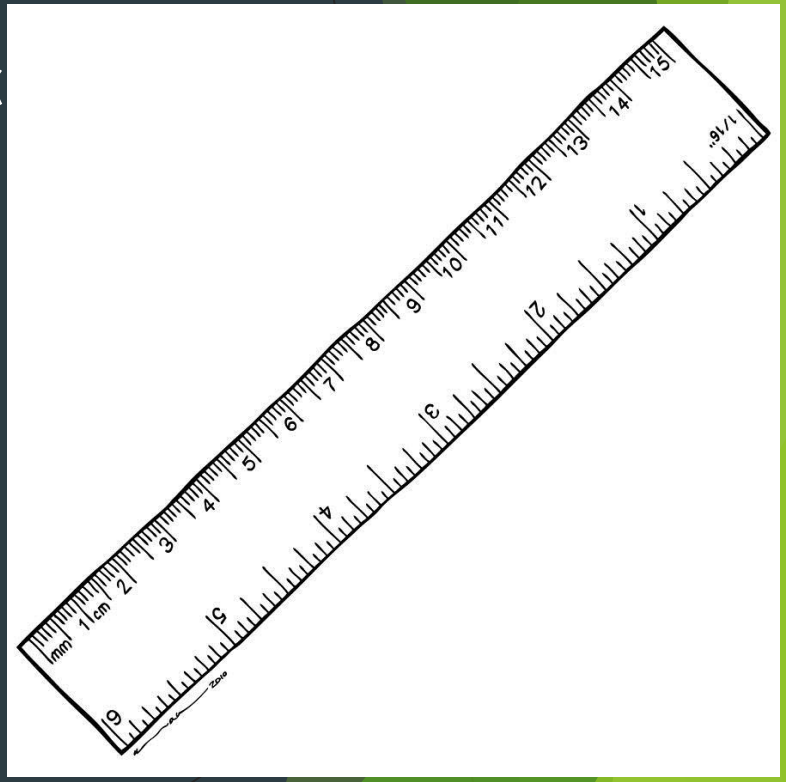

0 10 20 30 40 50 60 70 80 90 100 g
0 100 200 300 400 500 g
0 1 2 3 4 5 6 7 8 9 10 g

Measuring Length

- Length is how far away the ends of an objec when

  measured on the longest side
- The more distance between ends the longer
- Measured most commonly in science are

  meters (m) and centimeters (cm)



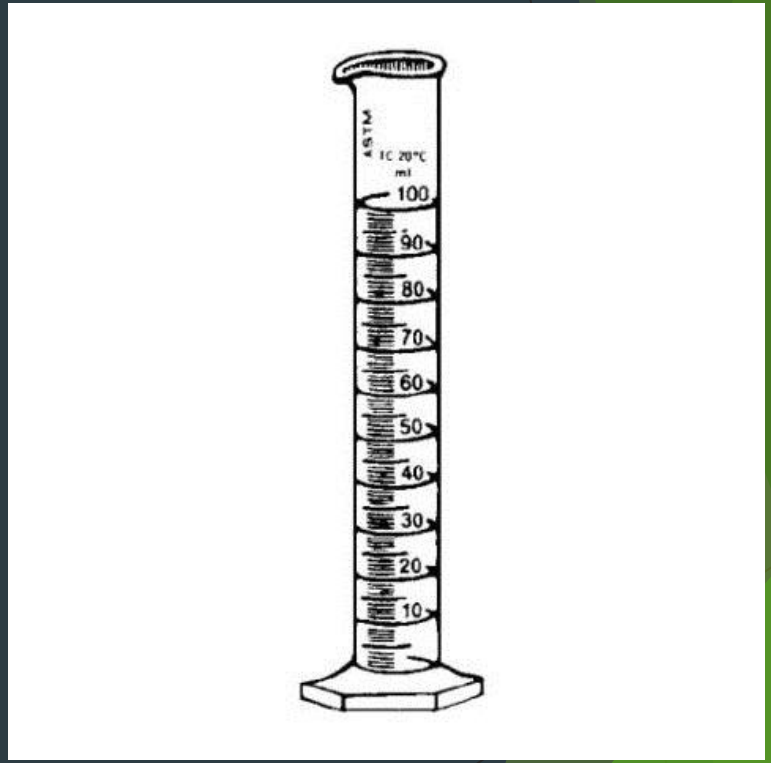
How to measure length

- Make sure that the zero mark on the ruler lines up with the end of the object you're measuring. NOT THE END OF THE RULER

- For science purposes always measure in meter units (mm, cm, m, km)

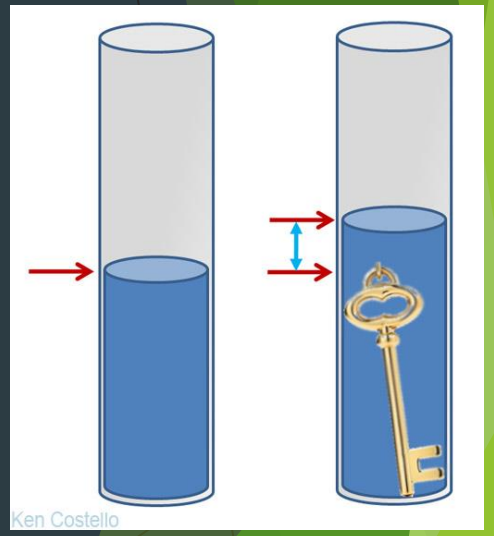
Measuring Volume

- How much space an object takes up
- Typically the larger the object the greater the volume
- Measured in many units the most common in science are mL, cm3



Measuring Volume- Water Displacement

- Fill a graduated cylinder up to a nice rounded amount (50mL, 100mL) that you're sure will cover the object you're finding the volume of
- Then place the object in the graduated cylinder with the water
- Measure the volume in the graduated cylinder with the marble in the water and record the difference between the volume with the marble and the volume without it
- The amount of water displaced (moved) tells you the volume of the object.



Practice measuring volume with water displacement