Activity 1: Floating Fruit

Materials

Sink, bath, or bin filled part way with water
Lemon or orange (and an optional lime)

Procedure

1. Have the student predict whether the fruit(s) will float or sink with and without their peels.

2. Put the unpeeled fruit(s) in the water first and observe if it floats or sinks.

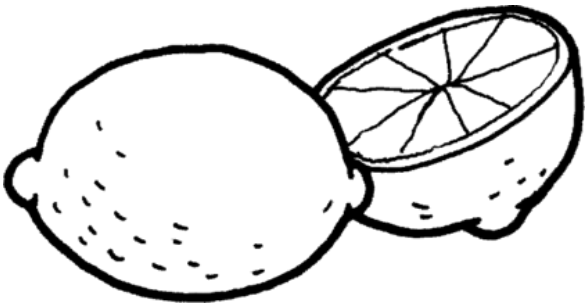
3. Peel the fruit(s) and observe if it floats or sinks.

4. Record observations.

Science Notes

The unpeeled orange floats because the rind is porous and filled with tiny pockets of air. Even though you're removing mass when you peel the orange, the peeled orange is denser and sinks in the water.

But the lemon lime mystery is a little different. Water has a density of approximately 1 gram per milliliter. The densities of the fruits were obtained and it was reported that the density of lime is 1.12 grams per milliliter while the density of lemon is 1.02 grams per milliliter. Considering this fact, limes are heavier compared to the density of water while lemons almost have the same density with water. Thus, when lime and lemon is put together in water, the lime will sink and the lemon will float.



Activity 2: Float or Sink

Materials:
Sink, bath, or bin filled part way with water
Variety of objects (some floaters, some sinkers): cork, washer, nail, styrofoam, lego blocks, wax paper, penny, pumice, domino, sponge, paper clips, fabric, wood, marbles, rock, paper towel, ping pong ball, small toys, etcetera

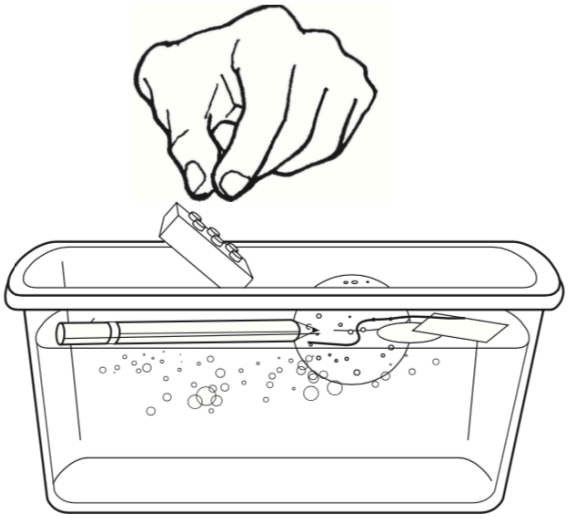
Procedure

1. Have the student predict a few objects that will float and a few objects that will sink.

2. Test each object by placing it in the water.

3. Record observations of whether the object sinks, floats, or first floats then sinks.

4. Check the predictions. Discuss any surprises.



Activity 3: Paperclip Float

Materials

Sink, bath, or bin filled part way with water
Paperclip
Sheet of paper towel

Procedure

1. Have the student predict if the paperclip will float by itself, and if it will float when added on top of a piece of paper towel.

2. Drop a paper clip in a cup of water. What happens?

3. Tear off a piece of paper towel that is slightly larger than the paper clip.

4. Place the piece of paper towel on top of the water.

5. Gently place the paper clip on the piece of paper towel. Wait a few seconds.

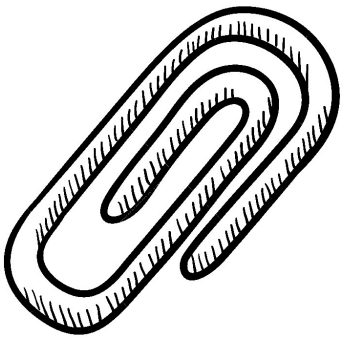
6. Record observations.

Science Notes

If you drop a paper clip in water, the paper clip sinks. But if you put the paper clip on a piece of paper towel, the paper towel sinks and the paper clip floats. This is because water particles are attracted to each other in all directions, making them "stick" together.

However, because there are no water particles above them, the water particles at the surface "stick" only to particles next to and below them. This makes the surface act as if it had a thin "skin". This is called surface tension.

