Reflecting Light

LO: to understand how mirrors reflect light and how they can help us see objects.

Success Criteria

- I can explain how light is reflected.
- I can measure the angles of incidence and reflection.
- I can use my understanding of reflection to create a working periscope.
- I can explain how the periscope allows me to see objects I would not usually be able to see.

Look into the mirror!

Describe your image:

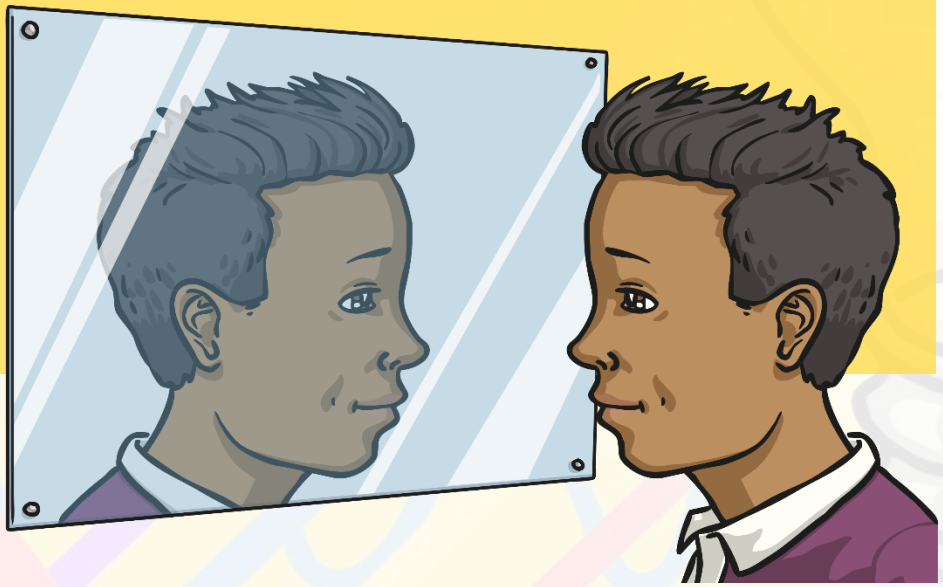
- Are you the same size as the object you see?
- Are you the same distance behind the mirror as you are in front?
- Are you the correct way up, and the right way round?

How Is Light Reflected?

Read the four explanations in the 'Reflection Explanations' pdf.

Three of the explanations are false; only one of them is accurate!

Have a look at the explanations, and make a decision about which one is the correct one.



Place your vote!

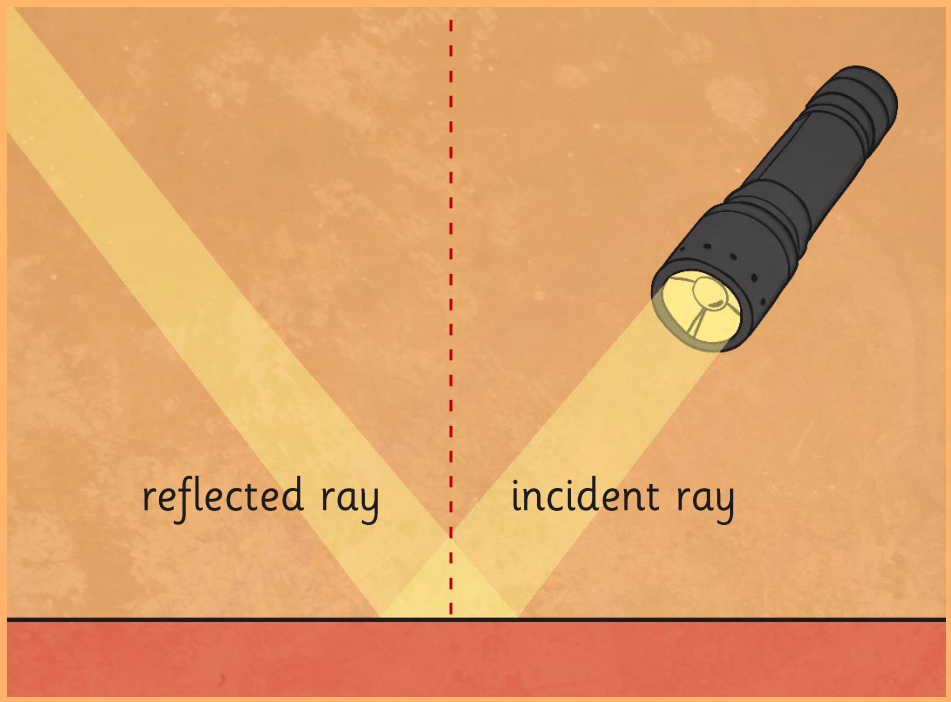
Face away from this screen and use your mirror to read the following message!

