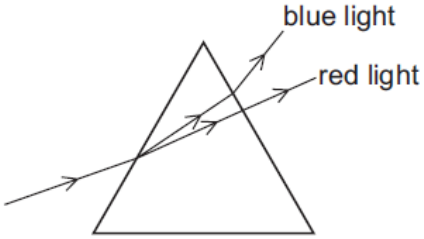
Light – 2023 IGCSE Physics 0625

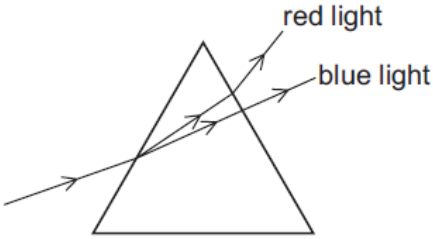
1. Nov/2023/Paper_ 0625/11/No.19

Which diagram correctly shows the dispersion of white light through a glass prism?

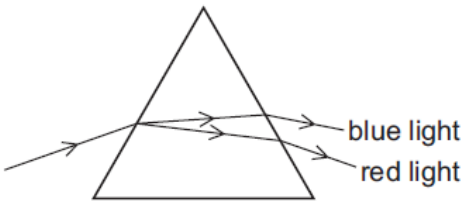
A



B



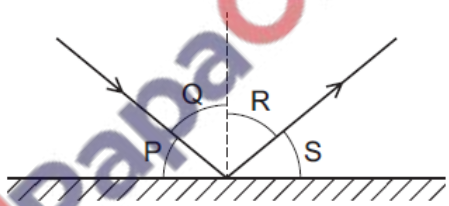
C



D

2. Nov/2023/Paper_ 0625/11/No.20

A ray of light is reflected by a plane mirror.



Which row shows the angle of incidence and the angle of reflection?

	angle of incidence	angle of reflection
A	P	Q
B	P	S
C	Q	R
D	R	S

3. Nov/2023/Paper_ 0625/11/No.21

A thin converging lens is used to produce a real image of an object.

Which statement about the real image is always correct?

A It is nearer to the lens than the object.

B It is on the opposite side of the lens to the object.

C It is the same size as the object.

D It is upright.

4. Nov/2023/Paper_ 0625/12/No.19

Red, green and violet lights are part of the visible spectrum of light.

What is the order of colours from shortest to longest wavelength?

A red → green → violet

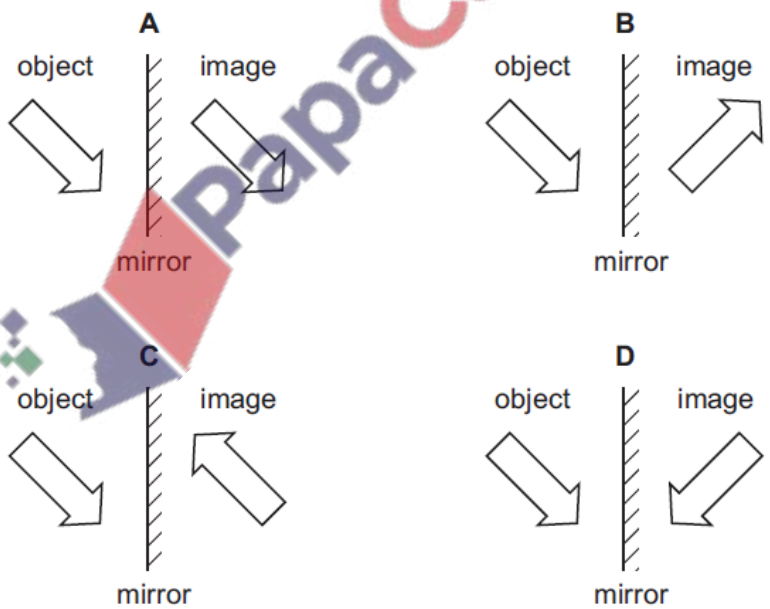
B red → violet → green

C violet → red → green

D violet → green → red

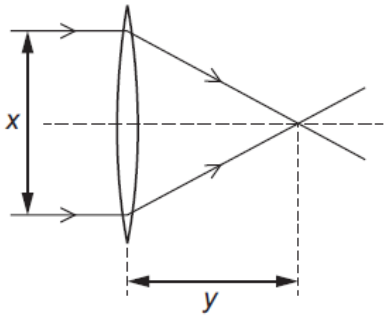
5. Nov/2023/Paper_ 0625/12,22/No.20

Which diagram shows the image correctly formed by reflection?



6. Nov/2023/Paper_ 0625/12/No.21

A student passes parallel rays of light through four different converging lenses. He measures the distance *x* and the distance *y* for each experiment.

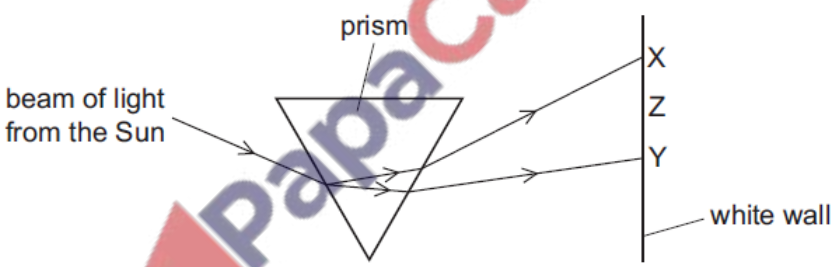


Which lens has the longest focal length?

	x / cm	*y* / cm
A	4.6	2.0
B	5.1	3.1
C	5.9	2.3
D	6.1	2.4

7. Nov/2023/Paper_ 0625/13/No.19

A beam of light from the Sun strikes a prism.



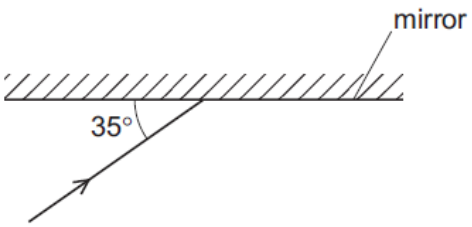
The dispersed beam is incident on a white wall between X and Y.

Which colours are seen at X, Z and Y?

	X	Z	Y
A	red	green	violet
B	red	violet	green
C	violet	green	red
D	violet	red	green

8. Nov/2023/Paper_ 0625/13/No.20

The diagram shows a ray of light incident on a plane mirror.



The angle between the ray and the mirror is 35°.

The ray is reflected by the mirror.

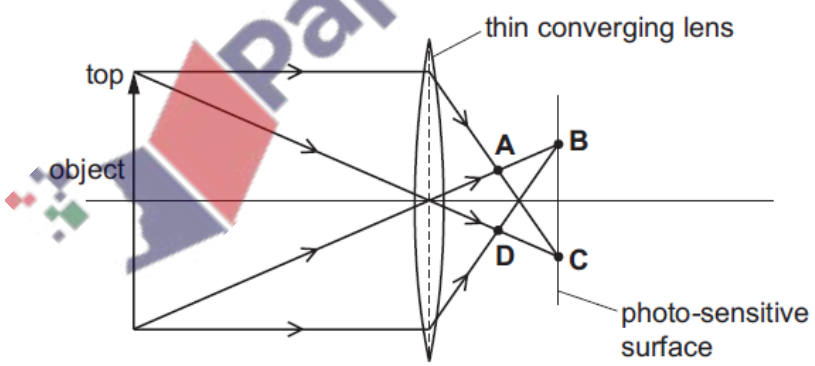
What is the angle of reflection?

A 35° **B** 55° **C** 70° **D** 110°

9. Nov/2023/Paper_ 0625/13/No.21

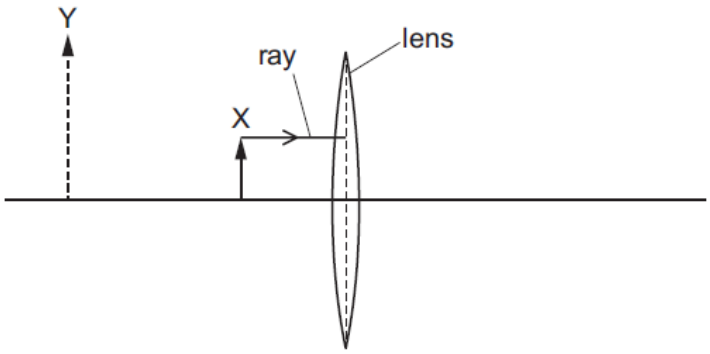
A thin converging lens in a camera produces a real image on a photo-sensitive surface, as shown.

At which position is the image of the top of the object formed?



10. Nov/2023/Paper_ 0625/21/No.19

The diagram shows part of a ray diagram that demonstrates the formation of a virtual image Y of object X by a converging lens.



