Q1.

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.

.....

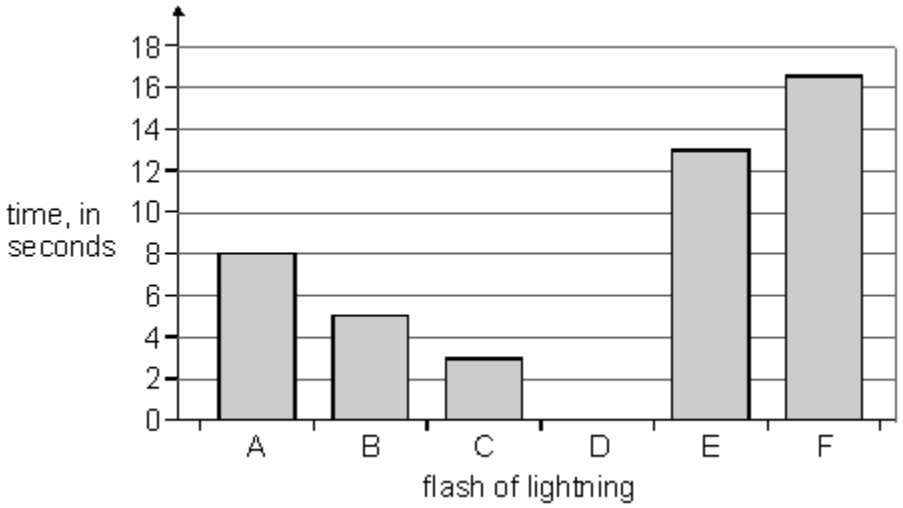
.....

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.

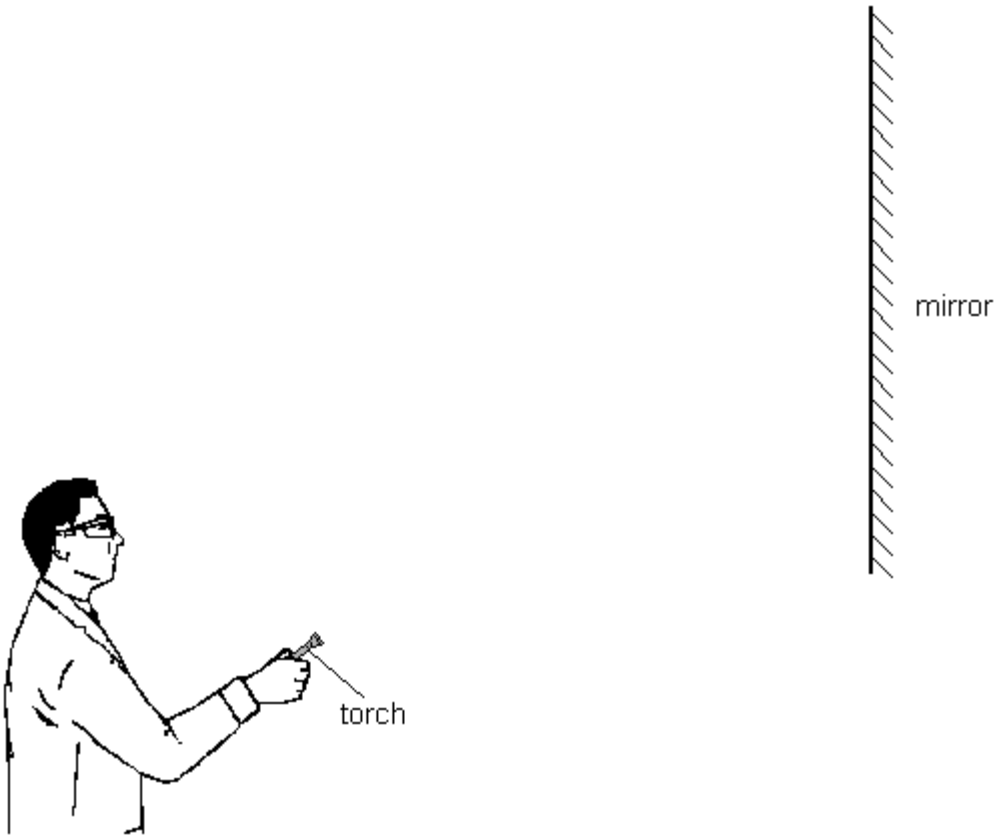
.....