The paper towel helps you to lower the paper clip onto the surface gently without breaking the surface tension. If you're very careful, you can float the paper clip on the water without using the paper towel.



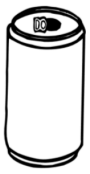
Activity 4: Container Test

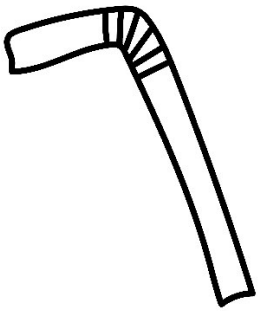
Materials
Sink, bath, or bin filled part way with water
Variety of empty containers: milk jug, milk carton, pop bottle, pop can
Measuring cup (optional)

Procedure
1. Have the student predict how full they can fill the containers with water before they sink (such as it will get half full, 2 cups of water, up to the bottom of the label, etcetera).

2. Place the containers in the water one at a time. Slowly add water until the container sinks.

3. Record observations of how much water was added before each container sunk (such as half full, 2 cups of water, up to the bottom of the label, etcetera). These observations could include pictures with brief descriptions if that makes the observations easier to record.





Activity 5: Tipping Straws

Materials:
Sink, bath, or bin filled part way with water (just deeper than the length of the straw)
Plastic drinking straw
Plasticine (play dough could work too as long as it's not underwater for too long)

Procedure

1. Have the student predict how full they can fill the continuers with water before they sink (such as half full, 2 cups of water, up to the bottom of the label, etcetera).

2. Drop a drinking straw onto the surface of a tub of water and observe what happens.

3. Now tilt the straw under water to fill it up with water from one end to the other. Let it go and observe what happens.

4. Challenge the student to make the straw float upright in the water using plasticine as the only material to be added to the straw.

5. Record observations of how the straw behaved in step 2, 3, and what they did using the plasticine in step 4.

Science Notes
Instructing children to attach the plasticine to one end of the straw limits the opportunities for exploration. Although most children will discover that attaching the plasticine to one end of the straw works, the teacher might want to suggest that students can try to attach the plasticine at various points on the straw during their exploration.

Students may discover attaching smaller pieces of plasticine to the end of the straw will affect the depth the straw floats in the water. The more plasticine that is added to the end of the straw, the lower the straw will float.

The "tipping" straw is really a *hydrometer*. A hydrometer is used to measure density. The level which the straw hydrometer floats depends on the liquid's density. The straw sits higher in more dense liquids. Liquids with a lower density weighs less than the same volume of one with a higher density. Water is more dense than cooking oil.

Activity 6: Rescue Boats

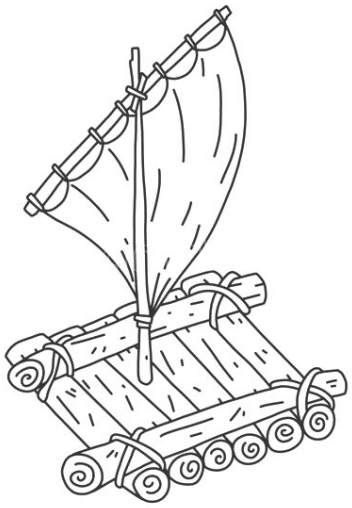
Materials:
Sink, bath, or bin filled part way with water
Writing paper
Tin foil
Wax paper
Magazine paper or newspaper
Scotch tape

Pretend Boat Scenario
You have just gone for a day of boating, when a strong wind blows you off course, beaching your craft bow first into sharp rocks. You crawl onto the sand and notice to your dismay that your boat is in pieces. You do all the right things like lighting a signal fire and preparing a place to camp. Days pass with no sign of help. Your only chance to be saved is to get a message to someone who can help. On your survey of the island, you notice a current out to sea. You plan to place a message in a miniature boat and drift it out for help. Amongst the debris scattered about the island are pieces of magazine or newspaper, writing paper, wax paper, and tin foil. You fold the materials into five separate boats using tree sap to seal the edges. A message for help is placed in each boat and sent adrift. Two days later you see two sea vessels approaching the island. YOU ARE SAVED! After giving your thanks, you find out which two of the five boats delivered the messages.

