Light

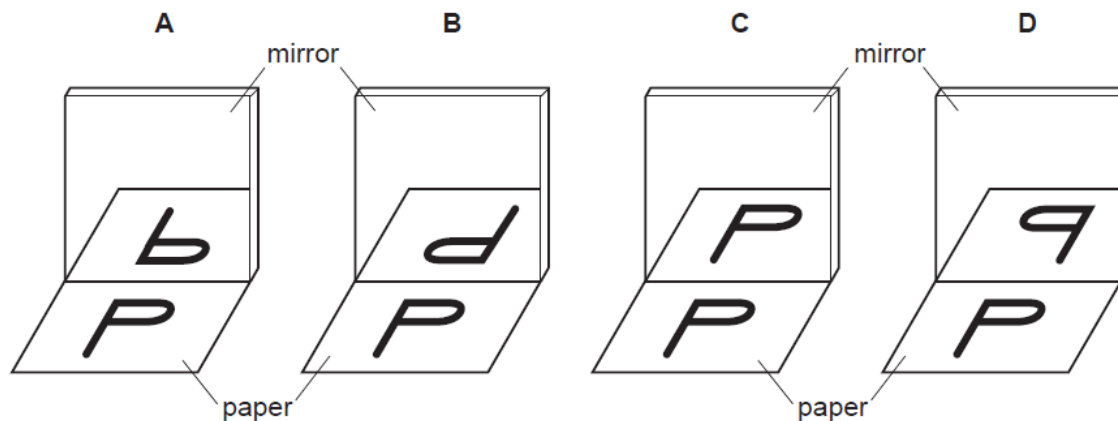
1.

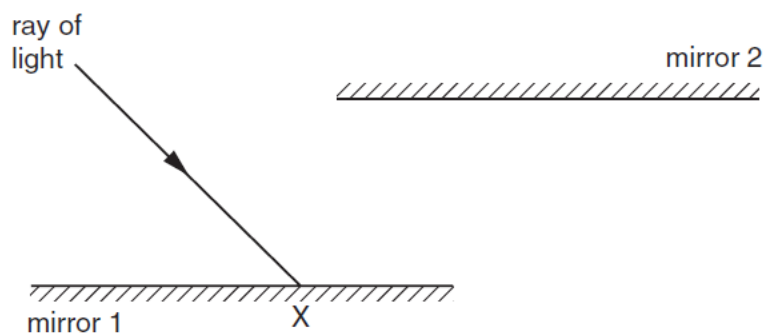A student looks at the letter P on a piece of paper, and at its reflection in a mirror.

What does he see?

2.

In this question, drawing should be done carefully.

Fig. 6.1 shows a ray of light striking mirror 1 at point X.

Fig. 6.1

(a) On Fig. 6.1,

   (i)   draw the normal at X,

   (ii)   draw the ray reflected from mirror 1,

   (iii)   mark the angle of incidence using the letter *i* and the angle of reflection using the letter *r*.

[3]

(b) Mirror 2 is parallel to mirror 1. The reflected ray from mirror 1 strikes mirror 2.

Compare the direction of the ray reflected from mirror 2 with the incident ray at X. You may do a further construction if you wish. Complete the sentence below.
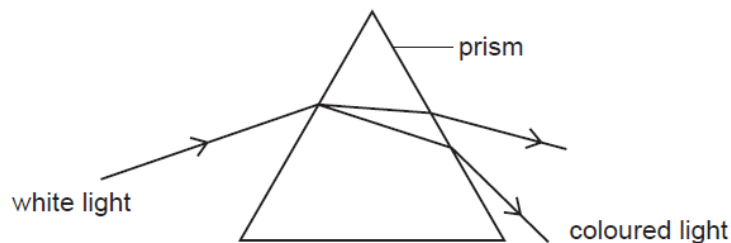
The reflected ray from mirror 2 is ....

....[1]

3.

Which diagram shows how a ray of light could pass through a glass block in air?

