

# Light/sound and hearing

8K & 8L

26 min

27 marks

*Q1-L3, Q2-L4, Q3-L4, Q4-L5, Q5-L5, Q6-L6*

1. Thunder and lightning happen at the same time.
- (a) We see the flash of lightning before we hear the thunder.  
Give the reason for this.

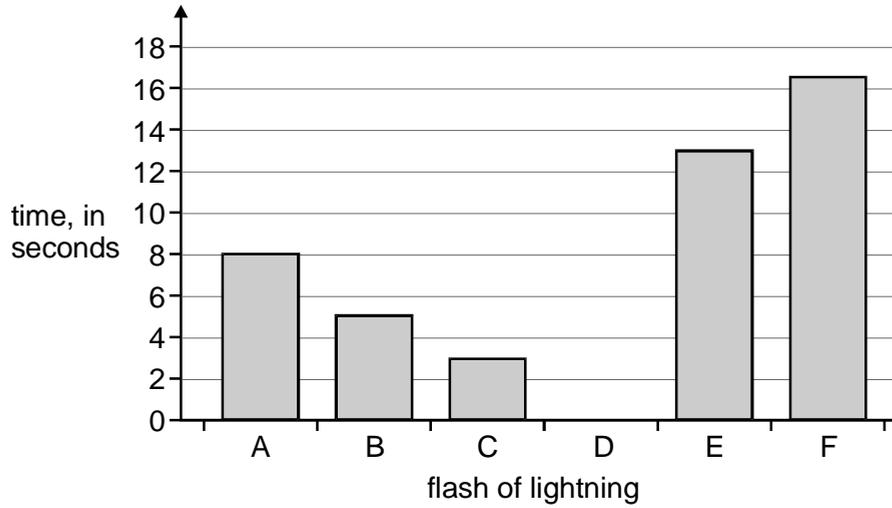
.....  
.....

1 mark

- (b) Omar investigated the movement of a storm. He measured the time between seeing a flash of lightning and hearing the thunder. He did this six times. Omar put his results in a table.

flash of lightning	time between seeing the lightning and hearing the thunder, in seconds
A	8.0
B	5.0
C	3.0
D	9.0
E	13.0
F	16.5

Omar drew a bar chart of his results as shown below.



(i) On the bar chart, draw a bar for flash D. Use a ruler.

1 mark

(ii) Which flash of lightning was closest to Omar?  
Give the correct letter.

.....

1 mark

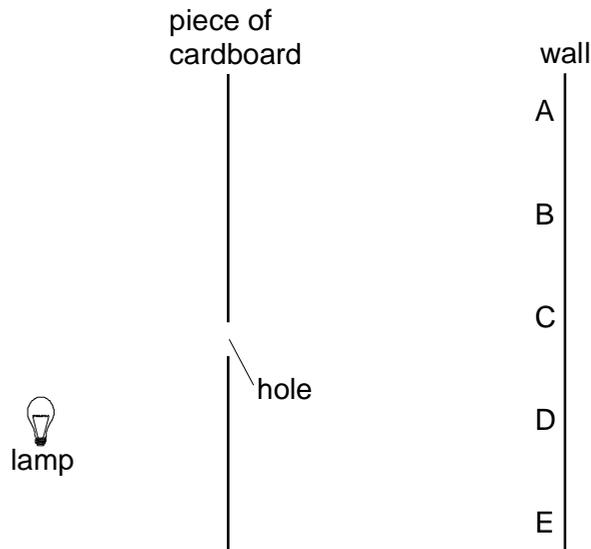
(iii) Describe how the distance between the storm and Omar changed as the storm moved between flash A and flash F.

.....  
.....

1 mark

Maximum 4 marks

2. The diagram shows a lamp and a piece of cardboard. The piece of cardboard has a hole in it. Light from the lamp passes through the hole and forms a bright spot on a wall.



- (a) (i) Which point on the wall, A B, C, D or E, is lit up by the lamp?

.....

1 mark

- (ii) Explain why the **other** points on the wall are **not** lit up by the lamp.

.....  
.....

