



# **KS3 Science**

## **Light**

### **Question Paper**

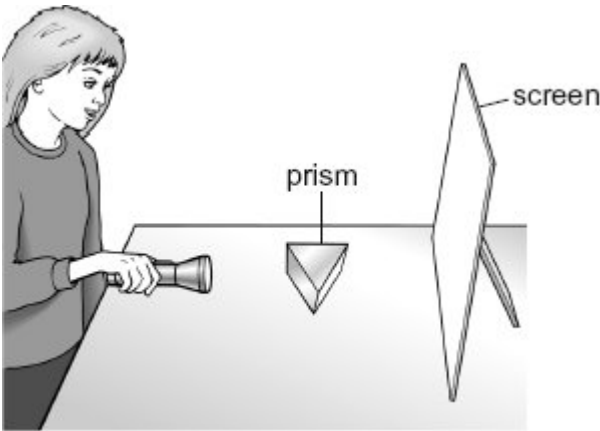
**Time available: 35 minutes**

**Marks available: 51 marks**

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1.

Ann shines a ray of white light at a glass prism.

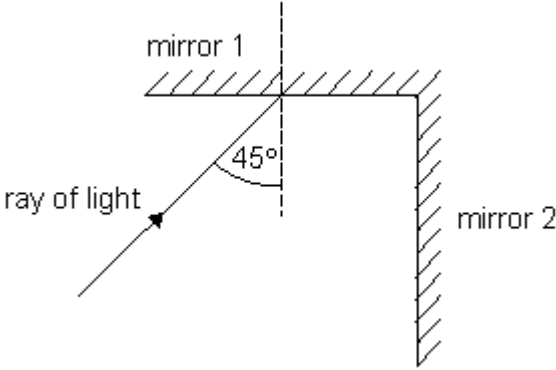


(a) Tick one box in each row to show if each sentence is **true** or **false**.

	<b>true</b>	<b>false</b>
The light refracts as it enters the prism.	<input type="checkbox"/>	<input type="checkbox"/>
The light refracts as it travels through the prism.	<input type="checkbox"/>	<input type="checkbox"/>
The light disperses as it leaves the prism.	<input type="checkbox"/>	<input type="checkbox"/>
The light forms a spectrum of colours on the screen.	<input type="checkbox"/>	<input type="checkbox"/>

2 marks

(b) Ann places two mirrors at 90° and shines a ray of light at mirror 1.



- (i) **On the diagram above** continue the ray of light to show how it is reflected by both mirrors. Use a ruler.

2 marks

- (ii) **On the diagram above** label the incident ray (i) and the reflected ray (r) for the light striking **mirror 2**.

1 mark

- (c) Ann shines the torch at a red book.



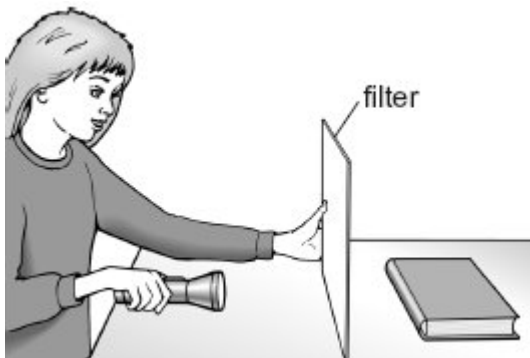
Explain why the object looks red in white light.

.....

.....

2 marks

- (d) In a dark room, Ann puts different coloured filters in front of the torch. She records the colour the book appears.

