Play at Powerhouse make & do activity kit

Science with Zoe & Cogs - Experiment 8

Pinhole Sun Viewer

Our eyes see images upside down. It's our brain that turns the image around the right way for us.

Things you need:

A piece of cardboard
Aluminium foil
A pin
A bright day (if viewing the Sun)
Sticky tape
Candle
White paper

What to do:

1 Cut a 2 x 2 cm square hole in the middle of a piece of cardboard about 20 x 20 cm wide.

2 Cut enough aluminium foil to cover the hole and tape it over the square.

3 Use a pin to create a small hole in the middle of the aluminium foil. This is your pinhole viewer.

Using your viewer:

IMPORTANT: Never look directly at the Sun, either through the viewer or with your naked eye; it can cause permanent damage or blindness.

1 Test the viewer first using a candle. In a darkened room, hold your viewer in front of the lit candle (not too close!). Hold the white paper behind the viewer so that you have the candle in front of the viewer and the white paper behind it

2 Move the paper until you can see an image of the candle flame projected onto the paper – you'll find you need to hold it within a few centimetres of the viewer.

3 You need a sunny day to try out your viewer on the Sun. If you hold the paper close to the viewer your projected Sun will look pretty small. Try holding the paper further away – the projected image looks bigger (think about why this might be). It's a good idea to have a helper if you want to get a good look at the image. A pinhole viewer is also a great way to view a solar eclipse, or the full Moon at night.

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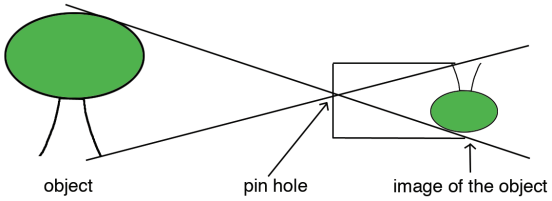
What's going on?

When light passes through the pinhole, it creates an inverted image of the object being viewed. It isn't so easy to see with the Sun, which is round. But have a look again at the candle flame – it is actually projected upside down.

Think of it like this. The light from the top of the candle flame travels in a straight line, like all light. It hits the paper at a certain point. The light from the bottom of the candle also travels in a straight line. When it passes through the pinhole and hits the paper, it does so above the spot where the light from the top of the candle is projected.



When light passes through the lens of a camera or a telescope, the same thing happens; the image is inverted as light passes through the lens, or aperture. (Actually, the same thing happens with our eyes, what hits our retina is an inverted image of what's in front of us – our brain just changes it around for us.)

In a telescope, light rays converge (meet) at a point behind the lens called the focal point. Although it is possible to correct the inversion using another lens fitted behind the first one, this reduces the brightness of the image, so astronomers tend not to use it.

What else do you see?

Use this space to write about, and draw anything else you noticed while doing this experiment.

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