Objects which reflect light have smooth shiny surfaces!

How Is Light Reflected?

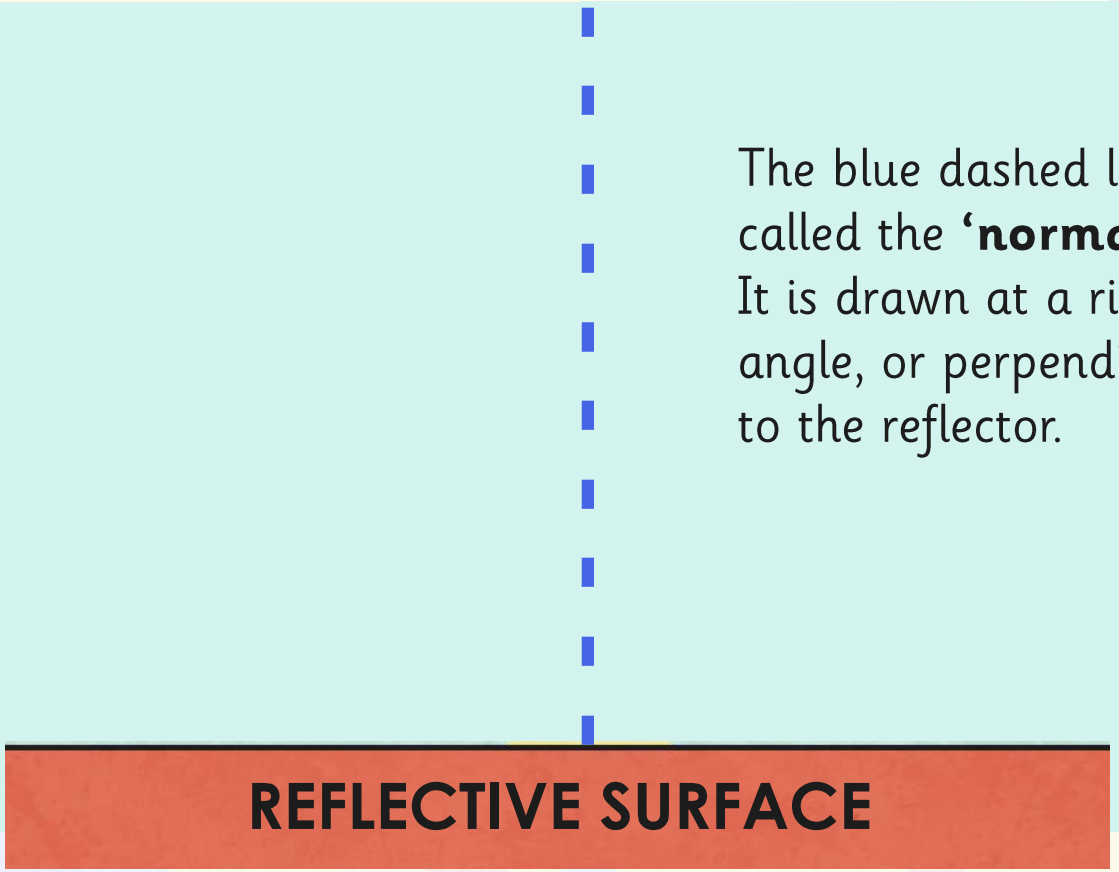
Reflection is when light bounces off a surface, changing the direction of a ray of light. All objects reflect light; smooth and shiny surface reflect all the rays of light at the same angle. However, rough or dull surfaces scatter the rays of light.

The light ray that hits the mirror or other object is described as the incident ray; the ray of light that bounces off is known as the reflected ray.



