

Investigating shadows

Outstanding Science Year 6 - Light - OS6D007

National Curriculum Statutory Requirements

6D4 - use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them; **UKS2W2** - taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate; **UKS2W3** - recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

Learning Objective



I can explain how moving an object changes the size of its shadow.

Me:   

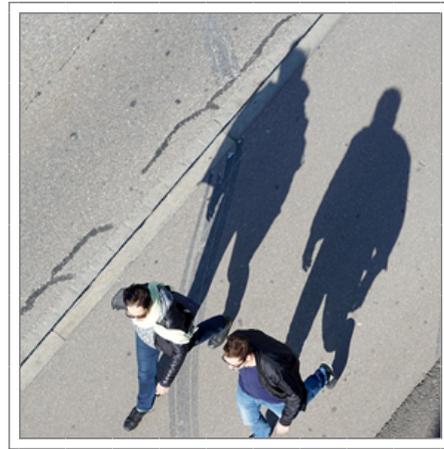
Teacher:   

Shadows

Shadows are formed when an **opaque object** (something that blocks light) is placed between a **light source** (something that creates light) and a **surface**.

Scientific play

Use a torch to make shadows on the wall using your hand. How can you change the size of the shadow?



Scientific question

How does changing the distance between the light source and the object affect the size of the object's shadow?

You will need:

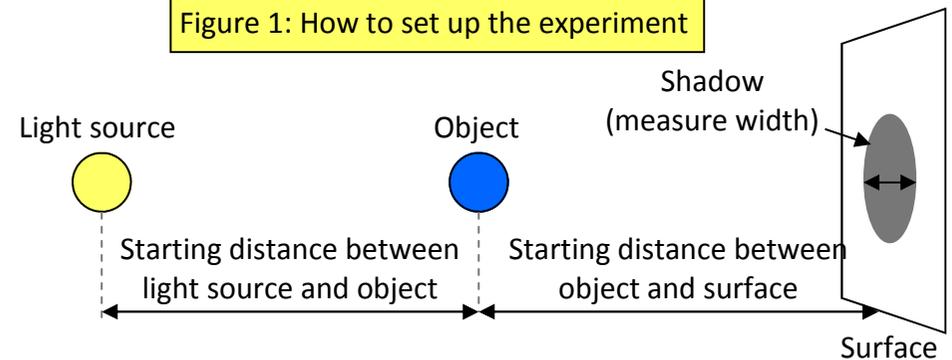
- A light source (An OHP projector is ideal)
- A small object (such as a football)
- A clear wall (to form the shadow)
- A metre ruler / tape measure (marked in cm)

Method

Set up the apparatus as shown in the diagram. Place the object between the light source and the wall so that it casts a shadow that you can measure. Predict and measure (to the nearest centimetre) the width of the shadow at its widest point.

Move the object 10cm closer to the light source. Make sure that you don't turn the object. Predict and measure the size of the new shadow. Do this a total of 6 times.