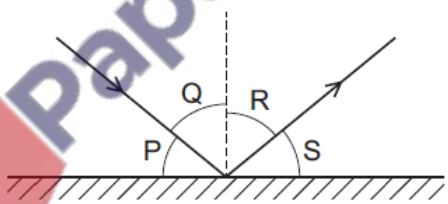
One ray of light from X is shown approaching the lens.

Which arrow shows the direction of this ray as it leaves the lens?

A **B** **C** **D**

11. Nov/2023/Paper_ 0625/21/No.20

A ray of light is reflected by a plane mirror.



Which row shows the angle of incidence and the angle of reflection?

	angle of incidence	angle of reflection
A	P	Q
B	P	S
C	Q	R
D	R	S

12. Nov/2023/Paper_ 0625/22/No.19

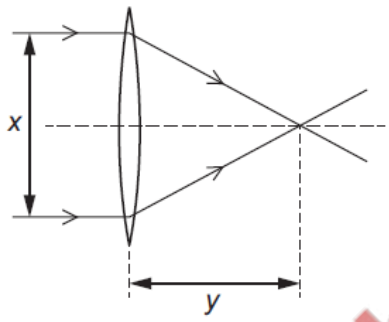
Light travels from air into glass.

What is the relationship between the refractive index n of the glass, the angle of incidence i and the angle of refraction r?

A $n = \frac{i}{r}$ **B** $n = \frac{r}{i}$ **C** $n = \frac{\sin i}{\sin r}$ **D** $n = \frac{\sin r}{\sin i}$

13. Nov/2023/Paper_ 0625/22/No.21

A student passes parallel rays of light through four different converging lenses. He measures the distance x and the distance y for each experiment.



Which lens has the longest focal length?

	x / cm	y / cm
A	4.6	2.0
B	5.1	3.1
C	5.9	2.3
D	6.1	2.4

14. Nov/2023/Paper_ 0625/23/No.17

Light diffracts when it enters a telescope. This causes the image to blur slightly. The amount of diffraction depends on the diameter of the hole through which the light enters the telescope and the wavelength of the light.

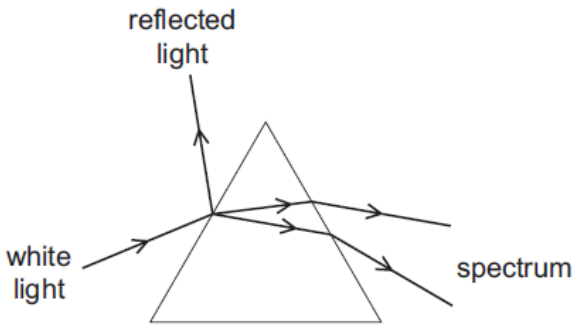
Which combination for diameter and wavelength will result in the sharpest image (least blurring)?

	diameter	wavelength
A	large	long
B	large	short
C	small	long
D	small	short

15. Nov/2023/Paper_ 0625/23/No.19

The diagram shows the effect of a prism on white light.

Some light is reflected on striking the prism and some is refracted and dispersed to form a spectrum.



What happens if monochromatic light is used instead of white light?

A The light changes colour as it passes through the prism.

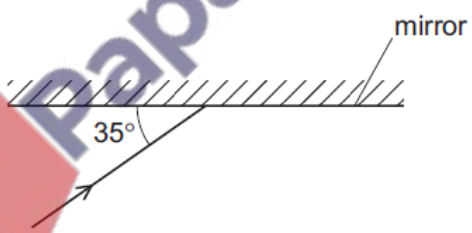
B The light forms a brighter spectrum.

C There is no reflected light.

D There is no dispersion of the emerging light.

16. Nov/2023/Paper_ 0625/23/No.20

The diagram shows a ray of light incident on a plane mirror.



The angle between the ray and the mirror is 35°.

The ray is reflected by the mirror.

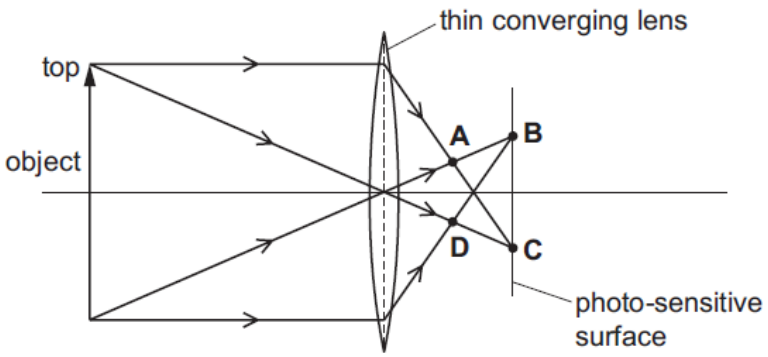
What is the angle of reflection?

A 35° **B** 55° **C** 70° **D** 110°

17. Nov/2023/Paper_ 0625/23/No.21

A thin converging lens in a camera produces a real image on a photo-sensitive surface, as shown.

At which position is the image of the top of the object formed?



18. Nov/2023/Paper_ 0625/23/No.22

Light is travelling through air. It strikes a glass block at an angle of incidence of 45°. The glass has a refractive index of 1.4.

What is the angle of refraction of the light as it enters the glass?

A 29° **B** 30° **C** 32° **D** 82°

19. Nov/2023/Paper_ 0625/31/No.7

Fig. 7.1 shows a ray diagram for an object positioned on the principal axis of a thin converging lens.

F_1 and F_2 are the focal points of the lens and C is the centre of the converging lens.

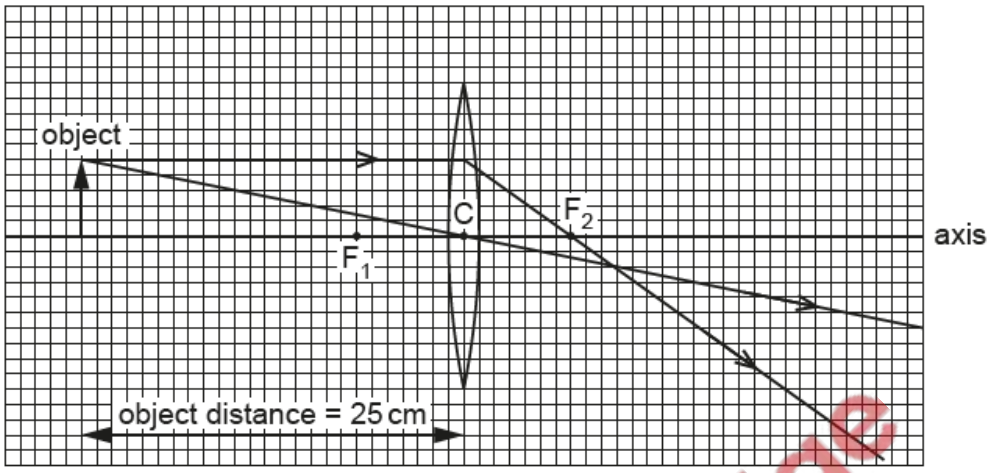


Fig. 7.1

(a) On Fig. 7.1, each small square of the grid represents 1.0 cm.

Determine the focal length of the converging lens.

focal length = ... cm [1]

(b) On Fig. 7.1, draw an arrow to show the position of the image formed by the converging lens. [1]

(c) State **three** characteristics of the image formed by the converging lens.

1 .....

2 .....

3 .....

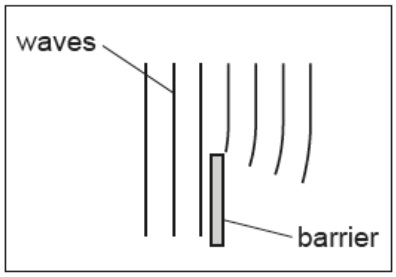
[3]

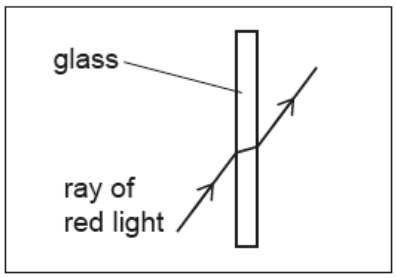
[Total: 5]

20. Nov/2023/Paper_ 0625/32/No.8

(a) In Fig. 8.1, each diagram illustrates a wave property.

Draw a line from each diagram to the correct wave property.





reflection

diffraction

dispersion

refraction

Fig. 8.1

[2]

(b) An object O is placed in front of a converging lens.

Fig. 8.2 shows two rays of light from the object passing through the lens.

