

Resistance

Resistance is like pushing a squashy ball through a tube – the smaller the tube, and the longer the tube, the more difficult it is.

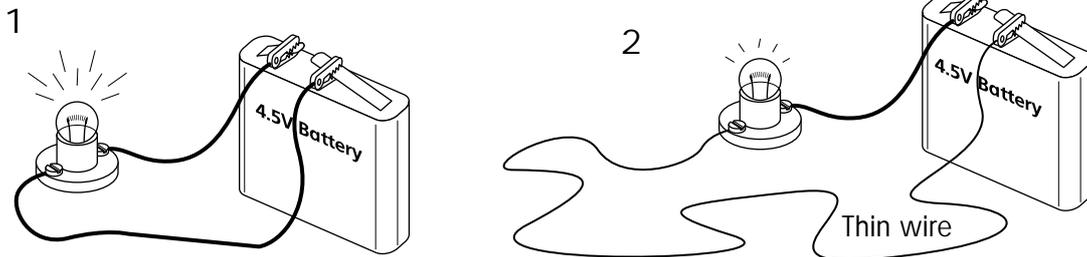
All parts of an electric circuit resist the flow of an electric current:

- The longer a piece of wire is, the more it resists the flow.
- The narrower a piece of wire is, the more it resists the flow.

Some metals resist the flow more than others. We can use the property of resistance to control the flow of an electric current in a circuit. The greater the resistance, the smaller the current.



If we want to make a light glow less brightly we could put a long, thin piece of wire in the circuit to reduce the electric current.

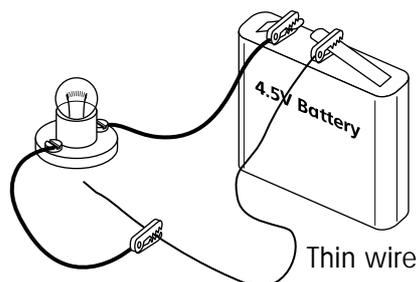


The bulb in diagram 2 will be less bright

Activity

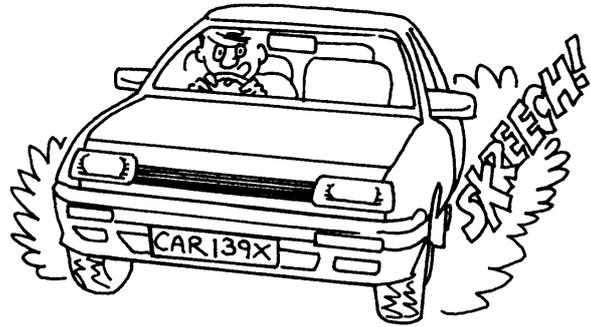
Using a crocodile clip in the circuit below allows us to vary the brightness.

How do you think this works? _____



Friction

On the Earth, moving things always seem to come to a stop eventually. This is because of a force called friction. Friction always acts in the direction opposite to that in which something is moving. It tends to slow things down and is caused by the moving object rubbing against its surroundings. Think about rolling a football through deep grass, a marble on a carpet, or trying to run through water.

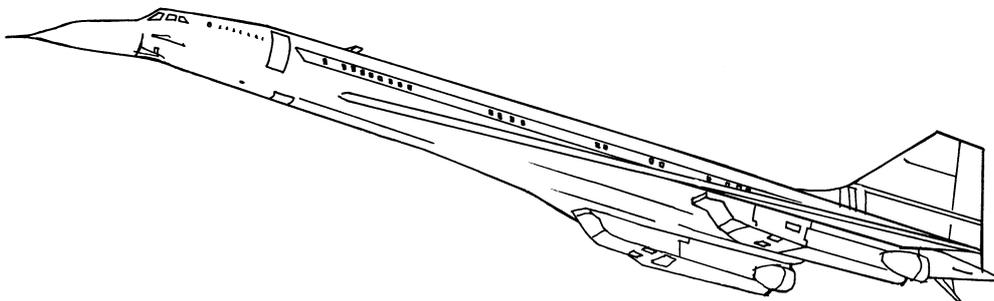


Question

Imagine pulling a sledge along the snow and pulling it along a grassy field. In which case is the friction greater?

