Summer Week 4 - Science lesson 1

Can I explain water resistance and buoyancy?

Fast Five - answers are on the next slide

1) What is friction?

2) What is one example where friction is used as a benefit?

3) What is gravity?

4) Where does the beginning of the digestive system start?

5) Name the types of teeth.

Fast Five - Answers

1) What is friction? A force between two different surfaces that slide against each other.

2) What is one example where friction is used as a benefit? Car tyres on the road, shoes on the path, brakes on a car or bike.

3) What is gravity? The force that pulls everything to the centre of the earth.

4) Where does the beginning of the digestive system start? In the mouth - teeth and enzymes in the saliva.

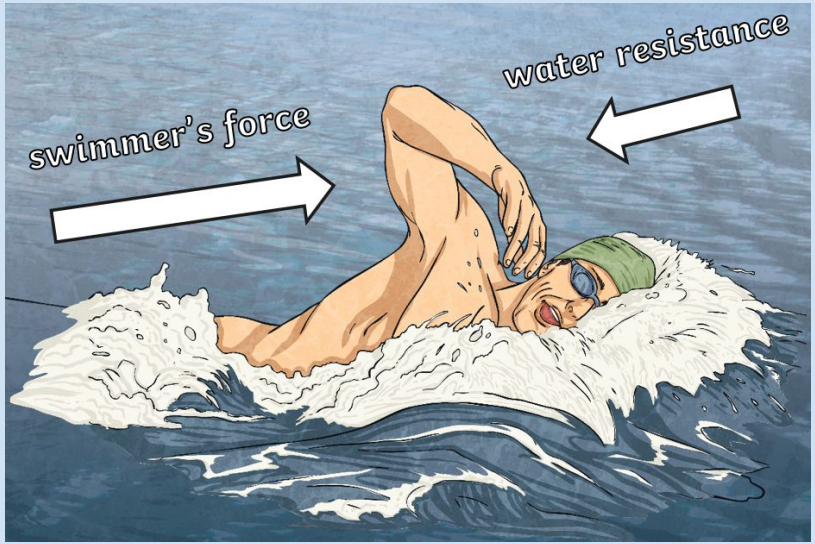
5) Name the types of teeth. Incisors, canines, premolars, molars.

What is water resistance?

Water resistance is a type of force, often called drag. Water resistance uses friction to slow things down that are moving through water.

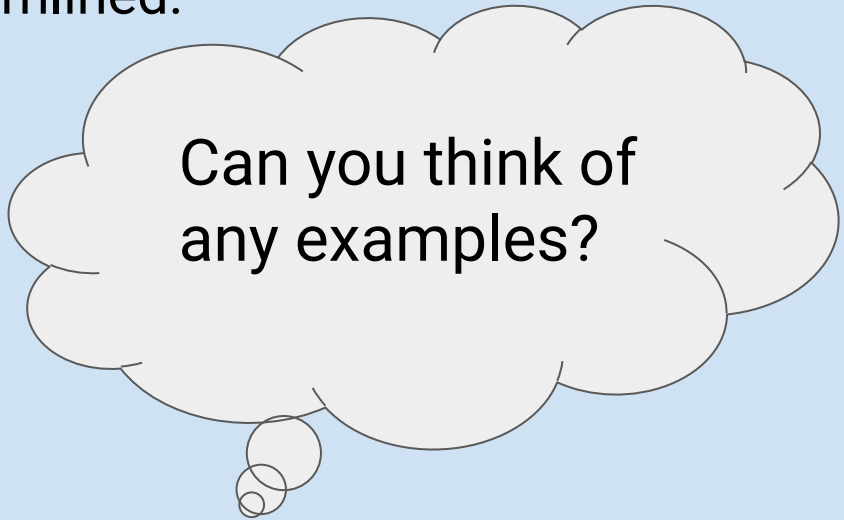
Forces come in pairs. If we look at the example of swimming, we know that one force that is being applied is the swimmer's force. The pair to that force is the water resistance acting in the opposite direction.

However, this also helps you to swim, as when you push against the water with your hands, the water resistance pushes back and helps you to move forward, like using oars to push against the water to row a boat.



How can we reduce the effects of water resistance?

The shape of the object (or person) can help reduce the effects of water resistance. Things that are shaped to have a point are less water resistant - we call this streamlined.