A

glass

B

glass

C

glass

D

glass
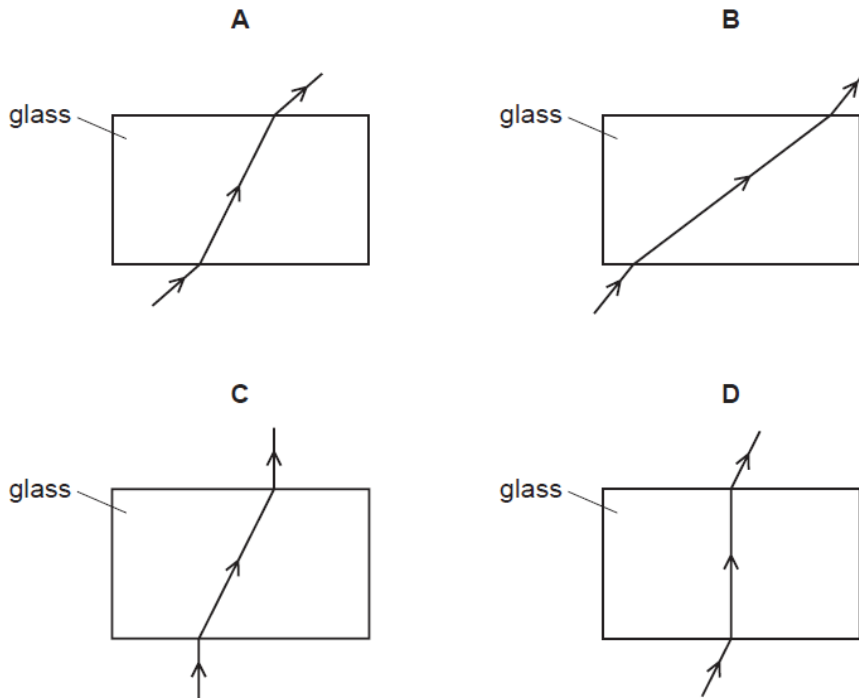
4.

One of the effects of passing a ray of white light through a prism is to split the light into colours.

prism

white light

coloured light

What is the name given to this effect?

A   deviation

B   dispersion

C   reflection

D   refraction

5.

(a) A ray of red light passes through a rectangular glass block, as shown in Fig. 6.1.
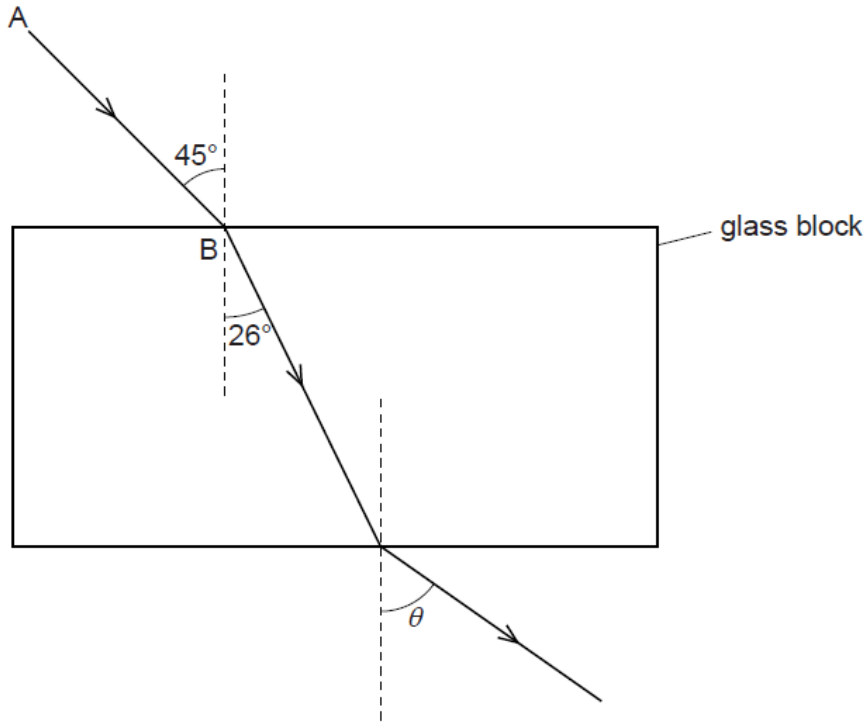

Fig. 6.1

(i) What name describes what happens to the ray of light at B?

....

(ii) On Fig. 6.1, the emergent ray is not drawn at the correct angle θ to the normal.

State the correct value of the angle θ.

$\theta =$ ....

[2]

