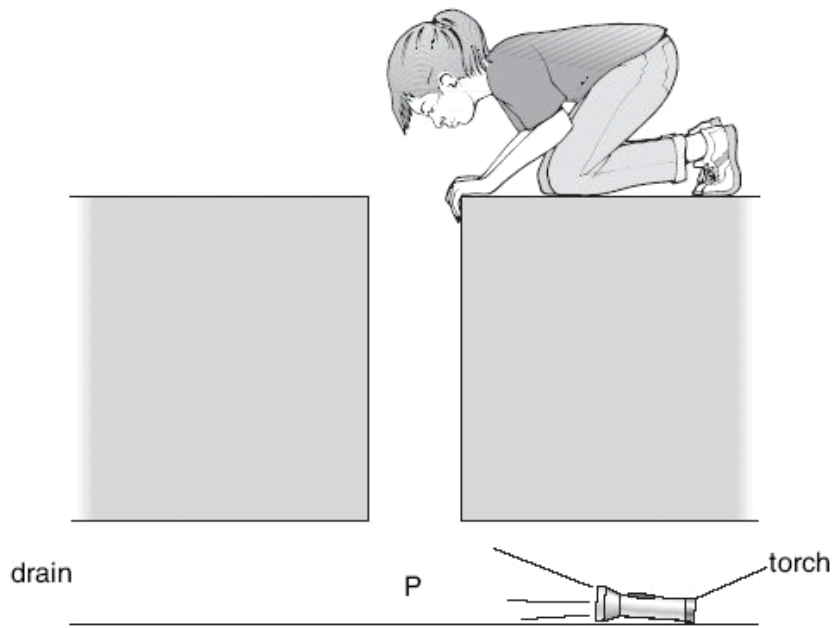


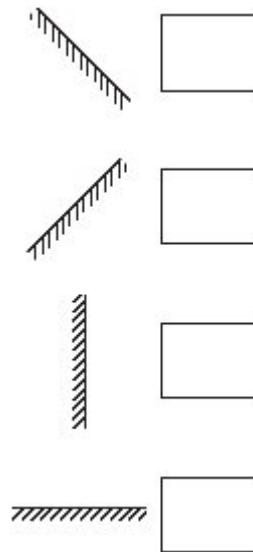
# DO NOT WRITE ON THESE SHEETS

1. Jenny dropped her torch down a drain.  
The torch was still switched on but Jenny could **not** see it.



*not to scale*

- (a) (i) Jenny lowered a mirror into the drain and placed it at position P.  
At which angle should Jenny put the mirror to see the torch?  
Tick the correct box.



1 mark

- (ii) What happens to the light from the torch when it hits the mirror?

.....

1 mark

- (b) The diagrams below show the symbols for three parts of the torch circuit.

- (i) On the line below each diagram, give the name of the part.



.....

3 marks

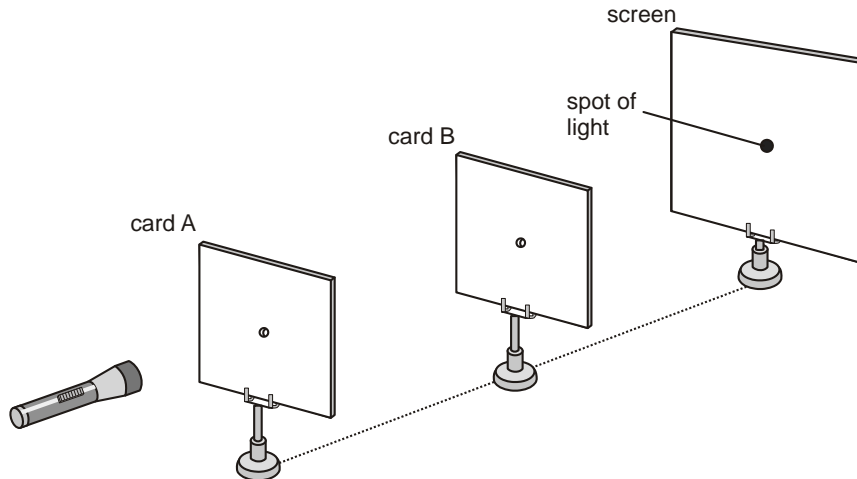
# DO NOT WRITE ON THESE SHEETS

- (ii) In the space below, draw a circuit diagram to show how these **three** parts are connected in a torch.