.....

1 mark
Maximum 4 marks

Q2.

A teacher has a small torch. He switches it on and points it towards a mirror.



(a) A ray of light from the torch reflects off the mirror. Use a ruler to draw the ray of light:

(i) from the torch to the mirror;

1 mark

(ii) reflecting off the mirror.

2 marks

Add arrows to the rays to show the direction of the light.

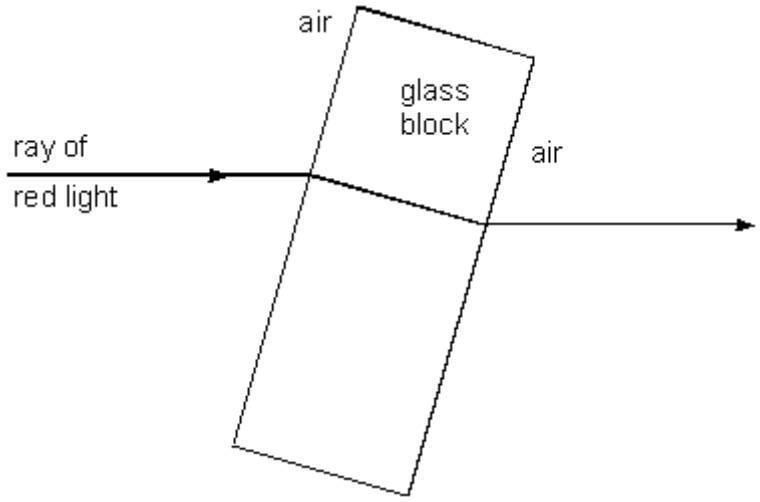
(b) A laser beam is a very bright and powerful beam of light. It is very dangerous to point a laser beam towards people or animals.
Which part of the body can be most easily damaged by a laser beam?

.....

1 mark
Maximum 4 marks

Q3.

(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?

.....

.....

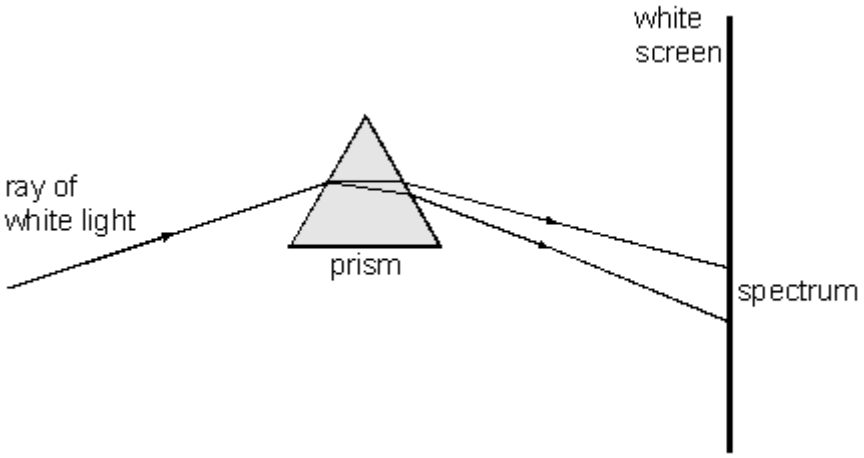
1 mark

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

.....

