

## " WHY DO BOATS FLOAT?"

Question:

Why does an object, such as a boat, which is heavier than water, float?

Hypothesis:

The boat pushes down into the water. The water pushes up on the boat. The water pushed out of the way by the boat weighs less than the boat.

Materials:

3 Containers

2 Rulers

Tape

Water

Red food coloring

2 one-pound blocks of non-hardening clay

Scale

Syringe

Experiment:

1. Tape a ruler to each container
2. Fill each container with water to the 10-centimeter mark.
3. Add 4 drops of red food color to each container.
4. Stir to mix.
5. Divide the clay into four equal parts using the scale to weigh each part. Record the data.
6. Form the four clay blocks into a ball and three boats.
7. Place one object at a time in the water in a container. Record the water height on the ruler before and after.
8. Using a big syringe suck water out of the container until it is at the 10-centimeter mark.
9. Put the water from the container into another container and weigh the water. Record the data.
10. Reweigh each object using the scale and record the data.

Data:

1. Weight of clay objects before and after the experiment.

Object No.	Before	After	Difference
Ball	245 grams	245 grams	0 grams
Boat 1	245 grams	245 grams	0 grams
Boat 2	242 grams	242 grams	0 grams

Boat 3	242 grams	242 grams	0 grams
Ball+Boat 3	487 grams	487 grams	0 grams

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2. Water levels before and after placing the clay object into the water.

Object No.	Before	After	Difference	Notes
Ball	100mm	107mm	7mm	Sank
Boat 1	100mm	107mm	7mm	Sank
Boat 2	100mm	110mm	10mm	Floated
Boat 3	100mm	110mm	10mm	Floated
Ball+Boat 3	100mm	120mm	20mm	Floated

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3. Weight of the water pushed out of the way by the clay objects.

Object No.	Before	After	Difference	Notes
Ball	245 grams	159 grams	-86 grams	Sank
Boat 1	245 grams	151 grams	-94 grams	Sank
Boat 2	242 grams	255 grams	+13 grams	Floated
Boat 3	242 grams	252 grams	+10 grams	Floated
Ball+Boat 3	487 grams	490 grams	+3 grams	Floated

Conclusions:

1. The Hypothesis is wrong.
2. If an object weights more than the water it pushes out of the way, it will sink.
3. If an object weights less than the water it pushes out of the way, it will float.