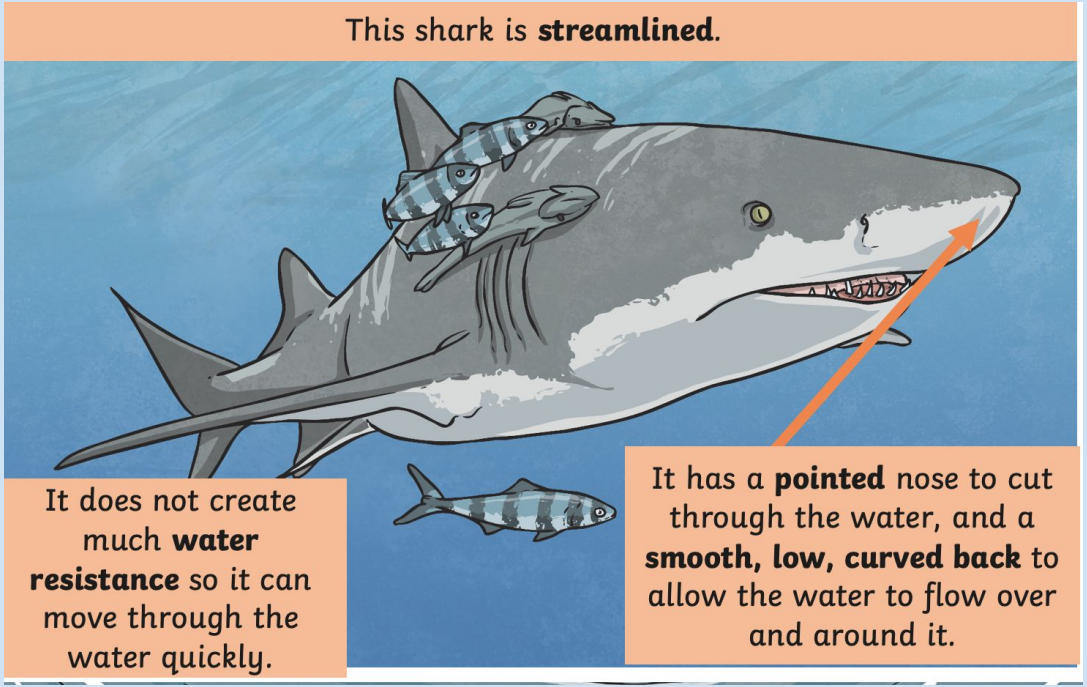
Examples:

We try to make a pointed shape when swimming to help cut through the water faster.

When diving, we try to make a pointed shape to help cut through the water smoothly and create as little splash as possible. Think about when you see divers jump into a pool, compared to when you cannon ball!

Because we are in a round shape here, and not pointed, we hit the water and have high water resistance. This means we make a massive splash and don't go through the water easily.

Dolphins, and many other aquatic animals, are in a streamlined shape to swim easily through the water. They have little water resistance because of their streamlined shape.

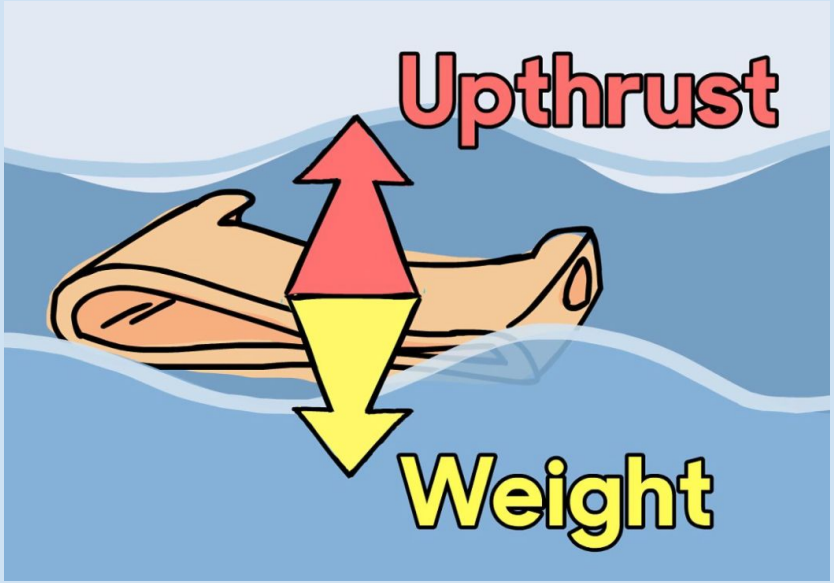


What is upthrust?

