# Buoyancy and floating (Item No.: P1001900)

## Curricular Relevance

**Area of Expertise:** Physik
**Education Level:** Klasse 7-10
**Topic:** Mechanik
**Subtopic:** Mechanik der Flüssigkeiten
**Experiment:** Auftrieb und Schwimmen

| Difficulty | Preparation Time | Execution Time | Recommended Group Size |
|---|---|---|---|
| Easy | 10 Minutes | 10 Minutes | 2 Students |

**Additional Requirements:**

**Experiment Variations:**

**Keywords:**

## Task and equipment

## Information for teachers

## Additional Information

The students should determine whether or not various objects float in water. They should then investigate whether the volume of an object or its shape affect its buoyancy.

## Remarks

Since the plasticine mass should not be specified, the number of little balls that the ship can carry is also unspecified.
The important thing is that the students realise that when a certain mass is exceeded, the carrying capacity of the ship becomes insufficient and the ship sinks.

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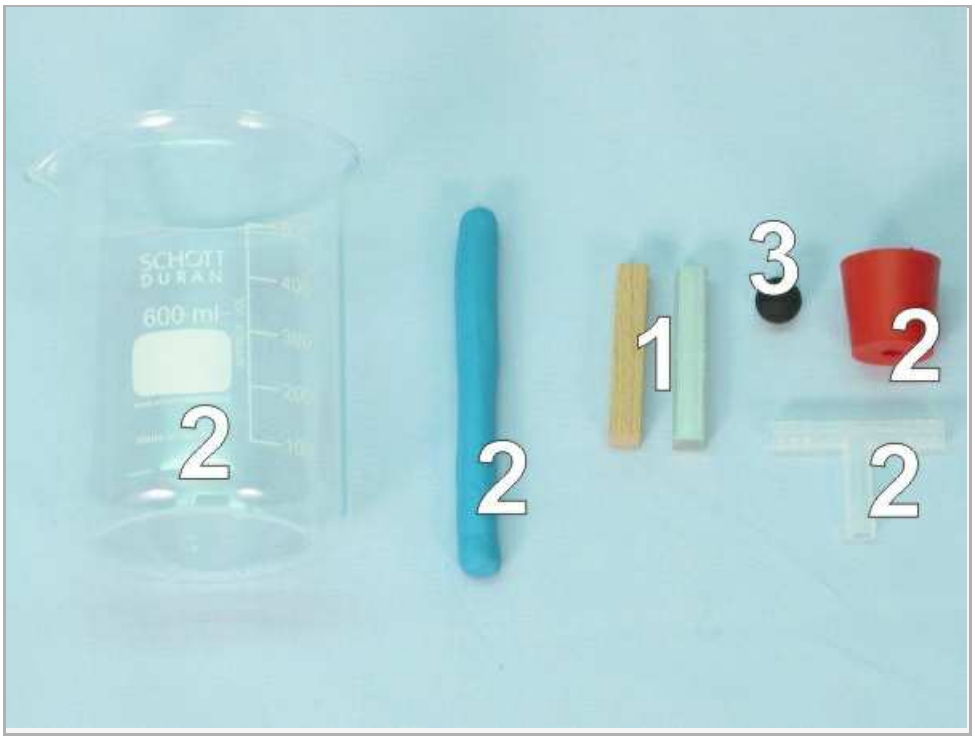
## Task and equipment

### Task

### When does an object float?

You will immerse various solid objects with different densities in water and determine whether or not they float. Then you will form a hollow object from a plastic material (plasticine) and determine if it floats.

## Equipment




| Position No. | Material | Order No. | Quantity |
|---|---|---|---|
| 1 | Aluminium column | 03903-00 | 1 |
| 1 | Wood column | 05938-00 | 1 |
| 2 | Glass beaker DURAN®, short form, 600 ml | 36015-00 | 1 |
| 2 | Plasticine, 10 sticks | 03935-03 | (1) |
| 2 | Rubber stopper 26/32, 1 hole 7 mm | 39258-01 | 1 |
| 2 | Tubing connect.,T-shape,ID 8-9 mm | 47519-03 | 1 |
| 3 | Rubber ball,diam.15 mm | 03921-00 | 1 |

## Set-up and procedure

- Fill the beaker three-quarter full of water and place the wood and aluminium columns (Fig. 1, 2), the rubber ball, the piece of plasticine, the connecting piece (plastic) and the rubber stopper one after another in the water.
- Observe whether the objects sink or float; record your observations under "Result – Observations 1" in the report.

Fig. 1

Fig. 2

- Divide the piece of plasticine into two pieces of about equal size. Form a ball from one half and a thin sheet from the other half from which you should shape a boat (Fig. 3).
- Place both pieces in water and observe whether they sink or float (Fig. 4). Tick the appropriate checkboxes in "Result – Table 1", part (a), in the report.
- Now form a ball from the boat and a boat from the ball. Place both objects in the water again and repeat the experiment, ticking the appropriate checkboxes in "Result – Table 1", part (b), in the report.

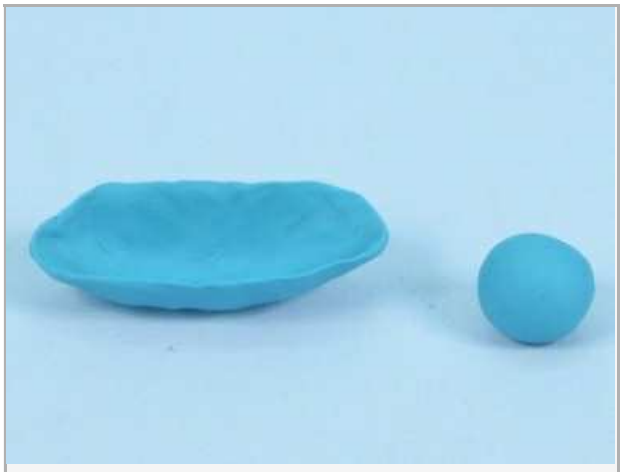


Fig. 3

Fig. 4

- Divide the plasticine ball into about 10 little balls which are as nearly as possible the same size. Place the boat in the water and load it bit by bit with the little balls. Record your observations under "Result - Observations 2" in the report.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# Report: Buoyancy and floating

## Result – Observations 1

Sort the investigated material in floating and non-floating material.

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## Result – Table 1

Note down your observations in the table:

| | Object | Floats? (yes/no) | |
|---|---|---|---|
| (a) | Ball | no | 1 |
| | Boat | yes | 1 |
| (b) | Ball | no | 1 |
| | Boat | yes | 1 |

## Result – Observations 2

Note down your observations of the boat loaded with little balls:

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## Evaluation – Question 1

Which of the six objects floats?

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## Evaluation – Question 2

Is the buoyancy of the individual objects dependent on the material they are made of?

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## Evaluation – Question 3

Is there a correlation with the object's densities? Arrange the objects according to whether their density is larger or smaller than that of water ($\rho$ = 1 g/cm$^3$) and compare these results with your recordings under "Result – Observations 1". What can you conclude?

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## Evaluation – Question 4

Is the buoyancy of the objects dependent on their volume?

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## Evaluation – Question 5

Draw a floating unloaded and a floating loaded boat in water. What is the difference?



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## Evaluation – Question 6

Why does the plasticine ball sink, while the boat made of the same material and with the same mass does not sink?

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## Evaluation – Question 7

What is the carrying capacity of the boat?

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