How Is Light Reflected?

When rays of light reflect, they obey the **law of reflection**: The angle of incidence always equals the angle of reflection.



The blue dashed line is called the **'normal'** line. It is drawn at a right angle, or perpendicular to the reflector.

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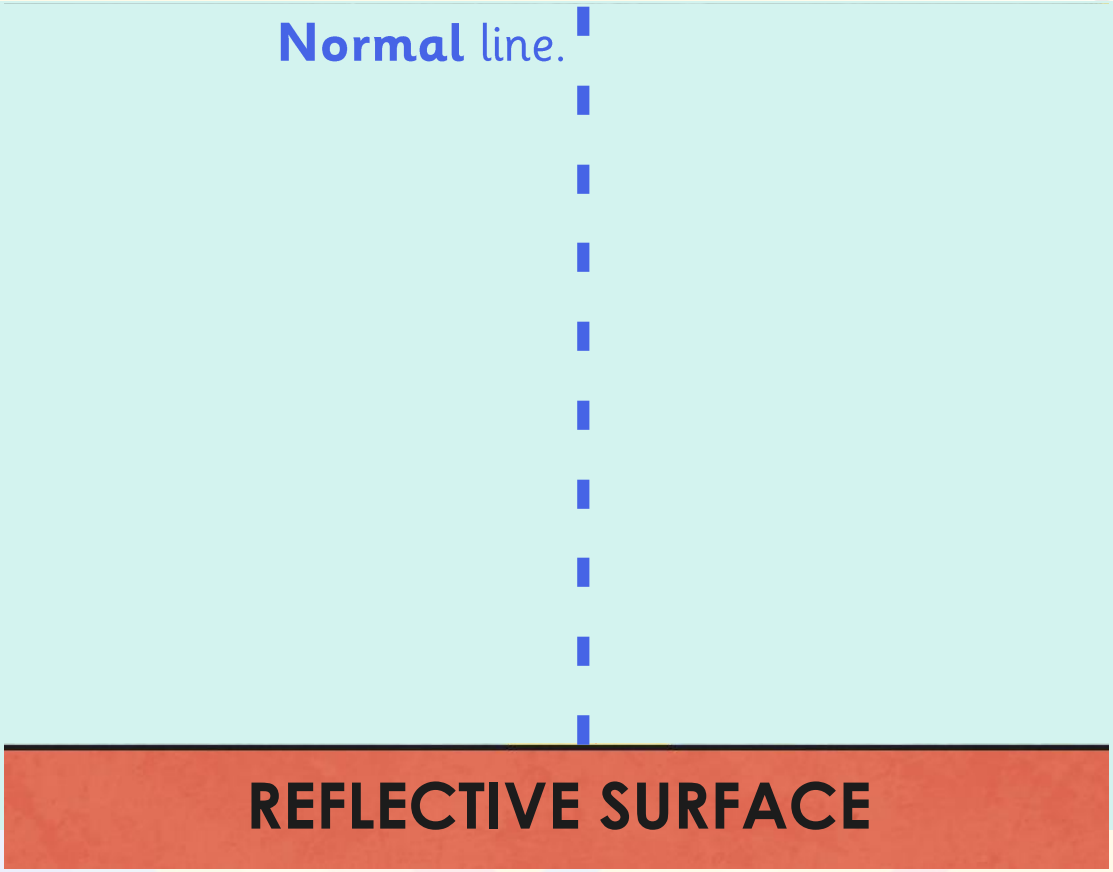
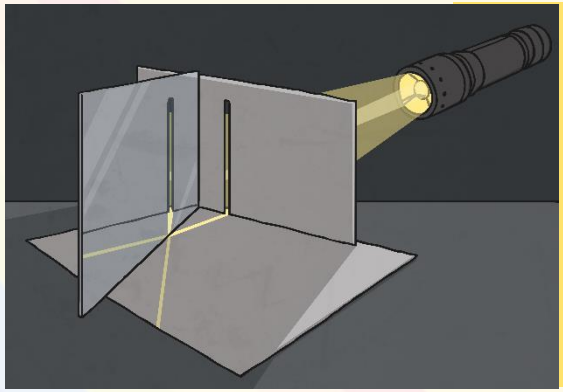


The angle of incidence is the angle between the normal line and the incident ray of light.

