

Problem Solvers Activity SE 9: Sink or Float?

CHILDREN ARE LEARNING...¹

Science Content:

- Floating means that an object remains on the surface of the water.
- Sinking means that an object falls below the surface of the water.

CHILDREN ARE DOING...

Science Practices:

- Make predictions
- Plan and carry out investigations
- Make observations
- Collect and analyze data

NOTE TO TEACHERS:

The science behind what makes an object float or sink is complicated, and children will revisit this topic with different levels of understanding throughout their schooling. By middle school, they'll learn that floating and sinking are related to density, which is how heavy an object is compared to its size. If an object is less dense than water, it floats. If it's more dense, it sinks.

To picture the idea of density, compare a bowl of mashed potatoes to a bowl of cheese puffs. They take up the same space (volume). *But*, the cheese puffs have lots of air—inside them and between them. The bowl of mashed potatoes weighs more (mass), compared to the cheese puffs. So the mashed potatoes are more dense.



The concept of density is challenging for preschoolers—in fact, it's confusing for many adults. Not all of a child's predictions about floating/sinking will be correct in this activity, and their understanding about these concepts will be incomplete when they finish this lesson. But that's what science is—asking questions about what's happening, figuring out a way to test your predictions, and revising your ideas over time as you learn more.

MATERIALS NEEDED:

2 clear plastic container/bins (to be filled with water)

Items to be tested for floating/sinking:

- 2 Pennies
- 2 Paper clips
- 2 Toy cars

¹Adapted from the Next Generation Science Standards (kindergarten): <https://www.nextgenscience.org/>

- 2 Metal spoons
- 2 Markers
- 2 Large, plastic interlocking blocks (like a Lego Duplo)
- 2 Empty plastic water bottles
- 2 Popsicle/craft sticks

2 Trays

Tape

1 piece of chart paper and marker

Optional: **Handout 1: Boats That Float**

Handout 2: Testing Materials

Handout 3: Data Chart

PREPARATION:

- **For the ENGAGE activity:**
 - Print **Handout 1** (optional).
- **For the EXPLORE activity:**
 - Place one penny, paper clip, toy car, spoon, marker, block, bottle, and craft stick on each tray. Set one tray aside until the **EXPAND** activity. Keep one tray handy for the **EXPLORE** activity.
 - Prepare the data chart. Using chart paper, draw a blue wavy horizontal line across the middle of the page.
 - Print and cut images from **Handout 2**. Keep the tape handy.
- **For the EXPAND activity:**
 - Fill the 2 bins with water and set aside until needed.

Activity Instructions

ENGAGE

Gather a small group of 4 children in a circle on the floor. (Note: Groups of 6 children work well if you are teaching 4-year-olds. Adjust materials as needed.)

ASK: Explore what children know and understand about the concepts of sinking and floating using questions like the ones below:

- Has anyone heard the word *float* before? What does it mean to you?
- What happens when something floats? What does it look like?
- What kinds of things float? Have you ever floated in the water?
- What about the idea of something sinking in the water—what does that mean to you?
- What happens when something sinks? What does it look like?

- How do you know when something sinks? Have you ever seen something sink in the water?
- Have you ever dropped something in water—like your bath or a pool? Did it float or sink?

EXPLAIN:

- Floating is when something stays on the top, or the surface, of the water—like a boat (*you can show children the optional **Handout 1**, or name one of the objects mentioned by children that they've seen float.*)
- Sinking is when something drops below the surface of the water and moves down to the bottom, like a stone you throw into a pond (*or name one of the objects mentioned by children that they've seen sink.*)

TRANSITION: Today we are going to be Problem Solvers and predict which objects will sink or float. You already have ideas about floating and sinking based on your experiences. You can use those ideas to make predictions. We make predictions when we use what we already know to make a guess about what will happen.

EXPAND

Take out the tray of materials.