Figure 1: How to set up the experiment



Fair testing

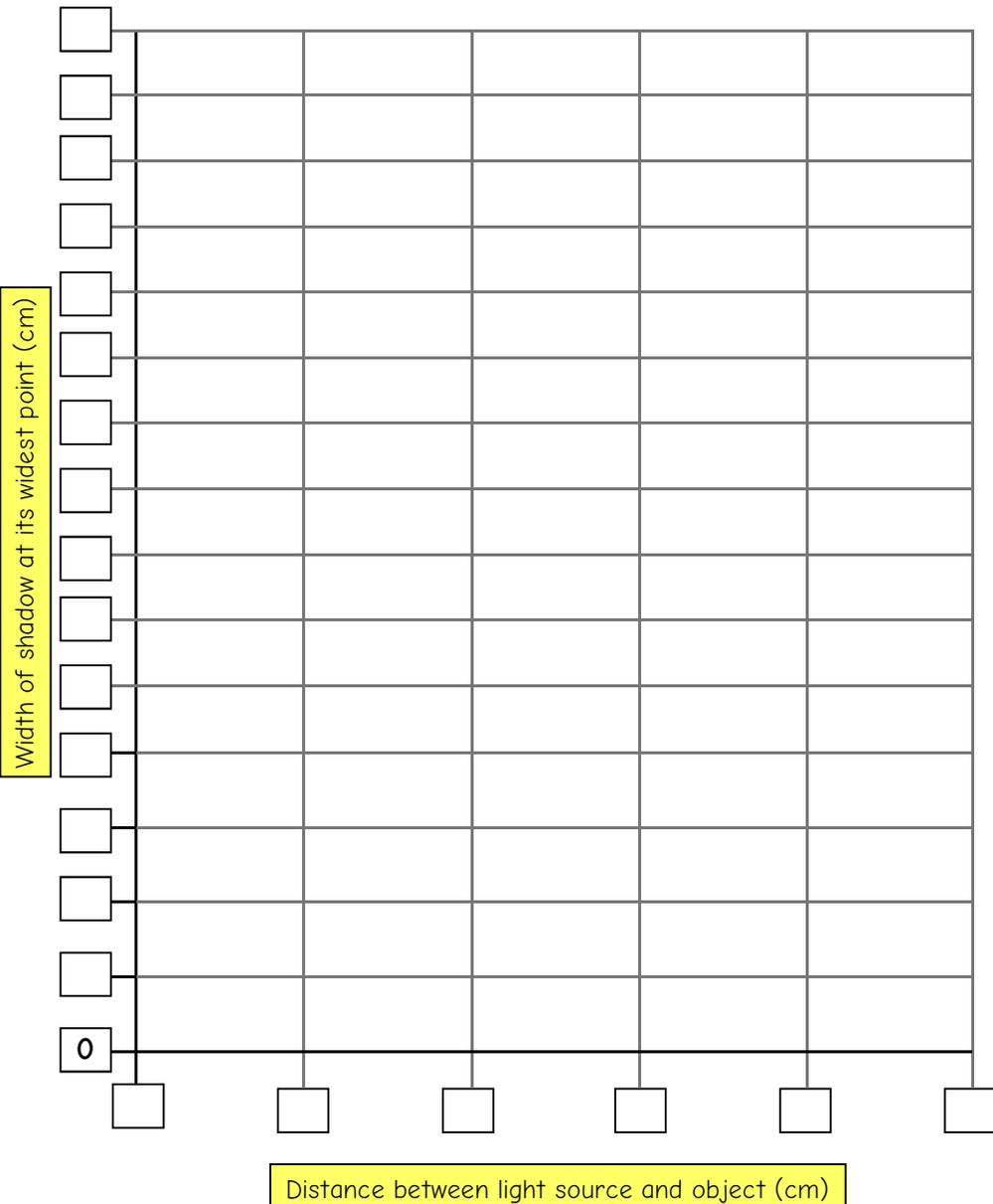
We are trying to make our test fair by only changing one thing at a time.

This is the object that we are using: _____

This is the starting distance between the light source and the object: _____

This is the starting distance between the object and the wall: _____

Line graph showing the relationship between the distance between a light source and an object and the size of the shadow cast on a wall



Record your predictions and measurements in the table below and use them to complete the line graph. You will need to choose a scale for the horizontal and vertical axes of your line graph. Think about the biggest and smallest results you have, and the number of spaces on each axis. Make 6 crosses on your line graph and link them with straight lines.

Table showing the size of shadow cast on a wall

Distance between light source and object (cm)	Width of shadow at its widest point (cm)	
	Prediction	Measurement

Results

How accurate were your predictions?
 Did any of your results surprise you?
 What happens to the size of the shadow as we move the object closer to the light source? Can you explain why?
 What do you think would happen if you moved the object away from the light source?
 Was our test fair? Did we only change one thing at a time?
 How could we make our test fairer?