



# MISSION MISSION POSSIBLE

IMAGINE. DESIGN. CREATE.



## **MISSION** : Make it Float

Your mission is to build a boat that will keep a quarter afloat in a container of water for one minute!

### **WHAT YOU'LL NEED**

- One quarter
- Recycled material from around your house (paper, plastic straws, packing material, plastic bags, balloons or anything else you think might help your quarter float)
- Tape (scotch tape or masking tape)
- A timer
- A large container to hold water (a mixing bowl, bucket or sink are good choices)
- Water
- Optional: pencil, pen, crayon, or marker and paper to draw on



## **LET'S READ**

Find a comfortable spot and read! Here are some ideas to get you started:

- *The Magic School Bus Ups and Downs: A Book about Floating and Sinking* by Joanna Cole
- *DK Eyewitness: Boat* by Eric Kentley
- *Buoyancy* by John Farndon
- *Dive! Dive! Dive!* by Isabel Thomas

**You can download digital copies of these books for free from openlibrary.org. Here is how!**

1. Go to [openlibrary.org](https://openlibrary.org).
2. Click the blue "sign up" button on the top right to create a free account. You will be sent a confirmation email.
3. Sign in.
4. Type the book title and author into the search bar.
5. Find your book and click the blue "borrow" button.
6. Don't forget to return your book when you are finished reading it!



Sam Noble Home



Activities

## Get Started:

- 1) Pick the area where you are going to work (in the kitchen, on the driveway, etc.)
- 2) Gather the quarter, large container and other supplies from around the house.
- 3) Fill the container with water.
- 4) Place your quarter in the water without anything to help it float. What happened?
- 5) Take your quarter out of the water.
- 6) Look at the supplies, quarter and container of water:

## THINK!

- How deep is the water in your container?
- How can you use the materials you collected to help your quarter float?
- Will they sink like the quarter did?
- Will you need any other materials?
- Optional: Draw what you want your boat to look like!

- 7) Build it!
- 8) Once you have built your boat, place the quarter on or in it.
- 9) Make sure your timer is ready.
- 10) Place your boat in the water, start the timer and see what happens!

## WHAT HAPPENED?

- Did your boat stay afloat for one minute?
- Did your boat float at first, then sink?
- Did your boat not float at all?
- Did the quarter fall off?



- 11) Try again! Just because your idea didn't work the first time, doesn't mean you should give up. Think about how you can change your idea to build your boat in a different way so it will float for longer. Be creative and try as many times as you want. Ask an adult or buddy for ideas if you've tried all of yours. (If you need some hints, check out the next page.)

When you're done, share what you did with someone!

### TELL THEM

- Did the quarter float for a minute on the first try?
- How did you change your design to help it float better?
- How many ideas did you try?
- What was hard about the challenge?
- If they wanted to try the make it float, what should they do?

### BONUS CHALLENGE

Now that you've build a boat, see if you can:

- Keep something heavier than a quarter afloat. You can try it with two quarters, or even try something much heavier - like a food can!
- Build a boat using only one material.
- Try to build a boat that sinks, but only sinks halfway down into the container.
- Challenge an adult or buddy to make a boat using the same materials and see which can hold the most weight before sinking.

Have you ever wondered what makes things float or sink, or how a large ship can stay afloat while a bowling ball will sink in water? Whether or not something sinks or floats has to do with the weight an object has in relation to its size. When an object (like a quarter) is placed in water, the object displaces, or moves, the water around it to make room for itself. If an object is heavier than the amount of water it displaces, it will sink. If an object is lighter than the amount of water it displaces, that object will float. Larger objects can float as long as they are still lighter than the amount of water they displace – since ships are so large, they displace a lot of water. This means a large ship is actually lighter than the amount of water it displaces! Since a bowling ball is small and heavy, it doesn't displace as much water as it weighs. That means that the bowling ball will sink, while a huge ship will float!



## HELPFUL WORDS

**Boat:** a small vessel

**Buoyancy:** the ability to float

**Density:** the amount of matter an object has relative to its size

**Displace:** when something is moved from its original position

**Float:** to rest on or near the surface of a liquid without sinking

**Matter:** anything that takes up space

**Sink:** to go down below the surface of a liquid

**Vessel:** something specifically designed to float on or move in water

**Weight:** the quantity of matter within an object

## TIPS

- It may be easier to make a larger boat float than a smaller one. The larger boat will spread out the weight of your quarter more, which will displace less water.
- Boats don't need to be complicated – you can make your quarter float with only one or two materials.
- Make sure your boat isn't heavy. A heavy boat will be more likely to sink than a lighter one.
- Try not to use materials that will absorb water – absorbing water will make your boat heavier.
- Your boat can come in many different shapes and sizes – there is no right or wrong design. You could:
  - o Fill a plastic baggie with air
  - o Use food containers or cardboard boxes
  - o Tape plastic straws together to make a flat device
  - o Use plastic or styrofoam bowls

## Talk like a boat builder!

1. My boat can also be called a vessel.
2. I want my boat to have buoyancy or else it will sink.
3. The quarter sank because it was denser than the water around it.
4. My vessel will be buoyant if it is lighter than the amount of water it will displace.

Want to learn more about the flotation device challenge? Check out the links below:



### **Buoyancy: What Makes Something Float or Sink (video)**

<https://www.youtube.com/watch?v=nMIXU97E-uQ>



### **Sink or Float (video)**

[https://www.youtube.com/watch?v=eQuW8G2QV\\_Q](https://www.youtube.com/watch?v=eQuW8G2QV_Q)



### **How Cruise Ships Work**

<https://adventure.howstuffworks.com/cruise-ship2.htm>



### **Eureka! The Archimedes Principle**

<https://www.livescience.com/58839-archimedes-principle.html>



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Activities

