

Friction



twinkl

What Is Friction?

Friction is a **force** that acts between two surfaces or objects that are moving, or trying to move across each other.

Friction always acts in the **opposite direction** to the moving object, and always **slows** a moving object down.

All surfaces create friction on an object moving across them. Even very smooth surfaces like ice create some friction.

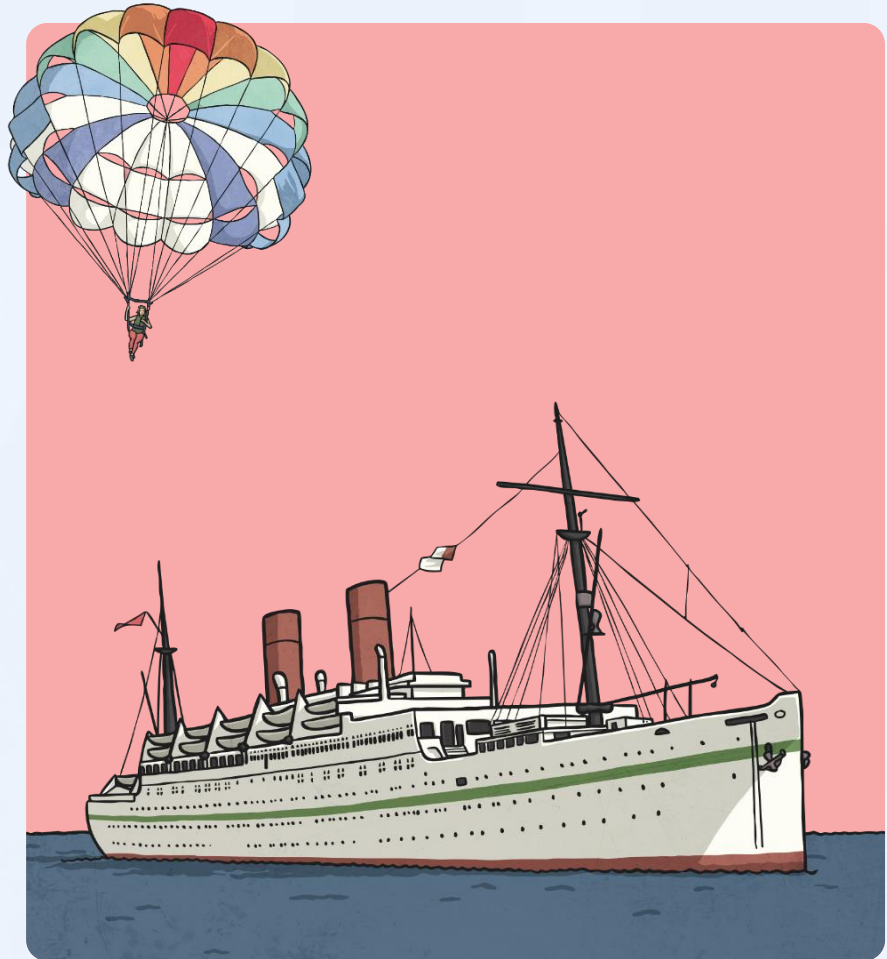


What Is Friction?

Air resistance and **water resistance** are both forms of **friction**. Gases and liquids create friction as well as solids.

Friction can be **useful** – for example, the soles of your shoes create friction with the ground, preventing you from slipping over.

