Density

Right Side – Teacher Input

*Remember that all notes must be on the right side and this ENTIRE lesson must be on this page only

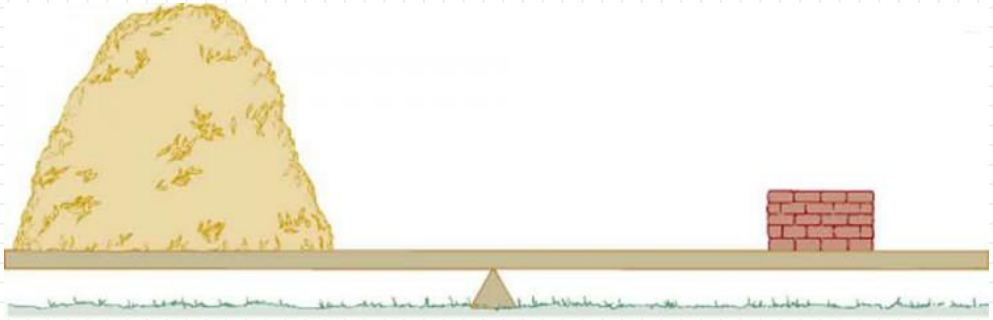
I can...

- Calculate density and compare density of materials
- Explore methods of altering density and practical uses of altered densities

Density

Which is heavier one pound of feathers, or one pound of bricks?

What would *one pound* of each of these materials look like?



What is **mass?**

What is **volume?**

Density

Density is the amount of matter in a given volume.

You can probably guess that not all substances have the same density. Recall that PMOM states that all matter is made of tiny particles and that different substances are made of different particles.

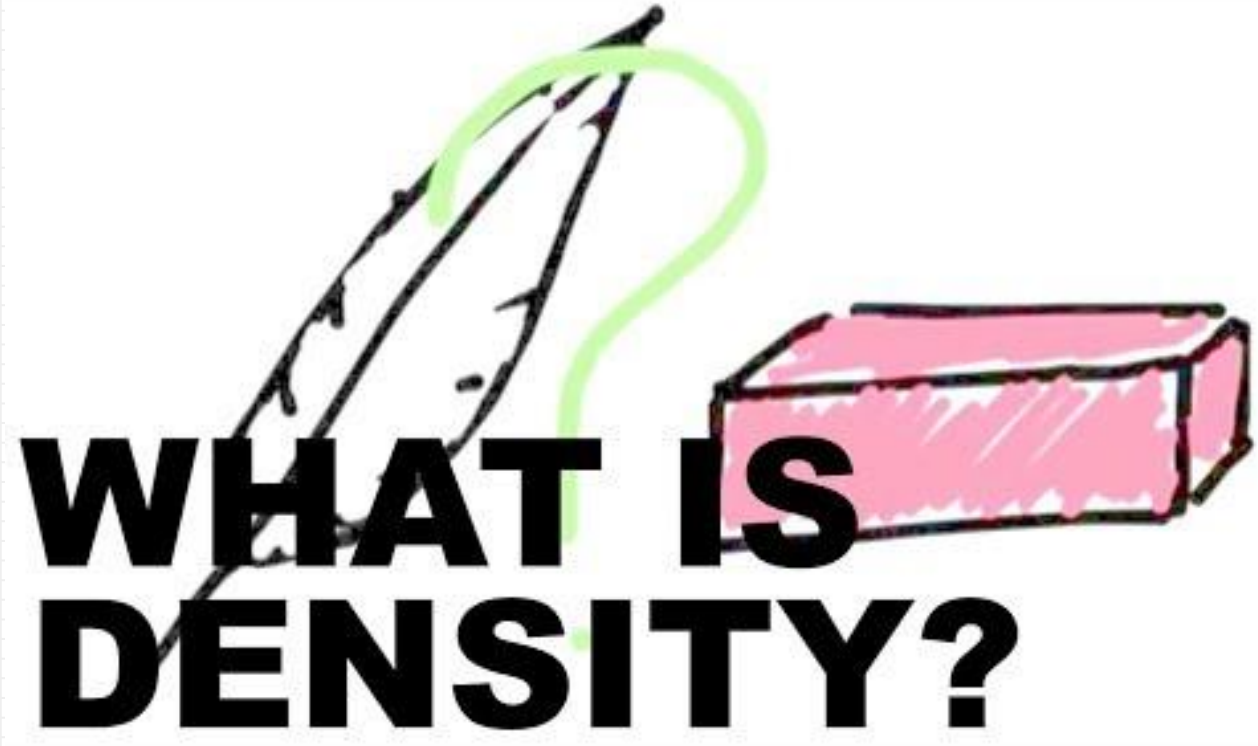
So the particles in each fluid are different from the particles in every other fluid. The density of a fluid or any other kind of substance depends on the particles it is made of.

