



## **Float Your Boat**

**Primary Audience: Families**

**Description:** Place different items in water to see if they sink or float and learn about buoyancy.

**Keywords:** Physics, Buoyancy

### **Materials:**

- Objects of various weights, sizes and shapes, including Styrofoam peanuts, paper clips and pennies
- Crown/Bottle Cap
- Eyedropper
- Cloth Towel
- Large dish tub of water or a small plastic drinking cup for each of the participants

### **Instructions:**

1. Collect a variety of objects. Discuss what characteristics an object needs to have in order to float, such as weight, size, type of material, etc.
2. Predict which of your objects will float and which will sink. Place each item, one by one, into the water. Why do some objects float? How is their appearance different from the objects that sink?
3. Do you think the crown cap will float? Why or why not? Test your prediction. You may have to put the cap on the water very carefully, but you should be able to get it to float.
4. Can you add things to the cap and still have it float? What things do you think it will be able to hold, how much of each thing will it be able to carry before it sinks?
5. Try a variety of things such as rice, cereal, grains, twist ties, foam, screws, paper, etc. How much of each thing is the cap able to hold before it sinks? Why does the cap sink?

### **What's Going On?**

## Engineering

Buoyancy is the effect that allows objects such as boats and crown caps to float. An object will move out or displace water when it is placed in water. It turns out that the weight of water that is displaced is equal to the weight of the object placed in the water. Floating is caused by the weight of the water pushing up on the object. But it's not just the weight that's important. The shape is also important. Boats and crown caps have spaces with air in them. Air is lighter than water so that helps the water hold up the cap. As the spaces fill up with water or other stuff, it no longer helps the water float the object and the object sinks.

People often ask, "Why did the *Titanic* sink?" Perhaps a better question would be, "Why did the ship float?" The ship was, after all, made mainly from iron and steel. Its anchors alone weighed 28 metric tons. (That's almost 62,000 pounds!) Steel has a density about eight times that of water, so you would expect a ship made of steel to sink.

However, if you were to look at a plan of the *Titanic*, you would discover that most of its volume was occupied by air. Air has a density of about one-thousandth that of water. Therefore, the average density of the ship was less than the density of water. That's why the ship floated.

Why did *Titanic* sink? When the *Titanic* hit the iceberg, water rushed into the ship's hull and displaced the air. The average density of the water and the steel ship was greater than the density of water. What was the result of this change? The *Titanic* sank to the bottom of the Atlantic.