

1. Same Size – Different Mass

- Balsa, pine, and oak blocks are the same size, but which is heavier? What does that tell you about their density?
- Since wood is wood – the molecules are the same ($C_6H_{12}O_6$), what does this mean about the packing of the wood molecules for ipe, oak, pine and balsa?
- Why do you suppose that tight packing might be important to a long-living tree in the jungle, like ipe?

2. Same Mass – Different Size

- 5 cylinders – all same mass, but different size, therefore must have different _____
 - ✓ Sketch their relative sizes. Which metal has the lowest density? Which is highest?

aluminum

tin

zinc

copper

lead

- Two blocks of wood, ebony and poplar. Same mass but remarkably different sizes.
 - ✓ What is causing the blocks to be different sizes?

3. Rubber Tubes & Mystery Ice cubes

- Different rubber tubes may be made of different materials therefore will exhibit different densities.
- The density of the object compared to the density of the liquid will determine float vs sink.
 - ✓ Why do the same rubber tubes float in one cylinder, but not the other?
- ✓ Why aren't those ice cubes floating like they are "supposed to" ?

4. Diet Soda vs Regular Soda

- It seems that a can made of aluminum metal (more dense than water) filled with soda (more dense than water) shouldn't float, why does it float?

Let's make some assumptions

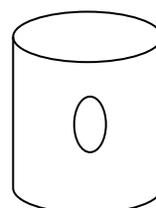
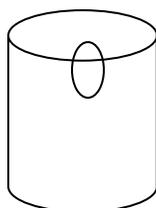
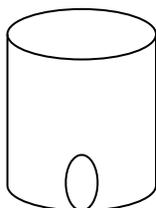
- ✓ the cans are the same size
- ✓ the volume of soda is the same
- ✓ the head space bubble must be the same size
- What do these assumptions allow us to conclude about the density of regular soda? And what about its mass?

- Compare how little nutrasweet is required to provide the same sweetness as sugar

- ✓ mass of packet of sugar _____
- ✓ mass of packet of nutrasweet _____

5. Egg - float or sink?

- Comment on what is going in the three beakers with the eggs?



6. Ball and Cylinder: How does temp affect whether materials float or sink?

- Does the ball sink or float in cold water?
- What happens when the water is heated? Explain
- What happens when the cylinder is put in room temp water?

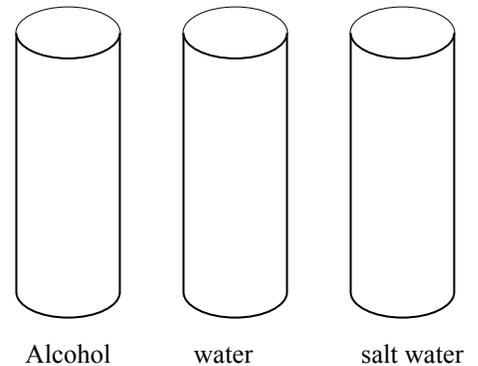
7. Hydrometers - Tools for measuring density directly.

Put a wooden dowel in water and mark a line on it.

Put the same dowel in alcohol and note where it falls on the line.

Voila – you have a device that can measure density directly.

- Sketch the dowel in alcohol , water, and salt water.



- Lead car batteries have sulfuric acid in them. The density of the acid will indicate the charge on the battery.
- Radiators in cars contain a mixture of water and ethylene glycol (anti-freeze). The density of the mixture will indicate the correct mixture of the two chemicals.

8. Galileo's Thermometer

Be sure and read about the thermometer on the home page of chapter 5.

- Observe the glass balls in the liquid. When the liquid is cool and they are all floating, what can you say about the density of the balls compared to the liquid?
- As the liquid heats up, what happens to its density? Why?
- What happens to the floating balls?