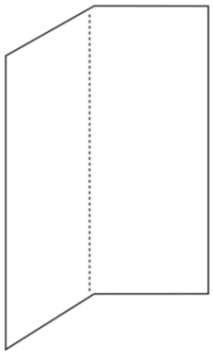
Procedure
1. Have the student predict which materials would work well to send a message in a miniature boat: tin foil, magazine or newspaper, writing paper, and wax paper.

2. Students build simple boats to determine which two boats delivered the rescue messages. Follow the steps shown in the diagram below. Make boats out of paper, newspaper, wax paper and foil. Each time, start with an approximately 8" x 11" piece.

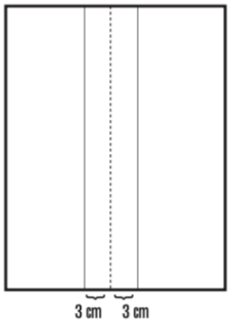
3. Record observations of which boats floated, and which boats sunk over time.



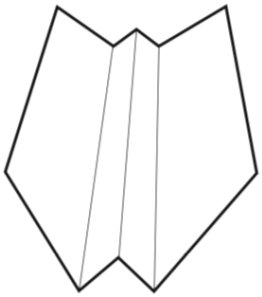
1. Fold 8” x 11” sheet of paper in half along its length.



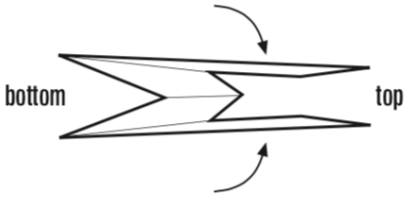
2. Open and flatten the paper. Mark off a 3 cm strip on both sides of the crease.



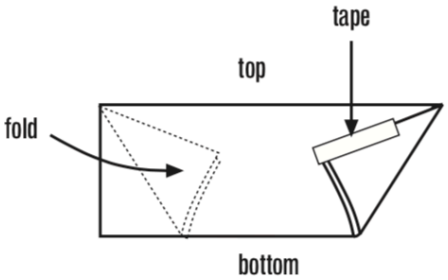
3. Flip the sheet over and fold along each dotted line. When done, the sheet folds will produce a “W” shape.



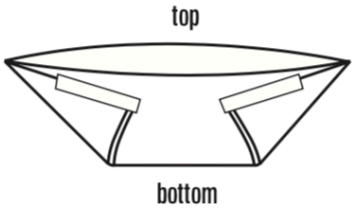
4. Fold the two halves together with the center indented.



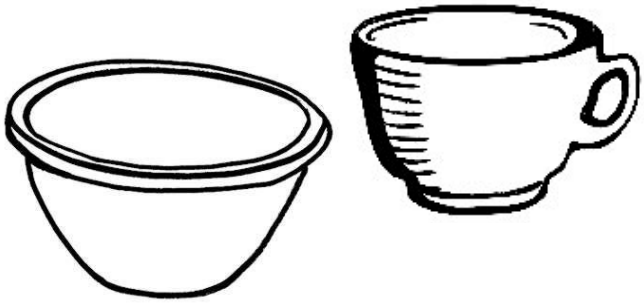
5. Fold each end over 2/3 of the way down from top to bottom and tape the flap in place



6. Open the boat up and flatten out the bottom.



Activity 7: Cupside Down



Materials
Sink, bath, or bin filled part way with water
Small glass cup or bowl

Procedure
1. Have the student predict if the cup/bowl will float or sink when right side up. Have the student predict if the cup/bowl will float or sink when upside down.

2. Gently place the cup or bowl right side up on the surface of the water. Watch what happens (upright cup should float).

3. Turn the cup or bowl upside down and place on the surface of the water. Watch what happens (upside down cup should fill with water and sink).

Science Notes
Objects will sink or float depending on their *placement* (how they sit) in the water. Other objects such as bottle caps and jar lids also support this concept. In the earlier activities, students would have generated some responses that indicated some of the objects will do both (float and sink).

Adding sides to an object increases its buoyancy. *Buoyant force* increases because there is a greater surface area for the water to hold the object up. If the object is one that sinks, the addition of sides (depending upon the height of the sides) could cause a change that allows the object to float. This happens because the altered object would now displace a volume of water having greater mass than the object that was first placed in the water.

For additional practice, provide each group of students with a variety of containers (such as styrofoam trays, foil muffin cups, plastic cups, waxed cups, styrofoam cups, yogurt containers, etc.). Let each group experiment with whether or not it floats and its stability. Encourage students to experiment with adding mass to each container.