The angle of reflection is the angle between the normal line and the reflected ray of light.

Angles of Incidence and Reflection

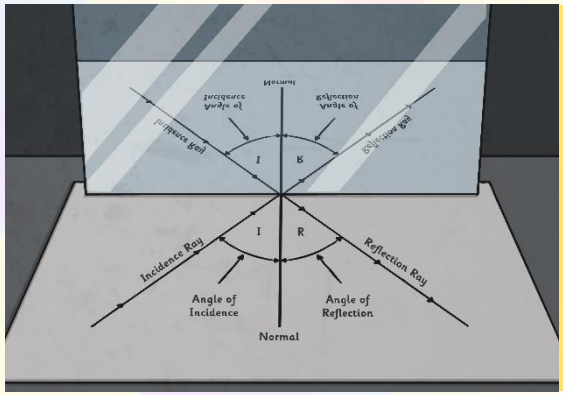
Try this challenge to prove the law of reflection!



Use modelling clay to stand a mirror up on a piece of white paper.

Make a very narrow slit in a piece of card.

Dim the lights and shine a torch through the slit towards the mirror.



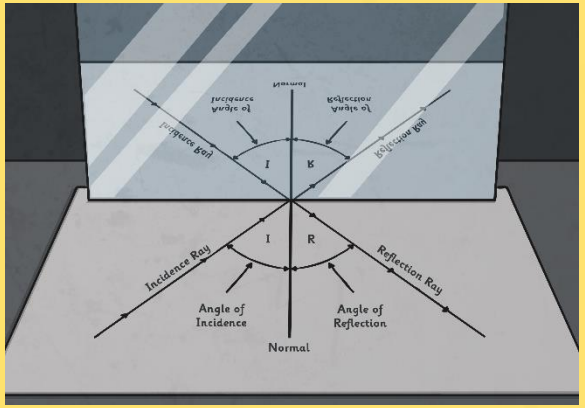
On the white paper, look for the incident ray and the reflected ray of light. You may have to play around with the angle of the torch and the distance you hold it from the mirror.

Angles of Incidence and Reflection

Use a pencil and ruler to draw the incident and reflected rays on the paper.

Draw a dashed line perpendicular to the mirror, from the point where the incident and reflected rays meet. This is the normal line.

Use a protractor to measure the angle formed between the incident ray and the normal line.



On the white paper, look for the incident ray and the reflected ray of light. You may have to play around with the angle of the torch and the distance you hold it from the mirror.

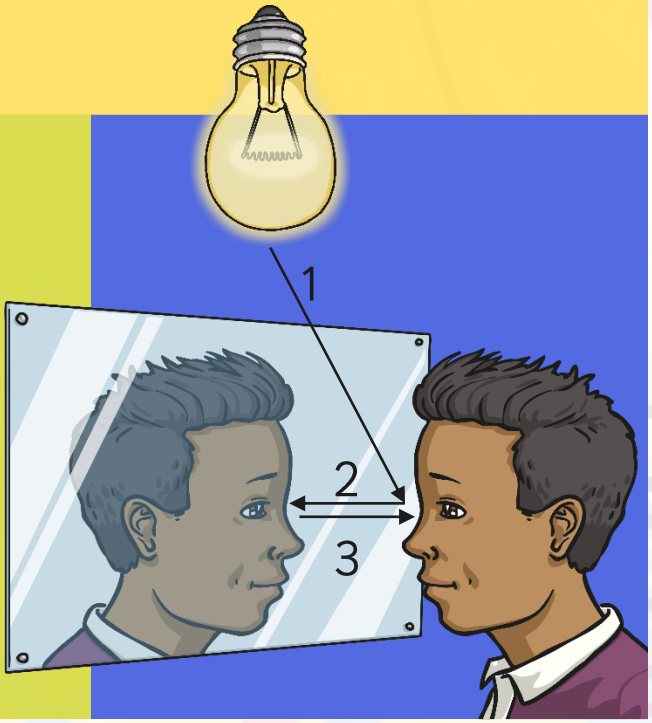
They should be equal.
Whenever light is reflected from a surface, it obeys this law.

