Year 6 – Light

Science

Pupils should be taught to:

- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- give reasons for classifying plants and animals based on specific characteristics

Key Knowledge

Light travels as a wave

Light travels as a wave but unlike sound waves, it does not need a medium to travel through. They also travel through outer space or a vacuum,

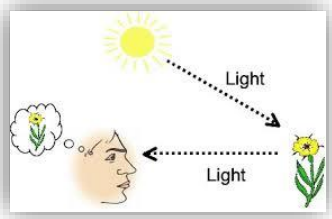
Light travels extremely fast

Light travels very fast. It has a speed of **300 million metres per second** in a vacuum. It only takes 8 minutes and 20 seconds for light to travel from the Sun to the Earth. Light travels through the air about a million times faster than through sound, which explains why you see lightning before you hear thunder.

Light travels in straight lines

We need light to be able to see things. Light waves travel out from sources of light in straight lines. These lines are often called rays or beams of light.

Light from the sun travels in a straight line and hits the chair. The light ray is then reflected off the chair and travels in a straight line to the person's eye, enabling her to see the chair.



Key Vocabulary	
Light	A form of energy that travels in a wave from a source
Light source	An object that makes its own **light**.
Reflection	Reflection is when light bounces off a surface, changing the direction of a ray of light.
Incident ray	A ray of light that hits a surface.
Reflected ray	A ray of light that has bounced back after hitting a surface.
The law of reflection	The law states that the angle of the incident ray is equal to the angle of the reflected ray.
Refraction	This is when light bends as it passes from one medium to another. E.g. light bends when it moves from air into water.
Visible spectrum	Light that is visible to the human eye. It is made up of the colour spectrum.
Prism	A prism is a solid 3D shape with flat sides. The two ends are an equal shape and size. A transparent prism separates out visible light into all the colours of the spectrum.
Shadow	An area of darkness where light has been blocked.

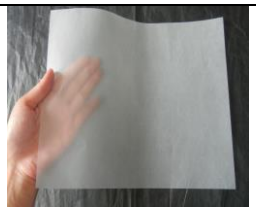
Light Sources








Key Vocabulary

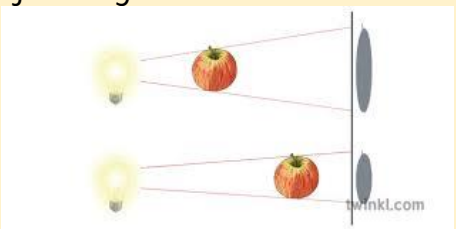
Transparent	Describes objects that let light travel through them easily, meaning you can see through the object.	
Translucent	Describes objects that things let some light through, but scatters the light so we can't see through them properly	
Opaque	Describes objects that do not let any light pass through them	

Key Knowledge

The spoon in this water looks as if it is bent. This is because the light bends when it moves from air to water. When light bends in this way, it is called refraction.

Key Knowledge

A shadow is always the same shape as the object that casts it. This is because when an opaque object is in the path of light travelling from a light source, it will block the light rays that hit is, while the rest of the light can continue travelling.

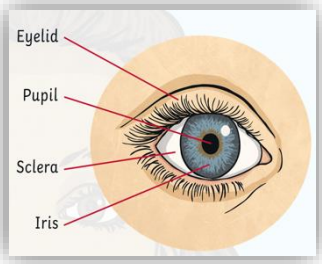


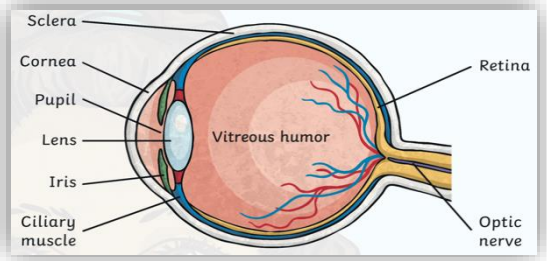
Shadows can also be elongated or shortened depending on the angle of the light source. A shadow is larger when closer because is blocks more light.

Significant scientists

Abu Ali al-Hasan (Alhazen) *(965-1040)* 	Alhazan was an Iranian mathematician, astronomer and physicist. He was the pioneer of modern optics. He carried out experiments with pinhole cameras and candles and explained how the image is formed by rays of light travelling in straight lines.
Ben Jensen 	Ben Jensen is an inventor at Surrey NanoSystems Ltd and developed Vantablack, a super-black coating that holds the world record as the darkest human-made substance.

Human Eye





The eyes are about the size of a ping pong ball. The **retina** is at the very back of the eye. The retina takes the light the eye receives and changes it into nerve signals so the brain can understand what the eye is seeing. When the image hits the retina, it is actually upside down. The **optic nerve** takes the message to the brain where it is translated. The **sclera** is the white part of your eye. It provides a protective coating which covers most of the eye. The **iris** is the colourful part of the eye. It can change size to control how much light goes through the pupil.