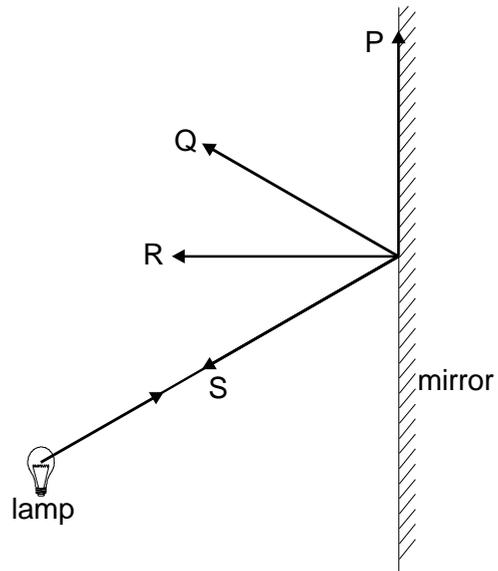
1 mark

- (b) A piece of clear green plastic is placed over the hole.  
What is the colour of the light which shines on the wall?

.....

1 mark

(c) The diagram shows a ray of light from a lamp hitting a mirror.



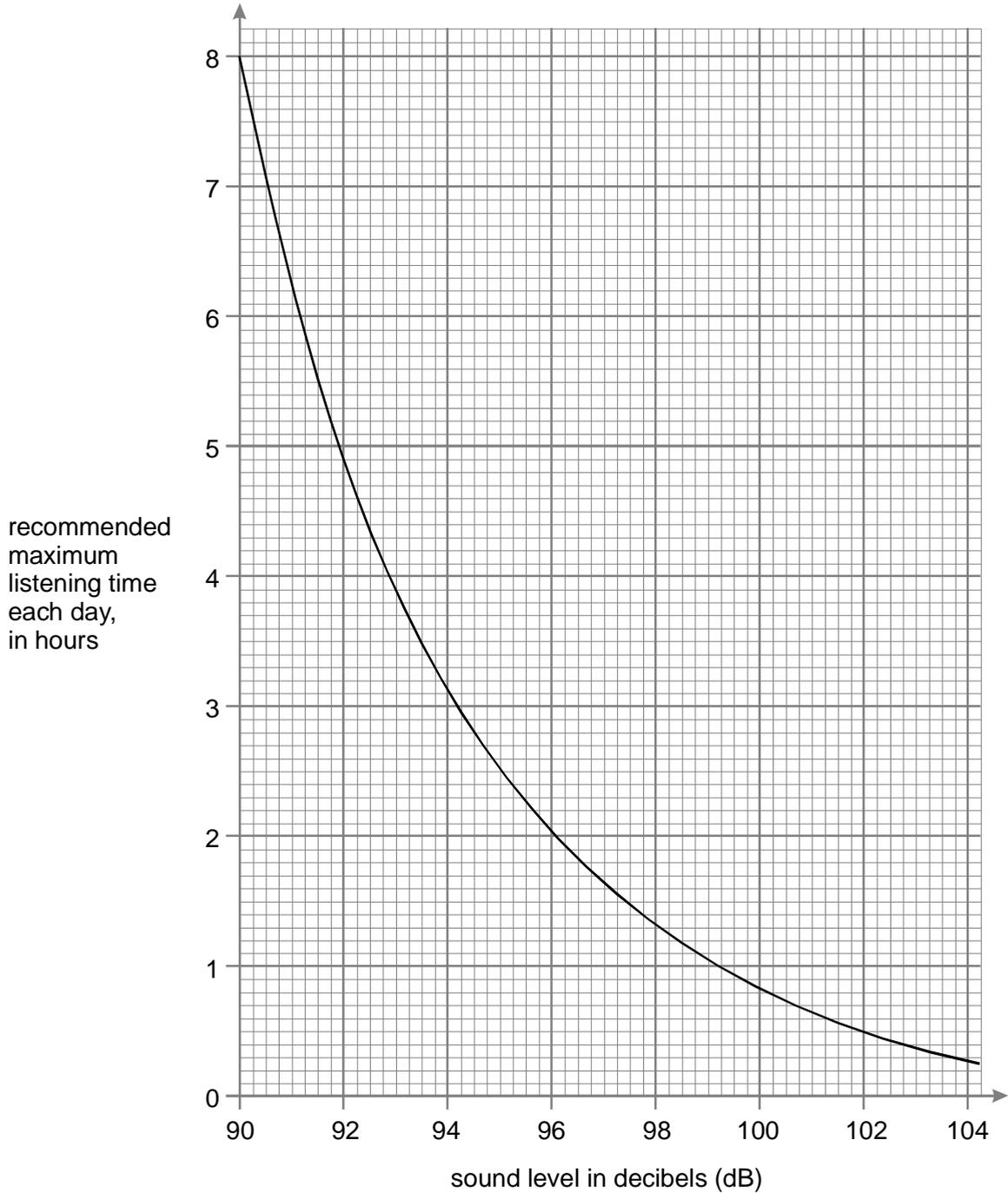
Which arrow, P, Q, R or S, shows the reflected ray?

