Term 1

2026-2025

EXAM

LIGHT, MIRRORS, AND LENSES

Einstein_AE

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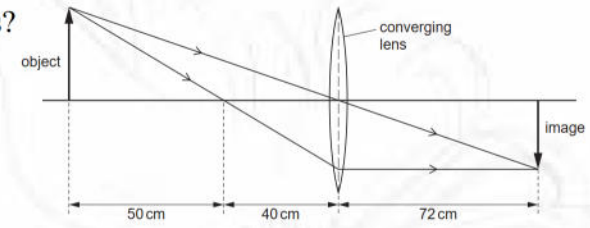
The ray diagram shows the image of an object formed by a converging lens.

What is the focal length of the lens?

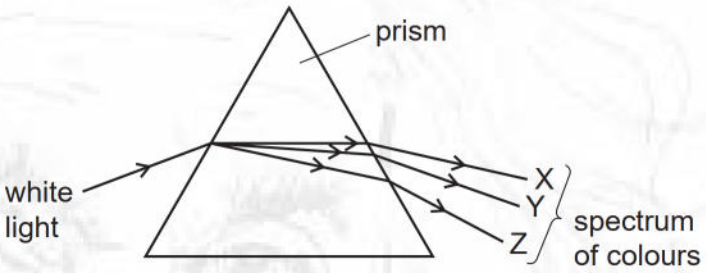


ⓐ 90cm ⓑ 40cm ⓒ 72cm ⓓ 50cm

The diagram shows the dispersion of white light by a prism.

Which row could be correct for the colours seen at X, at Y and at Z?

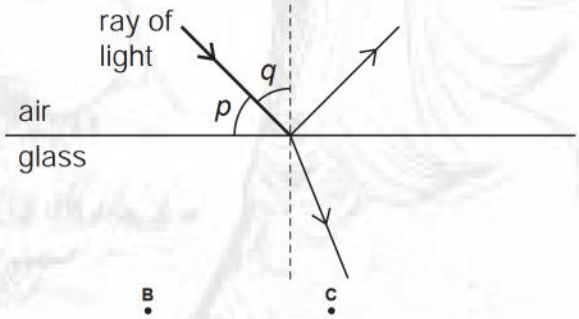
	colour at X	colour at Y	colour at Z
ⓐ	red	violet	yellow
ⓑ	red	yellow	violet
ⓒ	violet	yellow	red
ⓓ	yellow	red	violet



The diagram shows a ray of light in air incident on a glass block. Some of the light is refracted, and some of the light is reflected. Two angles p and q are marked on the diagram.

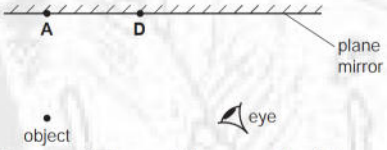
Which row gives the angle of incidence and shows whether the ray undergoes total internal reflection?

	angle of incidence	total internal reflection
ⓐ	p	no
ⓑ	p	yes
ⓒ	q	no
ⓓ	q	yes



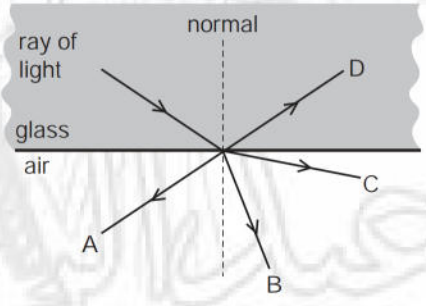
The diagram shows an object in front of a plane mirror.
At which labelled position is the image of the object formed?

ⓐ A ⓑ B
ⓒ C ⓓ D



The diagram shows a ray of light incident on the edge of a piece of glass. The angle i is greater than the critical angle. Which arrow shows the direction of the ray after it leaves the edge of the glass?

ⓐ A ⓑ B
ⓒ C ⓓ D



White light enters a glass prism. The light leaving the other side of the prism is separated into colours.

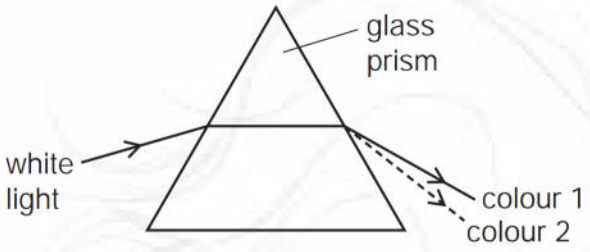


diagram 1

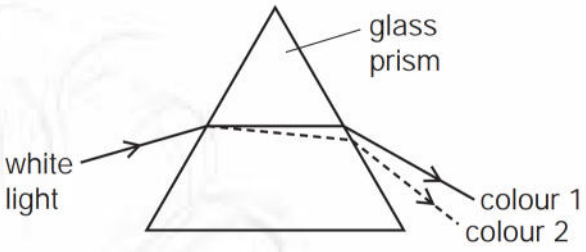
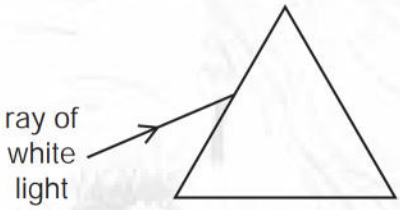


diagram 2

Which row correctly describes what happens?

	path taken by the light	colour 1	colour 2
ⓐ	diagram 1	red	violet
ⓑ	diagram 1	violet	red
ⓒ	diagram 2	red	violet
ⓓ	diagram 2	violet	red