INTRODUCE: Let's take a look at the materials I have on this tray. What do you see? Are any of these objects new to you? (*Answer any questions and label each item.*)

EXPLAIN:

- Let's think about each item and use our knowledge to predict whether we think it will sink or float.
- I have a data chart here for us to record our predictions (*show children the prepared chart.*)
- I drew a water line here (*point*).
- If something floats, will it be on top of the water (*point on chart*), or below the water (*point*)? (*Ask for children's ideas. Review floating and sinking with children by using the chart.*)

TRY IT: Focus on one object at a time. For each object:

1. Choose a child and let them select an object from the tray.
2. As they hold up the object for the group, name this object for the children. Encourage children to hold and explore the object.
3. Ask children to describe the object, including attributes like size (*big or small*), shape (*long and flat; thin and round, etc.*), and weight (*heavy or light*).
4. Ask children to make a prediction: Do they think the object will float (stay on top of the surface of the water)? Or do they think the object will sink (move below the surface of the water)?
5. Expand: Why do they think that? Explore their thinking (for example: do they think that the object will sink because it is heavy or because it is larger?)
6. Ask the child who selected the object to decide where to put the object's picture on the chart paper: Floating (*above the wavy water line*) or Sinking (*below the wavy water line*). Cut a small piece of tape and allow the child to place the object on the paper.
7. **NOTE: It's okay if children's predictions are incorrect!** Let them leave an incorrect prediction on the chart. The next part of the activity will give them an opportunity to correct their misconception.

SUMMARIZE by reviewing children's predictions about the objects. Use the chart to guide your summary. Keep the data chart posted for the next activity.

EXPAND

INTRODUCE: We made our predictions about which objects we think will sink and which will float. Now we're going to be scientists again, but this time we will do an experiment. An experiment is a test to see if a prediction was correct. We will test our predictions about which objects will sink and which objects will float.

TRY IT: Guide the experiment using the steps below.

1. Put children in pairs.
2. Give each pair a bin of water and a tray of materials to test.
3. Ask one child to choose which object to start with; prompt the other pair to select the same item. Direct children's attention to the data chart and ask whether the class predicted that object would float or sink.
4. Together, notice the size of the object. Notice how heavy/light the object feels.
5. Then on the count of three, invite each pair to drop that item into the water.
6. Ask what they observe: Does the object float or sink?
7. If the children's prediction on the data chart was correct, leave it as is. If the children's prediction on the data chart was incorrect, ask children if they think they should move the object's picture elsewhere on the chart (above or below the water, based on the experiment findings).
8. Repeat for the remaining objects, giving each child a turn to select and test items.

ASK: Help children develop a fuller understanding of floating/sinking using the discussion questions below. Supplement this discussion with children's observations from the experiment.

- When you look at the objects at the bottom of the water, what do you think made them sink?
- When you look at the objects on top of the water, what do you think made them float?
- Did all of the big objects sink? Did all of the smaller objects float? Why or why not?

SUMMARIZE: Today we learned that floating means an object stays on the surface or top of the water. Sinking means an object falls below the surface of the water. In our experiment, we discovered that some objects float and some objects sink. We made predictions about each object and then tested them in our experiment to find out what would happen.

REFLECT

To close the activity, use a reflective question/s - like those below - to prompt children's thinking about floating and sinking.

- What do you remember about floating and sinking from our activity today?
- What predictions did you make today about floating and sinking?
- When you did the experiment, what did you discover about floating and sinking?
- Did anything surprise you about floating and sinking?
- What will you tell your grown-ups about floating and sinking?
- What do you still want to learn about floating and sinking?

SUMMARIZE: Today we learned that some objects can float, which means they stay on the surface of the water. Some objects sink, which is when they fall below the surface of the water. If the object is heavier than water, it will sink. If an object is lighter than water, it will float.

Individualizing the Activity

Make it more challenging:

- Make additional copies of **Handout 2** and provide pairs of children with chart paper and tape to record their own predictions and observations. You can draw a line across the middle of the page to indicate the surface of the water or use **Handout 3** as a template. Together, they can talk and decide which objects they think will float and sink and tape the picture in the appropriate place on the chart. Later, they can work as pairs to test each object and revise the chart as needed.
- Invite children to find materials in the classroom that they wish to test. (Make sure these items are water-safe.)
- You can give children materials like tin foil, corks, popsicle sticks, tape, etc. and see if they can build a boat that floats. This would bring in the opportunity to practice the engineering design process as well.