1 mark

maximum 6 marks

2. 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.

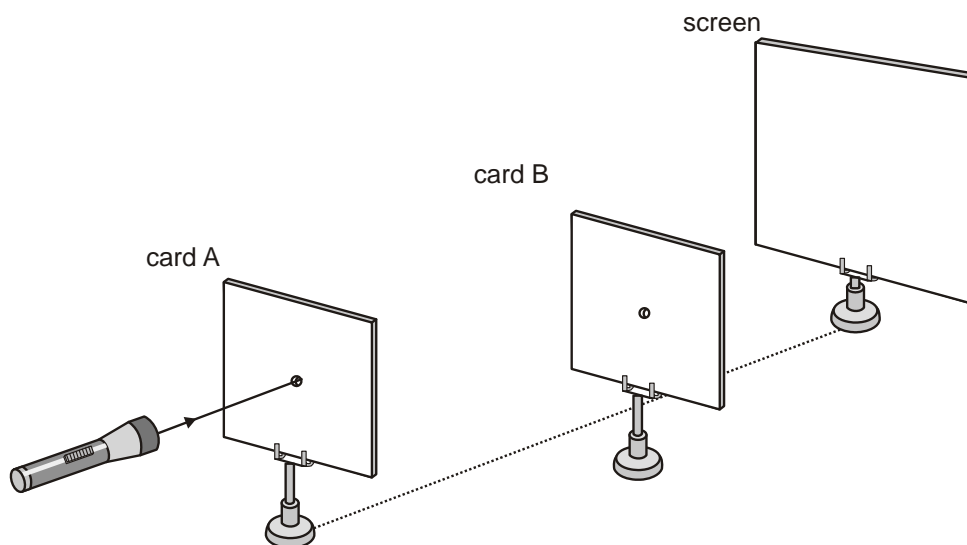
Light travels in straight lines.

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.

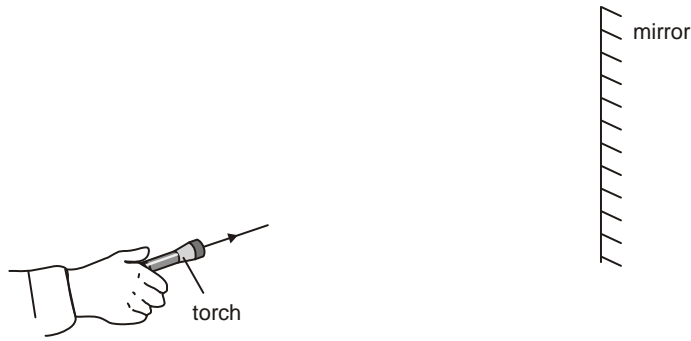
Continue the ray of light from the torch to show where it would hit card B. Use a ruler.



1 mark

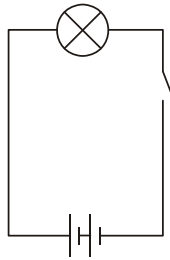
# DO NOT WRITE ON THESE SHEETS

- (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.

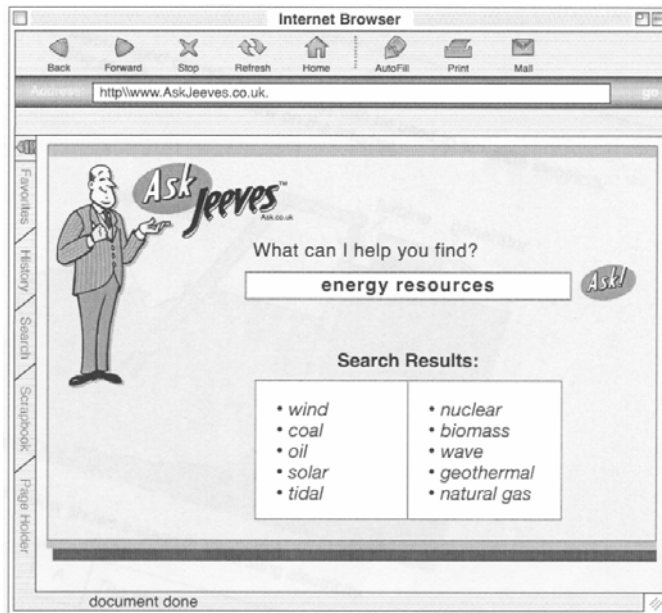


What could she do to the circuit to make this bulb brighter?  
Tick the correct box.