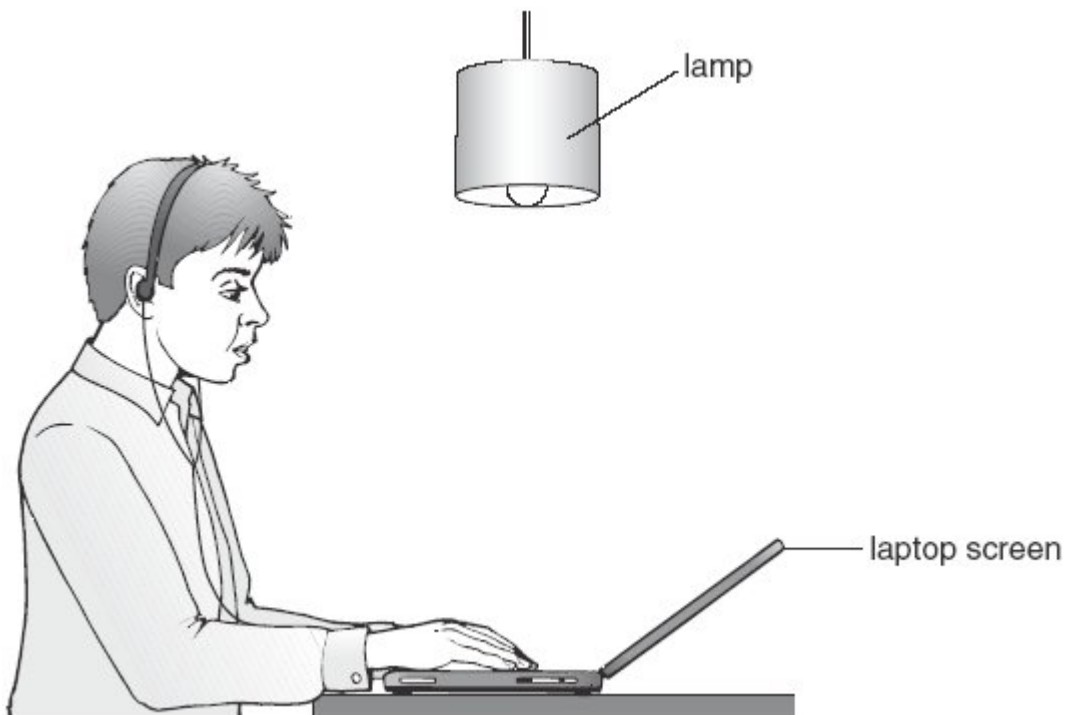


Complete the table below to show the colour that the book would appear.  
Tick **one** box in each row. The first one has been done for you.

colour of filter	What colour does the red book appear?		
	red	green	black
no filter	✓		
red filter			
green filter			

1 marks  
maximum 8 marks

- 2.** (a) The diagram below shows George using his laptop.  
Light from the lamp is reflected by the laptop screen.

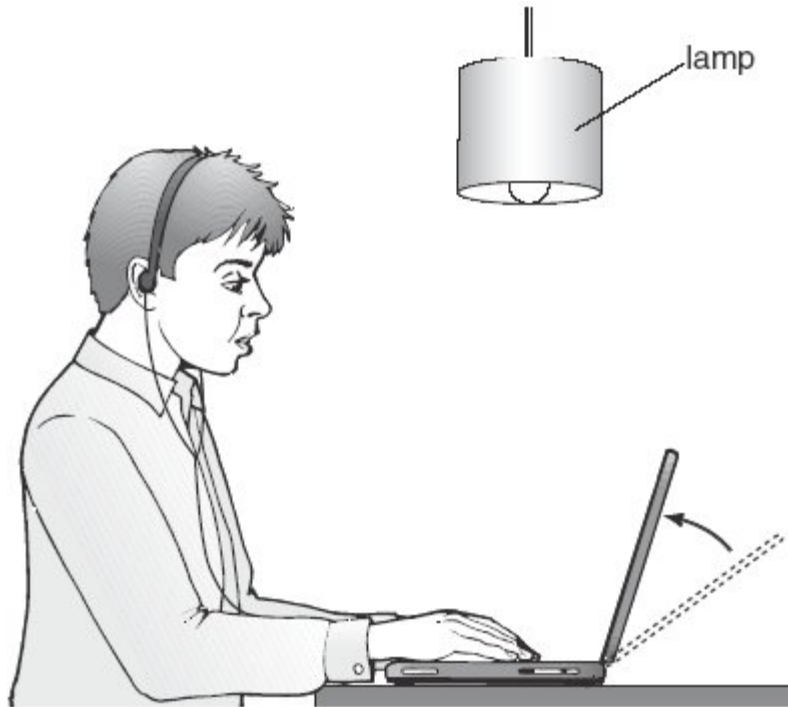


- (i) **On the diagram above** draw a ray of light to show how George sees the light from the lamp reflected by the laptop screen. Use a ruler.

Draw arrows to show the direction of light.

3 marks

- (ii) With the laptop screen in the position shown in part a(i), George sees an image of the lamp on the screen.  
George tilts the screen forwards as shown below.



When the screen is tilted forwards it is easier for George to see the words on the screen.  
What happens to the reflected ray of light when the screen is tilted?

.....  
.....

1 mark

- (b) George listens to music on his headphones.

Complete the sentence below using words from the box.

<b>chemical</b>	<b>electrical</b>	<b>gravitational potential</b>
<b>sound</b>	<b>thermal</b>	

The useful energy change in the headphones is from .....  
energy into ..... energy.