Optional Curricular Extension
Experiment with frozen balloons (filled with water). Place the frozen balloon in a large container of water. Note that the balloon of ice floats. However, the majority of the balloon is below the surface of the water. This is very similar to an iceberg. Only 70% of an iceberg is seen above the surface of the water. Note the change in the water level when the "iceberg" (balloon) is placed in the water. Research and talk about the Titanic.

Activity 8: Cork Boats

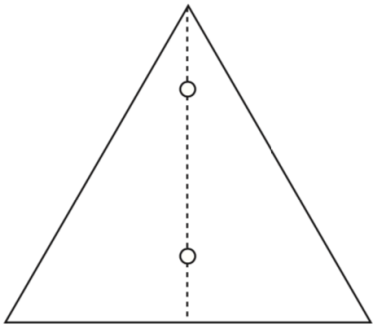
Materials:
Sink, bath, or bin filled part way with water
Cork
Ruler
Plasticine (or play dough if it's not in the water for too long)
Scissors
Toothpicks (round)
Cardstock paper (or another thick paper)

The challenge in this activity is to make a cork sail boat that will float upright and be stable.

Procedure

1. Have the student predict how they can make the cork sail boat float upright and be stable.

2. Cut out a triangular sail from cardstock paper about 5 cm - 6 cm in width and 8 cm high.



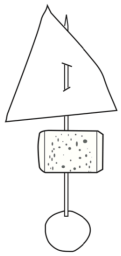
3. Using a sharp instrument, make two holes in the sail, one above the other along the mid-line from the base to the apex of the sail.

4. Push a round toothpick into the bottom of the cork and another into the top so they are secure.

5. Slip the toothpick through the two holes of the sail. Test the cork sailboat in water. It will not remain upright.

6. Challenge the student to find a solution to the problem. One solution is to add plasticine to a toothpick placed below the sail (in the water).

The student will hopefully discover the action of a keel as a counter weight.



7. Draw a picture of the successful cork boat and record observations.

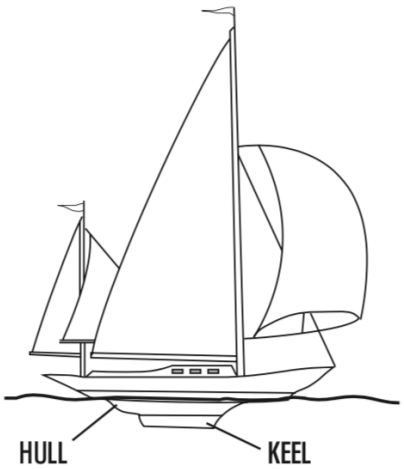
Science Notes

Students will discover that adding a ball of plasticine on the end of the bottom toothpick will make the cork boat remain upright. The mass of the plasticine prevents the cork from rolling over, and the greater the mass the more stable the cork boat. Teachers are encouraged to order the corks form the Distribution Centre as they are less dense than wine bottle corks. Students will have difficulty pushing a toothpick through a cork used for wine bottles.

The cork boat activity teaches children that *stability* can be increased by positioning a counterbalance directly below a boat which, in effect, lowers the center of gravity. This is achieved with the addition of a keel. The *keel* is a streamlined fin directly below the centre of the boat which runs bow to stern (front to back).

A keel achieves balance in two ways:

- *It works as a counterbalance (most keels are weighted) similar to the cork boat activity with the difference being that a keel is streamlined to reduce drag.*
- *Stability is increased because the water on either side of the keel creates resistance helping to maintain the boat's stability.*



Activity 9: Build a Boat

Materials

Sink, bath, or bin filled part way with water
Variety of materials of your choosing (cardboard, tin foil, milk container, styrofoam, etcetera)

Procedure

1. Have the student make a prediction about what type of boat will be stable, waterproof, and buoyant.

2. Design and build a boat that is designed to carry a load of your choosing (rocks, spoons, coins, etcetera).

Make sure your boat has:

- Waterproof materials
- Waterproof joints
- Buoyant materials
  Stiff materials (makes the boat stable)

3. Test the boat for buoyancy and stability in the water table or tubs by adding mass. For stability, add masses along one edge of the boat until they begin falling off. For buoyancy, add masses along the centre of the boat until the boat deck goes under water.

4. Record your observations of what worked well in the boat, and what did not. You can draw a picture of your boat and label it.