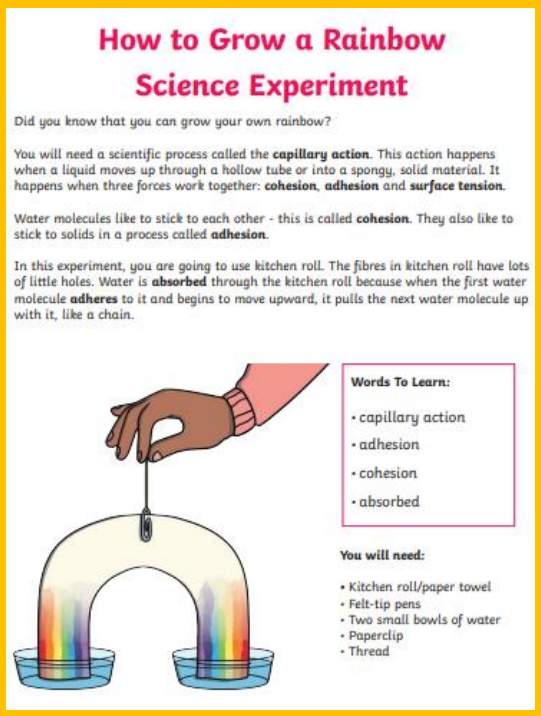
Want to explore more?

Want to find out more? Visit the website below to find out facts and to test your knowledge with fun games and activities.
https://www.bbc.co.uk/bitesize/topics/z3nnb9q/articles/zrs62v4

Make a periscope

Take two pieces of card and wrap them in shiny foil. You will need to smooth it really carefully to create a mirror surface. (You can use two small mirrors if you have them too.) Holding one mirror in each hand, can you use them to see around a corner? What do you have to do with each mirror? What about seeing over a wall? Can you work out how it works? www.stem.org.uk/rxyxt

As if by magic! When light travels from one material to another it bends. This is refraction. Draw a small arrow pointing left or right on a piece of paper. Fill a large, transparent glass with water. Hold the arrow behind the glass of water. What happens? Try this out with letters of the alphabet. Does it work with them all?



How to Grow a Rainbow Science Experiment

Did you know that you can grow your own rainbow?

You will need a scientific process called the **capillary action**. This action happens when a liquid moves up through a hollow tube or into a spongy, solid material. It happens when three forces work together: **cohesion**, **adhesion** and **surface tension**.

Water molecules like to stick to each other - this is called **cohesion**. They also like to stick to solids in a process called **adhesion**.

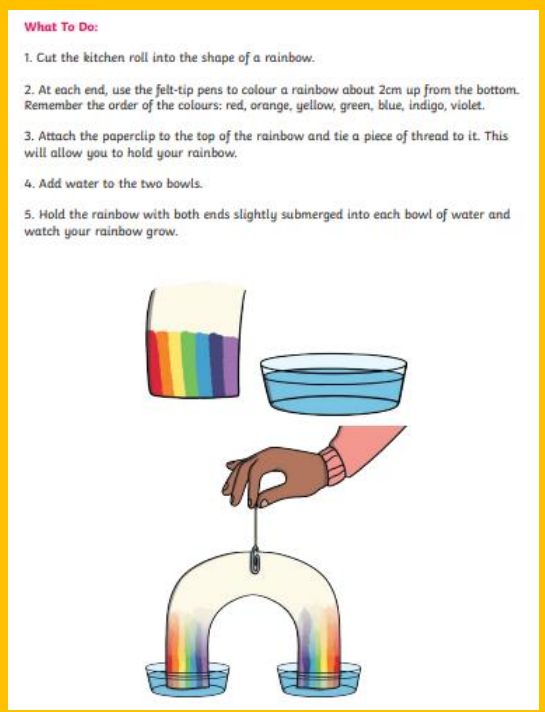
In this experiment, you are going to use kitchen roll. The fibres in kitchen roll have lots of little holes. Water is **absorbed** through the kitchen roll because when the first water molecule **adheres** to it and begins to move upward, it pulls the next water molecule up with it, like a chain.

Words To Learn:

- capillary action
- adhesion
- cohesion
- absorbed

You will need:

- Kitchen roll/paper towel
- Felt-tip pens
- Two small bowls of water
- Paperclip
- Thread



What To Do:

1. Cut the kitchen roll into the shape of a rainbow.
2. At each end, use the felt-tip pens to colour a rainbow about 2cm up from the bottom. Remember the order of the colours: red, orange, yellow, green, blue, indigo, violet.
3. Attach the paperclip to the top of the rainbow and tie a piece of thread to it. This will allow you to hold your rainbow.
4. Add water to the two bowls.
5. Hold the rainbow with both ends slightly submerged into each bowl of water and watch your rainbow grow.