|                      |                          |                   |                          |
|----------------------|--------------------------|-------------------|--------------------------|
| Add another battery. | <input type="checkbox"/> | Add another bulb. | <input type="checkbox"/> |
| Add another switch.  | <input type="checkbox"/> | Add longer wires. | <input type="checkbox"/> |

1 mark  
maximum 6 marks

3. Meera used the Internet to find out about energy resources. The drawing below shows what Meera saw on her computer screen.



# DO NOT WRITE ON THESE SHEETS

- (a) Coal is a fossil fuel.  
Give the names of **two** other fossil fuels in the list on the screen.

.....and.....

2 marks

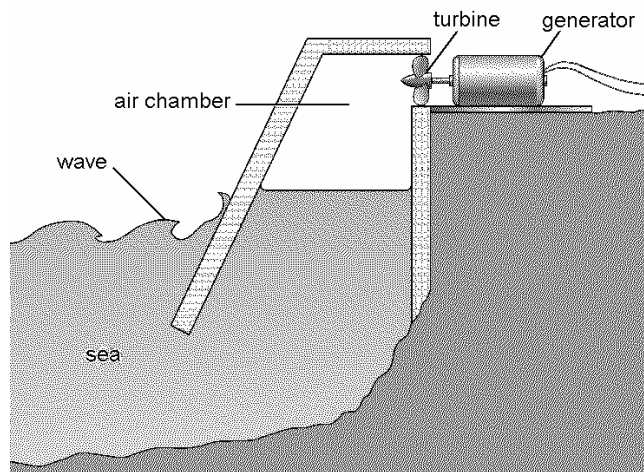
- (b) (i) Wave energy is an example of a renewable energy resource.

From the list on the screen above choose **two** other renewable energy resources.

..... and .....

2 marks

- (ii) Meera found out how wave energy can be used to generate electricity.  
She saw the diagram below on the Internet.



Each box below shows a stage in generating electricity.

|   |  |
|---|--|
| A | The air turns the turbine.             |
| B | The turbine turns the generator.       |
| C | The waves move up the chamber.         |
| D | The generator produces electricity.    |
| E | The waves push the air up the chamber. |

On the lines below write the letters of the stages in the correct order.  
Two have been done for you.

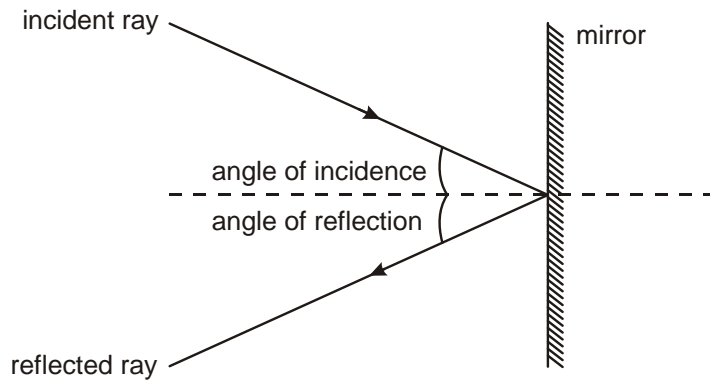
.....C.....      .....      .....A.....      .....      .....

2 marks

Maximum 6 marks

# DO NOT WRITE ON THESE SHEETS

4. 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> ( $^{\circ}$ )  | 30 | 40 | 50 | 60 | 70 |
| angle of <b>reflection</b> ( $^{\circ}$ ) | 30 | 40 | 50 | 65 | 70 |

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

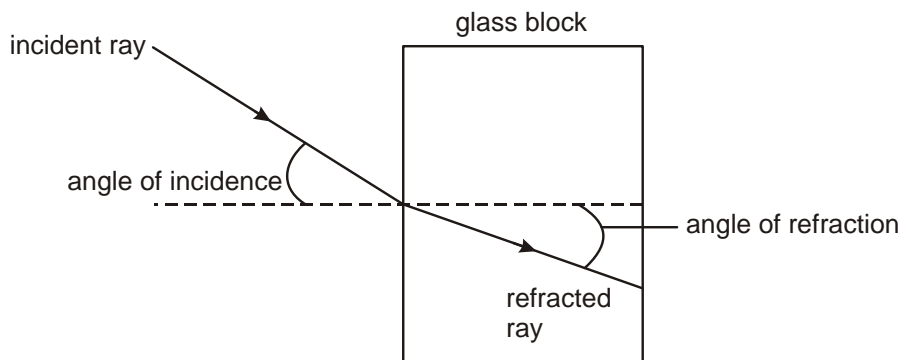
..... $^{\circ}$

How can you tell this from the table?

