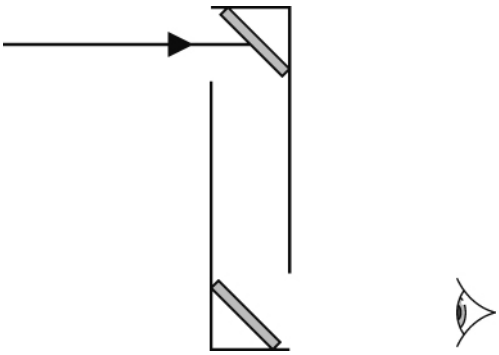
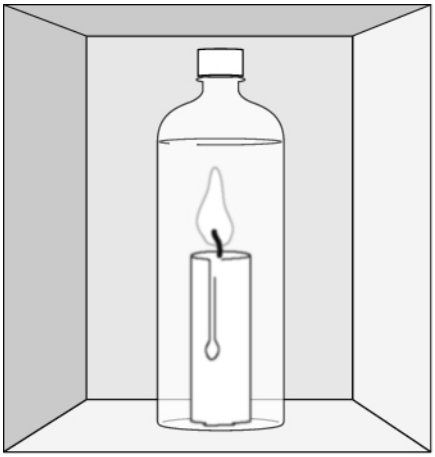
1 **a** Copy the diagram on the right and complete the lines to show the path of light to the eye.

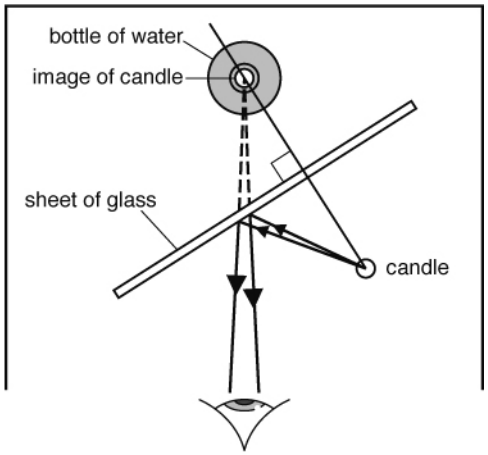
b Add arrowheads on the lines to show the direction the rays are travelling.

c Explain why two mirrors are needed in the periscope.



2 You can use a sheet of glass to make it look as if a candle is burning inside a bottle of water.





The candle is not really inside the water. The diagram shows how this illusion is created.

a Describe the path of the rays of light that let the person see the bottle of water.

b Describe the path of the rays of light that let the person see the candle.

c Why is a sheet of glass used rather than a mirror?

d Suggest why the bottle and sheet of glass need to be in a box.

3 A similar method was used in theatres in the nineteenth century to make a ghost appear and disappear on stage. This type of illusion was first created by Henry Dircks in 1862. John Pepper adapted Dircks' method to make it simpler to create the effect in theatres, and the effect has been called 'Pepper's Ghost' ever since. The actor playing the 'ghost' stands in a darkened part of the stage hidden from the audience, and a spotlight lights up the actor when the ghost has to appear. A reflection of the actor appears on a diagonal piece of glass across the part of the stage that the audience sees.

a Why does the actor playing the ghost have to stand in a darkened part of the room?

b Why does using a spotlight make the ghost 'appear' on stage?

c What practical problems do you think have to be overcome to make this illusion work successfully?

I can…

- explain some effects of reflection using the idea of light rays.