Friction is useful to us – we would not be able to walk if there were no friction between our feet and the floor.

Sometimes friction is a problem. When we want to make it as small as possible. For example, air friction slows down aircraft as they have to push the air out of the way. We reduce this friction by making aircraft with smooth, streamlined shapes.



Concorde can fly at twice the speed of sound

Air resistance is much greater if you are moving fast. You will know this if you ride a bike. If you don't ride a bike check this by carefully putting your hand out of a car window when it is just moving and when it is going faster. Do take care and make sure the road is clear.

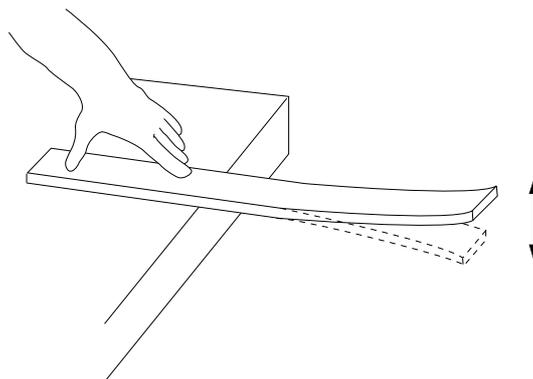
What causes sound?



Sound is caused by vibrations. These are to and fro movements.

Activity

Twang a ruler over the edge of a desk. You will need to hold the ruler very firmly to the desk with your hand.



This vibration will make a sound.
What affects the pitch of the sound
(how high or low it is)?

Try:

- putting a small blob of Blu-Tack or Plasticine on the end

- twanging harder

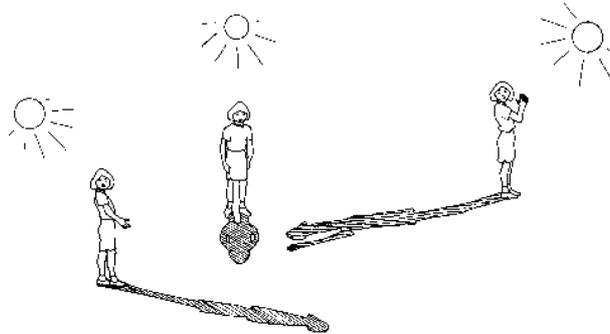
- increasing the length of ruler sticking out over the edge of the desk

- reducing the length of ruler sticking out over the edge of the desk.

You should find that the heavier the ruler is, the lower the pitch and that the longer the length of the ruler, the lower the pitch. Twanging the ruler harder to make it vibrate does not affect the pitch but makes the sound louder.

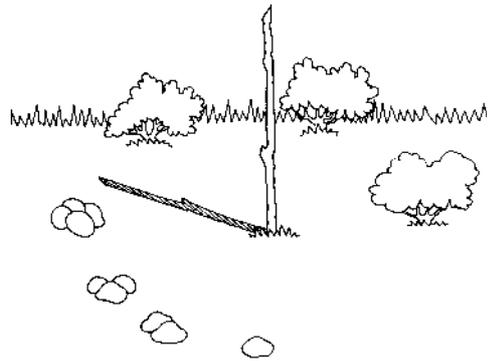
The Sun in the sky

Have you noticed on a sunny day how your shadow changes as the day goes on? At the start of the day it is quite long. Then it shortens. Then it lengthens again. This is a result of the Earth's spin. The Sun starts off low in the sky, then at midday it is at its highest, then it sinks again.



Activity

A sundial lets us tell the time. You can make your own. All you need is a stick, some pebbles and a sunny day. Push the stick into a flat piece of ground which is in the Sun all day. Look at the shadow. As the Sun moves across the sky from east to west, the shadow will move from west to east. Mark the position of the tip of the shadow every hour. Put one pebble at the shadow's position at one o'clock, two at two o'clock and so on.



1 What happens to the length of the shadow towards midday?

2 What does this tell you about the height of the Sun in the sky?

On the next sunny day, look at your sundial without looking at the time first.

3 How close are you to the right time?

4 What is the biggest problem with a sundial as a way of telling the time?