Make it less challenging:

- Reduce the number of items in the experiment to 4 (two that float and two that sink).
- Omit the predictions step and instead focus on helping children observe and share what they see happening during the experiment for each object: Does it sink or float? Document their observations/discoveries on the data chart.

MAKING CONNECTIONS ACROSS THE DAY:

- Add a water play option to your classroom (either indoors or outside). Offer children a tray of materials to test in terms of floating/sinking. Provide a clipboard, pen, and copies of **Handout 3** for them to record predictions. Encourage children to experiment with other items they find in the classroom or outside—for example, does mulch float or sink? Does a leaf? Does a plastic figurine?
- During meal or snack time, have a pitcher of water available, with a small bowl of ice cubes. Ask children to predict whether the ice cubes will float or sink in the water.
- Share this video (from PBS Learning Media: www.pbslearningmedia.org/resource/ket-earlychild-sci10/sink-or-float) that shows a sinking/floating activity. Pause the video before each object is put in the water to give children a chance to make a prediction.

Song: *Summer Days*

Directions: Model the movements suggested in the song. Encourage children to do what you do!

Summer days by the pool	(Nod head side to side)
Sun is hot, but we try to stay cool, and it's	(Fan face with hand)
Time to play a game 'cause we're out of school!	
Got our toys with us in the water	
We like to dive just like sea otters, so we're	(Hands together, pretend to dive)
Testing which toys are sinkers or floaters.	
First let's test a plastic boat	(Hands together like a boat)
It's really light; let's make a note.	
It sails along and it stays afloat!	(Pretend to sail the boat around)
Next let's try a little rock	
Toss it in the water; make a ripple mark	(Pretend to toss an object)
It sinks down to the bottom where it's really dark.	(Hand to forehead, look down low)
Next let's test a pair of shades	(Make pretend glasses with fingers over eyes)
Lay them on the water while we drink some cool-aid	(Pretend to set shades down gently)
They sink down low, and there they stay.	(Hand to forehead, look down low)
Last let's try a rubber duck	
Will he float? With any luck!	(Shrug shoulders)
Set him on the water, and he stays afloat!	(Pretend to set an object down gently)
Summer days by the pool	(Nod head side to side)
Sun is hot, but we try to stay cool!	

Making Literacy Connections

Share the following book with children as an opportunity to deepen their understanding of the concept of sinking and floating.

Suggested Book: *Who Sank the Boat?* by Pamela Allen

AS YOU READ:

- Ask children if any of them have ever been on a boat or a pool float/raft. Point to the cover illustration and ask children to predict what the story will be about.
- Ask children about each of the animals that we meet on the first page – what do we notice and know about cows? Are they big or small? Do children think this cow is heavy or light? Repeat these exploratory questions with each animal – donkey, sheep, pig and mouse.
- The title of the story is a question, “Who sank the boat?” so ask children to make a prediction about who sank the boat in this story. What makes them think that?
- When the cow gets in the boat, he loses his balance and almost tips the boat over. Ask children what it means for someone to *lose their balance*. (It means that we stumble for a moment and start to fall.)
- When the mouse gets in the boat last, it sinks. Is this because the mouse is too heavy? What do the children think made the boat sink when Mouse got in?
- Ask children to imagine: What if Mouse was the first animal to get in the boat, do you think it would sink if he was alone on the boat?
- Was it a surprise that Mouse sank the boat? If so, why?

BUILD ON THE BOOK: SINKING MY BOAT

Materials: Roll of aluminum foil, large bin of water, many pennies/coins OR containers of play-dough

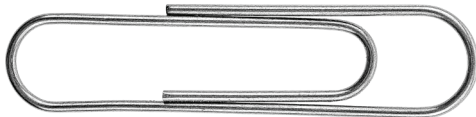
NOTE: Pennies/coins can be choking hazards so supervise this activity carefully and put all coins out of children’s reach when done. Alternatively, you can substitute play-dough, having children place little balls of play-dough instead of coins.