.....  
 .....

1 mark

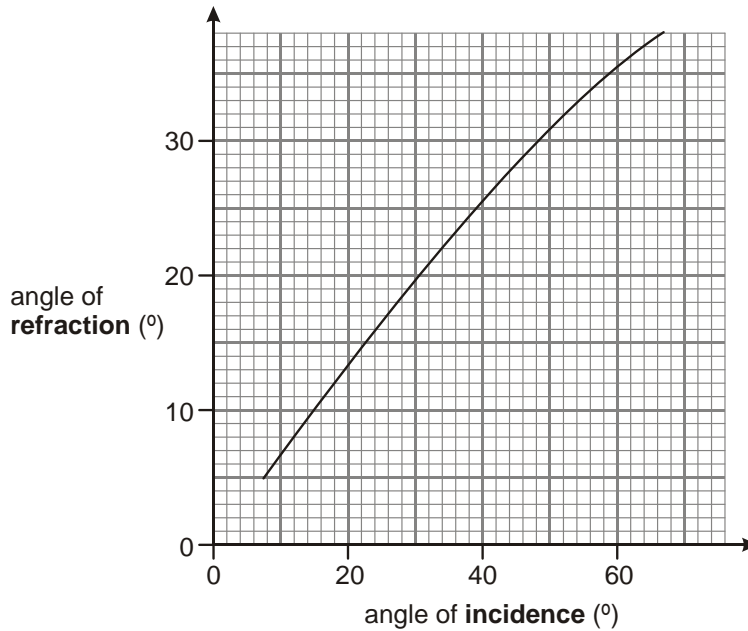
(b) James set up a different experiment as shown below.



**diagram 2**

He measured the angle of **refraction** for different angles of incidence. His results are shown in the graph.

DO NOT WRITE ON THESE SHEETS



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**.

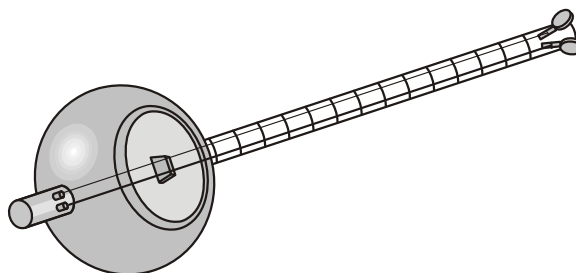
1 mark

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

1 mark

maximum 4 marks

5. The dotar is a musical instrument with two strings.



- (a) Aftal plays the dotar very quietly.

What must he do to the strings to make a louder sound?

.....  
.....

1 mark

- (b) Aftal makes the strings tighter so they vibrate more quickly.

How does this affect the sound produced by the strings?

# DO NOT WRITE ON THESE SHEETS

Tick the correct box.

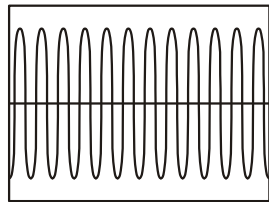
- |                               |                          |
|-------------------------------|--------------------------|
| The sound has a lower pitch.  | <input type="checkbox"/> |
| The sound is louder.          | <input type="checkbox"/> |
| The sound has a higher pitch. | <input type="checkbox"/> |
| The sound is quieter.         | <input type="checkbox"/> |

- (c) One of the strings is thicker than the other, so it vibrates more slowly. 1 mark

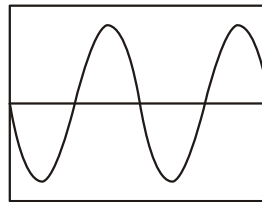
In what way is the sound made by the thicker string different from the sound made by the thinner string?

.....

