

**BBC**



**Light**

**Teacher Resource**





# Light

## Watch the film:

You might find it useful to watch the light film before you read through the resources.

[bbc.com/teach/terrific-scientific/KS2/zv9qf4j](https://bbc.com/teach/terrific-scientific/KS2/zv9qf4j)



## Introduction

We need light to be able to see things.

Light travels in straight lines. When it reaches an opaque object, some of it is reflected back - like a ball hitting a wall and bouncing away. The rest of the light is absorbed by the object.

The reflected part of the light means we can see the object. The light that does not hit the object continues onwards, moving in a straight line until it reaches the ground. As the light that reaches an opaque object is either absorbed or reflected, this means that a dark patch is found behind the object. This patch is known as its **shadow**.

When light hits a transparent object, such as a window, a little of it is still absorbed and reflected, but most passes through.

A lot of the time objects simply cast one shadow, but sometimes multiple shadows are formed.

This investigation is about making multiple shadows.



## Pre-activity discussion - questions to get the children started

- Why do we get shadows?
- Why are shadows different shapes?
- Why are they different sizes?
- Why are some darker than others?
- When do objects not cast shadows?
- Watch the film “Why do we sometimes have more than one shadow?” and discuss why you think the children in the film were able to cast more than one shadow.





## Learning intention

Children will:

- Recognise that light travels in straight lines.
- Know that shadows form when light travelling in straight lines hits an opaque object and can't get through and that this explains why the shadow is the same shape as the object.
- Understand that when light hits a transparent object most of the light gets through so they form only the slightest shadow.

Working scientifically, children will:

- Explore making different numbers of shadows using multiple torches
- Plan investigations to find answers to problems (challenges)
- Record solutions to problems (challenges)



## Expected duration

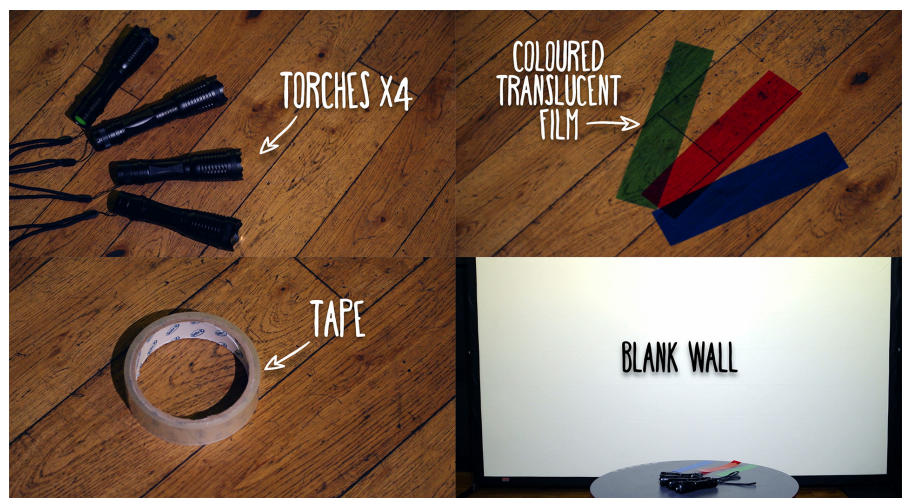
Approximately 45 mins.

## Equipment needed

- Four torches
- Coloured translucent film in three colours
- Tape
- Flip chart paper (optional)
- Scissors
- A room with blank walls that can be made dark

## Health & safety

- Do not look directly at the bulb in the torch.





## The investigation – instructions

Work in small groups.

### 1. Free exploration

Use a torch and explore making shadow shapes with your hands against a blank wall, screen or piece of flip chart paper. Now explore using two torches. Observe what is different.

### 2. Directed discovery

Use the tape to attach one of the three different coloured film sheets over the beam of three of the torches. The light will appear a different colour from each torch. The final torch will have a white light.

Choose one member of the group to be a ‘Shadowmaker’. They need to strike a pose in front of a blank wall.

Switch off the lights and arrange the four switched on torches in a semi-circle around the shadow maker. Place each torch at about waist height and between one and two meters away from the shadow maker.

Observe what happens.



### 3. Challenge

Attempt these challenges and record your solutions using light ray diagrams.

- a. How can you use your torches to create the most shadows?
- b. Still using all four switched on torches, how can you make the least number of shadows?
- c. How can you make the most interesting pattern cast with four switched on torches?
- d. What other shadow challenges could you investigate?



## Creative conclusions - findings from the experiment

Ask children to share with the class how their group solved the three challenges (a, b and c above). The children should discuss the relative positions of the torches in solving the challenges.

They could discuss:

- Any similarities or differences between how the groups solved the problems?
- Decide which is the “best” solution to each challenge?
- Describe why they think the “best” solution is best?
- What other “Shadow” challenges could they investigate?





## Glossary

<b>Absence</b>	lack of something
<b>Beam</b>	the light from a light source in any particular direction. For example: the beam from a torch
<b>Dark</b>	no light prevents us from seeing
<b>Light</b>	something that lets us see objects
<b>Light rays</b>	lines in a diagram showing the direction that light travels
<b>Opaque</b>	a word to describe materials or objects that don't let light pass through
<b>Reflect</b>	when light bounces off a surface
<b>Shadow</b>	a dark shape on a surface made by opaque objects blocking light
<b>Transparent</b>	a material that lets most of the light pass through