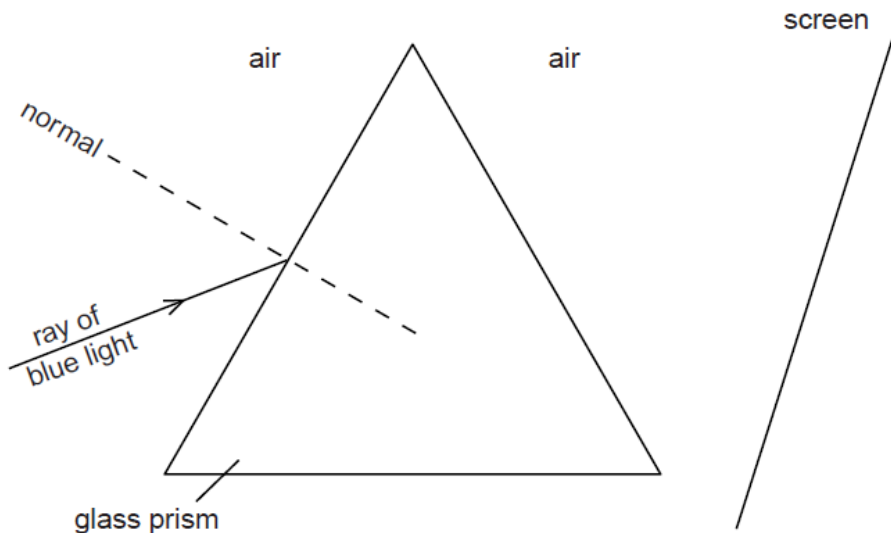**(b)** A ray of blue light is directed into a glass prism, as shown in Fig. 6.2.

Fig. 6.2

(i) Using your ruler, draw a possible path for the blue light, until it reaches the screen.

(ii) The ray of blue light is replaced by a ray of red light.

On Fig. 6.2, mark an X to show where the red light might hit the screen.

[3]

6.

(a) A narrow beam of red light strikes one face of a triangular prism at A, as shown in Fig. 12.1.

Fig. 12.1
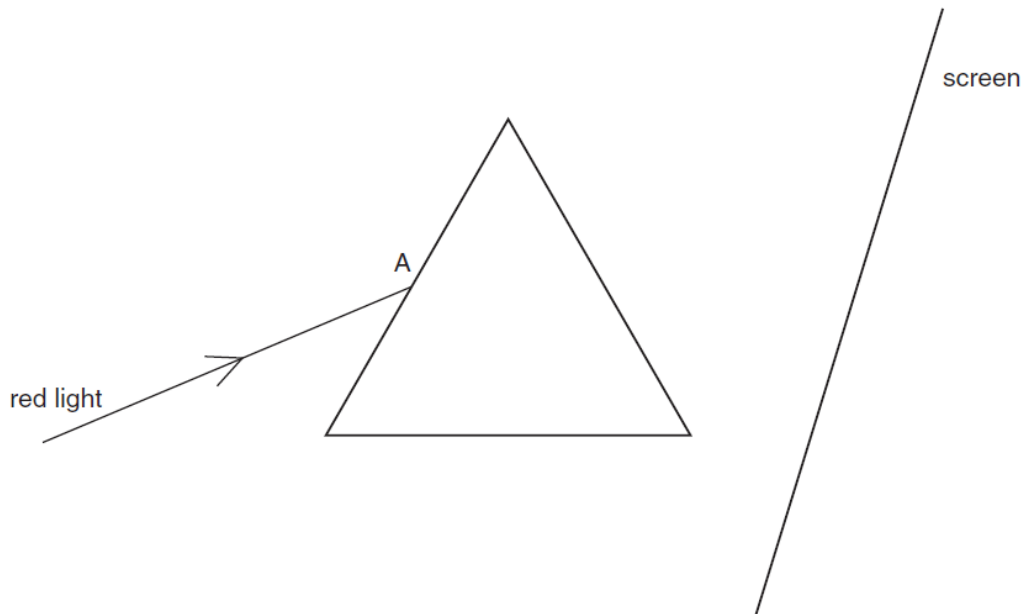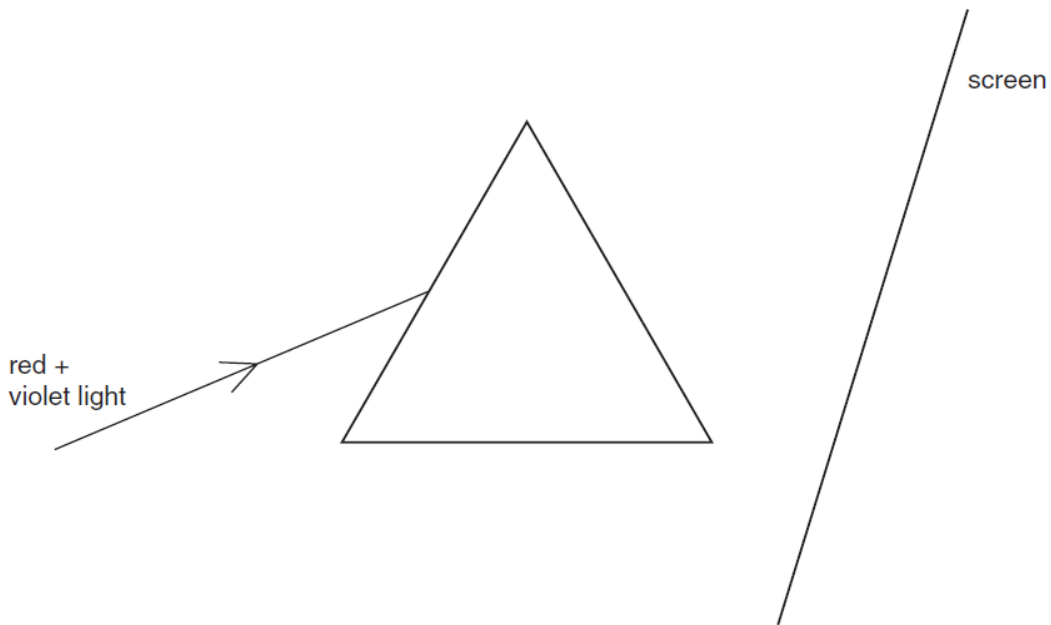
(i) On Fig. 12.1, show the path of the beam until it reaches the screen.

