



SINK OR FLOAT CHALLENGE

Challenge Goal: To learn more about buoyancy and find out why some objects float, and some sink.

Instructions:

1. Choose a container for water: a clear vase, a large bowl, a plastic tub, etc.
2. Gather different materials to see if they will float or sink: coins, plastic toys, ping pong ball, crayons, metal spoon, paper clip, etc.
3. On your data table, record all the materials you are testing. Predict whether you think the object will float or sink.
4. Drop the objects in the water. Record your results on your data table.

ABOVE & BEYOND

Can you think of things that don't float at the water's surface and don't sink to the bottom? This is called "neutral buoyancy."

Instructions:

1. Using your gathered materials, design a diver that won't sink or float, but hover somewhere in the middle of the water.
2. Test your diver in the water.

Was it easy or difficult to achieve neutral buoyancy with your diver?
How could you improve your design?

BUOYANCY

When Greek mathematician Archimedes got into his bath tub, he displaced some of the water and it overflowed out of the tub.

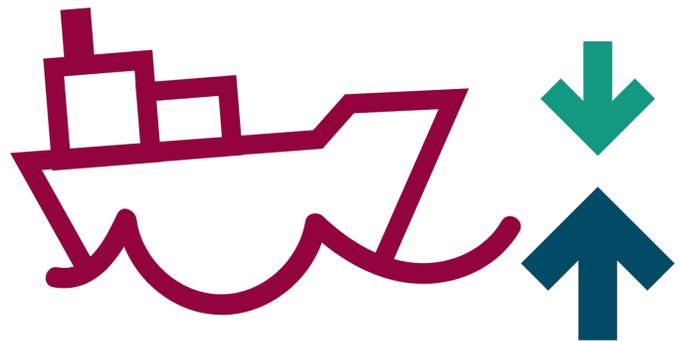


ARCHIMEDES' PRINCIPLE

After this observation, Archimedes figured out that if the weight of the water displaced is the same as the weight of an object, the object will float. We call this buoyancy.

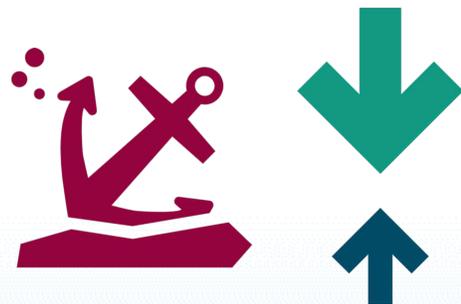
FLOATING

The weight of the object is a downward force. Buoyancy is an upward force. When the buoyant force is greater than the weight on an object, the object will float.



SINKING

When the downward force of the weight of an object is greater than the upward force of buoyancy, the object will sink.

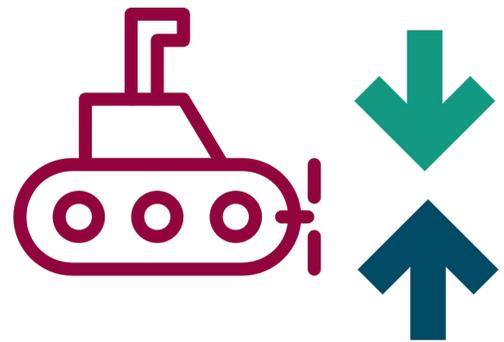


NEUTRAL BUOYANCY

How do submarines, divers, and fish navigate our planet's waters without sinking or floating? They have neutral buoyancy.

FORCES UNDERWATER

When the downward force of the weight of an object is equal to the upward force of buoyancy, the object will remain suspended in the water.



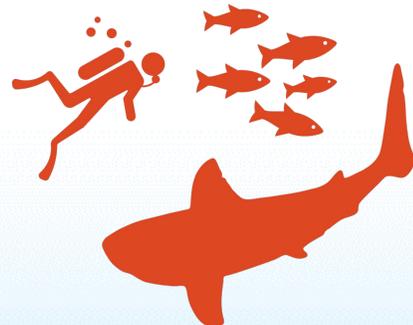
FISH

Bony fish have swim bladders that can fill with air to rise or release air to sink so that they can swim at different depths in water.

Sharks do not have swim bladders, but have skeletons made of cartilage and oil in their liver to stay light and provide a bit of buoyancy. They must swim continuously to change depths in the water.

SCUBA DIVERS

People have a natural tendency to float, so scuba divers have to use weights and have a special device, similar to a fish's swim bladder, that can hold or easily release air. They also need to pay attention to their breathing. Scuba diving takes a lot of practice!



DATA SHEET

Use the table below to record your buoyancy experiment materials, predictions, and results. Did anything surprise you?

OBJECT	PREDICTION: SINK OR FLOAT?	RESULTS: SINK OR FLOAT?	OBSERVATIONS

ABOVE & BEYOND

In the space below, describe your neutral buoyancy experiment. Draw a picture, or explain what materials you used. Was it easy or difficult to reach neutral buoyancy?