Measuring Density

- Density is the mass per unit volume, which can be measured in mL or cm^3

$$Density\ (d) = \frac{Mass\ (m)}{Volume\ (V)}$$

Density is usually measured in grams per milliliter (g/mL) or kilograms per liter (kg/L) for liquids and gases. The density for a solid is usually measured in grams per cubic centimetre (g/cm^3)

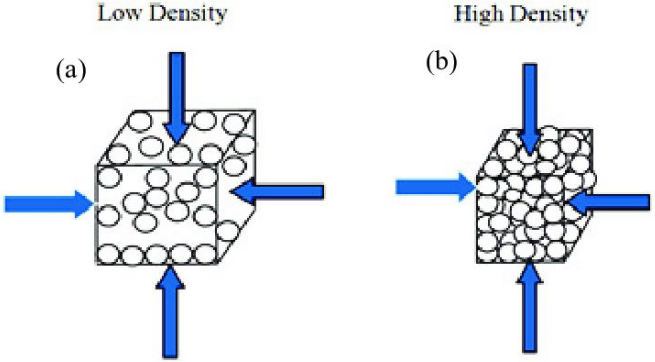

WHAT IS
DENSITY?

Density considers mass AND volume

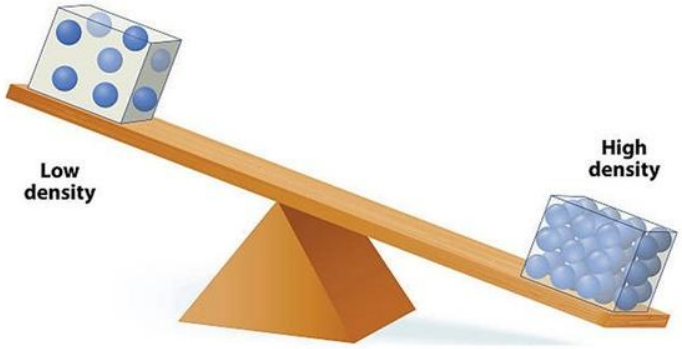
Density is NOT the same thing as weight or mass.

Just because an object is heavier doesn't mean it is more dense

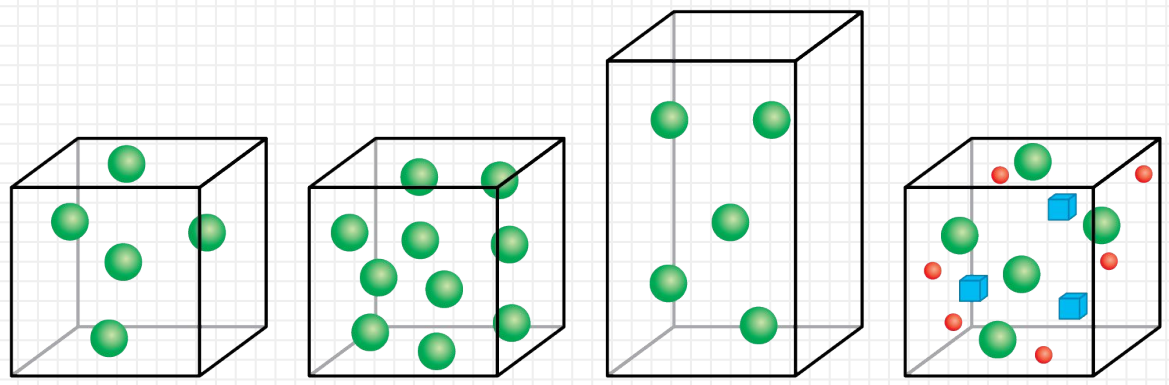
- You can have two objects with the same mass, but different DENSITIES because the amount of space they take up is different.