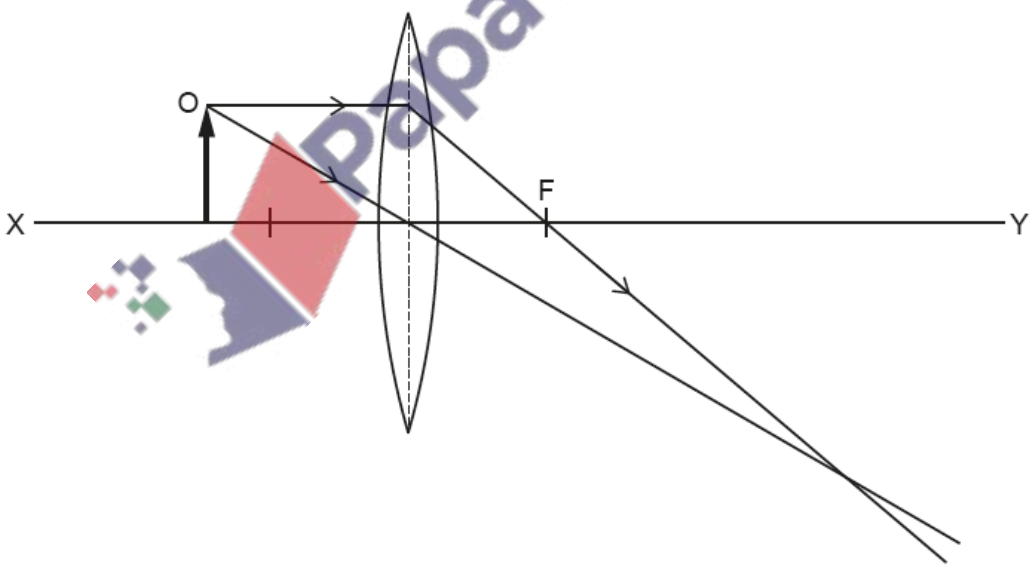


Fig. 8.2

(i) State the name of the line XY in Fig. 8.2.

..... [1]

(ii) State the name of the point labelled F in Fig. 8.2.

..... [1]

(iii) On Fig. 8.2, draw an arrow to represent the image of O. [1]

(iv) Using a ruler, measure the focal length of the converging lens.

focal length = ... cm [1]

(v) Describe characteristics of the image in Fig. 8.2.

Choose words from the list. Tick (✓) **three** boxes.

enlarged	
diminished	
same size	
inverted	
upright	
virtual	
real	

[3]

[Total: 9]

21. Nov/2023/Paper_ 0625/33/No.6

(a) A student shines a ray of red light into a rectangular glass block, as shown in Fig. 6.1.

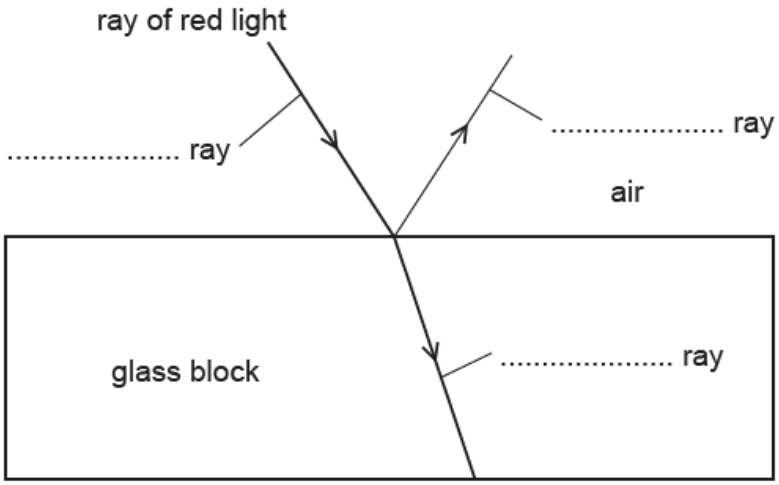


Fig. 6.1

(i) Draw the normal at the point where the ray of red light enters the glass block. [1]

(ii) On Fig. 6.1, label each ray using words from the list.

diffracted **diffused** **dispersed** **incident** **reflected** **refracted**

[2]

(b) Fig. 6.2 and Fig. 6.3 each show two parallel rays of light travelling through air towards a lens.

For each lens, draw the path of the two rays as they pass through the lens and back into the air.

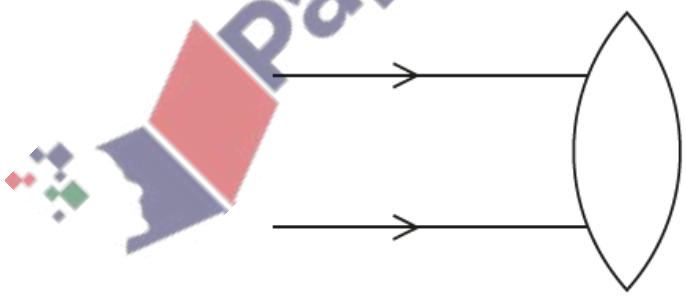


Fig. 6.2

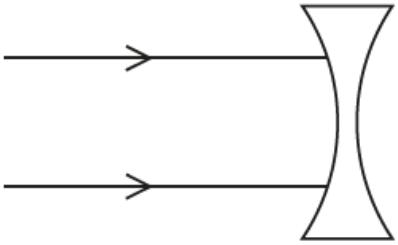


Fig. 6.3

[2]

(c) State the **seven** colours of visible light. Give the colours in order of frequency.

frequency	colour
greatest ↓ smallest	

[2]

[Total: 7]

22. Nov/2023/Paper_ 0625/41/No.6

A page of printed text is placed 18 cm from a converging lens of focal length 35 cm.

Fig. 6.1 is a scale diagram of the arrangement with each of the two principal focuses (focal points) of the lens labelled F.

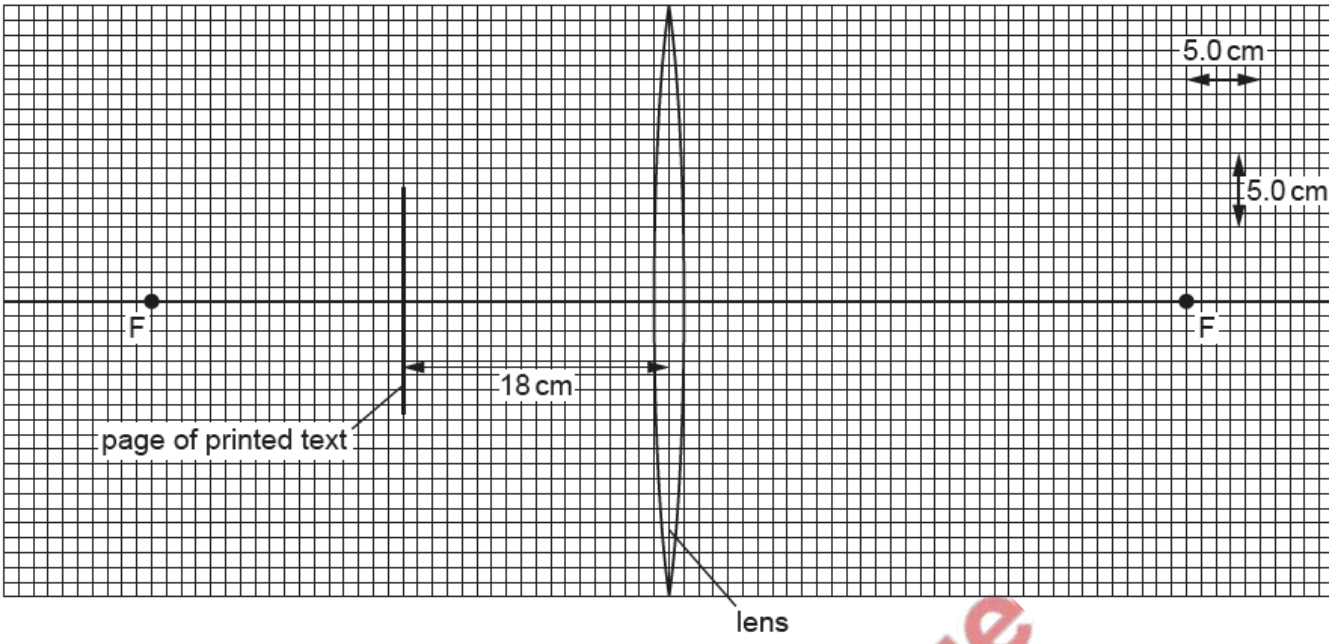


Fig. 6.1

(a) A length of 1.0 cm on the scale diagram represents an actual length of 5.0 cm.

(i) By drawing on Fig. 6.1, locate the image of the page produced by the lens and label it I. [3]

(ii) Using Fig. 6.1, determine the actual distance of image I from the lens.

actual distance from lens = ... [2]

(b) Converging lenses can be used as magnifying glasses.

State whether the image produced when a lens is used as a magnifying glass is real or virtual. Explain why.

.....

..... [1]

(c) Suggest how someone who is long-sighted may benefit from using a converging lens.

