# Design a boat

## Objective: To design a boat that will take the maximum number of passengers

The big questions:

1. How do boats float?
2. What materials are best for boat-making?
3. Does the shape of a boat impact the number of passengers it can take?
4. What is the best shape for a boat for taking the most passengers?
5. Have you produced 'valid data?'
6. How might you improve this experiment?

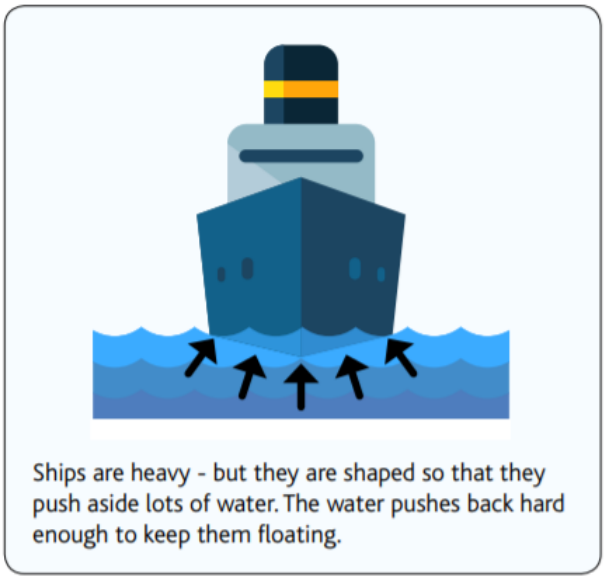
<u>Things to think about</u>

What does **valid data** mean?

Materials

- Junk modelling materials and glue/tape
- Passengers (I suggest using similar sized stones or even peas – but any objects of a similar size and shape will work)
- A container of water

Water pushes upwards with a force called 'upthrust'. (You can feel this if you try to push a light object such as a balloon or aeroboard under water). The shape of a 'boat' affects the weight (passengers/cargo) it can hold. The more water that the boat displaces the more it will float and therefore the more weight it can take.



Ships are heavy - but they are shaped so that they push aside lots of water. The water pushes back hard enough to keep them floating.

1. Create a number of boats in different shapes and sizes (don't worry if it takes time for the glue to stick if you've used glue – this experiment can be done over the whole week). Decorate them if you'd like to.
2. Make a **prediction/hypothesis**. Which boat do you think will carry the most passengers?
3. Place a boat into the container of water (only do one boat at a time for **valid data**). Place passengers into your boat, counting them and recording how many fitted into each boat before it sinks.
4. Repeat until you have tried each boat.
5. Write up your experiment. Was your hypothesis accurate? Include pictures and drawings of your experiment.
6. How might you improve this experiment?

**What is the most important variable for this experiment (what is the most important thing for carrying the most passengers)? Is it size, shape or material? Is it a combination of these?**

Ideas and learning extensions

- Why not take pictures or film your experiment?
- Make notes of what you find out
- Jot down your findings in a table
- Create a graph about how many passengers fitted into each of your boats

Questions

- Does it matter where the passengers are placed in your boat?
- Does the material of the boat make a difference?
- Does the length, height or weight of the boat make a difference?

An example of a table for recording data. Add more columns or take some out – do what works best for you!

| Boat number | Materials used to make boat | Length and height of boat (use a ruler) | Weight of boat (use scales) | Number of passengers |
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