.....

1 mark

Maximum 4 marks

3. Sound levels are measured in decibels (dB).  
 The graph shows the recommended maximum times people should listen to sounds of different levels.  
 At longer times there could be serious damage to hearing.



(a) What is the maximum time each day for listening to a personal stereo at 96 dB?  
 ..... hours

1 mark

(b) In what way could a sound of more than 120 dB damage the ear?  
 .....

1 mark

- (c) (i) Sally works for five hours in a nightclub. What should the maximum sound level be in the nightclub so that her hearing is **not** damaged?  
Use the graph to find your answer.

..... dB

1 mark

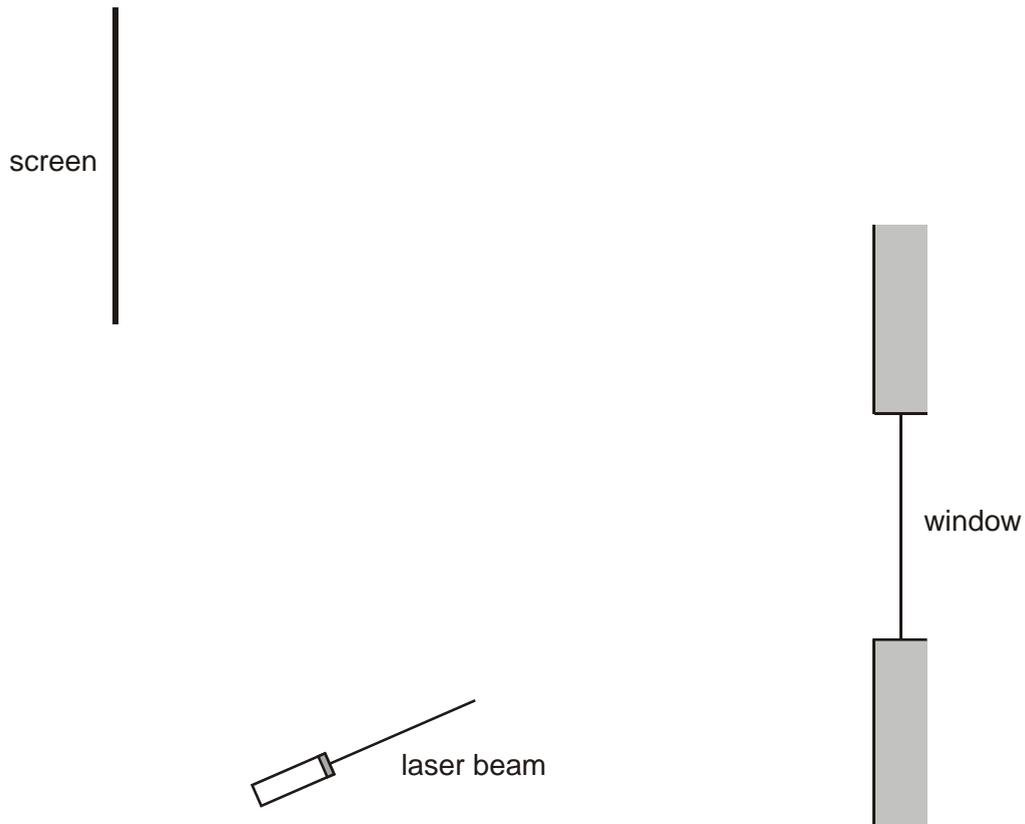
- (ii) How can ear plugs protect Sally's ears?

