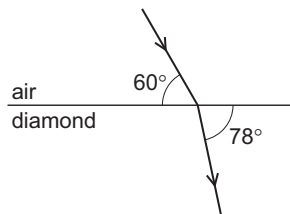


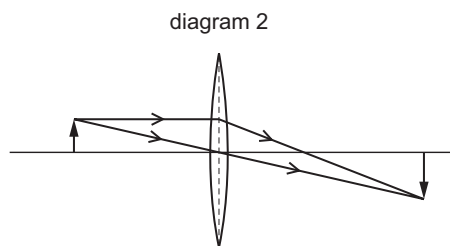
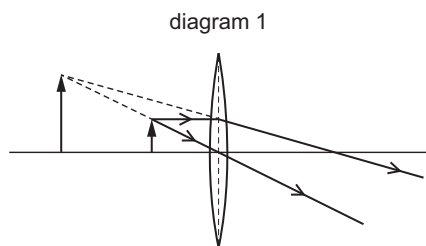
20 The diagram shows a ray of light passing from air into diamond.



What is the refractive index of the diamond?

- A** 0.89 **B** 1.1 **C** 2.4 **D** 2.5

21 The ray diagrams show the formation of an image by two different converging lenses.



Which row describes the images produced?

	diagram 1	diagram 2
A	real	real
B	real	virtual
C	virtual	real
D	virtual	virtual

6 Fig. 6.1 shows a full-scale diagram of an object O and its image I produced by a converging lens. The lens and its position on the principal axis are not shown.



Fig. 6.1

(a) On Fig. 6.1, draw:

- a single ray to locate the position of the centre of the converging lens
- a line to represent the position of the lens and label the line L.

[2]

(b) Determine the focal length of the lens by drawing another ray on Fig. 6.1.

focal length = [2]

(c) The object is moved 2.0 cm closer to the lens.

State **two** changes to the characteristics of the image.

1

2

[2]

[Total: 6]

5 (a) Fig. 5.1 shows a semicircular transparent plastic block.

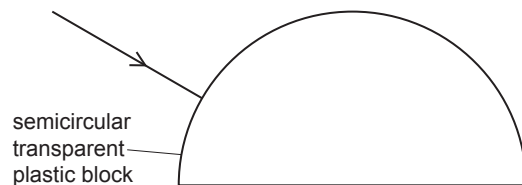


Fig. 5.1

A ray of light is incident normally on the curved surface of the block. The refractive index of the plastic is 1.5.

(i) Calculate the critical angle for the plastic.

critical angle = [2]

(ii) On Fig. 5.1, draw the path of the ray in the block and after the ray emerges from the block. [2]

(b) Fig. 5.2 is a full-scale diagram of a lens and an object O.

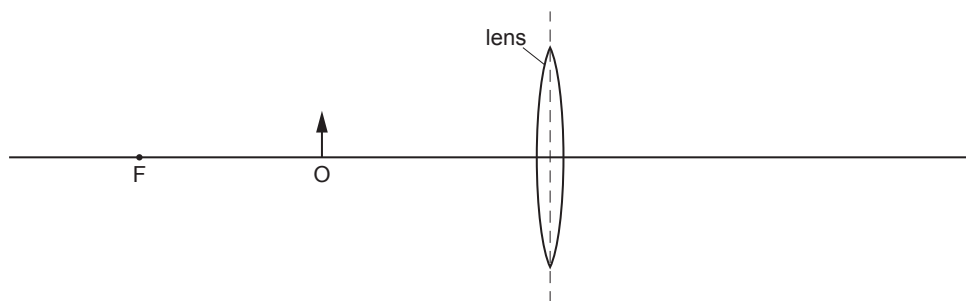


Fig. 5.2

The point marked F shows the position of a principal focus of the lens.

(i) Determine the focal length of the lens.

focal length = [1]

(ii) On Fig. 5.2, draw two rays from the object to locate the image. Label the image I. [2]

(c) Fig. 5.3 shows a simplified diagram of an eye with rays from a distant object and the path of the rays inside the eye of a person with short sight.

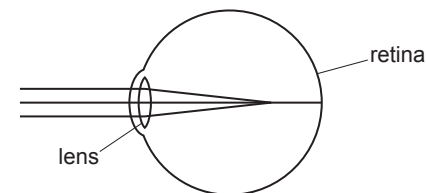


Fig. 5.3

On Fig. 5.4, draw an additional lens outside the eye to correct short-sightedness and show the path of the rays inside the eye.

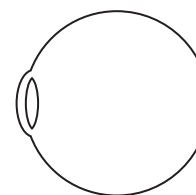


Fig. 5.4

[2]

[Total: 10]

- 5 A boy looks at the image of a clock in a plane mirror. Fig. 5.1 shows the mirror, the clock and the position of one of the boy's eyes.

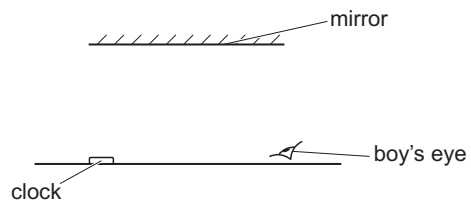


Fig. 5.1

- (a) (i) On Fig. 5.1, draw a ray of light from the clock, reflected to the boy's eye. [2]
 (ii) On Fig. 5.1, mark with an X the position of the image of the clock. [1]
 (iii) State whether the image formed by the mirror is virtual or real.
 Explain your answer.

 [1]
 (iv) Fig. 5.2 shows the image of the clock seen by the boy.

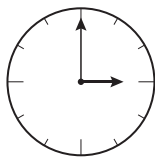


Fig. 5.2

The boy now looks directly at the clock.

On Fig. 5.3, draw what the boy sees.

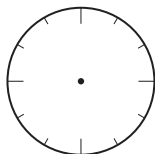


Fig. 5.3

- (b) (i) The clock is illuminated by a source of monochromatic green light.

State the meaning of monochromatic.

..... [1]

- (ii) The green light has a wavelength of 5.6×10^{-7} m.

Calculate the frequency of this green light.

frequency = [3]

[Total: 9]