



Boat Builder – Plasticine Imagineer

TOPIC A: PHYSICAL SCIENCES – FRICTION AND FLOATING
LESSON PLAN



THE AQUARIUM OF WESTERN AUSTRALIA

SEA FOR YOURSELF

Class: Year 4

Investigation: Boat Builder – Plasticine Imagineer:
What makes something sink or float?

MATERIALS NEEDED

- Water.
- Tub to float plasticine creations in.
- Equal amounts of plasticine.

KEY CONCEPTS

- A piece of plasticine with the same weight and density will either float or sink depending upon how it is shaped. This means that it's not just the material that an object is made from that matters – its form (or shape) also has a key role.
- Water supports a boat by pushing upwards on the bottom of it.
- If you put plasticine in the shape of a ball it would sink, but if you mould it into the shape of a boat or a leaf it should float. This happens because to float an object you need to move an amount of water equal to its own weight. If all its weight is in a small area it sinks – but if it spreads its weight out there is more water beneath it holding it up.

LESSON OUTLINE

- Independent Learning
- Group Work
- Peer Work

Discuss: we are going to become imagineers and our aim is to discover a shape that floats well on the water.

Discuss: how can we divide the plasticine up into equal pieces? How will we know the pieces are equal?

Do: divide plasticine (measure/weigh).

Do: give each student a piece of plasticine and have them shape it as they like.

Communicate: students show their creation to the class and suggest why they think it will float.

Predict: what creations will float?

Observe & Do: students place their shape creations into a tub filled with water. Do they sink or float?

Evaluate: was it as predicted?

Discuss: what shapes floated better than others?

Observe & Do: enable students to work in small groups and reshape their creations until patterns are formed.

Communicate: what did each group find?

Evaluate: why did some shapes work better than others?

KEY QUESTIONS

- What makes something sink or float?
- What if they are all made from the same thing?
- Why would some shapes work better than others?

- If the plasticine is pushing down on the water, could the water be pushing up on the plasticine?
- What would happen if we put something on our plasticine?
- Is there a limit to how well something can float? Or how much it can support?

BACKGROUND INFORMATION/RESOURCE LINKS/ CONCEPT DEVELOPMENT

- Just as water supports the plasticine boat by pushing upwards on it, water supports the weight of sea creatures enabling features, shapes and sizes that may not be possible on land where gravity pushes things down.
- This is one reason why marine animals can get so big – water's buoyancy helps support the bodies of sea creatures, taking some of the strain off their muscles and skeletons.
- The biggest animal to have ever lived on our planet (bigger than any dinosaur or ancient creature) is the blue whale. Blue whales grow to over 30 m long and weigh over 170 tonnes. They are so big that their heart is the size of a car and their tongue is as heavy as an elephant!
- On land, as you get bigger you need to dedicate more and more of your body mass to your bones to support yourself. The more energy invested in bones, the heavier the creature.
- What do you think may happen in space where there is no gravity?
 - It's possible that on a planet with lower gravity than Earth's, such as Mars, terrestrial creatures less encumbered by their loads could grow much larger.

- On earth, we work our bones and muscles every day by moving and standing against gravity. But without gravity to work against, an astronaut's bones lose strength.
- To lessen the effects, space station astronauts must exercise at least two hours every day and undergo weeks of rehabilitation after their return to Earth.
- Astronauts regain most of their bone mass in the months following their return from space, but not all of it.

LEARNING OBJECTIVES

The Role of Shape

- The material that an object is made from and its shape determine if it will sink or float.
- Water pushes up, supporting the weight of objects and living things.
- The shape of objects and living things affects how they move.
- There is a weight limit to how much shape, and water's upward push, can make objects and living things float.

LANGUAGE OBJECTIVE

Students describe what and why when talking about their creation.

ACHIEVEMENT STANDARDS

- Students identify that science is used to understand the world around them.
- Students broaden their understanding of form and function.

CURRICULUM LINKS

Science – Physical Sciences

Forces can be exerted by one object on another through direct contact or from a distance (ACSSU076).

Science as a Human Endeavour

Science involves making predictions and describing patterns and relationships (ACSHE061).

Science Enquiry Skills

(AC SIS064) (AC SIS065) (AC SIS069) (AC SIS071).

CAPABILITIES

- | | |
|--|---|
| <input checked="" type="checkbox"/> Numeracy | <input type="checkbox"/> ICT |
| <input checked="" type="checkbox"/> Critical and Creative Thinking | <input checked="" type="checkbox"/> Ethical Understanding |
| <input checked="" type="checkbox"/> Literacy | <input type="checkbox"/> Intercultural Understanding |
| <input type="checkbox"/> Personal and Social | |

RECENT PRIOR EXPERIENCE

- AQWA excursion – Sink or Swim and Smooth or Slimy worksheets.
- Nature hunt and floating observations.
- Orange Plops density experiment.

PROGRESSION OF TOPIC

1. What objects float or sink?
2. What helps an object float?
3. Understanding density.
4. **Understanding the role of shape.**
5. Air is less dense than water.
6. Do all liquids have the same density?
7. Does all air have the same density?

DIFFERENTIATION

Opportunity for students to:

- | | |
|---|--|
| <input checked="" type="checkbox"/> See and Look | <input checked="" type="checkbox"/> Touch and Do |
| <input checked="" type="checkbox"/> Hear and Listen | <input type="checkbox"/> Read and Write |

NEXT LESSON

Rainbow Tower investigation (do all liquids have the same density?).

EXTENSION

- You've discovered the best shape for floating but what about for moving through the water? Do you think it would be the same? How could you investigate this?
- Do you think that the shape that floats in the water would also float in air?
- Do you think one shape could be faster than another? What shape were the fastest fish and sharks at AQWA? What else helped them to move through the water?
- What other factors do you think affect the size a creature grows to? e.g. Space, food, body design (does having an exoskeleton like a crayfish make a difference?).

Notes: