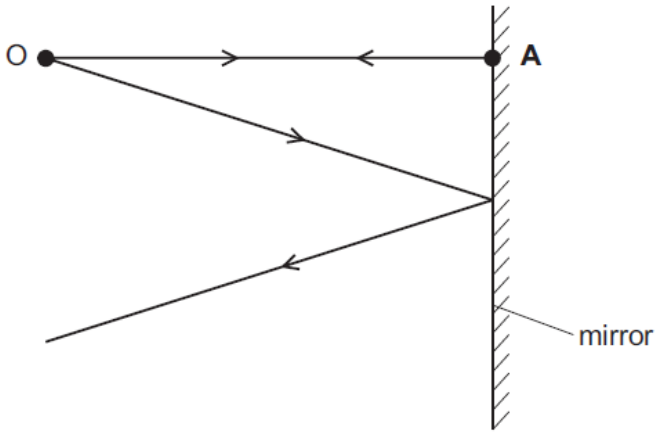
Light – 2023 June O Level 5054

1. June/2023/Paper_ 5054/11/No.19

The diagram shows two divergent rays of light from an object O being reflected from a plane mirror.

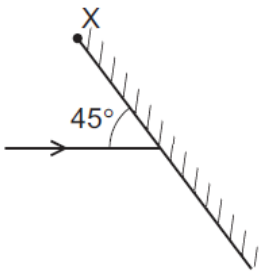
At which position is the image formed?



- B
- C
- D

2. June/2023/Paper_ 5054/11/No.20

Light is incident on a mirror at an angle of 45° as shown. The mirror can be rotated about an axis into the page through point X.



The mirror is rotated until the light is reflected back along its original path.

Through which angle is the mirror rotated?

A 22.5° clockwise

B 22.5° anticlockwise

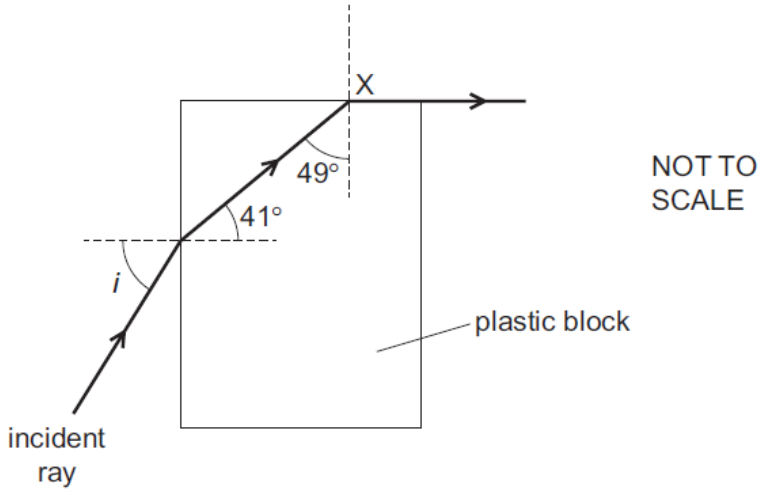
C 45° clockwise

D 45° anticlockwise

3. June/2023/Paper_ 5054/11/No.21

A ray of light is incident on a plastic block in air, at an angle of incidence *i*. The refractive index of the plastic is *n*.

The light ray refracts along the plastic-air boundary when it reaches X.



Which equation is correct?

A $\sin i = \frac{\sin 41°}{n}$

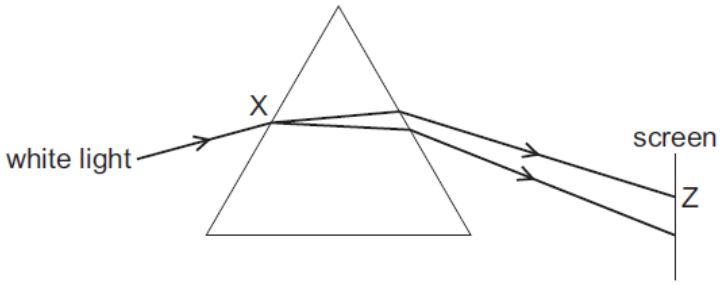
B $\sin i = \frac{n}{\sin 49°}$

C $\sin i = n \times \sin 41°$

D $\sin i = n \times \sin 49°$

4. June/2023/Paper_ 5054/11/No.22

The diagram shows white light entering a prism.



What happens at point X and what is the colour of the light that strikes the screen at point Z?

	at point X	at point Z
A	dispersion only	blue light
B	dispersion and refraction	blue light
C	dispersion and refraction	red light
D	refraction only	red light

5. June/2023/Paper_ 5054/12/No.19

Which characteristics describe the image formed by a vertical plane mirror?

A real and upside down

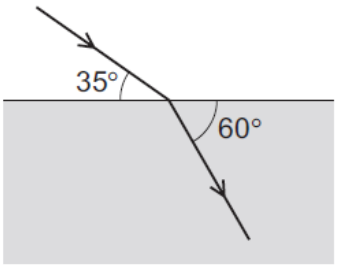
B virtual and upright

C real and larger than the object

D virtual and smaller than the object

6. June/2023/Paper_ 5054/12/No.20

A ray of light passes into a block of transparent material as shown.



What is the refractive index of the transparent material?

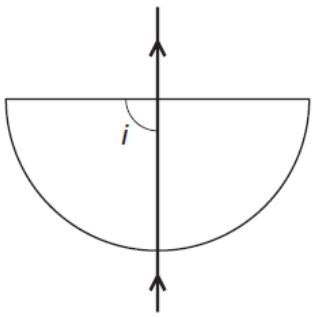
A 0.66 **B** 1.15 **C** 1.64 **D** 1.83

7. June/2023/Paper_ 5054/12/No.21

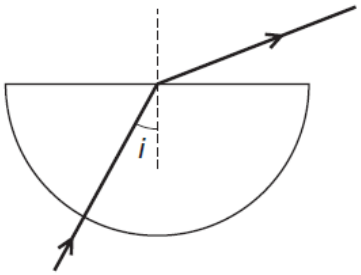
The diagrams show light incident on the straight edge of a semi-circular glass block after passing through it.

Which diagram shows refraction and an angle *i* equal to the critical angle of the glass?

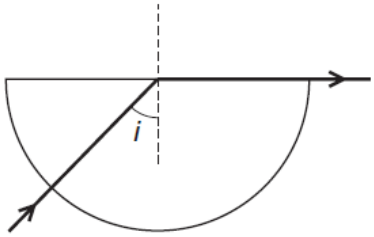
A



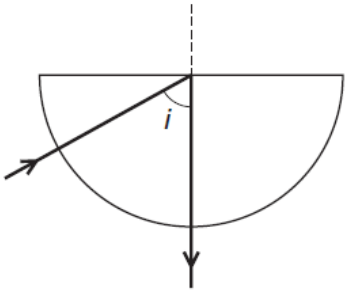
B



C



D



8. June/2023/Paper_ 5054/21/No.6

The virtual reality headset in Fig. 6.1 contains a display and a lens, as shown in Fig. 6.2.

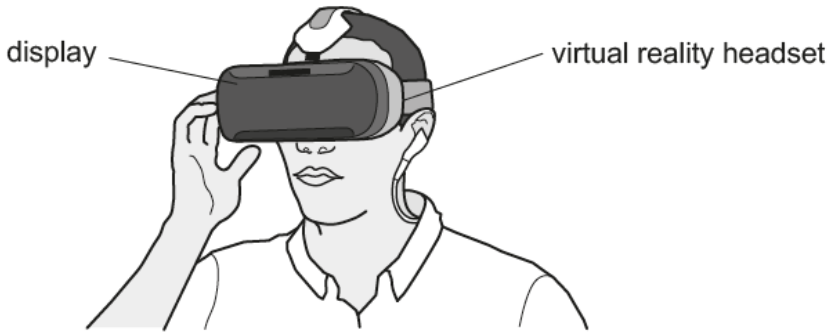


Fig. 6.1

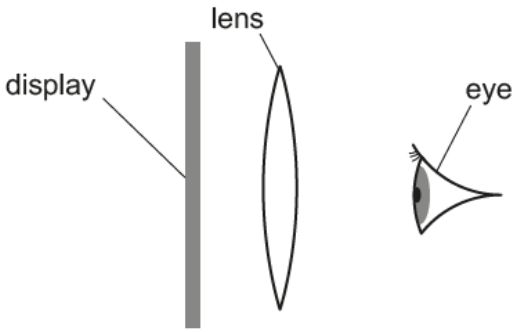


Fig. 6.2 (not to scale)

The display is the object for the lens.

