

# Learn to Light:



**Vision** We see things when light enters our eyes. The pupils in our eyes change size to let more light in when it's dark and less light in when it's bright. Too much light can damage our eyes, whilst too little light makes it hard to see. Not all objects give off light; we see most objects because light is reflected off their surface and into our eyes. Our eyes focus the light from an object to form an image of it at the back of our eye (the retina) and our brains then interpret the image as a vision.

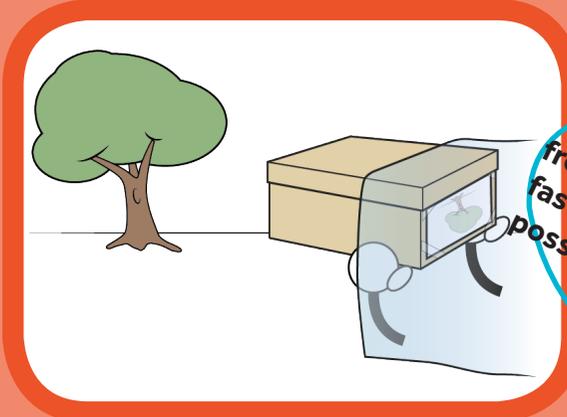
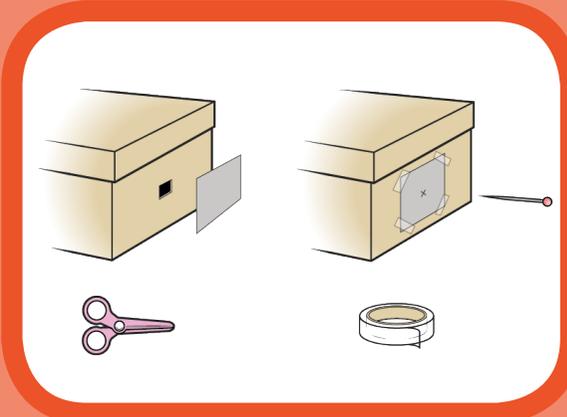
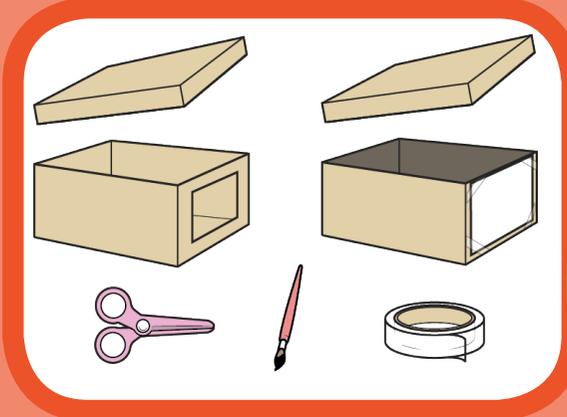
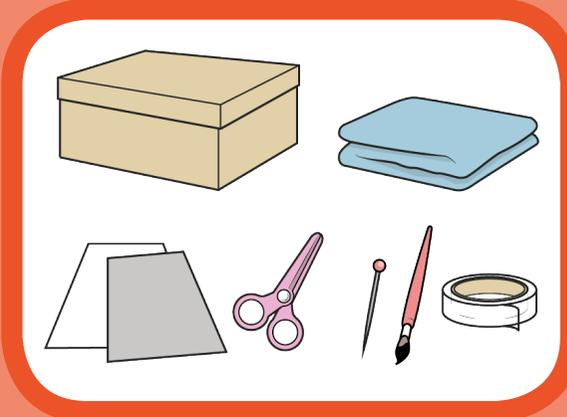
## Experiment

Making a pinhole viewer

**You will need:** A shoe box, a piece of tracing/baking paper, a pin, scissors, tin foil, tape and black paint

1. Cut a large oblong hole at one end of the box and cover with tracing paper. Paint (or line with paper) the inside of the box black.
2. Cut a smaller opening at the other end of the box and cover with tin foil. Using a pin carefully pierce a hole in the centre.
3. Cover yourself and the box with a thick blanket leaving just the tin foil end of the box poking out. Point it at an object and look at the tracing paper screen to see the image.\*

\*Make sure light is only entering through the pinhole, so tape up any gaps and use a thick enough blanket.



## FUN FACTS

During World War II the RAF started a myth that carrots helped their pilots see in the dark. Eating carrots won't enable you to see in the dark but they do contain vitamin A which keeps your eyes healthy.

Cats eyes glow in the dark because the back of their eyes act like a mirror. This helps reflect and absorb more light making it easier for them to see at night.



The saying 'in the blink of an eye' comes from the fact that the eye's fastest muscle in our body is the fastest to blink up to 5 times a second.

Newborn babies see upside down until their brain learns to turn the image the right way up.



**Findings** What can you see and what is unusual about the image ?

What happens if you cover the pinhole ?

What happens if you make the pinhole a little bigger ?

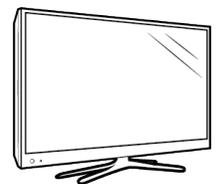
**I'm closed at night, I give you sight, what am I?**

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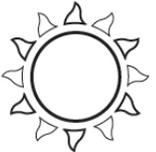
**Conclusion** We need light to see. Light travels in a straight line from an object and into our eye where the image appears upside down - our brain then flips the image the right way up. The more light the easier it is to see. Some people are afraid of the dark, especially at bedtime, but it's very rarely completely dark in our bedrooms. When we change from a light space to a darker space it just takes a few seconds for our eyes to adjust and let more light in so we can see again.

How do we see these objects?

Draw a line to show how the light reaches our eyes...



How does inquisitive owl see the TV?



How does inquisitive owl see the football?

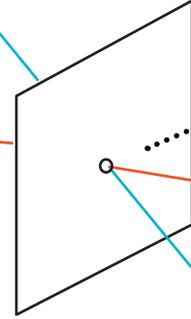


How does inquisitive owl see the tree?

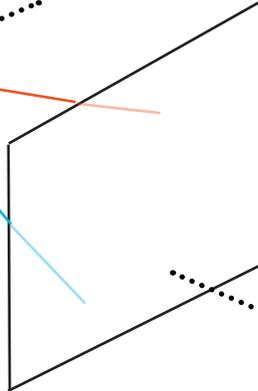
Which way up will

The image be?

Draw the image...



Pinhole



Image



OWLS ARE NOCTURNAL AND HUNT FOR FOOD AT NIGHT. They have big eyes to help them see in dim light. They can see a mouse moving over 15 meters away by just the light of a candle.



Bright Light



Dim Light

Get a mirror and look at your eyes, then close the curtains and turn the light off. Wait for 30 seconds, then turn the light back on and look at your eyes again - do they look different?

Grown-ups: If you have / buy some photographic paper then you can easily convert your pinhole viewer into a pinhole camera and take real photos with it. Another quick activity to show how vision also helps us to keep our balance: try standing on one leg with your eyes open then try again with your eyes closed - it's much harder to keep your balance when your eyes are closed.

Answers: FINDINGS - an image, it's upside down, the image disappears RIDDLE - an eye HOW DO WE SEE - tv>eye, sun >football>eye, torch>tree>eye IMAGE - draw the owl upside down NOCTURNAL - your pupils change size.