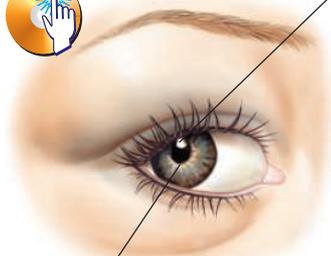


Seeing things

Your eyes are light detectors. They collect light from **luminous** and **non-luminous** objects. Your eyes form **images** of these objects, which are then sent to your brain. Your brain makes sense of the images so that you can see.

Look into my eye



Pupil

The hole through which light gets into the eye. Its size changes when the iris opens and closes.

Iris

The coloured part of the eye that opens and closes to let the right amount of light into the eye. In dark conditions, the **iris** opens to allow more light in so that you can see as much as possible. In bright conditions, the iris closes to make sure that not too much light gets in.

Meeting new substances

When light energy travelling through the air meets a new substance, three things can happen to it.

1. It can be **transmitted**; that is, it can travel through the substance.
2. It can be reflected from the surface of the substance, or reflected (scattered) from small particles inside the substance.
3. It can be **absorbed**; that is, the light energy is **transferred** to the particles inside the substance.

In this way, light is similar to heat and sound because they too can be transmitted, reflected or absorbed.

All substances can be described by what happens to light energy when it meets them. Substances can be **transparent**, **translucent** or **opaque**.



This sheet of glass is transparent. You can see Mick through the glass because the light reflected from his face travels through the glass. That is, the glass transmits light. You can also see an image of something in the glass. That's because some of the light striking the glass is reflected.

This sheet of glass is translucent. Tiny particles inside the glass scatter the light reflected from Mick's face in many directions. However, because some of the light gets through the glass without being scattered, you can still see the general shape of Mick's face.

This piece of wood is opaque. None of the light reflected from Mick's face travels through the wood. Opaque objects absorb or reflect light. Dark-coloured objects absorb more light than light-coloured objects made from the same material.

Light from a distant object

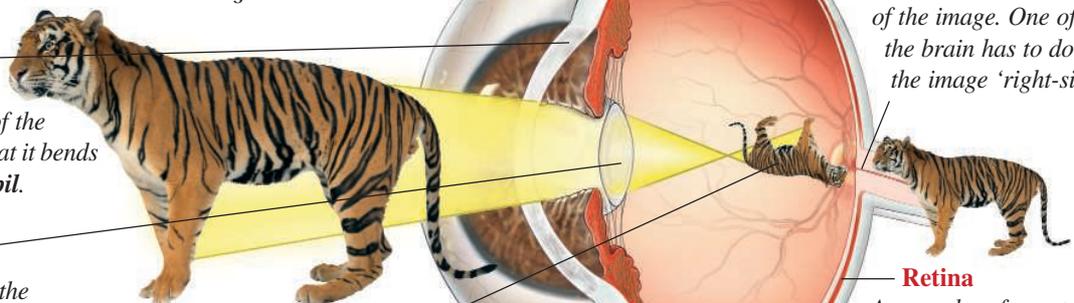
Light comes directly from luminous objects or is **reflected** from non-luminous objects.

Cornea

The clear outer surface of the front of the eye. It is curved so that it bends light through the **pupil**.

Lens

Bends light towards the **retina**. The **lens** is clear and flexible. It is connected to muscles that change its shape to make it thinner or thicker. The lens changes shape so that you can get sharp **images** whether you are looking at distant or nearby objects.



Image

The image of what you are looking at is formed on the retina, but it is upside down.

Optic nerve

Connects the retina to the brain. The brain allows you to make sense of the image. One of the things the brain has to do is make the image 'right-side up'.

Retina

A curved surface at the back of the eye. It is lined with the sight receptors, called **cones** and **rods**. The receptors change light **energy** into electrical signals, which are then sent to the brain through the **optic nerve**. The cones detect colour and the rods detect how bright the light is.



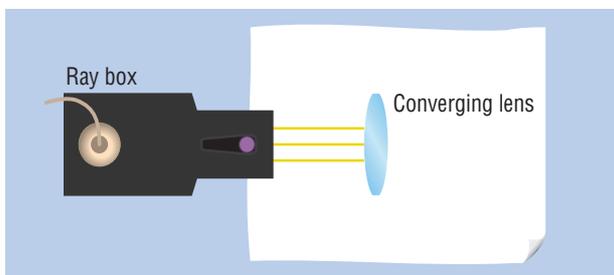


What does a lens do to light?

You will need:

ray-box kit 12 V power supply ruler pencil.

- Place the ray box on the edge of a sheet of white paper and connect it to the power supply.



- Put a thin convex lens about 5 cm in front of the ray box.
- Use a pencil to trace the shape of the lens and mark the paths of the **light rays** on both sides of the lens. Remove the lens and complete your ray diagram by showing the path of the rays through the lens. Use a ruler to draw the rays.



- How does the thin convex lens change the path of the light rays?
- Replace the thin convex lens with a thicker convex lens. Trace the shape of the lens and the light rays on a different part of the white paper.
- What difference does it make to the path of the light rays when they pass through a thicker convex lens?
- Repeat the steps above with a thin concave lens.
- How does a thin concave lens change the path of the light rays?
- Replace the thin concave lens with a thicker concave lens.
- What difference does the extra thickness make to the path of the light rays?



Can you see a torch beam?

You can't usually see light as it travels through the air. You don't usually see beams of light rays coming from the Sun or the lights in a room. But you can sometimes see light if it passes through small droplets of water in the air (fog), or small particles of smoke or dust in the air. This is because the light hits the droplets or particles and is reflected in all directions. This type of reflection is called **scattering**. Some of the scattered light reaches your eyes. You are not actually seeing the light. You are seeing the small droplets or particles. Those droplets or particles show you the path taken by the light.



Activities



REMEMBER

- What important job does your eye do?
- Which two parts of the eye bend light?
- What are the main jobs of (a) the pupil and (b) the optic nerve?
- What special name is given to the reflection of light from many tiny particles?
- Describe what can happen to light travelling through the air when it meets a new substance.
- What type of substance allows the least amount of light through to the other side – transparent, translucent or opaque?

THINK

- Why can't you usually see a beam of light from a torch at night?
- The image on your retina is upside down. Why do you actually see things 'right-side up'?
- How do you know that the piece of wood held by 'Mick' in the figure above left reflects some of the light that strikes it?

learning I CAN:

- describe the parts of the eye
- describe how the eye forms an image of an object
- explain how light behaves when it meets a new substance.