



## Related Standards:

**MS-PS1-2, HS-ESS2-5**

# Buoyancy: *Cartesian Diver*

### Squeeze it!

Squeeze the water bottle to watch the straw move up and down inside the water.

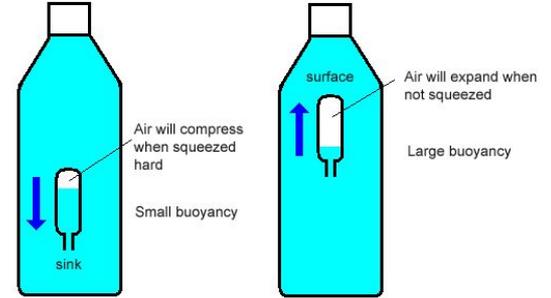


### Materials:

- Straw
- 2 Paperclip
- Bottled water

### Instructions:

1. Cut a 2 inch piece of straw.
2. Fold the straw in half and insert one end of the paper clip into each open end of the straw in order to secure the straw in an upside down V shape.
3. Hang a second paperclip from the upside down V by attaching it to the first paperclip.
4. Open the bottle of water and place the folded straw and attached paperclips into the bottle of water. The paper clips should enter the bottle first, then the straw. Close the bottle.
5. Make your cartesian diver dive by holding the bottle upright and tightly squeeze the lower half of the bottle.



### What's the science behind it?

When you squeeze the sides of the bottle, you are increasing the pressure on the liquid inside. That increase in pressure is transmitted to every part of the liquid. That means you are also increasing pressure on the diver itself. If you squeeze hard enough, you will push some more water up inside the straw. The air inside the straw squeezes tighter as more water is forced in, causing the straw to get heavier and sink.

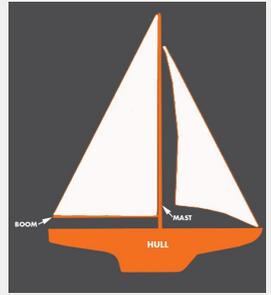


# Buoyancy & Density: Edible Boat

## Related Standards:

- K-PS2-1
- 3-PS2-1
- 4-PS3-3

In this activity we will create a sailboat model using edible ingredients and observe the basic components of the boat. A common sailboat has eight essential parts: **hull, tiller, rudder, mainsail, mast, boom, jib and keel.**



### Materials:

- Nutter Butter or Oreo Cookie
- Pretzel Stick
- Blue Food Coloring
- Plastic Knife/ Utensil
- Plate
- Condiment Container

### Instructions:

1. Unwrap the white airhead and fold it to make a square. Turn the square so one corner is pointed toward you.
2. Lay one pretzel on the airhead from the center to this bottom corner of the airhead.
3. Fold the left corner of the airhead across the pretzel stick to make a triangle shape. The airhead and the pretzel creates the **sail** (airhead) and **mast** (pretzel) of the boat.
4. Separate the two sides of a cookie and place the pretzel stick and airhead in between the cookie. Then push the two sides back together again. This is called the **hull** of your boat.
5. Squeeze the icing into the condiment container.
6. Drop 4-6 drops of blue food coloring into the small cup of icing.
7. Use a plastic knife to mix to the blue food coloring and icing together. Then, spread the icing on top of another cookie. The blue icing represents the **sea**.
8. Lastly, place your boat (cookie with pretzel and airhead) sideways across the top of the icing.



### What's the science behind it?

The **hull** is the shell of the boat. The **mainsail** is the larger sail that captures the wind power that is needed to move the sailboat. It attaches to the **mast**, which is a long vertical pole, this pole is also attached to the **boom**, a long pole parallel