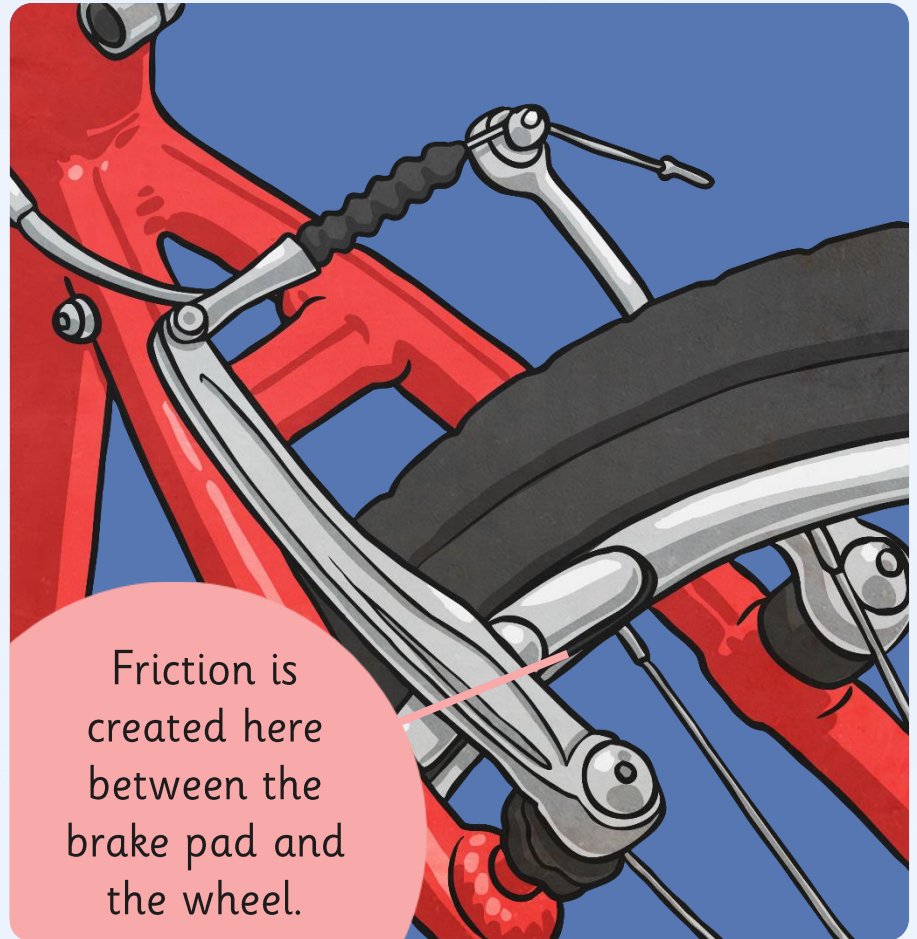
However, friction can be **unhelpful** too – friction on a bike chain can make the bike harder to pedal.



Friction in Action

The brakes on a bike or car work by creating friction between the brake pad and the wheels.

The friction opposes the movement of the wheels, slowing them down and eventually stopping them.



Friction is created here between the brake pad and the wheel.

Design a Brake Pad

A company called 'Tremendous Tricycles Ltd' want to create a new set of brakes for their latest model of tricycle. They need to make sure the tricycle slows down and stops safely for the young children using the tricycle.

They have asked you to help them find the **best material** for their brake pads.

The best material will be the one that creates the **most friction** between the brake pad and the wheel.

You will need to test different materials and demonstrate the best choice.



Design a Brake Pad



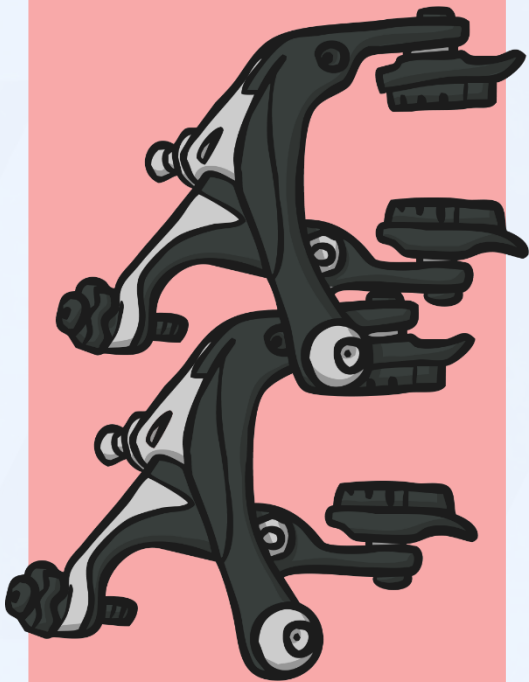
To test the different materials for the brake pad, you will need a bike/tricycle/wheel, a piece of thick card (about the size of a playing card) and different materials to wrap around the card.

Spin the wheel, then carefully hold the piece of card against the spinning wheel. Be careful not to put your fingers on the wheel. Time how long it takes for the wheel to stop completely.

Then wrap the card in a different material, and see how long that material takes to stop the wheel.

Complete this with each different material.

Reliable Results



When scientists carry out investigations, it is important that they **control** all the **variables** to get **reliable** results.

In this investigation, the **independent** variable is the **type of material** the brake pad is made from. The **dependent** variable is the **time** it takes for the wheel to stop spinning.

All the other variables in the investigation are the **controlled** variables, and need to be kept exactly the **same** each time.

Can you think of any variables in this investigation that may be tricky to control?

Reliable Results

Two controlled variables that could be tricky to keep the same are:

The **speed** at which the wheel spins each time;

The **pressure** with which the brake pad is applied to the wheel.

If the wheel spins very fast when you try one material, but slowly when you try another, you will not get reliable results.

If you press the brake pad onto the wheel very hard with one material, but gently with another, your results will not be reliable.

You will need to be very careful to control these two variables.

Talk with your group about how you can try your best to control these variables.