Seeing Reflections

The law of reflection is what allows us to see an object reflected in a mirror.

Look at the way light travels to enable the boy to see his face reflected in the mirror:

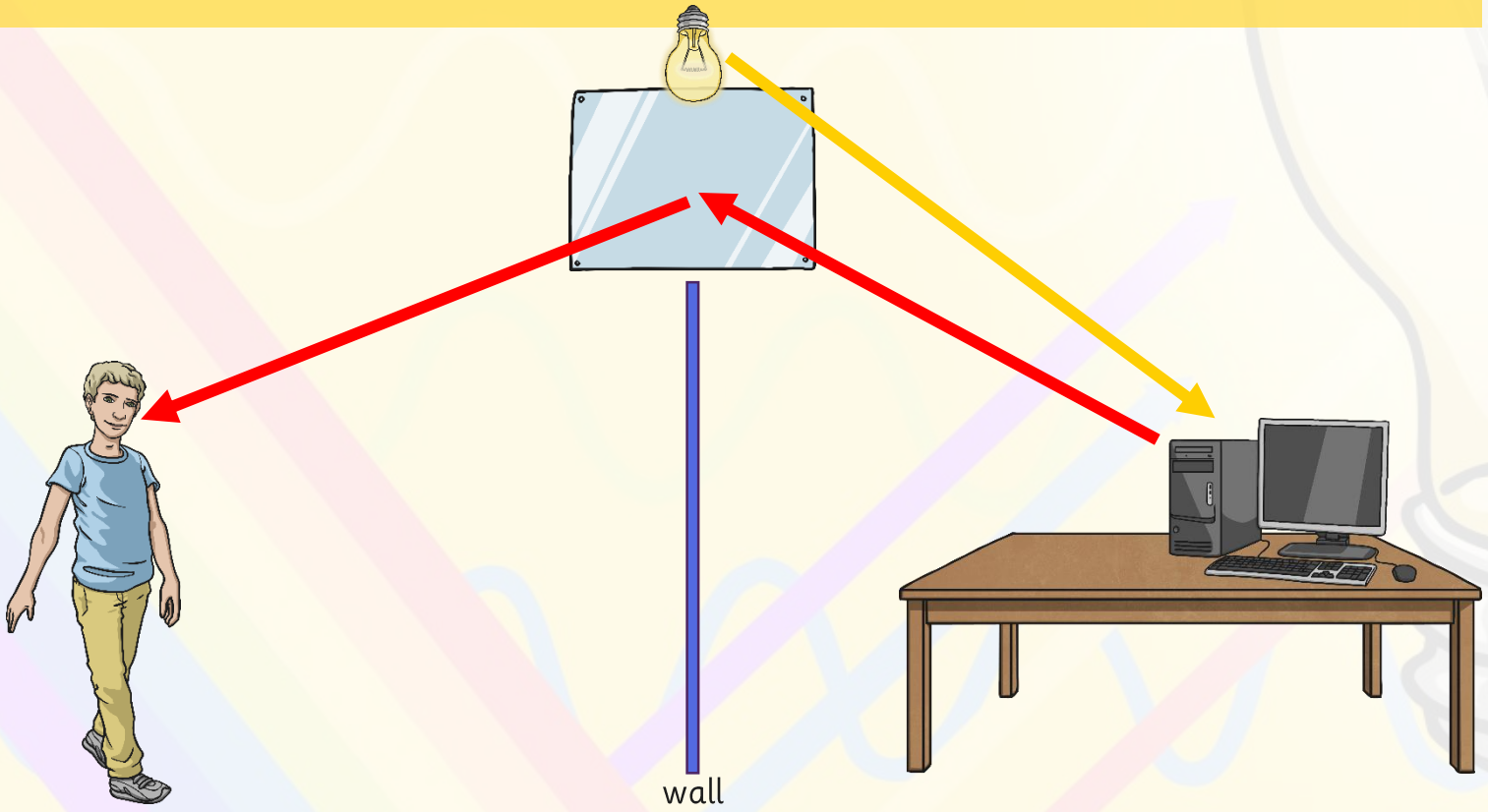
1. Light from the bulb hits the boy's face and bounces off.
2. The light reflected from the boy's face hits the mirror.
3. The light reflected from the mirror travels to the boy's eyes, so he can see the image of his face reflected in the mirror.