.....  
.....

1 mark

Maximum 4 marks

4. (a) A teacher shines a laser beam onto a classroom window. It reflects off the window and onto a screen.



On the diagram above, continue the laser beam to show its path as it reflects off the window and onto the screen. Use a ruler.  
Add arrows to show the direction of the laser beam.

2 marks

- (b) (i) When a pupil plays her flute in the classroom the window vibrates. Give the reason for this.

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.....

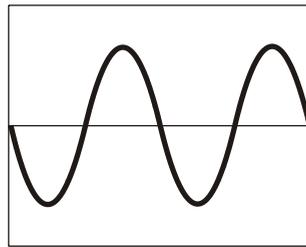
1 mark

- (ii) When the window vibrates, what happens to the laser beam that is reflected off the window?

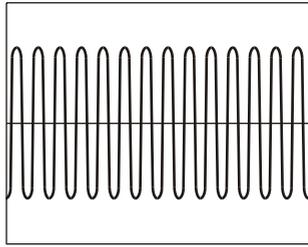
.....  
.....

1 mark

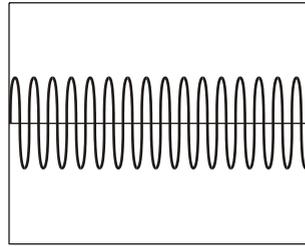
- (c) The teacher places a microphone near the pupil as she plays her flute. The diagram below shows the pattern on an oscilloscope screen.



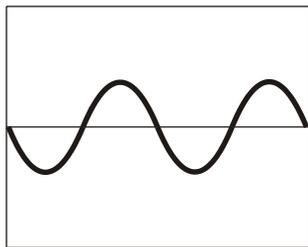
The pupil then plays her flute at a **higher pitch** and **more quietly**.  
 Which diagram below shows the pattern that would be seen on the oscilloscope?  
 Tick the correct box.



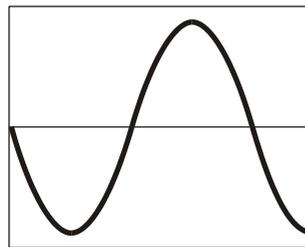
A



B



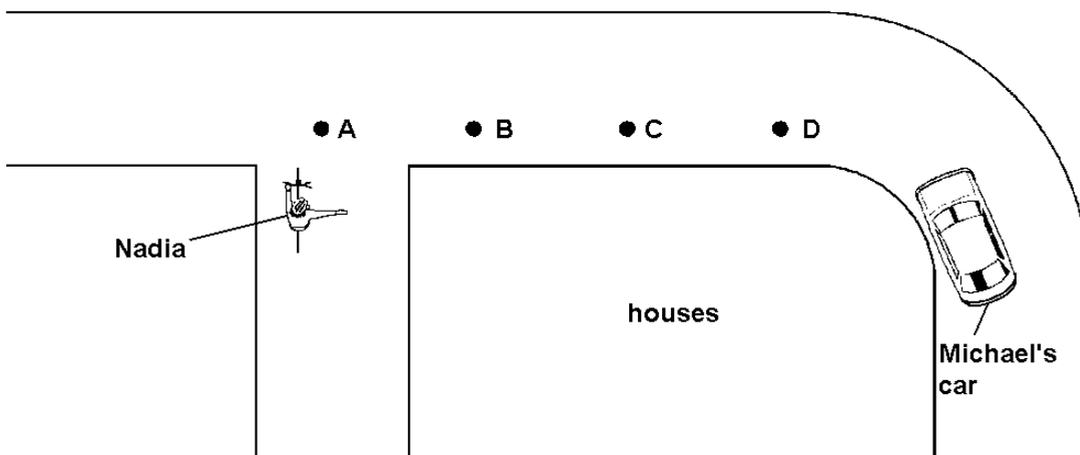
C



D

1 mark  
 maximum 5 marks

5. 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.