(ii) What name do we use to describe what happens to the beam at A?

....

[4]

(b) The red light is replaced by a narrow beam of mixed red and violet light, as shown in Fig. 12.2.

Fig. 12.2

Complete Fig. 12.2 to show what happens to the red and the violet light. [2]

(c) The beam of red and violet light is replaced by a narrow beam of white light from the Sun. State what is now seen on the screen.

....[1]

(d) The rays from the Sun also include infra-red rays. Infra-red radiation can pass through glass.

    (i) On Fig. 12.2, mark with the letter X the place where infra-red radiation from the Sun might strike the screen after passing through the prism.

    (ii) Why can infra-red not be seen on the screen?

    ....

    (iii) What could be used to detect the infra-red radiation?

    ....

                                                  [3]

7.

What causes refraction when light travels from air into glass?

  A   The amplitude of the light waves changes.

  B   The colour of the light changes.

  C   The frequency of the light waves changes.

  D   The speed of the light changes.

8.

(a) Fig. 6.1 shows the results of an experiment to find the critical angle for light in a semi-circular glass block.
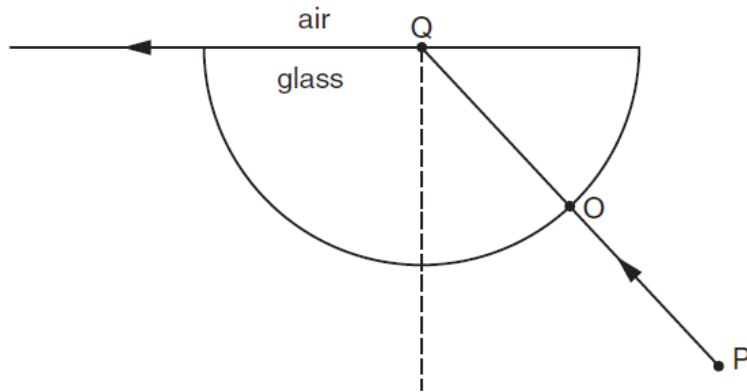

Fig. 6.1

The ray of light PO hits the glass at O at an angle of incidence of 0°.
Q is the centre of the straight side of the block.

(i) Measure the critical angle of the glass from Fig. 6.1.

critical angle = ...

(ii) Explain what is meant by the *critical angle* of the light in the glass.

....

....

....
[3]

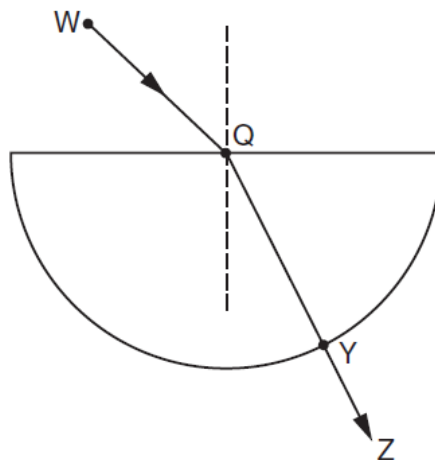**(b)** Fig. 6.2 shows another ray passing through the same block.

Fig. 6.2

The speed of the light between W and Q is 3.0×10^8 m/s. The speed of the light between Q and Y is 2.0×10^8 m/s.

(i) State the speed of the light between Y and Z.

speed = ...

(ii)

Explain why there is no change of direction of ray QY as it passes out of the glass.

....

(iii)

What happens to the wavelength of the light as it passes out of the glass?

....

[5]