- Put children in pairs. Alternatively, the teacher can lead this as a group activity.
- Distribute a piece of aluminum foil to each pair, about 5” by 5”.
- Demonstrate how to fold the foil into a boat (try an oval or rectangle shape). Encourage children to work on this together. Assist as needed.
- Invite children to place their boat in the water and observe whether it floats or sinks. (It should float.)
- Explain that, like in the story, they will add one coin at a time to see how many coins it takes to sink their boat. Supervise to ensure pairs take turns. (To make this activity more challenging, you can have children count or keep a tally of how many coins they add.)
- Observe if there are any changes to the boat as children add more coins. Continue until the boat sinks.
- Point out that the last coin was like the little mouse – the last bit of weight needed to sink the boat.

Handout 1: Boats That Float

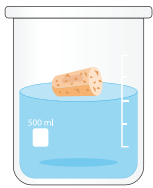


Handout 2: Test Materials

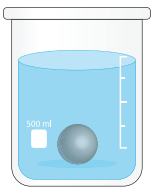


Handout 3: Data Chart

Float



Sink



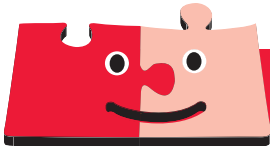


Sink or Float?

This week, children are learning about sinking and floating. Sinking is when an object falls below the surface of the water. Floating is when an object stays on top of the water's surface. You can help children learn at home by trying some of the activities below.

- **Use bathtime as a scientific experiment.** Collect some objects for your child to test at bath-time, such as a plastic spoon, a metal spoon, a bottle of shampoo, and a cork or bath toy. Encourage your child to make predictions about whether each object will sink or float. Then let your child drop each object into the water to test their prediction.
- **Notice when food or drink sinks or floats.** If your family is enjoying soup, cereal, or a drink with ice cubes or a lemon, observe together what is floating and what is sinking. Ask your child what they think might make an object float or sink.
- **Test objects found outside** by filling a bowl or bucket of water. Ask your child to search your yard or local park for objects to place in the water to test if they float or sink. This may include sticks, grass, mulch, pebbles, leaves, and more! Supervise carefully to ensure all items are child-safe and be sure to pour out the water when you're done playing together.





Solo para familias

¿Hundirse o flotar?

Esta semana, los niños están aprendiendo sobre lo que quiere decir hundirse o flotar. Un objeto se hunde cuando cae por debajo de la superficie del agua. Flotar significa que un objeto permanece sobre la superficie del agua. Usted puede ayudarlos a aprender en casa con algunas de las actividades que se indican a continuación.

- **Utilice la hora del baño como un experimento científico.** Reúna algunos objetos para que su niño experimente con ellos a la hora del baño, como una cuchara de madera, una cuchara de metal, un envase de champú y un corcho o un juguete para el baño. Anime a su niño a hacer predicciones sobre si cada objeto se hundirá o flotará. A continuación, dígame al niño que deje caer cada objeto en el agua para comprobar su predicción.

- **Señale cuándo la comida o la bebida se hunde o flota.** Si su familia está tomando sopa, cereales o una bebida con cubitos de hielo o una rodaja de limón, observen juntos lo que flota y lo que se hunde. Pregúntele a su niño cuál puede ser la razón de que un objeto flote o se hunda.

- **Hagan pruebas con objetos que encuentren afuera de la casa llenando un recipiente con agua.** Pídale a su niño que busque objetos en el jardín o en el parque local para colocarlos en el agua y observar si flotan o se hunden.

Pueden ser palitos, hierbas, mantillo, tapones de botella, hojas, ¡y mucho más! Tenga cuidado de que todos los objetos sean seguros para los niños y asegúrese de vaciar el agua del recipiente cuando hayan terminado de jugar juntos.

