



Lesson: 1

HOW MANY MARBLES SINK A BOAT?

TIME REQUIRED: 2 x 55 minute lessons

BRIEF DESCRIPTION:

Students will investigate the importance of correct loading of a ship to prevent capsizing.

OBJECTIVES:

Students' prior knowledge, previous skills and concepts:

Students will use their understanding of floating and capsizing to develop this topic further.

Students' Values and Perspectives:

(e.g.: Cultural, Environmental, Social, Economic)

Students' understanding of why this is an important issue will need to be developed and emphasized.

An understanding of wise water use is necessary in this practical. Wherever possible it is necessary to discuss procedures for water disposal which does not include tipping it down the sink.

PROCEDURE:

Materials necessary for practical for each group:

At least 3 pieces of 30 cm x30 cm square of aluminium foil

Container to use as a mould... margarine container is suggested

20 Marbles

A large container of water, a 9 litre bucket 1/2 filled is sufficient

Card board

Scissors

Ruler

Paper towel or a cloth

1. Students make 3 boats out of the aluminium foil. Try boats of different sizes. Boats are stronger if the foil is doubled.
2. See how much cargo (i.e. the marbles) the boat will hold before it capsizes. Patience is required for this stage of the practical.
3. Record observations. Refer to diagrams and images overleaf to explain table.

	NUMBER OF MARBLES CAUSING CAPSIZE			
	No Divisions	4x Perpendicular	4x Diagonal	6 Divisions
Boat 1				
Boat 2				
Boat 3				

RESOURCES

Teacher Resources:

Laboratory or wet area access
Materials as outlined in procedure

Student Resources:

Practical materials as listed
Work books for a range of possible products such as

- Practical write-up
- Predictions, Observations and Explanations or
- Problem solving

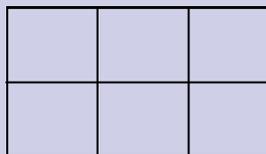
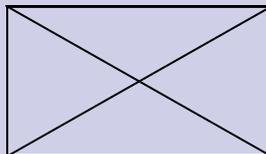
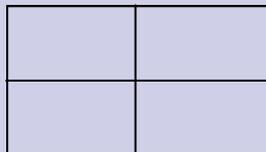
Student Product:

Depending upon the focus of the lesson students may produce a range of products. The accompanying Prediction/observation and evaluation (POE) sheet is a starting point.

TEACHER NOTES:

Water usage in this practical will need to be monitored. The use of stations rather than a large water container for each group is suggested.

- Students are to make some divisions which fit comfortably but do not damage the interior of the boat. Refer below to some ideas. The best way to construct these are to cut slits in both pieces of card and slip them together.
- Students load the various sections with cargo and observe the effect this has on the balance of the boat. Students record the results.



- Students should be able to make some conclusions about why boats/ships need to have divisions within their holds.

Related Standard: SACSA Framework:

Science

4.7 Compares properties of materials before and after physical or chemical change by planning, conducting, evaluating and communicating an investigation.

[In] [T] [C] [KC1] [KC2] [KC3]

Numeracy & Literacy Strategies

Opportunity to assess measurement skills and shape recognition and description.

Students could be asked to see if a pattern exists between the number of marbles and the amount of divisions.

ICT Inclusion

If desired this practical could be word processed.

Modifications for Improved Learning

Nominate a scribe to allow those with difficulties to show understanding.