

Balloon-powered boat

For middle / upper primary students

VELS:

Discipline-based Learning.

Science: Levels 3 (science knowledge and understanding; science at work), 4 (science at work) & 5 (science knowledge and understanding, science at work).

Interdisciplinary Learning

Thinking: Levels 3 (reasoning, processing and inquiry; reflection, evaluation and metacognition), 4 (reasoning, processing and inquiry; reflection, evaluation and metacognition), 5 (reasoning, processing and inquiry; creativity; reflection, evaluation and metacognition) & 6 (reasoning, processing and inquiry; creativity; reflection, evaluation and metacognition)

Communication: Levels 3, 4 & 5 (listening, viewing and responding)

Design, Creativity and Technology: Level 3 (investigating and designing; analysing and evaluating)

Introduction:

This activity aims to investigate boats that are able to plane (sometimes known as hydroplaning) and Newton's Third Law of Motion.

Most ships float by displacing water - this was first explained by the Greek philosopher [Archimedes](#). Archimedes' Principle states that the buoyancy of an object is equal to the weight of the water that the object displaces. However, some smaller boats displace very little water and are able to remain on the surface by planing.

When planing, most of a boat's hull is above the surface; this reduces drag and allows the vessel to travel faster. Although, in order to begin planing, the boat must be travelling quickly so that the hull is lifted free of the water. Boats that use this method include jetboats, speedboats and hydrofoils.

Newton's Third Law states: for every action there is an equal and opposite reaction - as a boat's propeller pushes water in one direction, the boat travels in the opposite direction. With a jetboat, a jet of water is used instead of a propeller but the principle remains the same. In this experiment, the boat is pushed forward by a stream of air escaping from a balloon.

Equipment:

margarine containers / plastic pots
balloons
trays for water
straws
plasticine / blu-tac
rubber bands
scissors

Method:

1. Using scissors, make a hole low down in one end of the margarine container.
2. Slide a straw into the end of the balloon, leaving about 5 cm sticking out.
3. Wrap a rubber band around the neck of the balloon so that the straw will stay in place.
4. Place a piece of plasticine / blu tac in the bottom of the margarine container near the hole.
5. Firmly anchor the balloon to the bottom of the container using the blu tac.
6. Make sure the straw is sticking out through the hole and under the water by a couple of cm.
7. Inflate the balloon, hold the straw tight to stop the air escaping, put the boat back into the water and let the air out. Watch what happens.

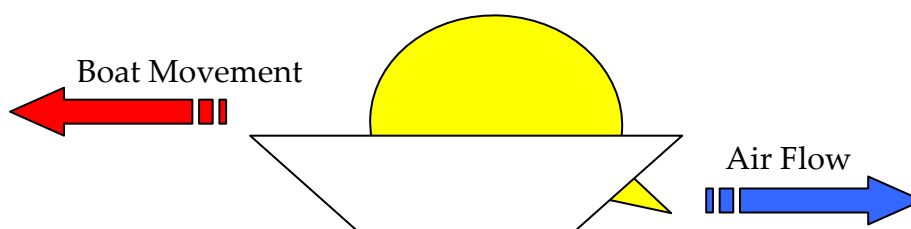


Fig 1 Balloon boat