.....

.....

..... [2]

[Total: 8]

23. Nov/2023/Paper_ 0625/42/No.5

Fig. 5.1 shows a road junction, a moving car and a stationary truck. The road has high walls on each side.

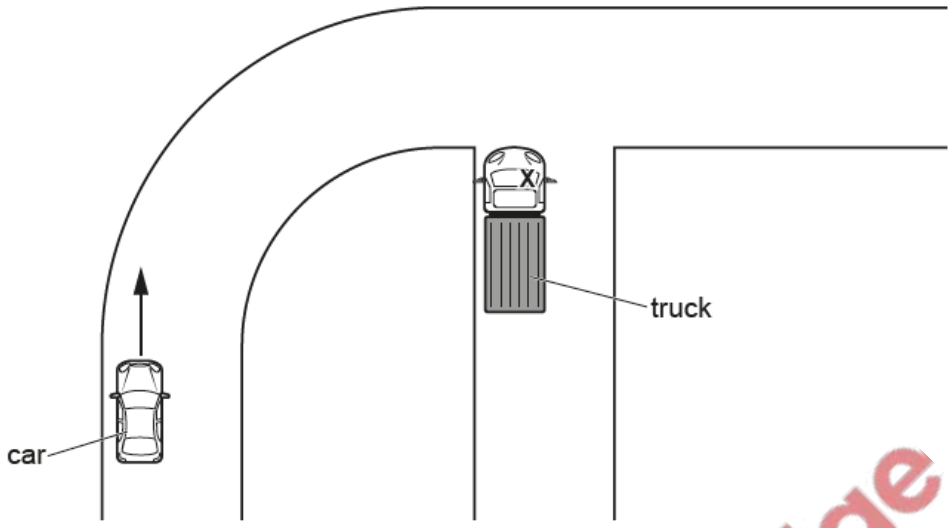


Fig. 5.1

(a) The driver of the truck is at position **X**. The car moves around the corner.

On Fig. 5.1, label a point Y on the road where the truck driver first sees the car. [1]

(b) A plane mirror is placed at the road junction as shown in Fig. 5.2.

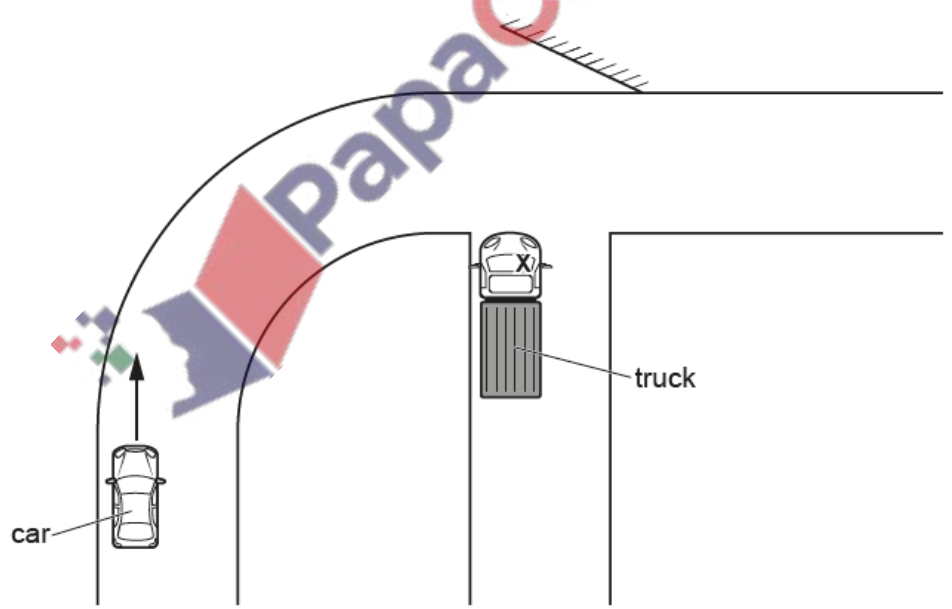


Fig. 5.2

Show how this mirror allows the driver of the truck to see the car when it is at the position shown in Fig. 5.2. [2]

(c) The truck driver wears spectacles to correct long-sightedness. Fig. 5.3 shows how a blurred image of an object O forms on the retina. Any effect of the cornea on the rays of light can be ignored.

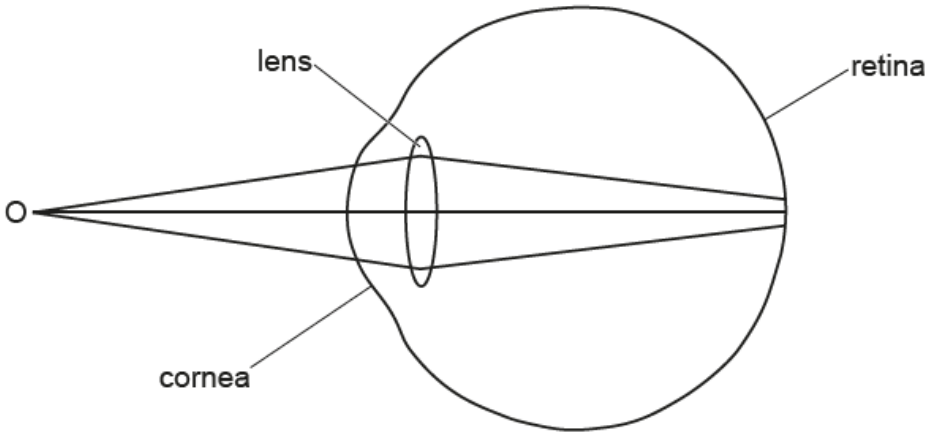


Fig. 5.3

On Fig. 5.4, show how long-sightedness is corrected by:

- adding a suitable lens in front of the eye
- continuing the path of the **three** rays of light until they meet to form an image.

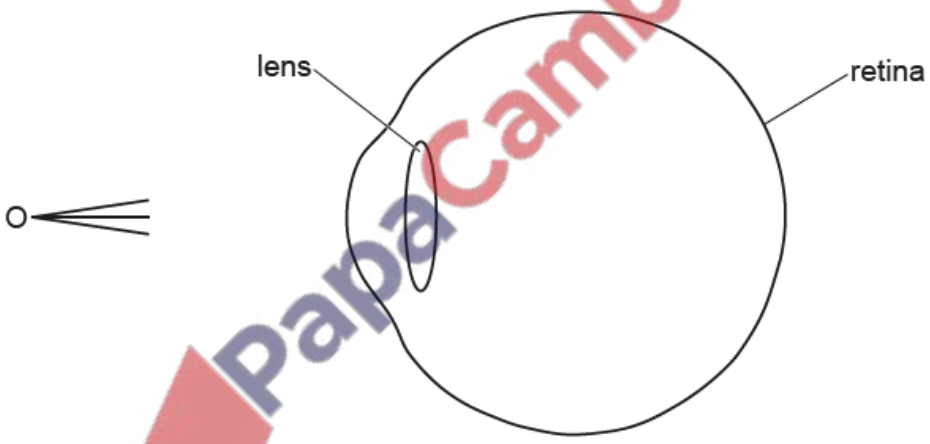


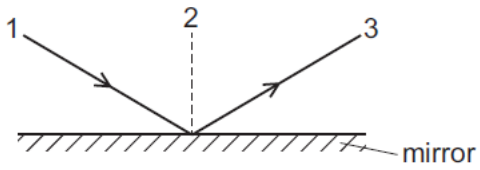
Fig. 5.4

[4]

[Total: 7]

24. June/2023/Paper_0625/11/No.18

A student draws a diagram to show the directions of a light ray reflecting off a plane mirror.

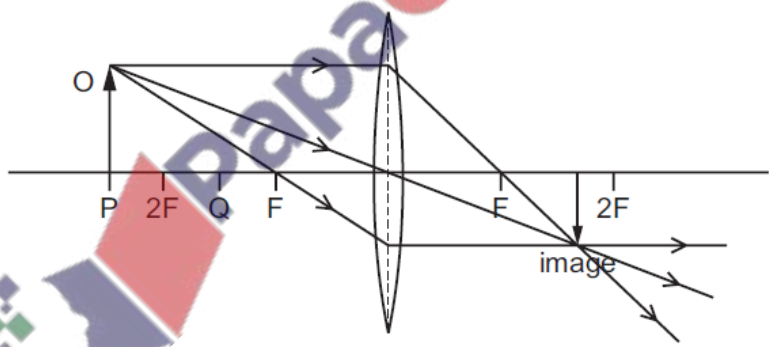


What are the correct terms for the lines drawn?

	normal	incident ray	reflected ray
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1

25. June/2023/Paper_0625/11/No.19

An object O is placed at point P near to a thin converging lens. The diagram shows three rays from the top of O passing through the lens. Each point F is one focal length from the centre of the lens. Each point 2F is two focal lengths from the centre of the lens.