When an item is in water, there are two forces acting against it: **Gravity** pulling the weight of the object down, and the force of the water pushing the object back up, this is known as **upthrust**.

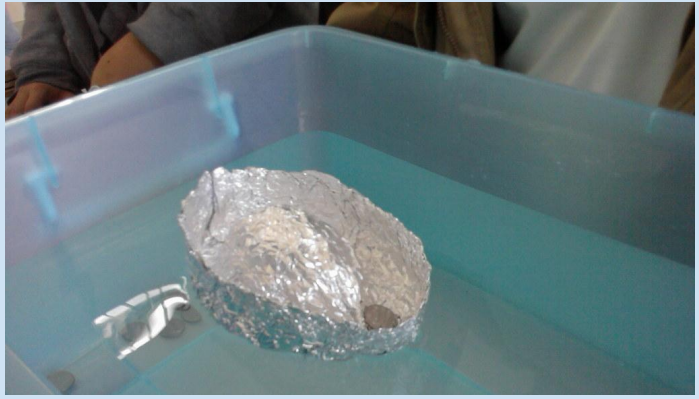
If the forces are equal, or the weight is less than the upthrust, the object will float. Objects that float are called **buoyant.**

If the weight is more than the upthrust, then the object will sink.



Optional Investigation

Today you can experiment with an object in water and test it's buoyancy! You are going to see how many coins it takes to sink two foil boats. One boat will be long and thin, the other will be round and wide.



You will need:

- Foil to make a foil boat
- Coins - it can be any type of coins, but they need to be the same.
- A bucket to fill with water. If you do not have a bucket, you could always fill up the sink or bath!
- Water.
- An adult to watch you complete the investigation safely.

First, using the template sentences on the activity sheet, write your prediction.

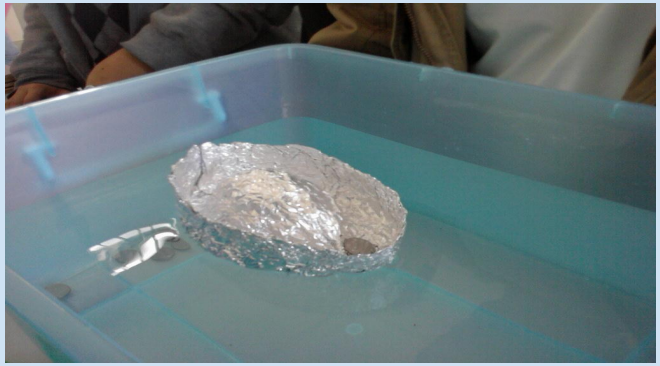
Which boat do you think will sink with more coins?

Do you think the long, narrow boat will float with the most coins, or do you think the round, wide boat will?

Why?

Now that you've made your predictions, let's start our experiment!

Make your two different shape boats! Use these two examples to help you create your boats.



If you are really proud of your experiment and want to share photos of it or your work, remember you can send us an email. We'd love to see what you've been up to!

Send them to: year4@monkwickjunior.school

Now you've made your boats, place one of them in the water in your bucket/sink/bath.

1. Carefully place 1 coin in the boat at a time, and check if it still floats. Continue to do so until the boat sinks.

2. Record on your table how many coins it takes for the boat to sink.

3. Once you have tested one boat, test the next one!

If you have finished the two first boats, why not try a different size and shape boat - add it to your table!

Were your predictions right?

You should have found that the narrow, thin boat took the least amount of coins to sink. This is because the weight of the coins is concentrated on a smaller surface area.

With the round, wide boat, there is a bigger area for the weight of the coins to cover. Therefore, the wider boat can float with a heavier weight than the narrow boat!

Fun fact! This is similar to how polar bears can walk across the ice without it breaking. Polar bears' paws are large and wide, this helps to spread their total body weight across all four paws evenly. If they had small paws, the large weight of the polar bear would be concentrated on a very small area and break the ice! So even though the weight of the polar bear is the same, they can 'float' on the ice because of their wide paws.

Now that you have done your experiment, complete the template sentences to describe what you have learnt in your experiment.

If you want to challenge yourself, see if you can explain why!