1 mark  
maximum 5 marks

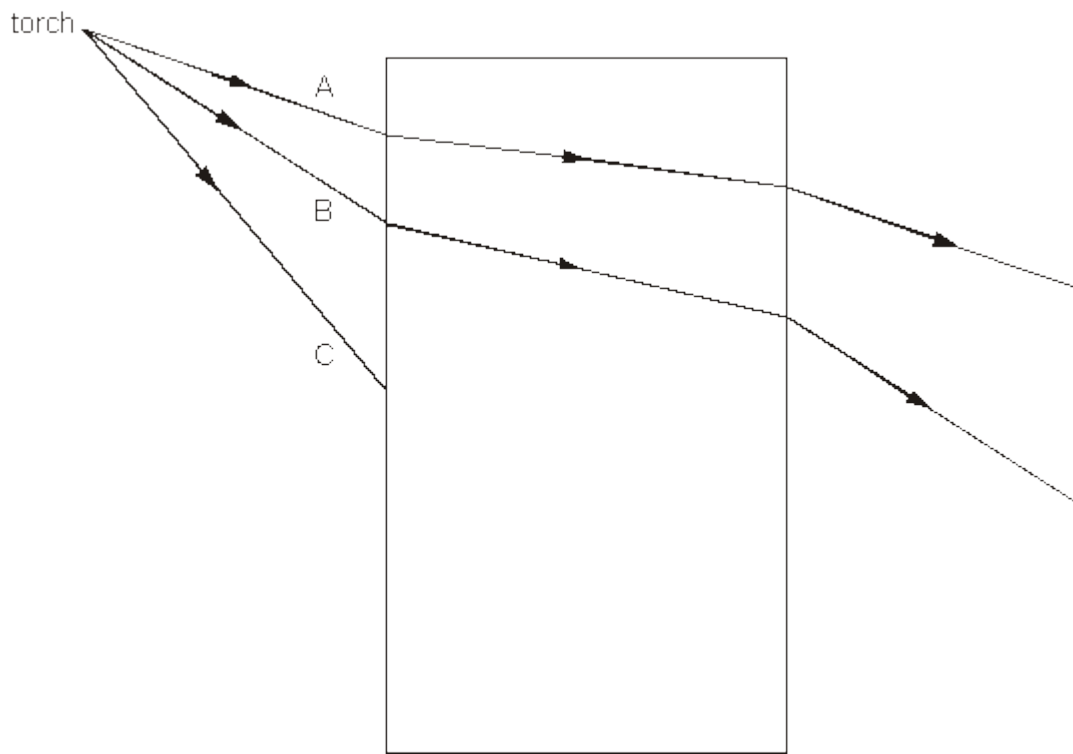
**3.**

- (a) When light travels from air to glass, it changes direction.  
What is the name of this effect?

.....

1 mark

- (b) The diagram below shows three rays of light A, B and C striking a glass block.



The paths of A and B have been drawn.

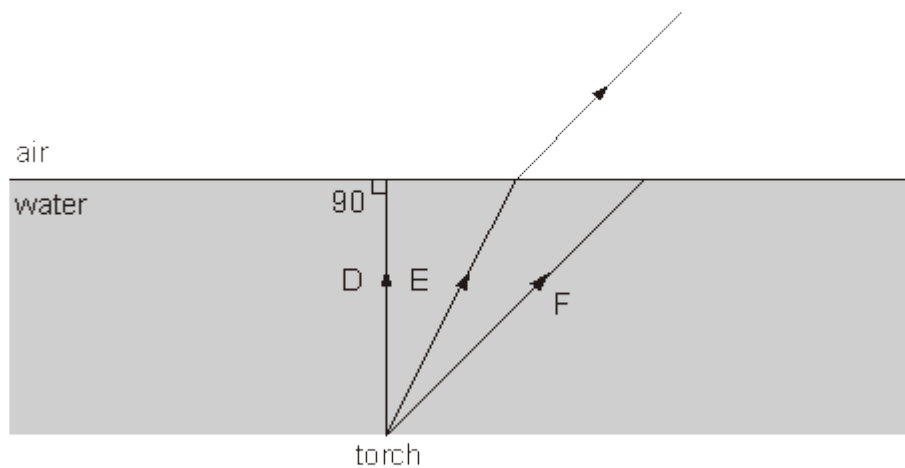
Continue ray C to show its path through the block and out the other side.  
Use a ruler.

2 marks

- (c) The diagram below shows three rays of light, D, E and F, from a torch placed under water.

