

# Introduction to Technology

## Types of boats and ways they can be designed

The way that boats have been powered has considerably changed through time, in the past we relied on wind/oars, but now most are propeller driven with energy from steam, diesel, electric motors, gas turbine, nuclear and more. Using a powered boat has meant that people can travel longer distances, more efficiently, using fewer people. This has been advantageous to the Navy as it has meant that ships could

travel further at a quicker speed, without being forced to follow the wind.

## Engine Types

Now let's look at the three types of engines you'll find on powered boats: outboard, inboard and stern drive engines.

### What is an Outboard Engine?

Outboard engines are mounted outside of the boat's hull, which is why they're called "outboards". They are used to both power and steer the boat (by moving the entire engine). On smaller boats, this is often done using a hand tiller, while on larger boats a steering wheel is used.



### What is an Inboard Engine?

Inboard engines are located inside the boat's hull. Inboard engines are automotive engines that have been modified for boats. These engines power a drive shaft connected to a propeller. Unlike an outboard, an inboard only powers the boat. To steer an inboard, you use a rudder that is located behind the propeller and turned by a steering wheel.



### What is a Stern Drive Engine?

A stern drive engine is sometimes called an "inboard-outboard" because it has similarities with both other types of engine. Similar to inboards, they use an automotive engine mounted on the inside of the hull. Similar to outboards, a steering wheel turns the drive unit to steer the boat.



Image source: <https://www.boaterexam.com/boating-resources/boat-engine-types-sizes.aspx>

## Learn about: How forces affect buoyancy

# Buoyancy Explained

**When something is in the water, two forces are acting on it.**

- The weight of the object upon the water
- The force of the water pushing up against the object; upthrust

**So, if the weight of the object is equal to or less than the Upthrust it floats. This is called buoyancy.**

**If the weight is greater than the upthrust, it sinks.**

## You will need:

- Large bowl for water
- Lollypop stick / Plastic Spoon
- Pebble / Coin

## What to do:

1. Fill the bowl with water
2. Drop the lollypop stick or plastic spoon into the bowl. Did it float or sink?
3. Now drop the pebble or coin into the water into the water

## Did it float or sink?

**Conclusion:** The Lollypop stick or plastic spoon floated because the weight of them was less than or equal to the upthrust of the water.

The pebble or coin was heavier than the upthrust of water.



The item has sunk because it is heavier than the upthrust of water



The item floats because the weight of it is less or equal to the upthrust of water

Learn about: How propulsion causes objects to move

# Propulsion or Thrust

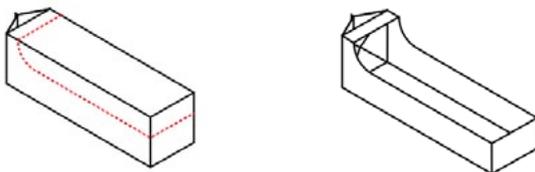
We are going to look at propulsion or thrust with a small **Balloon Boat** experiment.

## You will need:

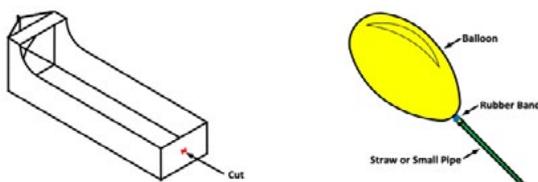
- Scissors
- Milk or Juice Carton (Cardboard or Plastic)
- Rubber Band
- Balloon
- Small pipe or Drinking straw
- Bathtub / Bucket of water

## What to do:

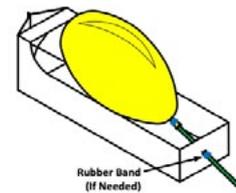
**Cut the Carton to make a Boat.** Carefully cut a milk or juice carton as shown using scissors:



**Fit the Straw in the balloon using a rubber band.** Carefully insert the straw into the opening of the balloon, and use a rubber band to hold it in place. Make sure it's tight enough to hold the straw but not too tight that the straw is pinched and air cannot go through it. You can test it by trying to inflate the balloon a small amount through the straw.

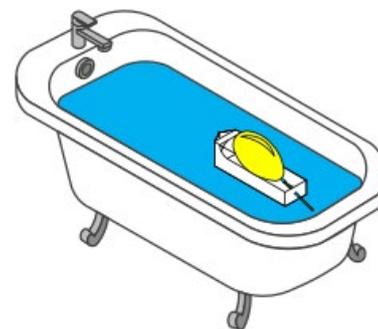


**Push the straw through the slit in the boat.** Carefully push the straw through the slit in the end of the carton. Make sure it's secure, if it's loose, use a rubber band on the outside of the carton to hold the straw in place.



**Blow the balloon up.** Hold the balloon firmly by the tail and tube. Blow into the balloon through the tube, then quickly cover the opening of the tube with your finger. Keep holding the tail end of the balloon.

**Set the boat into a body of water point and let go.** You can use anything, from a sink to a bathtub to a swimming pool. Keep your finger over the tube, point the boat in the direction you want to go (the straw should point in the opposite direction) and let go!



Learn about: How propulsion causes objects to move

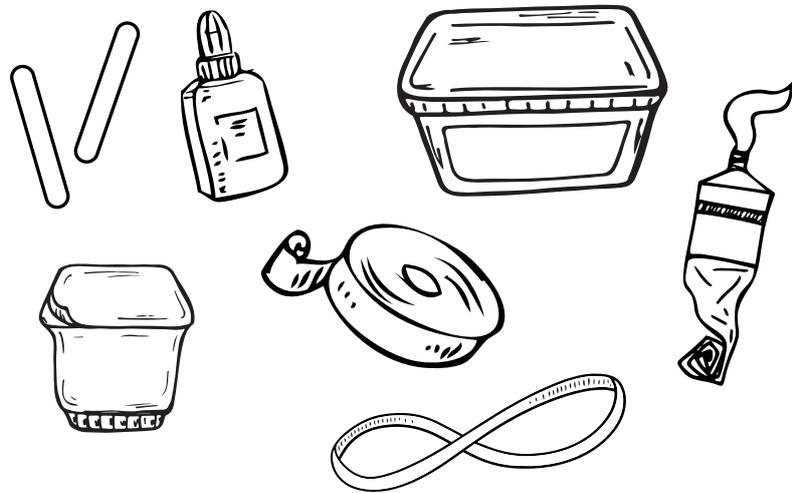
# Make a Self-Propelling Ship



Source: <https://www.redtedart.com/margarine-tub-tug-boat-craft/>

## You will need:

- Margarine tube
- Yoghurt pot
- 2 craft sticks
- Super glue or glue gun
- Duct tape
- Acrylic paint
- Elastic band
- Another piece of plastic



## What to do:

1. Get a parent to superglue two lollipop sticks to each side of the margarine tub, leave it to stick overnight (you can also tape it with duct tape to make sure it sticks). Also, do the same of the yoghurt pot lid and stick it to the lid.
2. (Optional) Paint and design your boat!
3. Cut two slits halfway down into the piece of plastic to make a paddle as shown below. It must be able to fit between the lollipop sticks.
4. Feed the elastic band around the lollipop sticks and twice through the plastic paddle.
5. Wind up the paddle clockwise and let it go!