Seeing Reflections

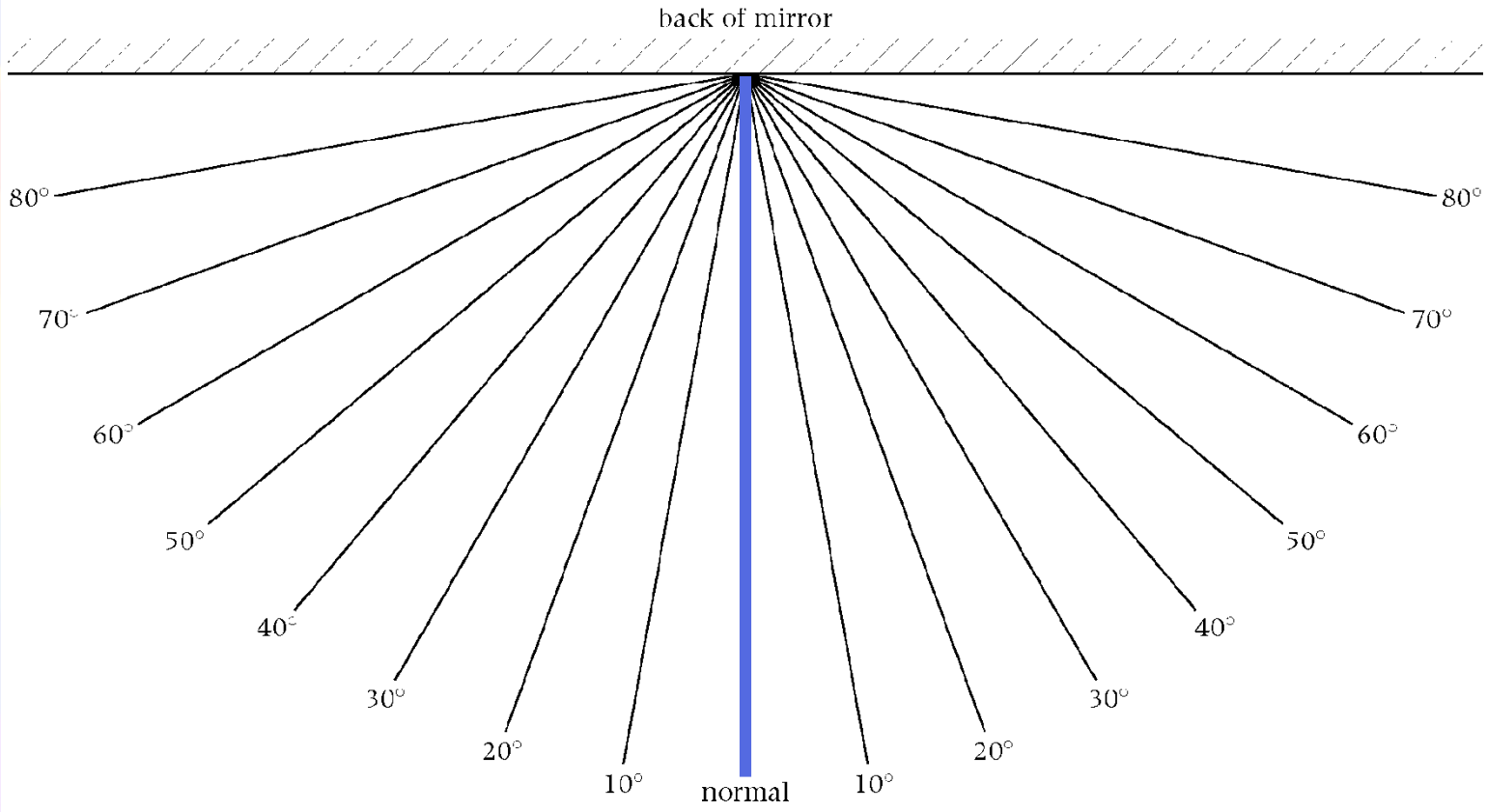
Whole Class

How is light travelling to enable the boy to see the computer behind the wall?