The path of ray E is shown as it leaves the water and enters the air.

Continue the paths of D and F as they pass through the air.  
Use a ruler.



2 marks  
maximum 5 marks

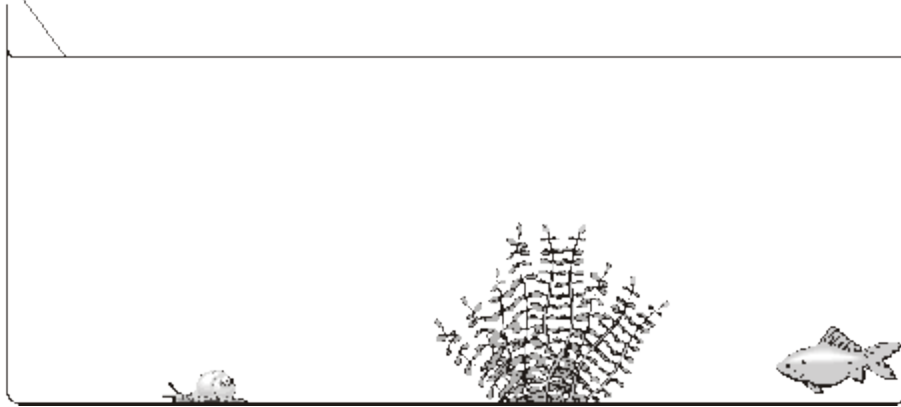
4.

(a) The diagram below shows a fish tank.

The surface of the water acts like a mirror.

The fish can see the snail reflected in the surface of the water.

surface  
of water  
(mirror)



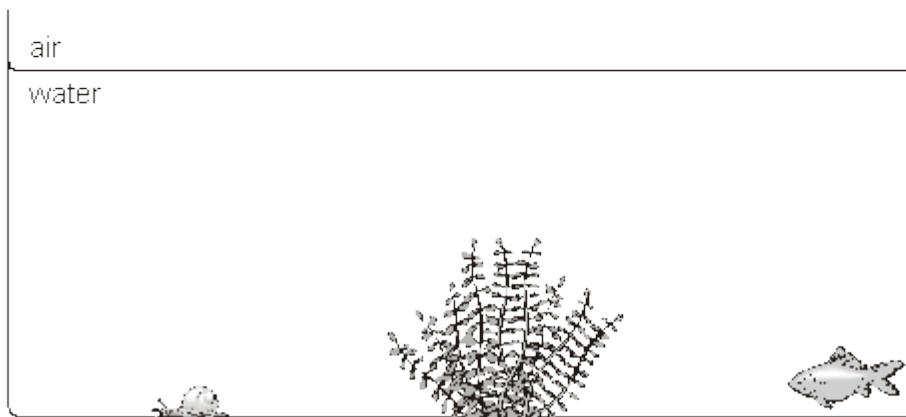
Draw a ray of light which passes from the snail, and reflects from the surface, to show how the fish can see the snail. Use a ruler.

Put arrows on the ray of light.

3 marks

(b) Andrew is looking at the snail.

Andrew



When a ray of light passes from water to air it changes direction.

- (i) Draw a ray of light from the snail to Andrew to show how Andrew can see the snail. Use a ruler.

Put arrows on the ray of light.

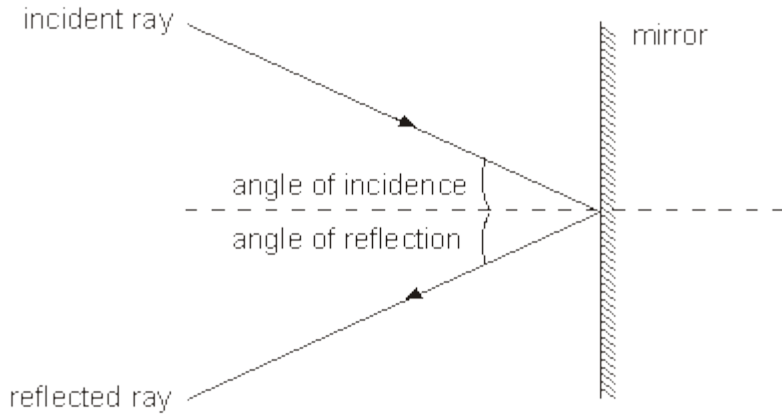
2 marks

- (ii) What is the name given to this change in the direction of a ray of light?

.....

