DIVING DEEPER INTO DENSITY

DENSITY (BY THE BOOK!):

The amount of mass of a substance in a given volume; the mass per unit volume.

DENSITY (BY ME)!

- The amount = How much
- of mass = matter (stuff)
- ~~of a substance = something~~
- in a given volume = is in a certain space

THE FORMULA(S) TO CALCULATE DENSITY

- A formula is a “math sentence”.
- How do you find the volume of a rectangular prism?
  - What do you say?
    - Volume is length times width times height.
  - How do you write it mathematically?
    - V = l x w x h

AND….

- Density is mass per unit volume, what is the FORMULA?
  - D = m/v
  - D = m ÷ v
  - D = 

PRINCIPLES OF DENSITY

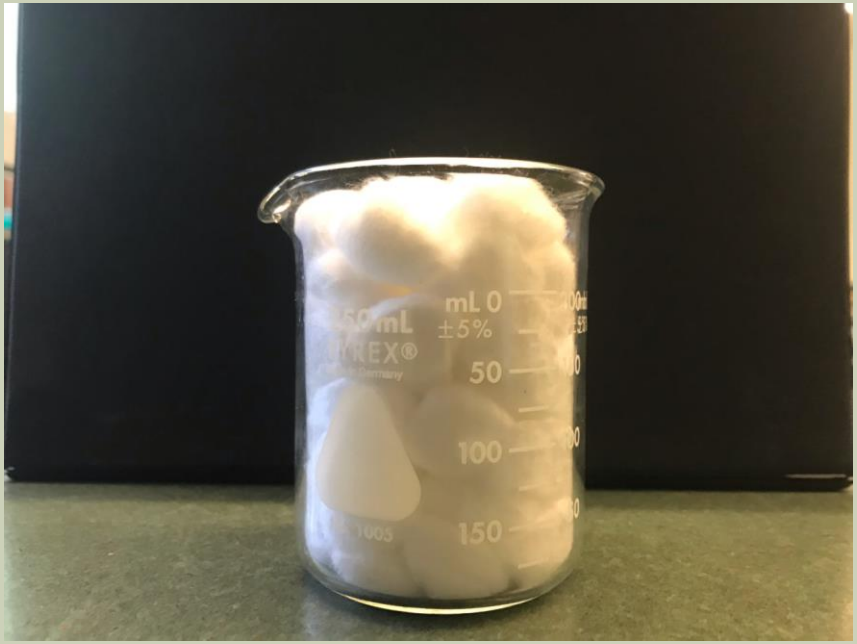
What the Principle Says	What the Principle Means	How I know the Principle is True
If you add more mass to the same volume, it is more dense!	More matter (stuff) into a small sized space means it's more dense.	Suit case.
If you add the same mass to less volume, it is more dense!	Same amount of matter (stuff) into smaller space means more dense.	Cotton ball and beaker.
Just because something has more mass, doesn't mean it's more dense!	More matter (stuff) doesn't always mean more dense.	Styrofoam floats/paperclips sink.

SUITCASE

COTTON BALLS IN BEAKERS

70 cotton balls in 600 ml beaker.

70 cotton balls in 250 ml beaker.

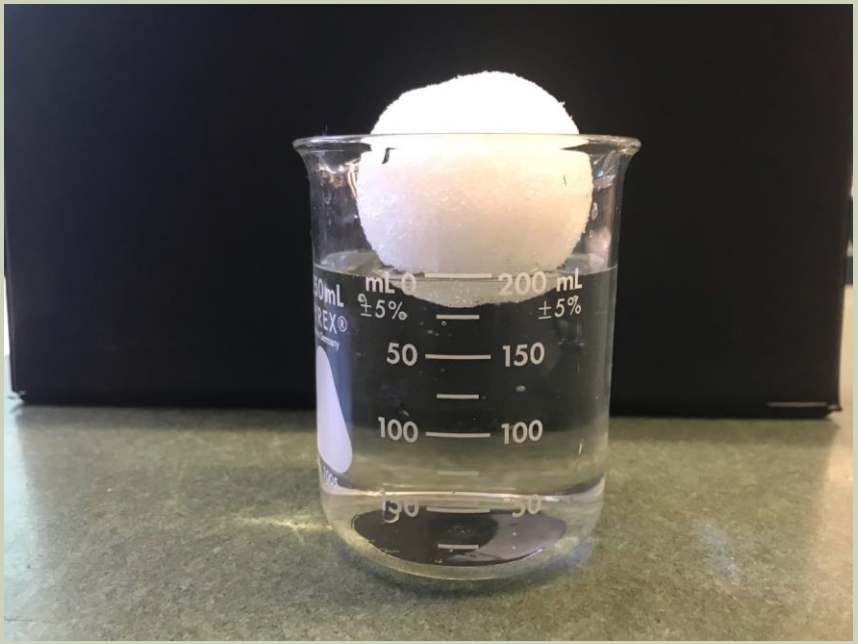


COTTON BALLS IN BEAKERS

- 70 cotton balls in 600 ml beaker.
- 70 cotton balls in 250 ml beaker.