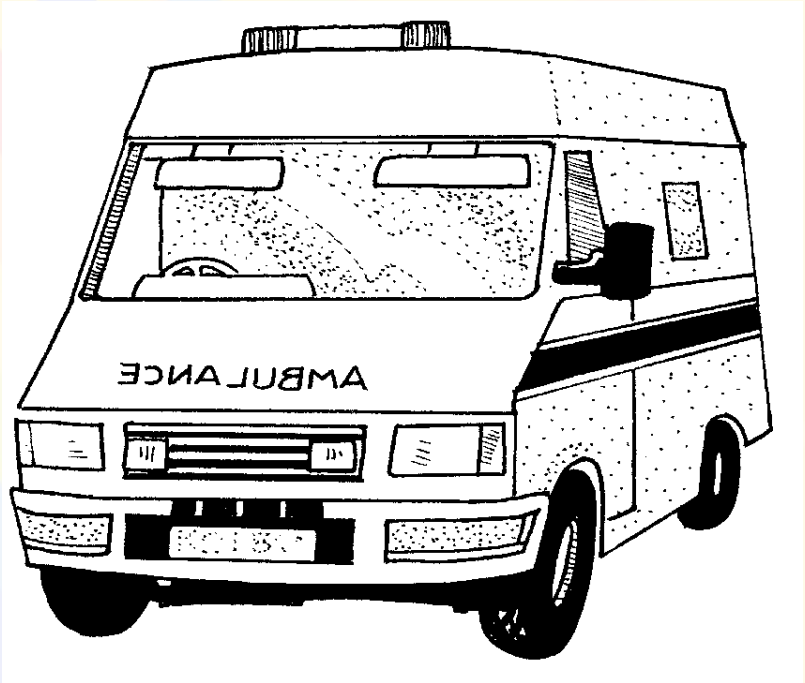


LAW OF REFLECTION

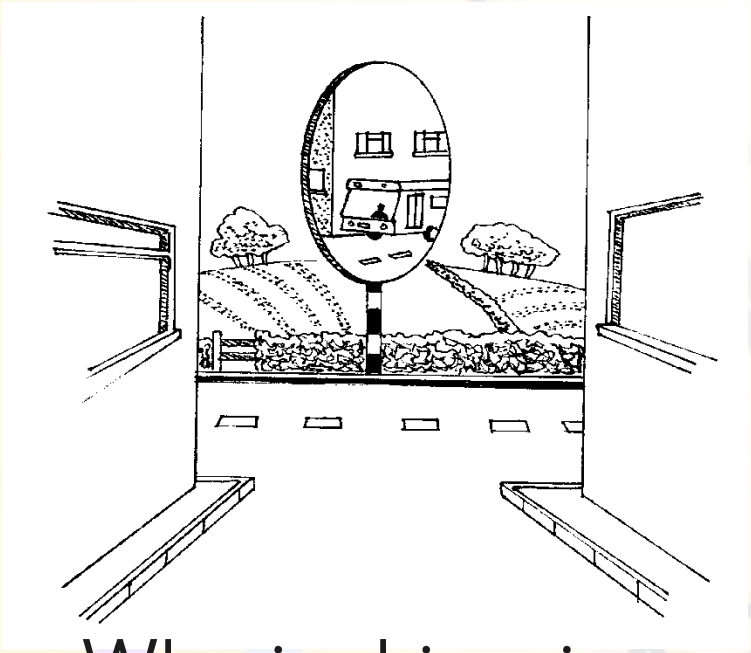
- The angle of incidence is equal to the angle of reflection



How are mirrors useful?