1 mark  
maximum 6 marks

**5.** James shone a ray of light at a mirror as shown below.



**diagram 1**

He measured the angle of **reflection** for different angles of incidence. His results are shown below.

angle of <b>incidence</b> (°)	30	40	50	60	70
angle of <b>reflection</b> (°)	30	40	50	65	70

- (a) Which angle of reflection was **not** measured accurately?

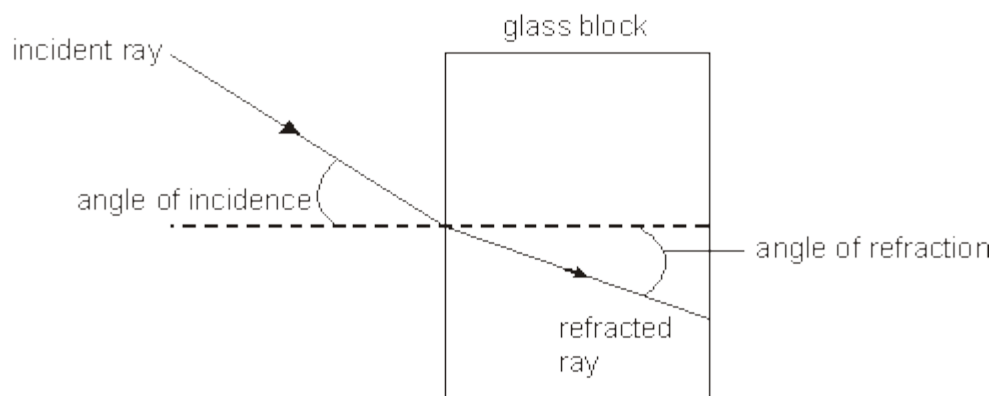
.....°

How can you tell this from the table?

.....  
.....



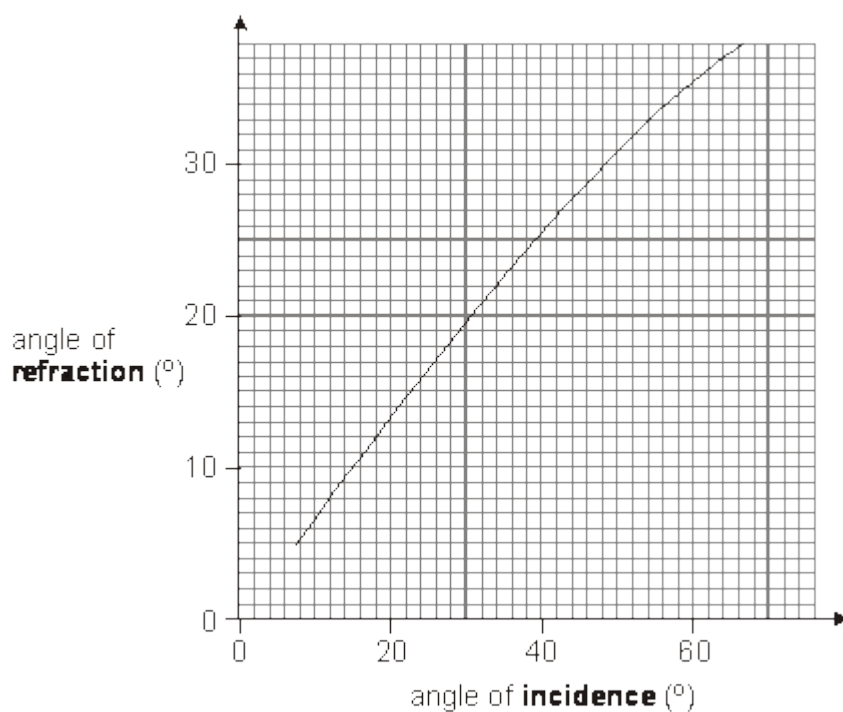
(b) James set up a different experiment as shown below.



**diagram 2**

He measured the angle of **refraction** for different angles of incidence.

His results are shown in the graph.



Use the graph to answer the questions below.

- (i) When the angle of **refraction** is  $20^\circ$ , what is the angle of **incidence**?

..... $^\circ$

1 mark

- (ii) What conclusion could James draw from his graph?  
Complete the sentence below.

When light passes from air into glass, the angle of **incidence** is  
always ..... the angle of **refraction**.

1 mark

- (c) **On diagram 2**, draw a line to continue the refracted ray as it leaves the glass block.

