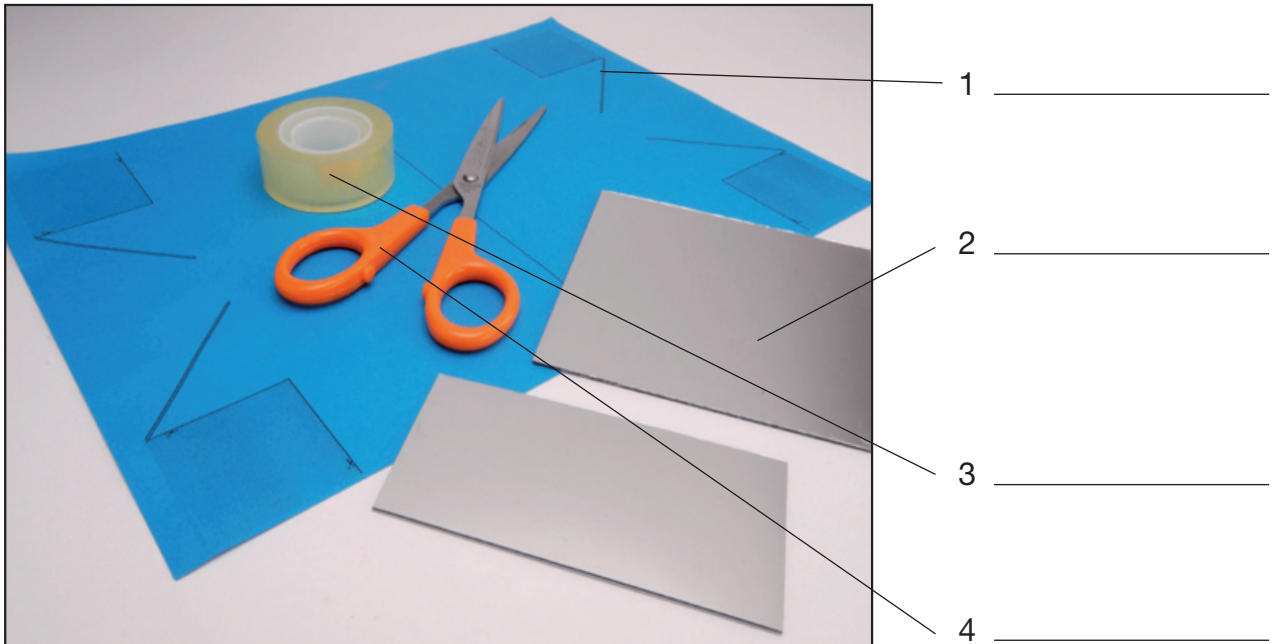


Exercise 1

Vocabulary: Materials

Label the diagram with the materials you used for this experiment.

periscope template mirrors sticky tape scissors



Exercise 2

Vocabulary: Preposition phrases

Complete the instructions for the experiment with the correct preposition phrase from the box.

from different places round it into each end into a tube
along all the lines

- 1 Cut _____ on the template till you're left with the two pieces of card.
- 2 Roll and tape one half _____.
- 3 Roll and tape the other half _____ ... like a telescope.
- 4 Slot a mirror _____ and tape in place.
- 5 Look through the periscope _____ around the classroom.

Look at your experiment sheet and check your answers.

Exercise 3

Conclusions: Speaking, Writing

What did you learn from this experiment? What have you learned about how light travels? What happens when light hits a mirror? How is it possible for you to see things with the periscope? Talk with a partner then complete the sentences together.

Use the words in the box to help you.

- 1 Light travels in _____ .
- 2 Light is reflected by _____.
- 3 Periscopes let us see events and things we could not see before. They work by using _____.

multiple mirrors mirrors straight lines

Exercise 4

A Scientific Report: Writing

Now write a report on your experiment. Use the language provided to help you.

Useful Language

useful language for writing a Scientific Report

1. *Say what you made*

We made ...

2. *Say how you made it*

First we cut ...

Then we taped ...

After that we rolled and taped ...

Then we slotted ... and taped ...

And then we looked ...

3. *Write your prediction here*

When the image is the right way up, the periscope will be ...

When the image is the wrong way up, the periscope will be ...

360° Periscope
Keith Kelly**Learning Objectives**

Pupils explore the effects of mirrors on the passage of light.

Content summary

Light travels in straight lines and is reflected by mirrors. Using a periscope we can see events and objects which are otherwise obscured. Periscopes work by using multiple mirrors.

Skills

Reading, speaking, writing

Grammar

Past simple; present simple

Vocabulary

Nouns: *periscope, template, mirrors, sticky tape, scissors*

Adjectives: *straight, multiple*

Verbs: *slotted, rolled, taped*

Time needed

60–90 minutes

Age group

7–11

Materials needed

- Periscope template
- 1 mirror approx. 100 mm x 100 mm, 1 mirror approx. 50 mm x 100 mm (both can be cut from a single sheet of mirror polystyrene, e.g. from www.mutr.co.uk)
- Tape
- Scissors

Practicalities

You may choose to have the pupils construct the periscope in one piece to demonstrate the standard arrangement, then get them to discuss how they could see behind them.

Procedure

1. Tell pupils they are going to conduct a scientific experiment and learn how to make their own periscope.
2. Introduce/pre-teach the vocabulary that pupils will need: *periscope, template, mirrors, sticky tape, scissors, straight, rolled, taped*
3. Hand out the experiment sheet or put the sheet up on the interactive whiteboard or projector and have pupils read out the instructions in class.
4. Ask them to work in groups and predict the results of the experiment following the questions which are on the worksheet. You may need to give them a little time to think and talk about this. They can do this first in their own language but should then try to express it in English. (They should use *will* e.g. *We think the periscope will be ...*)
5. Pupils work in groups and follow the instructions on the experiment sheet. Monitor and help where required. Help pupils to say what they are doing in English.
6. Pupils try out their experiment. Get them to record their results. They can make notes in English or in their own language.
7. Ask pupils to discuss in their groups these questions: Why are periscopes useful? What is happening to the light? What position do you need to put the periscope in to make the image the right way/wrong way up? Why?
8. Hand out the worksheet and ask pupils to work their way through exercises 1, 2 and 3. They can check their answers with a partner. These exercises consolidate the vocabulary used in the experiment and get them to come to a conclusion about how light is reflected and what happens in a periscope.
9. Pupils then write up their findings in the form of a scientific report – encourage them to use the language in the Useful Language box. This exercise could be done for homework.

Open-ended investigation

For a more inquiry-based activity, challenge the children to build a periscope that they can use to see behind them.

Extra ideas to explore with your pupils

How can you look behind you and still see an upright image?

You may want to combine this line of questioning with exploratory work on lenses.

Can you make a reflector that will bounce a beam of light directly back to you wherever you stand in the room, without moving it?

Relate this to radar reflectors on ships and the one on the moon's surface.

What is the tallest you can make the periscope? Can you look on the school roof? Can you find any lost footballs?

What happens when you rotate the top section of the periscope through 360 degrees?

This opens up discussions about light and mirrors as well as using vocabulary about direction and change.

360° Periscope
Keith Kelly**Exercise 1 – Vocabulary: Materials**

- 1 – the periscope template
- 2 – the mirrors
- 3 – a roll of Sellotape
- 4 – the scissors

Exercise 2 – Vocabulary: preposition phrases

Answers are on the experiment sheet

Exercise 3 – Conclusions: Speaking, Writing

- 1 Light travels in straight lines.
- 2 Light is reflected by mirrors.
- 3 Periscopes let us to see events and things we could not see before. They work by using multiple mirrors.