The object O is moved to point Q on the diagram.

Which type of image is produced when the object O is at point Q?

A inverted and the same size as the object

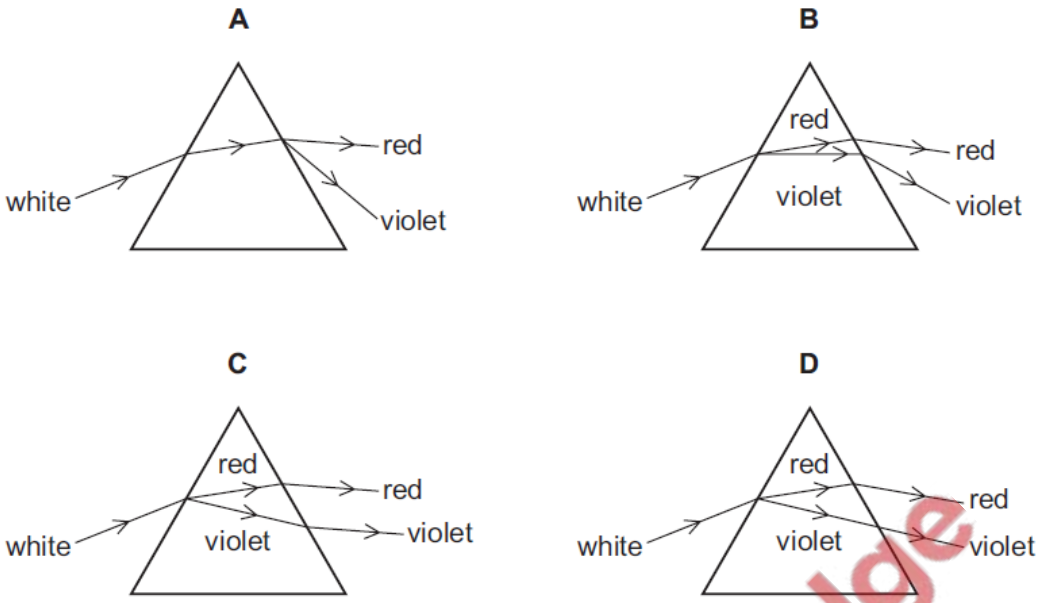
B inverted and enlarged

C upright and the same size as the object

D upright and enlarged

26. June/2023/Paper_0625/11/No.20

Which diagram shows the dispersion of white light by a glass prism?



27. June/2023/Paper_0625/12/No.18

A light ray strikes a plane mirror and is reflected.

Which angle is always equal in size to the angle of reflection?

A the angle between the incident ray and the mirror

B the angle between the incident ray and the normal to the mirror

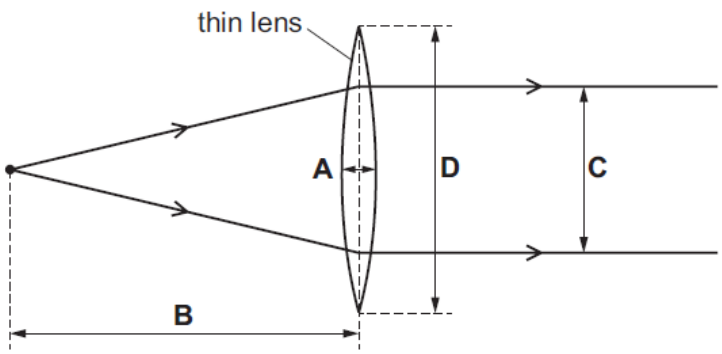
C the angle between the reflected ray and the mirror

D the angle between the reflected ray and the incident ray

28. June/2023/Paper_0625/12/No.19

The diagram shows two diverging rays of light passing through a lens and emerging parallel to each other.

Which labelled distance is the focal length of the lens?



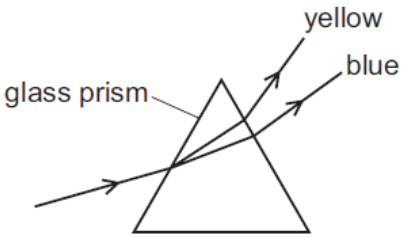
29. June/2023/Paper_0625/12/No.20

A beam of light consists of yellow and blue light.

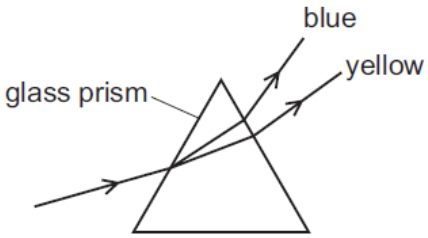
The beam of light is incident on a glass prism.

Which diagram is correct?

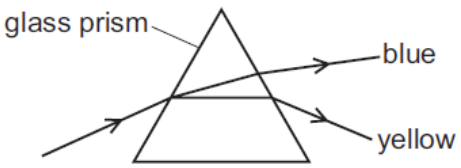
A



B



C



D

30. June/2023/Paper_0625/13/No.18

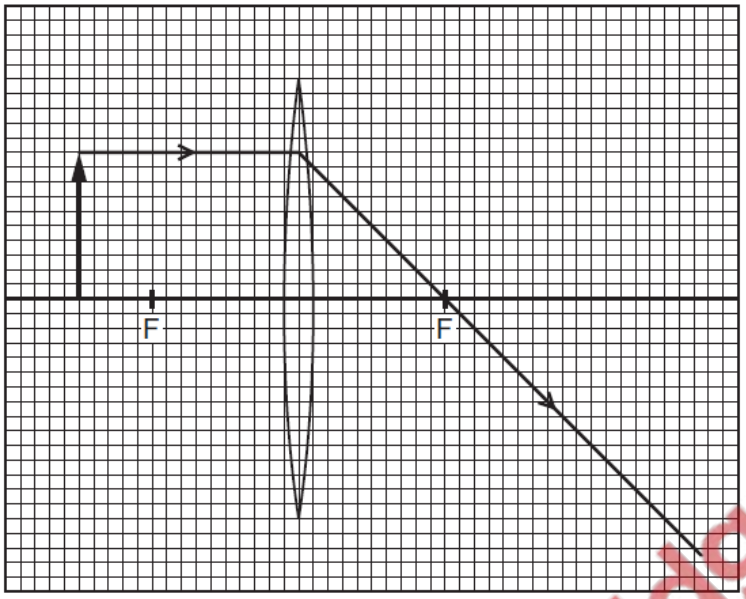
The optical image formed by a plane mirror is the same size as the object.

Which row describes the other characteristics of the optical image formed?

	distance from the mirror	real or virtual
A	same as object	virtual
B	smaller than object	virtual
C	larger than object	real
D	same as object	real

31. June/2023/Paper_0625/13/No.19

The diagram shows a partly completed scale drawing of an upright object placed 3 cm in front of a thin converging lens of focal length 2 cm.



What is the nature of the image formed by this lens?

A diminished, inverted and closer to the lens than the object

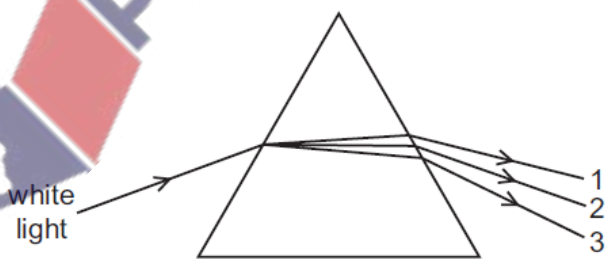
B diminished, upright and further from the lens than the object

C enlarged, inverted and closer to the lens than the object

D enlarged, inverted and further from the lens than the object

32. June/2023/Paper_0625/13/No.20

A narrow beam of white light passes through a prism and is dispersed into a spectrum.

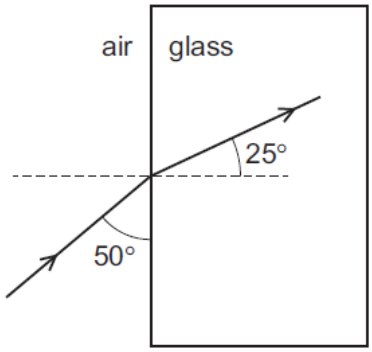


Which row is correct?

	colour 1	colour 2	colour 3
A	blue	yellow	red
B	red	blue	yellow
C	red	yellow	blue
D	yellow	blue	red

33. June/2023/Paper_0625/21/No.18

The diagram shows a ray of light entering a glass block.