The lens acts as a magnifying glass and forms a virtual image of the display.

(a) (i) Describe where the display must be positioned relative to the focal length of the lens for the lens to act as a magnifying glass for the image on the display.

.....

..... [1]

(ii) Explain how a virtual image is formed.

.....

.....

..... [1]

(b) An arrow on the display is 3.4 cm from the lens. The virtual image of the arrow is 22 cm from the lens.

Fig. 6.3 shows the arrow O, the lens L and the virtual image of the arrow I, drawn on a grid with a scale of 1:2.

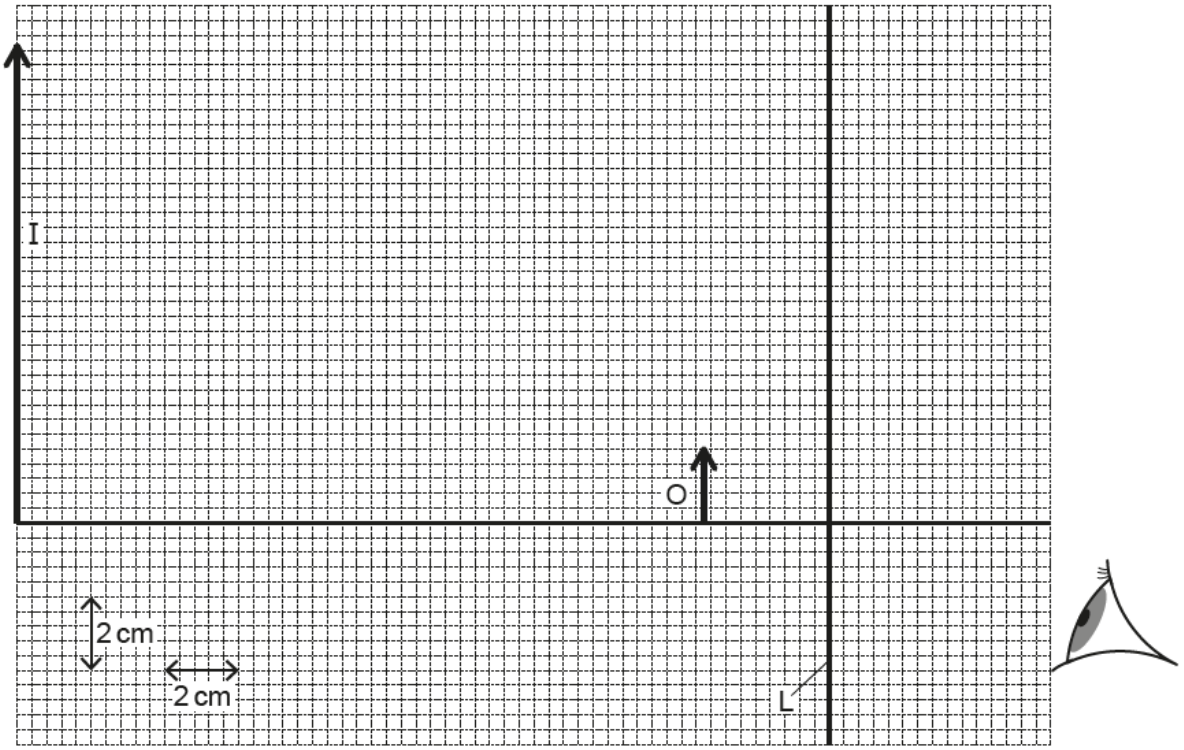


Fig. 6.3 (scale: 1 cm represents 2 cm)

(i) On Fig. 6.3, draw a ray diagram to show the formation of the virtual image I. [3]

(ii) Determine the focal length of the lens.

focal length = ... cm [1]

[Total: 6]