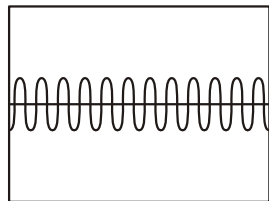
- (d) Aftal played the dotar near a microphone connected to an oscilloscope. The diagrams below show the patterns made by four sounds. 1 mark



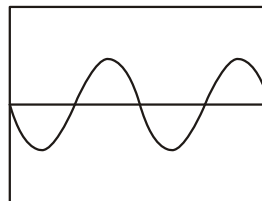
A



B



C



D

- (i) How does the sound shown in trace A differ from the sound in trace B?

.....  
 .....

1 mark

- (ii) How does the sound shown in trace A differ from the sound in trace C?

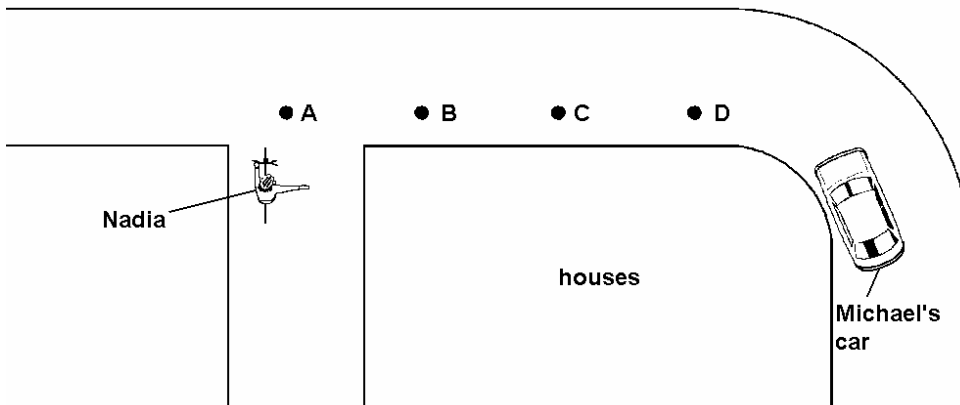
.....  
 .....

1 mark

maximum 5 marks

# DO NOT WRITE ON THESE SHEETS

6. Nadia is on her bicycle, waiting to pull out from a road junction. Michael is driving his car round the bend. A row of houses stops Nadia from seeing Michael's car.



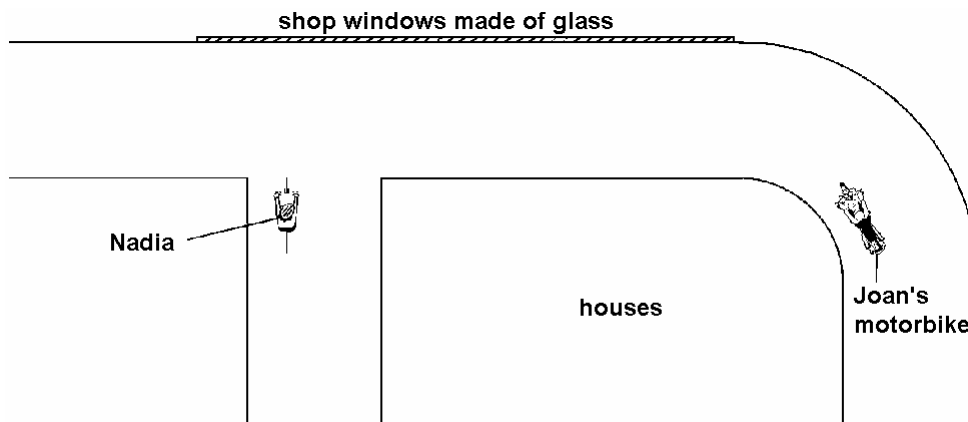
*not to scale*

- (a) At what position will Michael's car be when Nadia first sees it?  
Tick the correct box.

A       B       C       D

- (b) A row of shops was built opposite the junction. The shops have glass windows which act as a mirror.

1 mark



*not to scale*

Nadia could see Joan's motorbike reflected in the glass window.

- (i) **On the diagram above**, draw a ray of light to show how Nadia can see Joan's motorbike reflected in the glass window. Add arrows to the ray. Use a ruler.

3 marks

- (ii) How does the glass window help to reduce the number of accidents?