1 mark  
maximum 4 marks

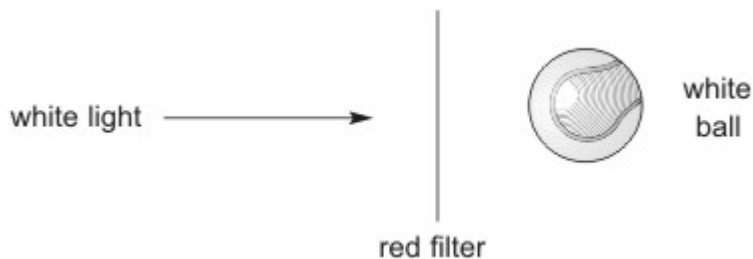
**6.**

- (a) Peter had two different coloured tennis balls as shown below.



He shone white light through a red filter onto each ball.

- (i) **experiment 1**

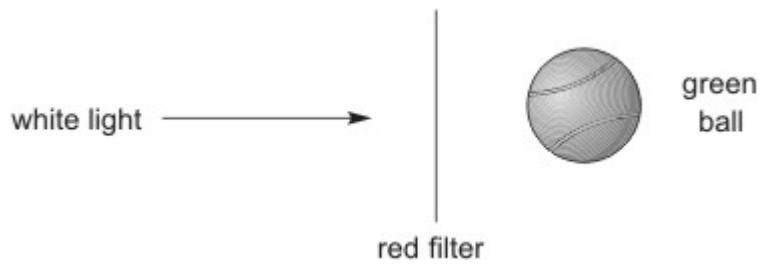


The white ball appeared red.  
Explain why this ball appeared red.

.....  
.....  
.....  
.....

2 marks

(ii) **experiment 2**



What colour did this ball appear?

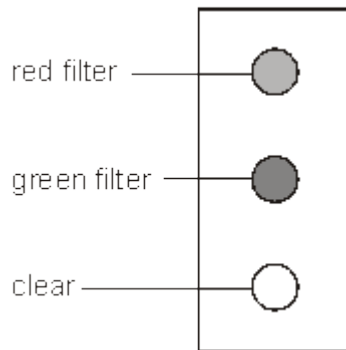
.....

Explain your answer.

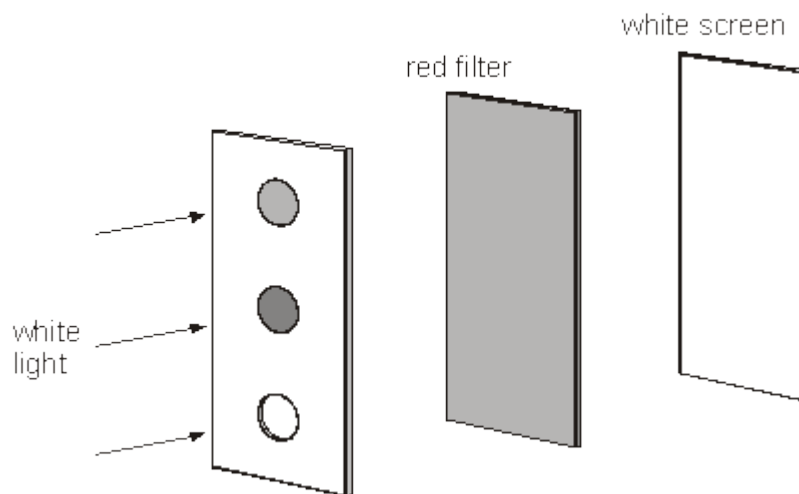
.....  
.....

2 marks

- (b) Peter set up a different experiment.  
He cut three holes in a piece of card.  
Two of the holes were covered by coloured filters as shown below.



Peter placed a red filter between the piece of card and a white screen.  
He shone white light at the piece of card with three holes in it.



What would Peter see on the screen?