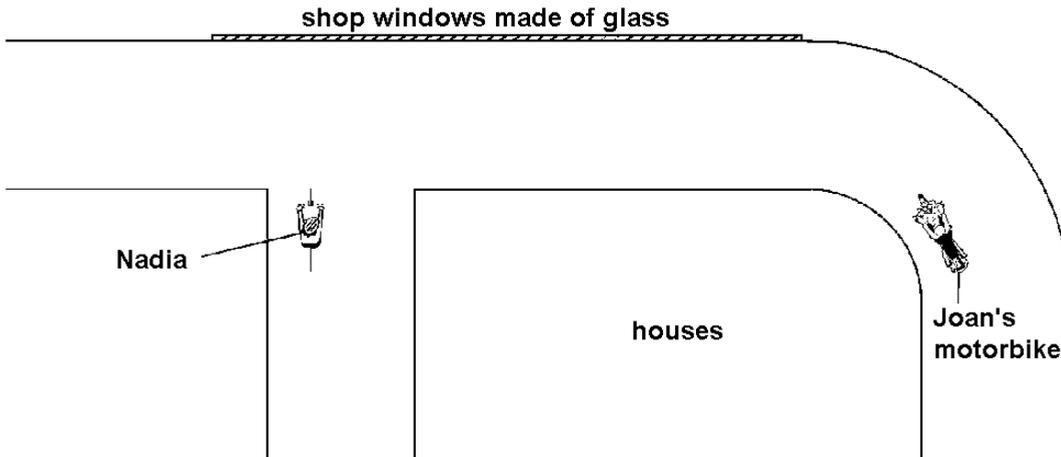
not to scale

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

A       B       C       D

1 mark

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



*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.

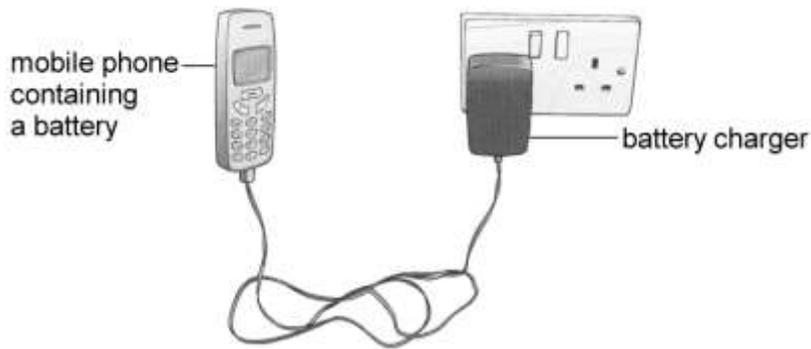
3 marks

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

1 mark

Maximum 5 marks

6. (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.

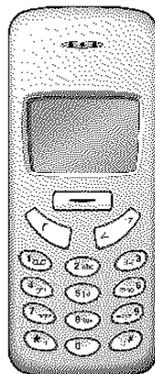
chemical to sound  sound to thermal

electrical to chemical  thermal to electrical

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

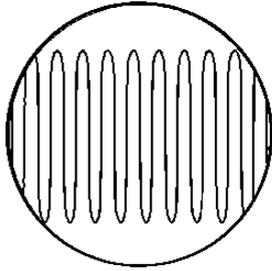
electrical to chemical to sound

kinetic to electrical to sound

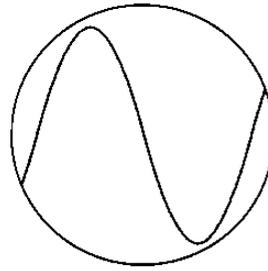
thermal to electrical to sound

1 mark

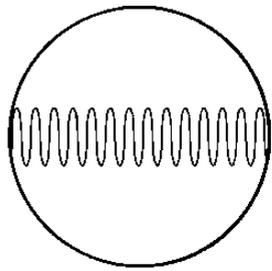
- (b) Jacquie can change the ring-tone of her phone.  
 The diagrams below show the patterns made by four sound waves on an oscilloscope screen.  
 They are all drawn to the same scale.



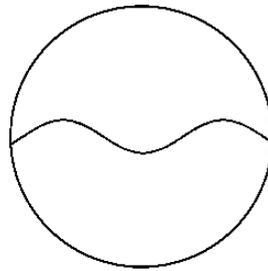
P



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