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. ☐

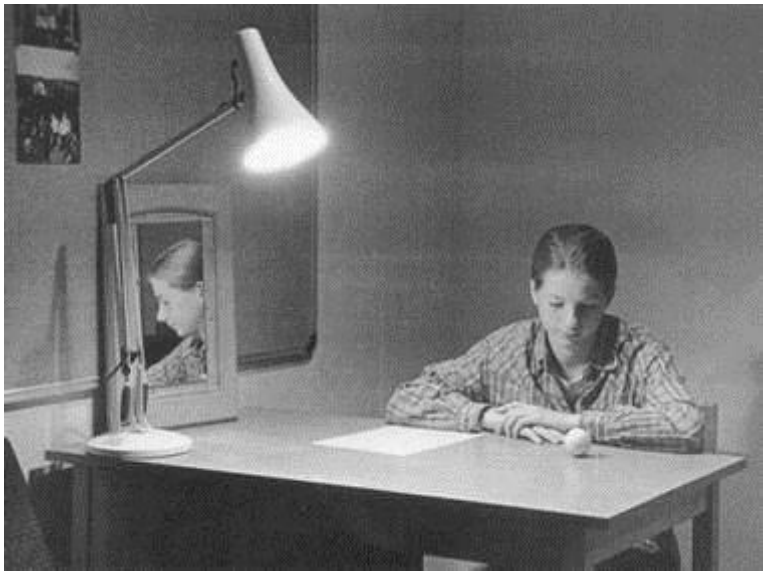
The green part of the spectrum stays the same, but the other colours disappear. ☐

The whole spectrum disappears. ☐

1 mark
Maximum 4 marks

Q4.

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

Q1.

(a) any **one** from

- light travels faster than sound
- sound travels more slowly than light

accept 'light travels faster'
accept 'sound travels slower'
accept 'light is faster than sound'
*do **not** accept 'light travels fast' **or** 'sound travels slow'*
*do **not** accept 'light travels before sound'*

1 (L4)

(b) (i) a bar halfway between 8 and 10 seconds

the top of the bar must be in the middle third between 8 and 10

1 (L3)

(ii) C

accept '3.0'

1 (L3)

(iii) any **one** from

- the storm became closer then moved further away
  *accept 'the storm passed over' **or** 'it passed by'*
- towards then away from Omar
  accept 'at Flash A Omar was closer and at Flash F Omar was further'
- the distance decreased then increased
  accept 'it increased'
  accept 'it went further away'

1 (L4)

[4]

Q2.

(a) (i) a straight line from the torch to the mirror

1 (L3)

(ii) a straight ray which reflects off the mirror with the angle of reflection approximately equal to the angle of incidence

*do **not** accept dotted lines*
the incident ray must be continuous with the reflected ray

1 (L3)

an arrow on either the incident ray **or** the reflected ray pointing in the correct direction

1 (L3)

(b) the eye

accept any named part of the eye

1 (L4)

[4]

Q3.

(a) (i) any **one** from

- it is reflected

  accept 'bounces off'

- it is scattered

  accept 'it is absorbed by the air'
  *do **not** accept 'it is absorbed by the glass'*
  ***or** 'it is absorbed' **or** 'it goes into the air*

1 (L5)

(ii) refraction

1 (L5)

(b) green
blue
violet

***all three** colours in the correct order are required for the mark*

accept 'orange, yellow, green, blue, indigo, violet' in the correct order

1 (L5)

(c) The green part of the spectrum stays the same, but the other colours disappear. ✓

i.e. a tick in the third box if more than one box is ticked, award no mark

1 (L6)

[4]

Q4.

(a) the light is scattered by the ball

*accept 'it is scattered **or** reflected*
***or** bounces off the ball'*

1 (L5)

some of the light from the ball enters Naomi's eye

*accept 'it goes into **or** gets to her eye'*

1

(b) (i)

colour of ball	**colour of the light**	**the colour the ball appears to Naomi**

white	*red*	red	*do not accept 'pink' or 'light red'*	**1 (L6)**
green	*white*	green	*do not accept 'light green'*	**1 (L6)**

(ii) any **one** from

- it absorbs all the light
  accept 'it absorbs light'
- it does not scatter any light
  accept 'it does not reflect light'

1 (L6)

(c) equal to

1 (L6)

equal to

*accept 'equals' **or** 'the same as'*

1 (L6)

(d) **one mark is for describing scattering and one mark is for describing reflection**

scattering sends **or** reflects light in all directions

accept 'scattered light goes all over the place'
***or** 'the light from the paper goes off in lots of rays'*
***or** 'no image can be seen in the paper'*

1 (L6)

reflection sends light in one direction **or** to one point

accept 'the light from the mirror is all in one ray or beam'
***or** 'reflected light goes at one exact angle'*
***or** 'an image can be seen in the mirror'*

1 (L6)

[9]