

Physical Science: Sink and Float

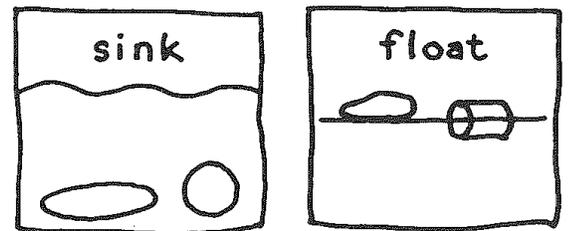
Activity Overview

Children **make predictions** about whether various objects will sink or float, and then **test** the objects by placing them into a tub of water. They **sort and classify** the objects into "floaters" and "sinkers." As they **experiment**, the children **make observations** about the properties of the different objects and **construct explanations** about what factors determine if an object sinks or floats.

*Science process skills are in bold.

Underlying Science Concepts:

- Some objects float in water and some objects sink.
- Different properties of an object, such as the material it's made from, shape, size, and weight affect whether it will sink or float.



Materials:

- One large clear container of water for each group of four children filled deep enough so that floating objects will not touch the bottom of the tub
- Collection of objects for each group to test (15-25 objects per group)
- Two trays with Sink and Float sorting signs for each group (see sample drawing above)
- Towels for cleaning up spills and drying hands
- Picture of a heavy ship in water (optional)

Getting Ready:

- Collect assorted objects made from different materials for testing. Suggestions:

<ul style="list-style-type: none">▪ Balls: marbles, ping pong balls, tennis balls, golf balls▪ Wooden, plastic, and metal spoons▪ Rocks of different sizes (pumice floats!)▪ Cork▪ Candles/wax▪ Crayons▪ Foam items	<ul style="list-style-type: none">▪ Shells▪ Metal screws, washers, clips▪ Wooden and plastic blocks▪ Plastic cups and straws▪ Small toys that can get wet▪ Various fruits and vegetables▪ Pinecones, small sticks▪ Old CDs
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- Fill a large clear container or tub at least halfway full of water for each small group of children.
- Make a set of Sink and Float picture labels for each group's sorting trays. Refer to the sample drawing to create your own. You might want to laminate signs or cover them with contact paper to prevent them from getting soggy.

→ Engage

- Gather children at the circle area away from the materials.
- Show a clear container of water filled at least halfway. Tell the children that they are going to be testing objects to find out if they sink or float.
- Ask the children if they have heard the words "sink" and "float." Have them share what they think those words mean.
- Agree on definitions of "float" (stays at the top of the water, does not touch the bottom) and "sink" (goes to the bottom of the water.)
- Have the children brainstorm ideas of things that sink or float. You can have them think of objects they have used in the bathtub.
- Ask, "What are your ideas about why some things float and some things sink? (This is a time to share ideas. Do not correct their preconceptions or give explanations.)
- Select an object from the collected materials and ask the children to predict whether it will float at the top of the water or sink to the bottom. One way to have them show their predictions is "thumbs up" if you think it will float; "thumbs down" if you think it will sink; "thumbs to the side" if you're not sure.
- Demonstrate placing the object carefully into the water and observe what happens. Test one object that sinks and one object that floats, making predictions first.
- Using the Sink and Float sorting signs, establish one tray for the objects that sink and the other tray for objects that float. Model sorting the objects onto the appropriate tray after testing them.
- Explain that everyone will get to experiment with floating and sinking. Remind them to make their predictions first and to sort the objects after testing.

This is a good opportunity to use Turn-and-Talk as a strategy to allow children to actively share ideas with a partner before sharing with the larger group. This strategy promotes greater overall participation in class discussions.

Emphasize that predictions are guesses and they do not have to be right. Just like scientists, we will test our predictions.

→ Explore

- A group of four children working together with an adult is recommended.
- One at a time, children will:
 - Choose an object
 - Pass it around the group for each child to hold
 - Make predictions about whether it will sink or float
 - Test it in the water
 - Place the object on the appropriate sink or float tray
- Focus the children's observations on noticing and describing what happens to each object when placed in the tub.