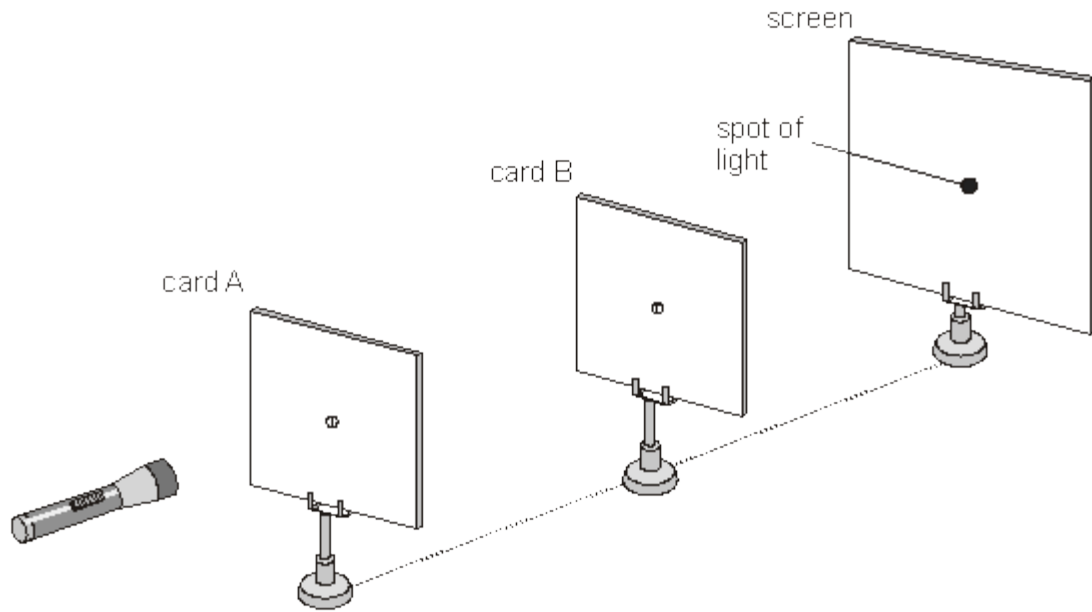
.....

.....

1 mark  
maximum 5 marks

7.

Gabby arranged a torch, two cards and a screen as shown below.  
Light from the torch passed through holes in the cards and onto the screen.



(a) Why did a spot of light appear on the screen? Tick the correct box.

Light can be split up into many colours.

Light can travel through empty space.

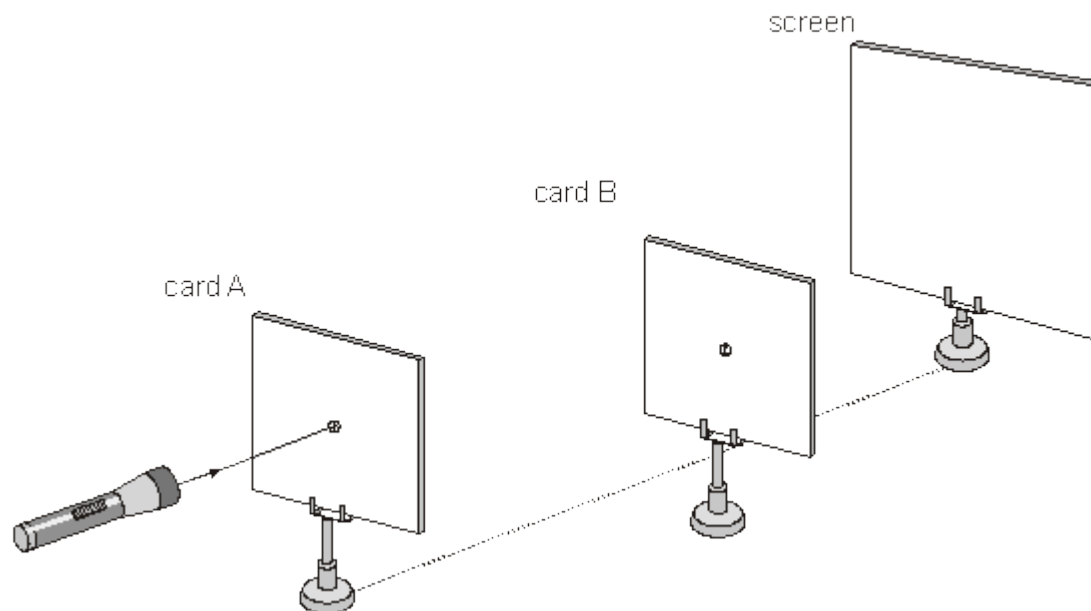
Light travels in straight lines.

Light travels very fast.