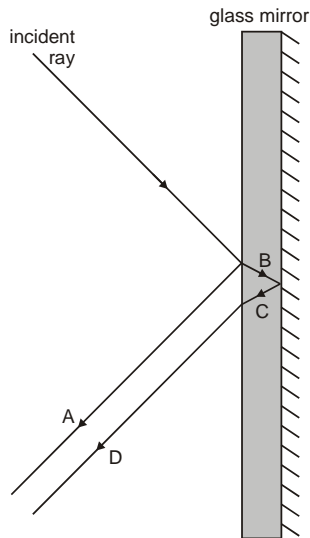
.....  
 .....

1 mark

Maximum 5 marks

# DO NOT WRITE ON THESE SHEETS

7. 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

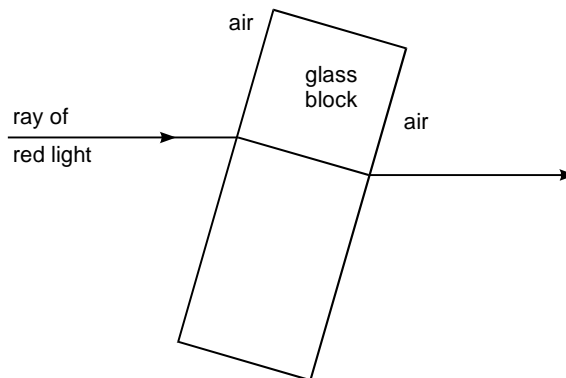
- (b) The incident ray is brighter than ray A. Give **one** reason for this.

.....  
 .....

1 mark

maximum 3 marks

8. (a) The diagram below shows a ray of red light entering a glass block.



- (i) Most of the light goes into the glass block, but some does not. What happens to the light which does **not** go into the glass block?

.....  
 .....

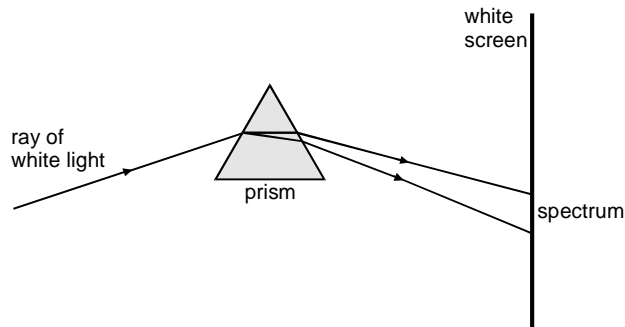
1 mark

- (ii) As the light goes into the glass block, it changes direction. What is the name of this effect?

# DO NOT WRITE ON THESE SHEETS

1 mark

- (b) The diagram below shows white light passing through a prism and forming a spectrum on a white screen.



The spectrum contains light of all colours. Red is at one end of the spectrum. Write **blue**, **green** and **violet** below in the order of the spectrum.

\_\_\_\_\_ Red \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

1 mark

- (c) A pupil puts a green filter in the ray of white light. What happens to the spectrum on the screen?  
Tick the correct box.

The whole spectrum turns green.

The green part of the spectrum disappears, but the other colours stay the same.

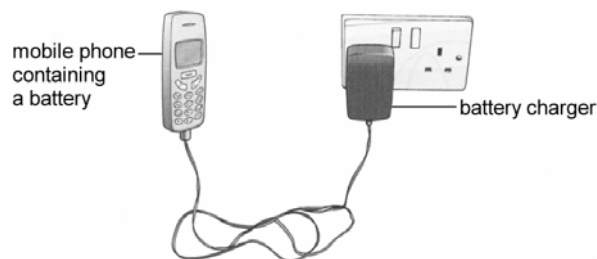
The green part of the spectrum stays the same, but the other colours disappear.

The whole spectrum disappears.

1 mark

Maximum 4 marks

9. (a) Jacquie has a mobile phone. Energy is stored in the battery of the phone. The drawing shows the battery being charged.



- (i) Which energy transfer takes place in the battery as it is being charged? Tick the correct box.