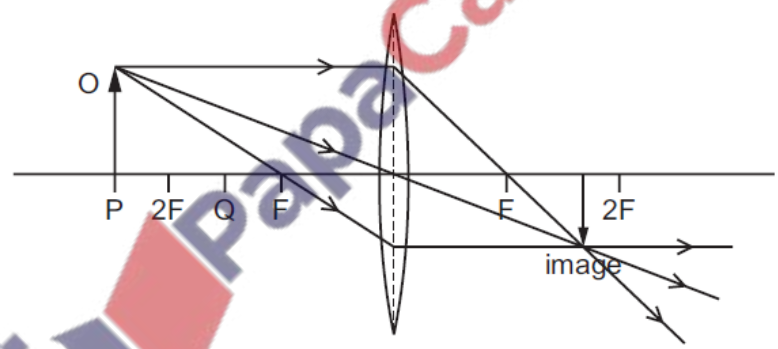


Which calculation gives the refractive index of the glass?

A $\frac{\sin 40°}{\sin 25°}$ **B** $\frac{\sin 40°}{\sin 65°}$ **C** $\frac{\sin 50°}{\sin 25°}$ **D** $\frac{\sin 50°}{\sin 65°}$

34. June/2023/Paper_0625/21/No.19

An object O is placed at point P near to a thin converging lens. The diagram shows three rays from the top of O passing through the lens. Each point F is one focal length from the centre of the lens. Each point 2F is two focal lengths from the centre of the lens.



The object O is moved to point Q on the diagram.

Which type of image is produced when the object O is at point Q?

A inverted and the same size as the object

B inverted and enlarged

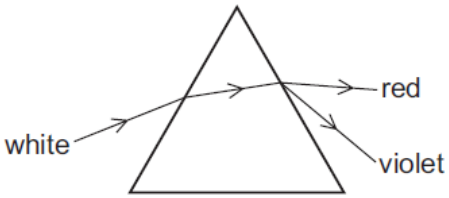
C upright and the same size as the object

D upright and enlarged

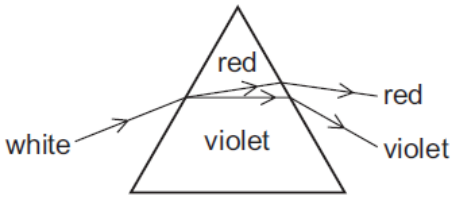
35. June/2023/Paper_0625/21/No.20

Which diagram shows the dispersion of white light by a glass prism?

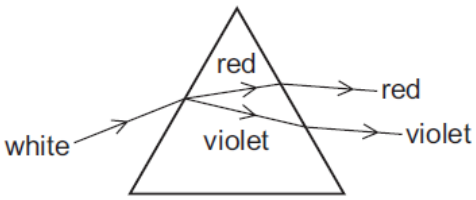
A



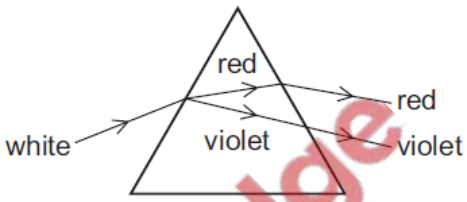
B



C

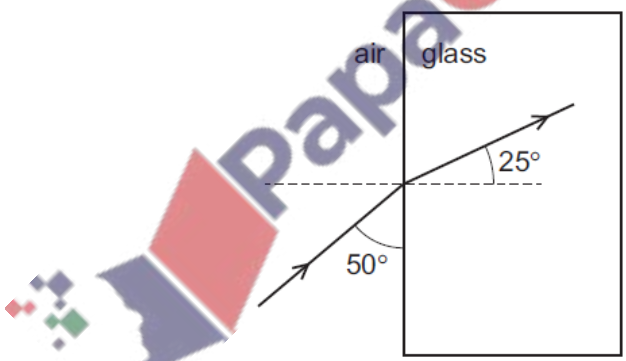


D



36. June/2023/Paper_0625/21/No.18

The diagram shows a ray of light entering a glass block.



Which calculation gives the refractive index of the glass?

A $\frac{\sin 40°}{\sin 25°}$ **B** $\frac{\sin 40°}{\sin 65°}$ **C** $\frac{\sin 50°}{\sin 25°}$ **D** $\frac{\sin 50°}{\sin 65°}$

37. June/2023/Paper_0625/22/No.18

Optical fibres are used to transmit digital signals using infrared radiation.

The average refractive index of the fibres is 1.50.

Which row describes a digital signal and gives the speed of infrared radiation in the fibres?

	digital signal	speed of infrared radiation in the fibres m/s
A	a signal that consists of only two values	2.0×10^8
B	a signal that consists of only two values	4.5×10^8
C	a signal that consists of a continuous range of values	2.0×10^8
D	a signal that consists of a continuous range of values	4.5×10^8

38. June/2023/Paper_0625/22/No.19

Which statement describes monochromatic light?

A light of a single frequency

B light transmitted by a transparent prism

C visible light

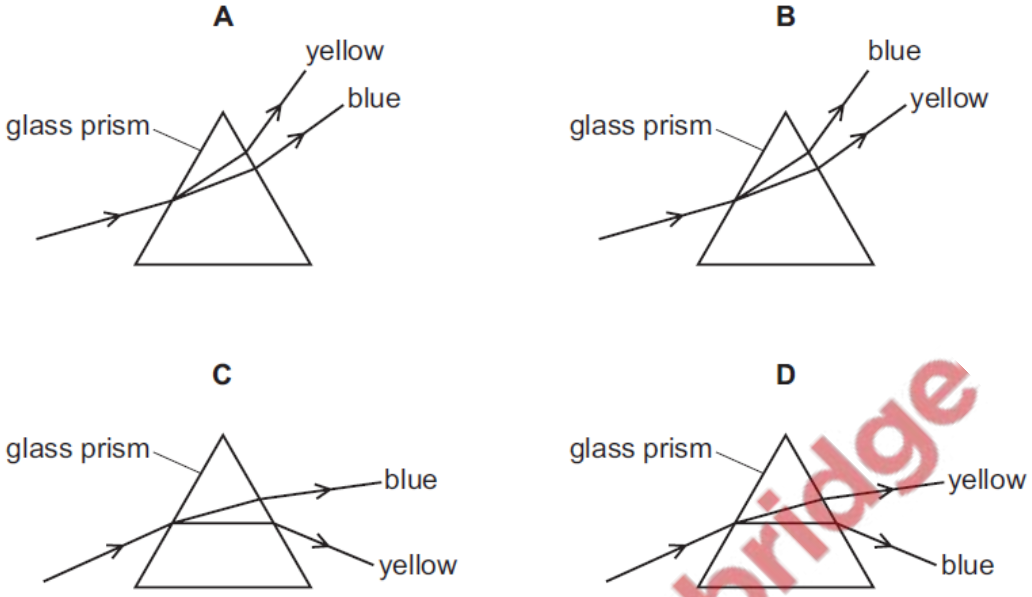
D white light

39. June/2023/Paper_0625/22/No.20

A beam of light consists of yellow and blue light.

The beam of light is incident on a glass prism.

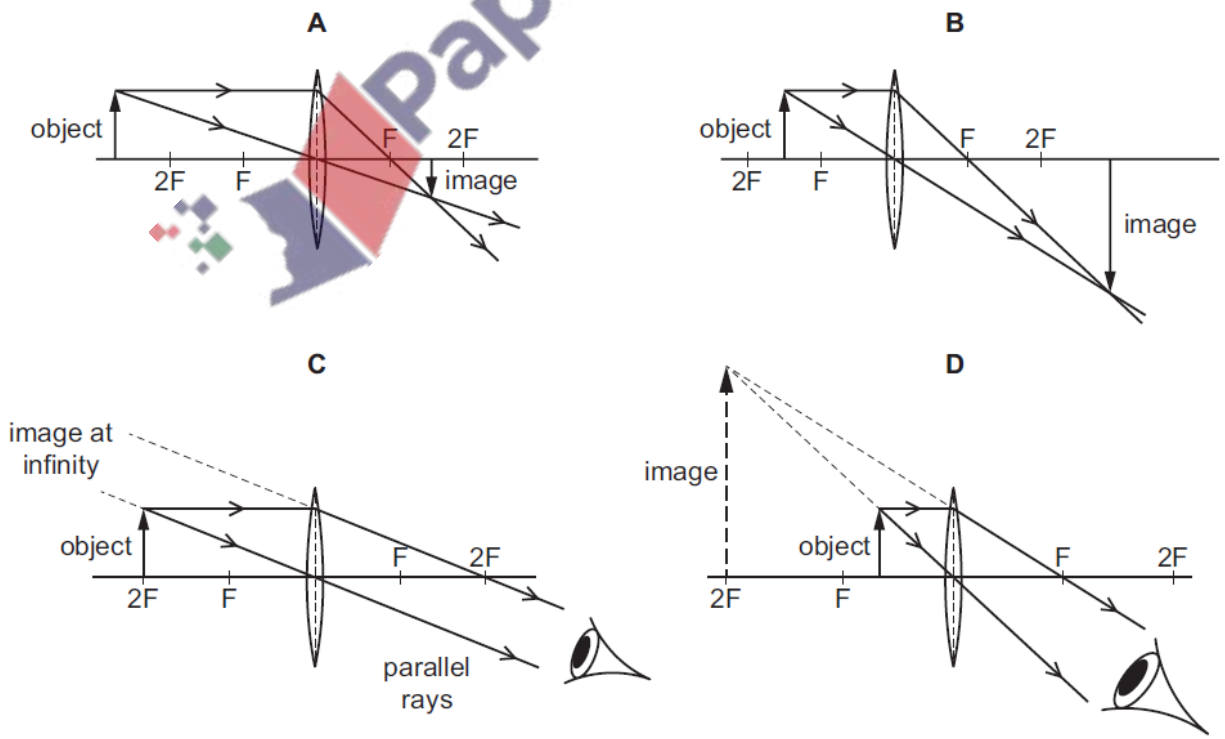
Which diagram is correct?