- You can have two objects with the same volume, but different DENSITIES because they are made of different particles (mass)



What can you say about the DENSITY of each of these substances?

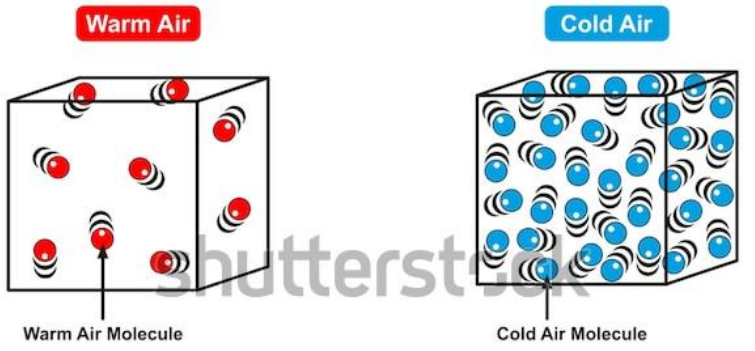


Density and Temperature

Think about swimming in a lake on a hot day...have you ever noticed the water on the surface is warmer than on the bottom?
That is because the warm water has a lower density

Using PMOM we know that as particles heat up they move more quickly and as a particle changes from a solid to a liquid to a gas, it moves faster and faster.

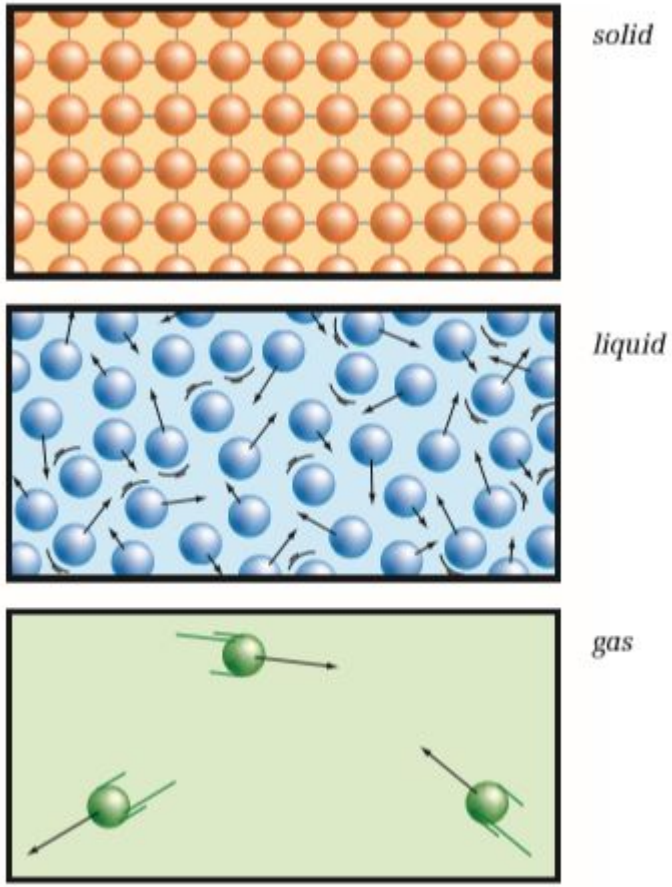
This causes particles to move farther apart from each other, this in turn causes the volume to increase, but the number of particles stays the same, decreasing density.



Temperature

One substance, then, can have different densities depending on its temperature.

What happens to a substance as it is heated? It changes state: at low temperatures, it will be a solid, and at higher temperatures, it will be a liquid, and at even higher temperatures, a gas. A substance (except water) has a greater density in its solid state than in its liquid state and gas state.




AMAZING
9 LAYER
DENSITY
TOWER

Left Side – Student Input

Investigation

Observe the following 3 experiments and lab demonstrations and try to justify and explain what is happening based on your new knowledge of density.

Requirements

✘ Complete the table (on the next slide)

If at home use these videos to complete lab::

- https://www.stevespanglerscience.com/lab/experiments/co2-extinguisher/
- https://www.stevespanglerscience.com/lab/experiments/sinking-soda-surprise/
- https://www.stevespanglerscience.com/lab/experiments/floating-egg/

	Diagram	What you think happened...	What actually happened...
Sinking Can			
Floating Egg			
CO2 Extinguisher			