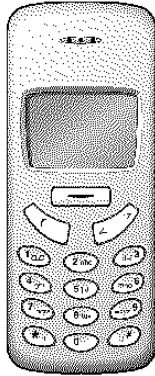
# DO NOT WRITE ON THESE SHEETS

|                        |   |                       |   |
|------------------------|---|-----------------------|---|
| chemical to sound      | <input style="width: 100%; height: 100%;" type="checkbox"/> | sound to thermal      | <input style="width: 100%; height: 100%;" type="checkbox"/> |
| electrical to chemical | <input style="width: 100%; height: 100%;" type="checkbox"/> | thermal to electrical | <input style="width: 100%; height: 100%;" type="checkbox"/> |

1 mark

(ii) When the battery is fully charged, Jacquie unplugs the phone.

Which energy transfers take place when the mobile phone rings?  
Tick the correct box.



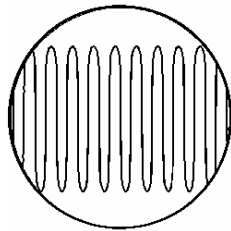
|                                 |   |
|---------------------------------|---|
| chemical to electrical to sound | <input style="width: 100%; height: 100%;" type="checkbox"/> |
| electrical to chemical to sound | <input style="width: 100%; height: 100%;" type="checkbox"/> |
| kinetic to electrical to sound  | <input style="width: 100%; height: 100%;" type="checkbox"/> |
| thermal to electrical to sound  | <input style="width: 100%; height: 100%;" type="checkbox"/> |

1 mark

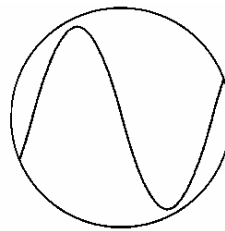
(b) Jacquie can change the ring-tone of her phone.

The diagrams below show the patterns made by four sound waves on an oscilloscope screen.

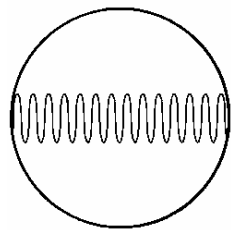
They are all drawn to the same scale.



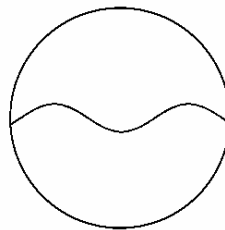
P



Q



R



S

Write the letter of the sound wave that matches each of the descriptions below.

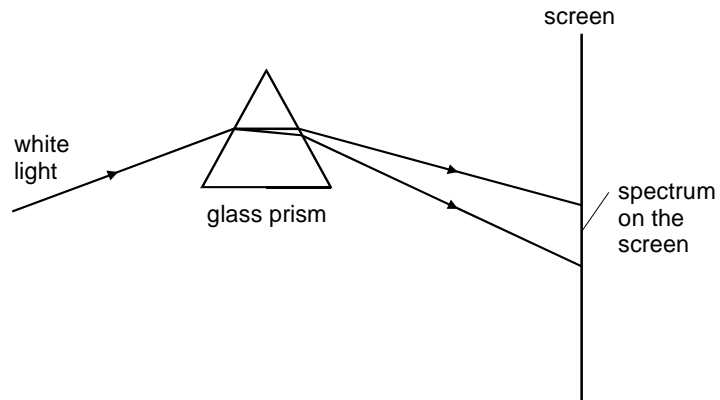
- (i) a loud sound with a low pitch .....
- (ii) a quiet sound with a high pitch .....
- (iii) a loud sound with a high pitch .....

3 marks

Maximum 5 marks

# DO NOT WRITE ON THESE SHEETS

10. When white light is shone through a glass prism the light bends and splits into the colours of the spectrum.



- (a) (i) What word describes the bending of light as it enters and leaves glass?

.....

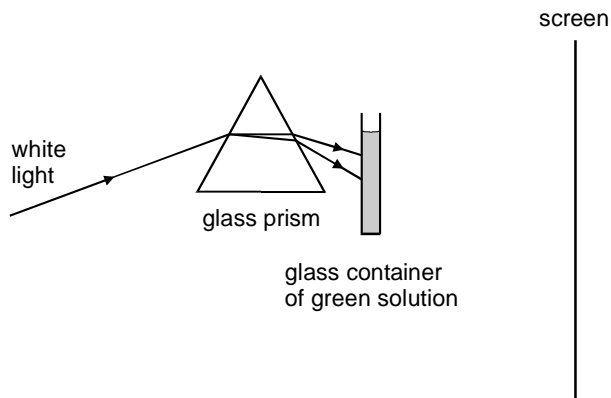
1 mark

- (ii) What word describes the splitting of light into the colours of the spectrum?