Having the children take turns to place objects in the water **one at a time** helps focus them on each of the objects and encourages more collaborative learning.

➔ Reflect

Ask questions to help children reflect on and to articulate their thinking such as:

- "What did you learn about sinking and floating?"
- "Do you have any new ideas about why some things float or why some things sink?" (Resist the temptation to give explanations.)
- You can point out that some heavy objects like boats float, while relatively lighter objects such small pebbles sink. You could show a picture of heavy ship floating in water. Challenge them to think about other factors, besides weight that affect floating and sinking.
- To demonstrate that some light things sink, while some heavy things float, you can compare two objects such as big piece of wood and a tiny pebble. Pass them around the circle. Which is heavier? *Which is bigger? What are they made of?* Make predictions about whether each one is a floater or a sinker and test them.
- Another way to engage the children in a good discussion is to compare a metal and plastic spoon. Make predictions and test them in the tub. Focus the children's attention on the material the spoons are made from.
- There is great value in encouraging children to verbalize, process, and communicate their ideas. The goal is to help children begin to understand that several things contribute to whether an object sinks or floats, including: material, shape, size, and weight (all of these factors affect an object's density).

Children will initially think that weight alone determines whether an object sinks or floats. Through their explorations they will begin to build a foundation for later understanding of density, buoyancy, and water displacement.

Ideas for Further Explorations

- Send children on a hunt in the classroom to choose one item that they think will sink and one that they think will float. Give them a few minutes to search. One by one, let each child put his or her items into a tub of water and test them. Encourage all the children to make predictions before each item is tested.
- Give each child a piece of wax-based modeling clay (about the size of a Ping Pong ball) and allow them to manipulate the size and shape and test it in the water to see if it sinks or floats. They can first test the ball of clay. Then challenge them to change the size and shape of the clay to make it float.
- Let the children experiment with a variety of materials to make boats, and test them in water. Suggested materials: plastic and paper plates, cups, pieces of wood, foam trays, cardboard tubes, craft sticks, sponges, straws and paper squares (for making sails). Tape, string, pipe cleaners and rubber bands are good for attaching materials. Which materials make the best boats? Why?
- Let children play with ice cubes in tubs of water to make more discoveries about floating and sinking.



Guiding Questions

- Do you think the object will sink or float?
- What's happening to the object?
- What do you notice?
- What other objects would you like to test?
- What have you discovered?
- What surprised you?

Key Vocabulary:

During the activities integrate the words below into your conversations. Children's vocabulary will build with practice.

- Sink
- Float
- Observe
- Predict
- Experiment
- Test
- Sort
- Heavy/light
- Wood, Plastic, Metal

Teacher Tips

It is important for children to have plenty of time for free exploration with water play before doing a structured sink/float activity. Be sure to offer children time to freely play at a water center for several days before doing Sink and Float activities.

Most children can easily observe and recognize objects that sink or float, but understanding buoyancy and density at a scientific level is difficult for young children. Rather than trying to explain these concepts, keep the focus on describing observations, making comparisons, and encouraging them to hypothesize and construct their own explanations.

Song: Will it Float?

[to the tune of: "When the Saints Go Marching In"]

Oh, will it float, or will it sink?
Which will it be; what do you think?
Will it stay on top of the water?
Or, like an anchor, will it sink?



Background Information for Teachers

While an object's weight does play a role in why some things float, and others sink, it is not the only factor. An object's density, the relationship between its volume and mass is a key factor. Density is defined as the mass of an object per unit volume ($D = m/v$). Therefore, the mass and volume of an object both affect whether it will sink or float, and changes to either of these variables might change the results of the sink/float test. Density explains why a ping-pong ball floats and a large marble of equal size sinks.

An object floats if the water it displaces weighs as much as the object. If the object weighs more than the displaced water, the object sinks. The shape of an object can also determine if it floats or sinks. A ball of clay will sink, but a canoe shape made from the same amount of clay can float because it pushes more water out of its way in relation to its weight. The amount of air inside of an object can also help it float. Boats can float despite the heavy and dense materials used to build them because a good portion of the interior of any boat is air.