1 mark

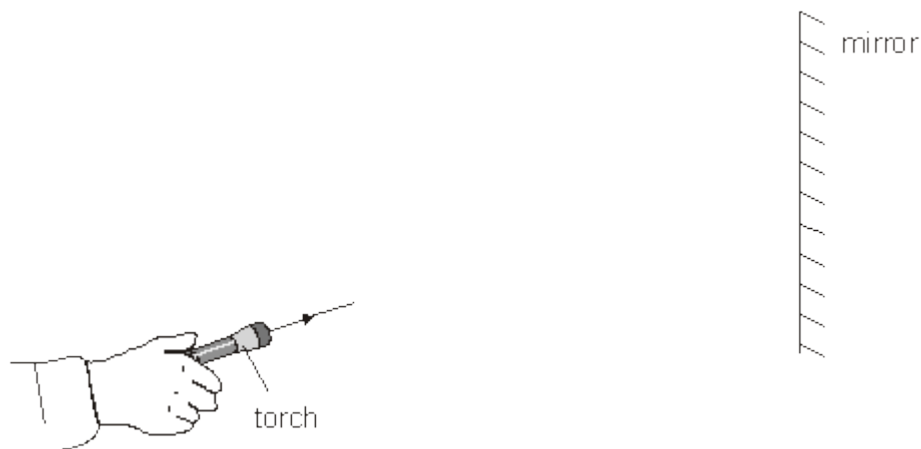
- (b) Gabby moved card B to one side as shown below.  
The ray of light passed through the hole in card A and onto card B.

Continue the ray of light from the torch to show where it would hit card B.  
Use a ruler.



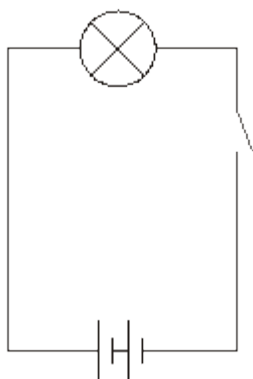
1 mark

- (c) Gabby used a torch to shine a ray of light towards a mirror.  
Continue the ray of light to show how it reflects off the mirror.  
Add an arrow to show the direction of the reflected ray.  
Use a ruler.



3 marks

(d) Gabby built a circuit like the circuit in her torch.



What could she do to the circuit to make this bulb brighter?

Tick the correct box.

Add another battery.

Add another bulb.

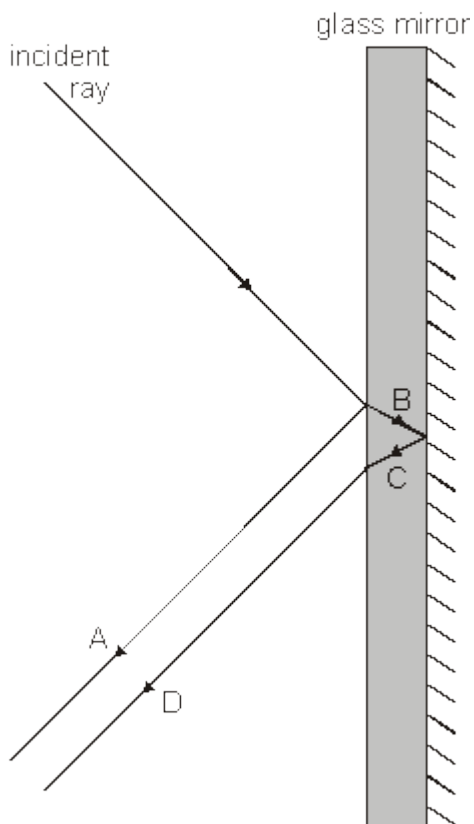
Add another switch.

Add longer wires.

1 mark  
maximum 6 marks

8.

The diagram shows a ray of light hitting the surface of a mirror made from thick glass. The incident ray is both reflected and refracted.



(a) (i) Give the letters of the **two** reflected rays.

..... and .....

1 mark

(ii) Give the letter of **one** refracted ray.

.....

1 mark

(b) The incident ray is brighter than ray A.  
Give **one** reason for this.

.....  
.....

1 mark  
maximum 3 marks

**9.**

Light shines onto a ball. Naomi is looking at the ball.



(a) Describe how light from the lamp lights up the ball and makes it visible to Naomi.

.....  
.....  
.....  
.....

2 marks

- (b) (i) Naomi uses different colours of light and different coloured balls.

Complete the table to show the colours that the balls appear to Naomi.

colour of ball	colour of the light	the colour the ball appears to Naomi
white	red	
green	white	

2 marks

- (ii) Why does a black object appear black in any light?

.....

1 mark

- (c) Choose from the following terms to complete the sentences below.

**less than                      equal to                      greater than**

At a plane mirror, the angle of incidence is .....

the angle of reflection. The distance from the object to the mirror is

..... the apparent distance from the mirror to the image.

2 marks

- (d) A beam of white light shines onto a sheet of white paper. An identical beam of light shines onto a mirror. The light is scattered from the paper and reflected from the mirror.

Describe how scattering by paper and reflection by a mirror are **different** from each other.

.....  
 .....  
 .....  
 .....

2 marks

Maximum 9 marks