.....

1 mark

- (b) Some leaves from a buttercup plant were ground up in a solvent and filtered to give a green solution of chlorophyll. A glass container of this green solution was put in the rays of coloured light.



What change in the spectrum would you see on the screen?  
Explain your answer.

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

- (c) Why is it necessary to grind up the buttercup leaves to release the chlorophyll from the cells?

.....

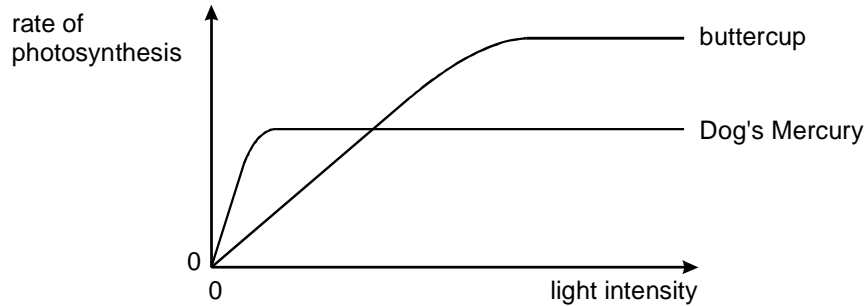
2 marks

# DO NOT WRITE ON THESE SHEETS

.....  
 .....

1 mark

- (d) Buttercup plants grow mainly in open fields. Dog's Mercury is a plant which grows mainly in woodland. The graph shows how the rate of photosynthesis in these two plants changes as the light intensity changes.



Why do Dog's Mercury plants grow better than buttercups in woodland?  
 Use the graph to help you.

.....  
 .....

1 mark

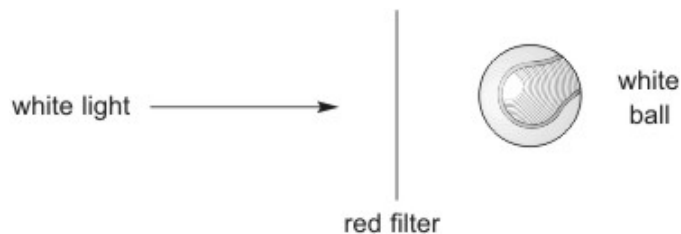
Maximum 6 marks

11. (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**



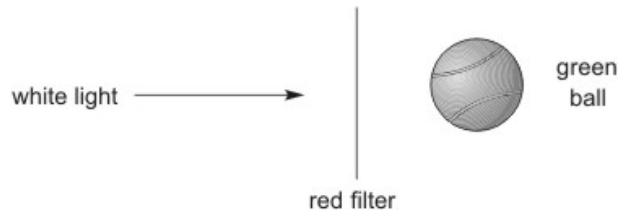
The white ball appeared red.  
 Explain why this ball appeared red.

.....  
 .....

2 marks

# DO NOT WRITE ON THESE SHEETS

## (ii) experiment 2



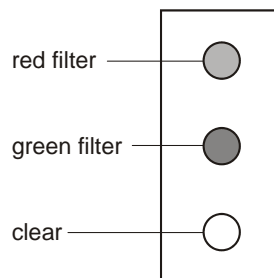
What colour did this ball appear?

.....  
Explain your answer.

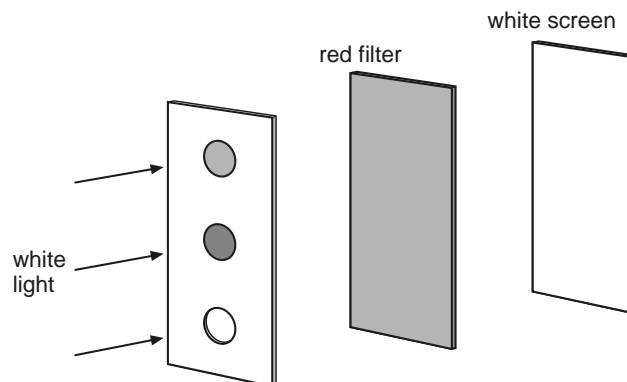
.....  
.....

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