



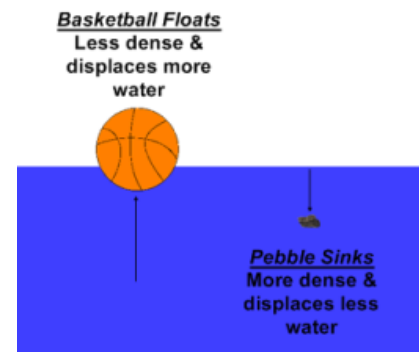
PHYSICS

~Buoyancy and Density~



Overview & Purpose

Do you know why or how boats float? What makes something float while some things sink? Well, in physics, **buoyancy** is the upward force of an object when it is immersed in a fluid (like water) or even air, which allows it to float. Buoyancy depends on two things: the amount of water that the object displaces and the density of the object. When an object is placed in water, the object pushes the water aside. This is called displacement. For example, a pebble is denser than the water it would displace and it would displace only a little bit of water, so it sinks. A basketball, on the other hand, is not very dense and displaces more water, so it floats.



So why do large and heavy boats like cruise ships float in the water? That has to do with their shape. They designed to be really wide and to displace lots of water. The amount of water displaced is then equal to the weight of the boat, because the inside of the boat is actually pretty hollow to make up for its large size. This displacement of water allows it to float!

Materials Needed for this Experiment



- * Large bowl of water
- * Aluminum foil
- * 30 pennies

Experiment

1. Fill your large bowl with water and place it on a flat surface.
2. Cut a couple large squares out of your tinfoil (make sure that they are about the same size).
3. Take around 15 pennies, put them in the tinfoil square. Then ball them up in the tinfoil and place this ball in the bowl of water.
4. Observe what happens.



It is expected that this ball of pennies will float to the bottom of the bowl.

5. Now, take another piece of tinfoil (around the same size as the other one) and try to make a boat out of it and place the same number of pennies in it. You can play around with the shapes and sizes of the tinfoil, until you can get the tinfoil boat with all the pennies to float. You can also keep adding as many pennies as you would like until the boat sinks to see how many your boat can hold!



Summary / Take-Away

With the ball of foil and pennies, there is not enough upward force pushing on the ball to keep it afloat. However, the boat with the pennies in it takes up a greater surface area so it has more force pushing up on it and it can float! There are many different boat shapes that you can make, but as long as the buoyant force is greater than the weight of the object, it will float.