40. June/2023/Paper_0625/23/No.18

Each point F is one focal length from the centre of the lens. Each point 2F is two focal lengths from the centre of the lens.

Which diagram shows a converging lens being used as a magnifying glass?



41. June/2023/Paper_0625/23/No.19

A monochromatic ray of green light in air enters a block of glass.

Which property of the ray of light always remains the same as it moves from air to glass?

A wavelength

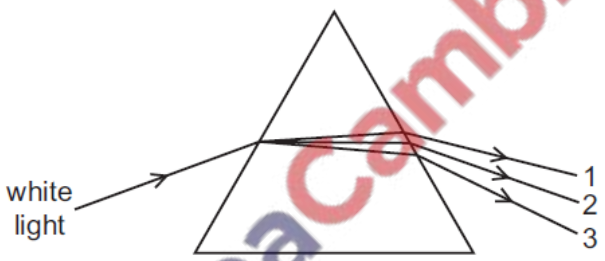
B speed

C frequency

D direction

42. June/2023/Paper_0625/23/No.20

A narrow beam of white light passes through a prism and is dispersed into a spectrum.



Which row is correct?

	colour 1	colour 2	colour 3
A	blue	yellow	red
B	red	blue	yellow
C	red	yellow	blue
D	yellow	blue	red

43. June/2023/Paper_0625/31/No.7

Fig. 7.1 represents two rays of light striking a thin converging lens. The rays are both parallel to the principal axis.

F_2 and F_1 are the focal points of the lens.

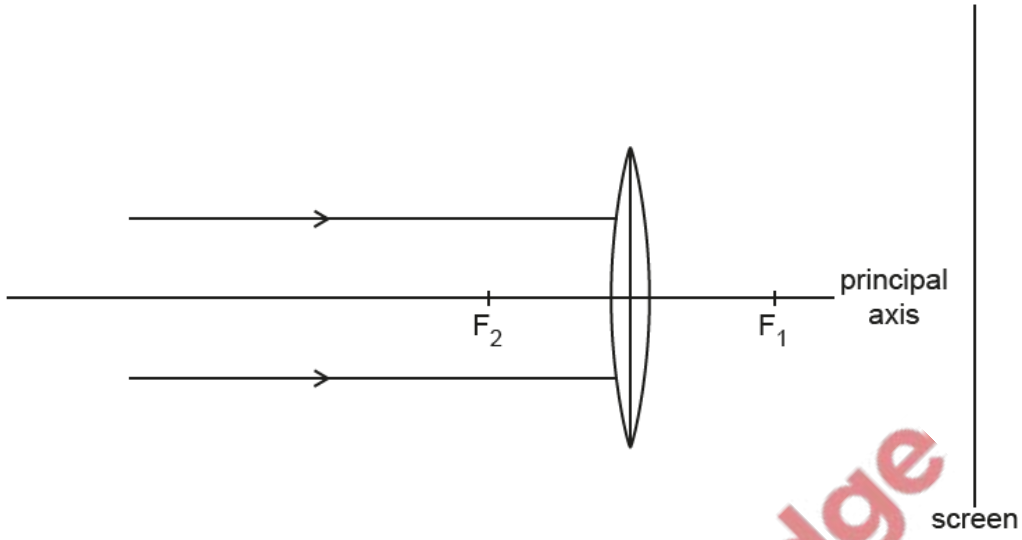


Fig. 7.1

(a) On Fig. 7.1, continue the path of each ray beyond the lens as far as the screen. [2]

(b) Visible light is a region of the electromagnetic spectrum.

State **one** region of the electromagnetic spectrum which has waves of longer wavelength than waves of visible light.

..... [1]

(c) Gamma rays are another region of the electromagnetic spectrum.

(i) Describe **one** use of gamma rays.

..... [1]

(ii) Describe **one** harmful effect on people of excessive exposure to gamma rays.

..... [1]

[Total: 5]

44. June/2023/Paper_0625/32/No.6

Fig. 6.1 shows light waves passing from air into a glass block.

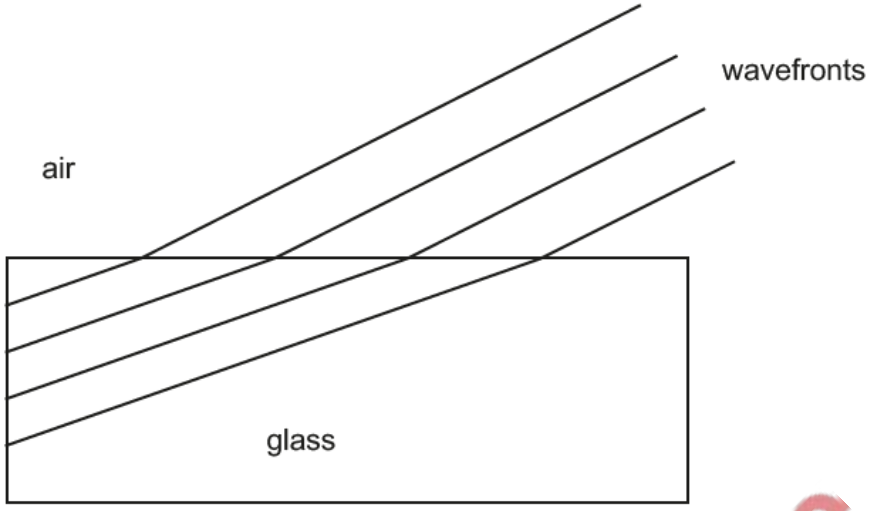


Fig. 6.1 (not to scale)

(a) **(i)** State the name of the process shown in Fig. 6.1 as the wavefronts enter the glass block.

..... [1]

(ii) State **two** changes in the light waves as they pass from air into glass.

1 .....

2 .....

[2]

(b) Fig. 6.2 shows a ray of red light travelling through a glass fibre. The glass fibre is made of solid glass.

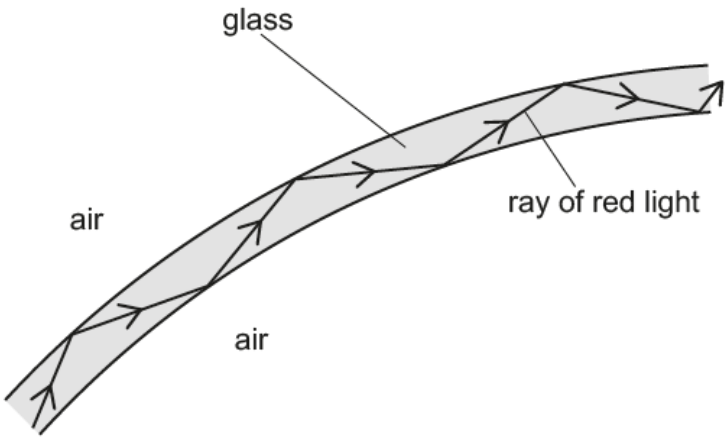


Fig. 6.2

State and explain how the ray of red light travels through the glass fibre as shown in Fig. 6.2.

.....

.....

..... [3]

[Total: 6]

45. June/2023/Paper_0625/33/No.7

(a) Students are investigating the refraction of light as it travels from air into glass.

Their task is to measure the angle of incidence and the angle of refraction at the surface of the glass block.

The students have the equipment shown in Fig. 7.1.

