# Design a Boat

SILVER

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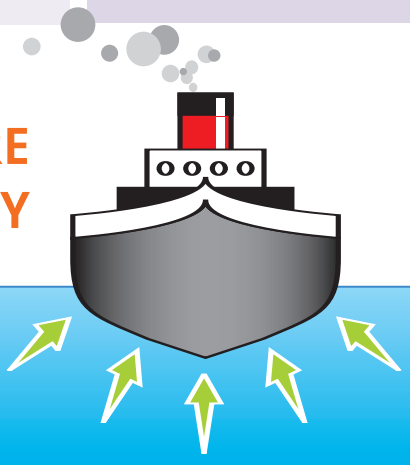
| **EQUIPMENT** | Plasticine, Dried peas, Container (e.g. butter carton) of water, Orange, Jam jar |
| **PREPARATION** | Collecting materials. |
| **BACKGROUND INFORMATION** | Water pushes upwards with a force called 'upthrust'. (You can feel this if you try to push a light object such as a balloon or 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. |
| **SKILLS** | Designing and Making<br>Investigating and experimenting - fair testing |
| **ACTIVITY** | Design and make a boat to take the maximum number of passengers with the given materials.<br>For fair testing give each group the same amount of Plasticine.<br>Suggest they first roll the Plasticine into a ball and put it into the water. What happens? (It sinks).<br>Now see if they can get it to float.<br>Once they have it floating can they get it to take some 'passengers' (dried peas)?<br>Can they alter the shape so that the boat will take more 'passengers' before it sinks?<br>Whose boat takes the most 'passengers? |
| **SAFETY** | Care with water. |
| **FOLLOW-UP ACTIVITIES** | (i) Put an orange in water. What happens? *(It floats).* Now peel the orange and put it back into the water. What happens? *(It sinks. Orange peel is full of trapped air bubbles, which make the orange light for its size, so the unpeeled orange floats. Without the peel the orange is heavy for its size, so it sinks).*<br>(ii) Make a diver (see next page). |

## 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**

# Making a Diver Which will float and sink

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| **EQUIPMENT** | Plasticine pen top with clip, Plasticine, Paper clip, Large plastic bottle with screw top |
| **AIM** | To make the plastiine figure of such a size that when it is attached to the paper clip and pen top if just floats (i.e. the top is just above the water-level).<br><br>What happens when you squeeze the bottle?<br><br>What happens when you relax your grip? |
| **EXPLANATION** | When you put the diver (pen top, paper clip and plasticine) into the water so that it floats the trapped air bubble inside the pen top makes the diver lighter than water so it floats.<br><br>When you squeeze, the bottle water is pushed up into the pen top, squashing the air into a smaller bubble.<br><br>The pen top now has more water in it, making the diver heavier, so it sinks.<br><br>When you relax your grip on the bottle, the air in the pen expandss again, the diver becomes lighter and floats again. |
| **FURTHER DISCUSSION** | Submarines, Squashing air - air pressure |