STYROFOAM FLOATS/PAPERCLIPS SINK

Styrofoam ball (2 grams)

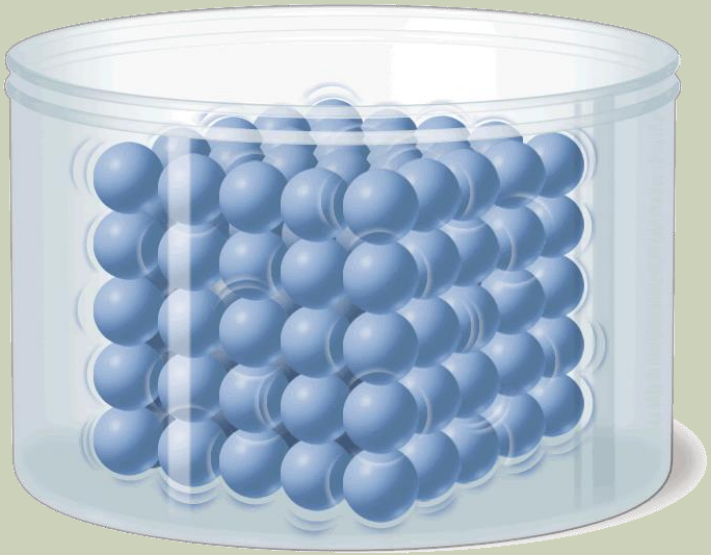


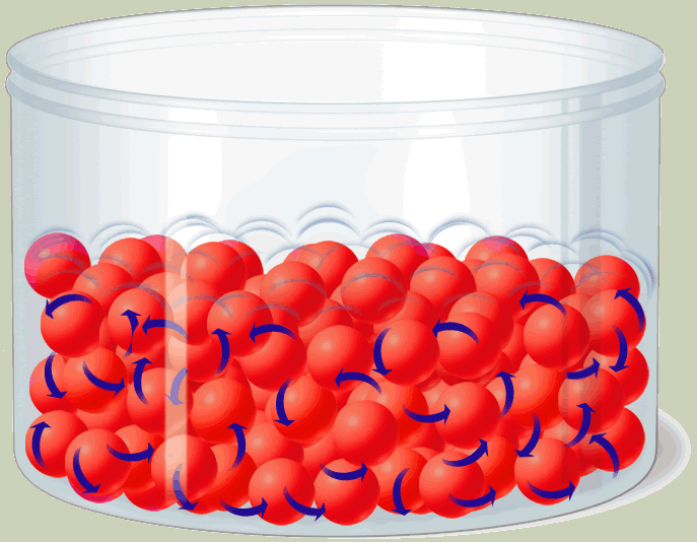
Paperclip (1 gram)

Density

More dense = more particles

Less dense = fewer particles





COMPARING LIQUIDS

Do liquids have different densities???

Of course. . . So what happens when you mix them together???

Talk with your groups and create a hypothesis about what will happen when liquids of different densities are placed into the same cylinder.

They form layers with the highest density falling to the bottom.

Alcohol = .79 g/ml
Vegetable Oil = .92 g/ml
Water = 1.0 g/ml
Maple Syrup= 1.37 g/ml

CONSIDER THIS: THE DENSITY OF PURE WATER = 1.0 G/ML

- **If an object has a density greater the 1.0 g/ml, then it will <u>sink</u> in water.**
- **If an object has a density less than 1.0 g/ml, then it will <u>float</u> in water.**

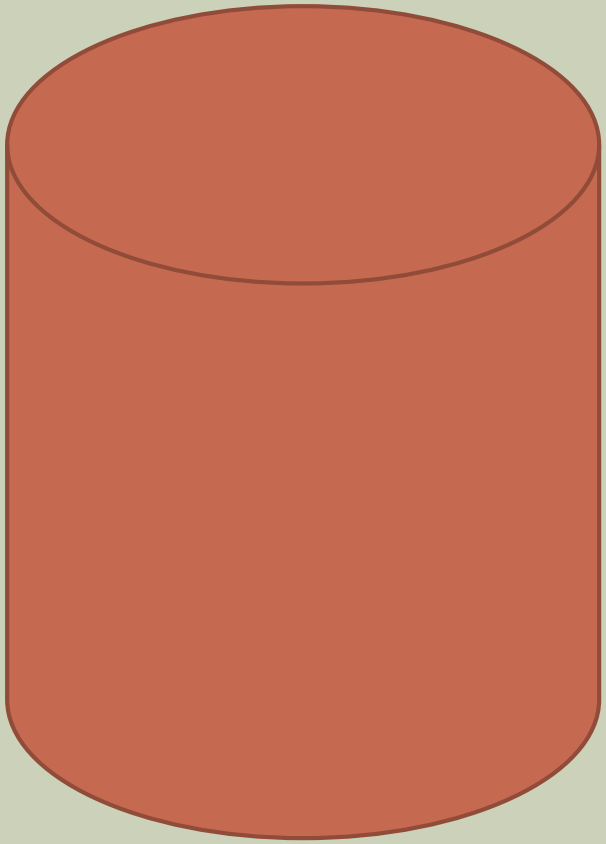
So. . . This means that knowing the density of an object lets you know if it will sink or float in water.

But. . . What if the density was **<u>exactly</u>** 1.0 g/ml?

THEN…the object will be suspended in the liquid!

TRY YOUR OWN

- Sea Water = 1.03 g/ml
- Gasoline = 0.7 g/ml
- Turpentine = 0.9 g/ml
- Glycerine = 1.3 g/ml
- Pure Water = 1.0 g/ml



COMPARING DENSITIES

- What can you tell me about Coke vs Diet Coke?
  - Density comparison?
  - Sink or float?
- What can you tell me about fresh water vs salt water?
  - Density comparison?
  - What would happen if they combined?

Does the sample size affect the density of an object???

In other words, if you break a piece off of an object. . .
Will it have a different density than the whole piece?

NOOOOOOO!!! Density is based on total mass divided by total volume. When one changes,
the other also changes, so the density stays the same!!!