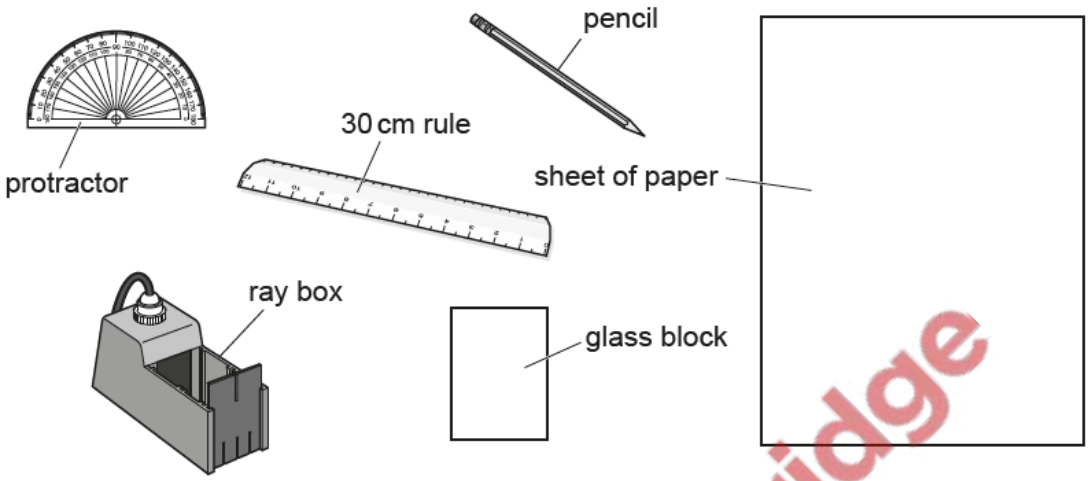


Fig. 7.1

Describe the method for the task.
You may draw a diagram as part of your answer.

.....

.....

.....

..... [4]

(b) Fig. 7.2 and Fig. 7.3 show two identical lenses, each forming an image. The images I_1 and I_2 have different characteristics.

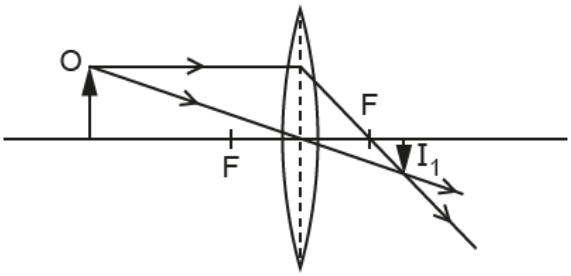


Fig. 7.2

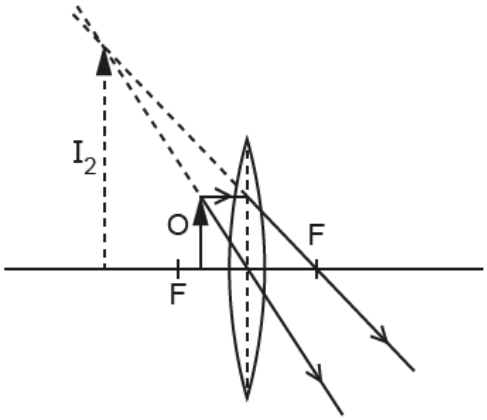


Fig. 7.3

One difference in the characteristics of the two images is:

Image I_1 is ..diminished.. but image I_2 is ..enlarged.. .

State **two** more differences in the characteristics of the images:

Image I_1 is ..... but image I_2 is ..... .

Image I_1 is ..... but image I_2 is ..... .

[3]

[Total: 7]

46. June/2023/Paper_0625/41/No.5

Fig. 5.1 shows a block ABCD made of glass that has a refractive index of 1.5. The block has one curved side AB and three straight sides, BC, CD and DA.

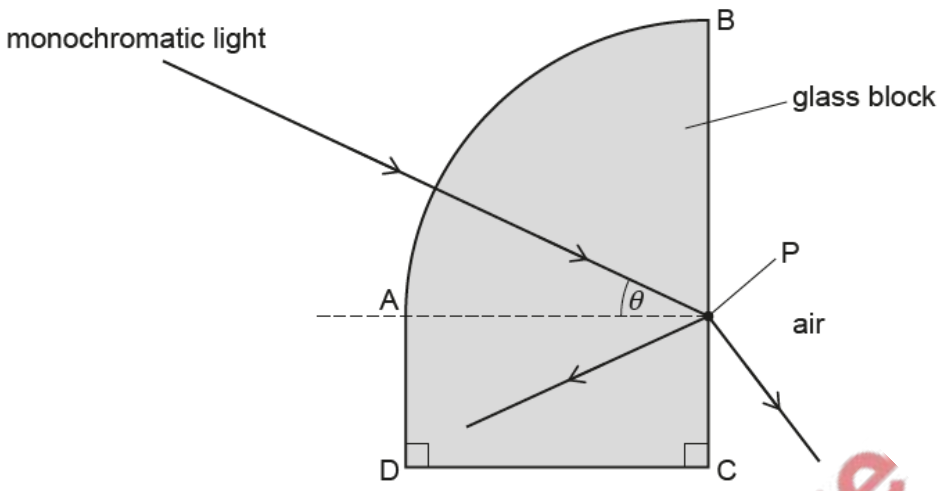


Fig. 5.1

There are right angles at C and D. The curved side AB is one quarter of the circumference of a circle that has its centre at point P.

A ray of monochromatic light enters the block through the curved side AB and strikes side BC at P. Some light emerges into the air and some is reflected.

(a) State what is meant by monochromatic.

.....

..... [1]

(b) Explain why the ray of light does **not** change direction when it enters the block through side AB.

.....

.....

..... [2]

(c) Show that the critical angle *c* for glass of refractive index 1.5 is 42°.

[2]

(d) Fig. 5.1 shows that the angle between the ray of light and line AP is θ, where line AP is at right angles to side BC.

Angle θ increases to 45°.

(i) State and explain what happens to the light that strikes P.

.....

.....

..... [2]

(ii) When $\theta = 45°$, the reflected light strikes side CD.

Describe what happens when this reflected light strikes side CD.

.....

..... [1]

[Total: 8]

47. June/2023/Paper_0625/42/No.7

Fig. 7.1 shows a container of oil.

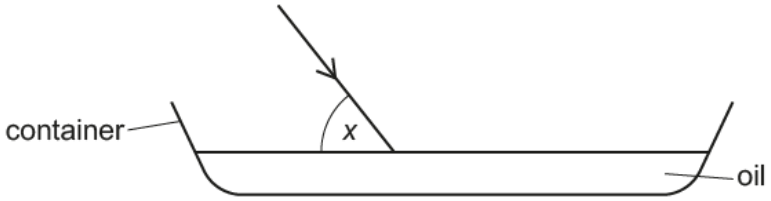


Fig. 7.1

A ray of light shines on the surface of the oil. The refractive index of the oil is 1.47.

(a) On Fig. 7.1, draw the normal at the point where the ray enters the oil. [1]

(b) The angle *x* is 56°.

Calculate the value of the angle of refraction.

angle of refraction = ... [3]

(c) State the approximate speed of light in air.

..... [1]

(d) Calculate the speed of light in the oil.

Give your answer to three significant figures.

speed = ... [2]

[Total: 7]

48. June/2023/Paper_0625/43/No.4

(a) Fig. 4.1 is an incomplete ray diagram showing an object O, a converging lens and the principal axis. The focal points of the lens are each labelled F.

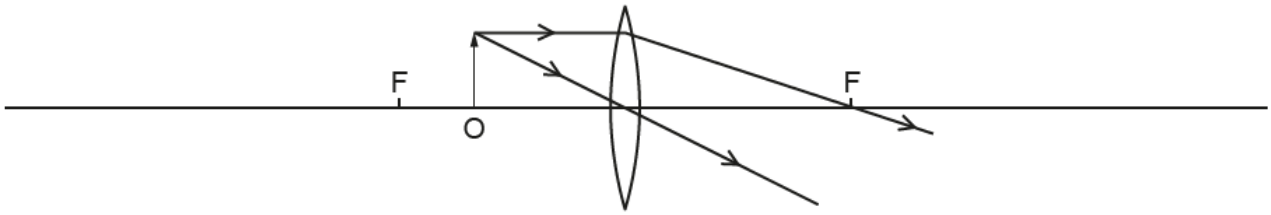


Fig. 4.1

(i) Complete the ray diagram to draw the image formed by the lens. Label your image I. [3]

(ii) Circle **three** descriptions in the list which describe the image formed in **(i)**.

diminished **enlarged** **inverted** **same size**

real **upright** **virtual**

[3]

(b) **(i)** State the name for the defect of vision that can be corrected by a converging lens.

..... [1]

(ii) Describe how a converging lens corrects the defect in **(i)**.
You may find it helpful to sketch a ray diagram.

.....

.....

..... [2]

[Total: 9]

49. June/2023/Paper_0625/43/No.5(b)

(b) **(i)** The critical angle of the glass in an optical fibre is 45°.

Calculate the refractive index of the glass.

refractive index = ... [2]

(ii) Fig. 5.1 shows an optical fibre made of the glass described in **(i)**.

Fig. 5.1

On Fig. 5.1, draw carefully a ray of light in the fibre undergoing total internal reflection. [2]