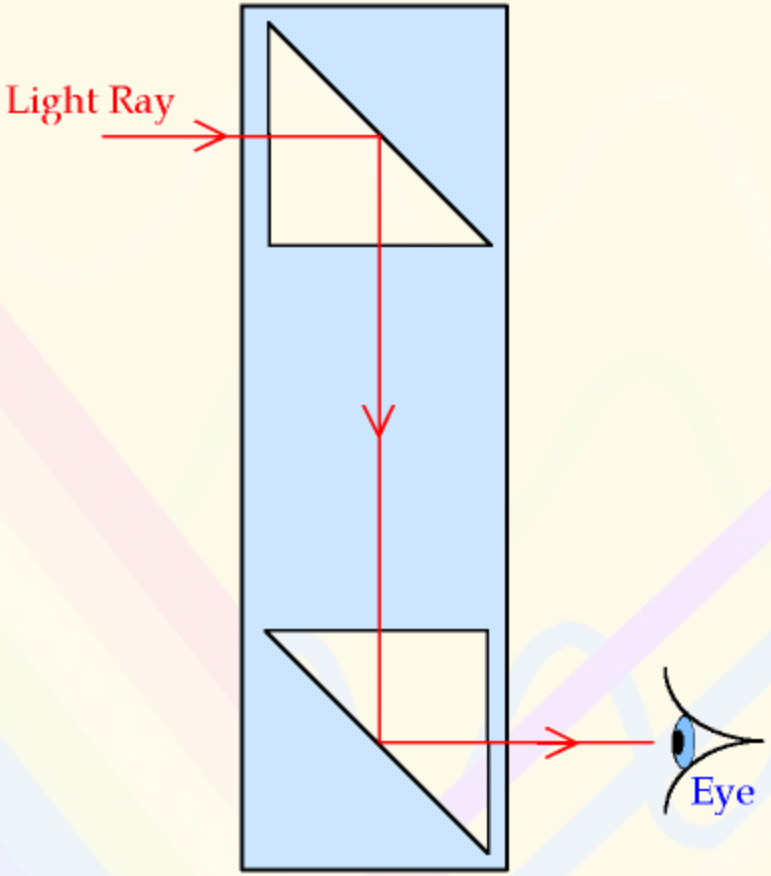
Why does the ambulance have the sign reversed?



Why is this mirror helpful?

WHAT IS THIS?
WHAT PIECE OF EQUIPMENT DOES IT HAVE THAT USES THE LAW OF RELECTION?

PERISCOPEs



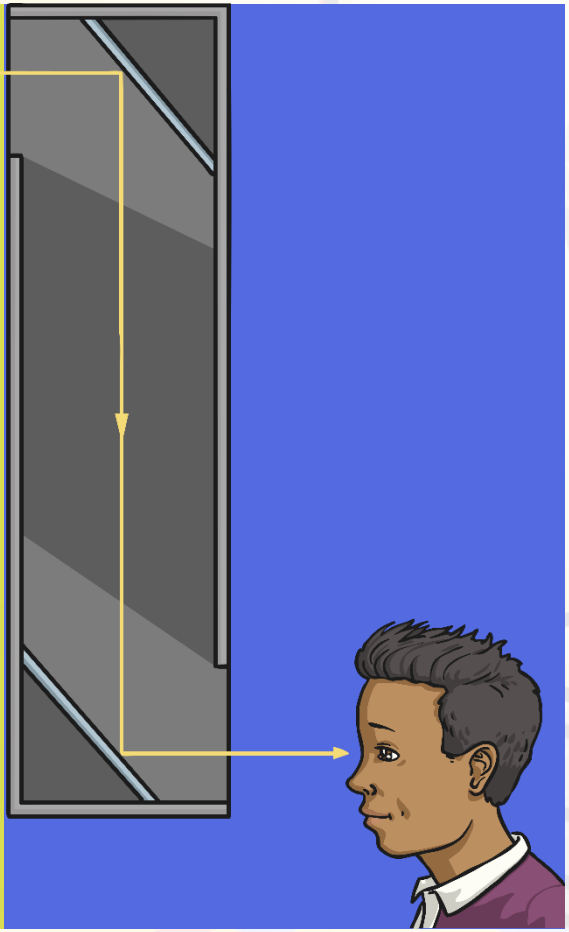
Make a Periscope

You are going to use your understanding of reflection and the angles of incidence and reflection to make a periscope.

A periscope is a device for seeing over or around something.

Periscopes were first used by sailors in around 1860, who used them in submarines to see above the surface of the water. They were also used by soldiers in the First World War, to see over the top of their trenches. They are still used today by tanks and some submarines.

A simple periscope is a tube with a mirror at either end. The mirrors need to be positioned so that the light is reflected from the mirror at one end, down the tube to the other mirror, then out of the tube to the observer's eyes.



Aim

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