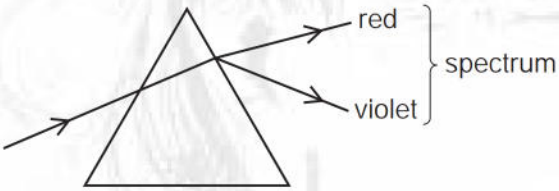
A ray of white light is incident on a glass prism



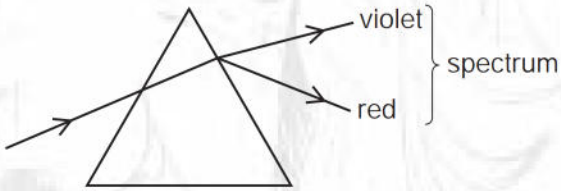
prism

Which ray diagram shows the ray as it passes through the prism and emerges from the opposite side?

ⓐ



ⓑ



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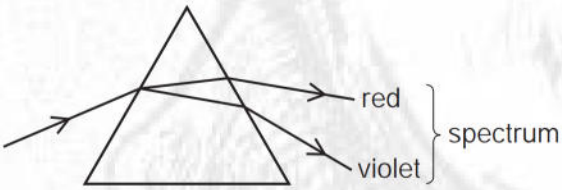

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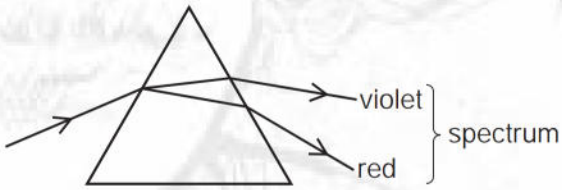
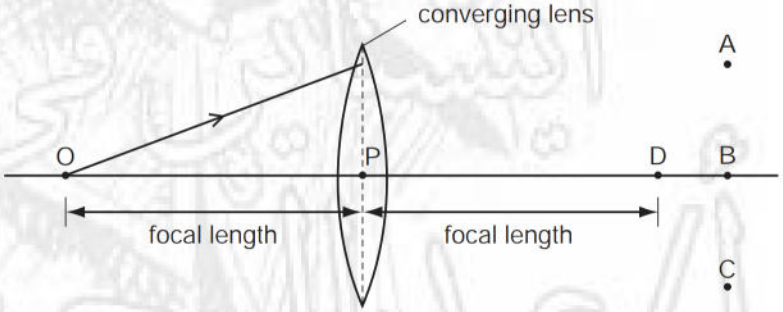


In the diagram, the distance OP is the focal length of the converging lens. One ray of light from O is shown. Through which point will this ray pass, after refraction by the lens?

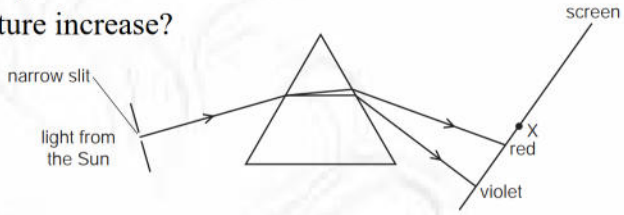
ⓐ A ⓑ B
ⓒ C ⓓ D



Light from the Sun passes through a prism and a spectrum is produced on a screen.

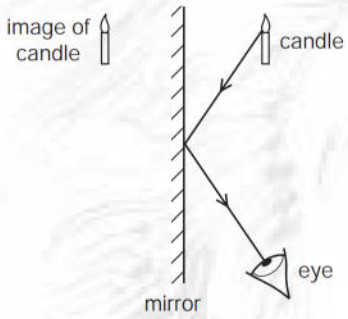
A thermometer placed at X shows a large temperature increase.
Which type of radiation causes this temperature increase?

ⓐ visible light
ⓑ ultraviolet
ⓒ microwave
ⓓ infra-red

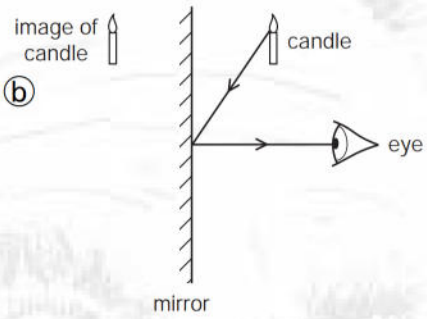


Which diagram shows how the light from a candle is reflected by a mirror, and shows the position of the image formed?

ⓐ



ⓑ



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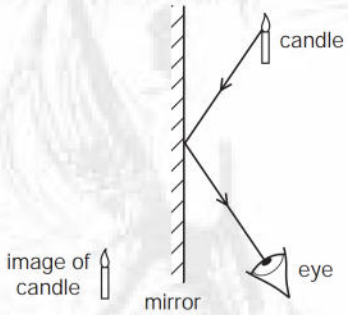

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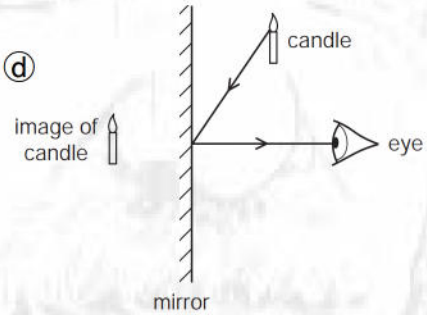
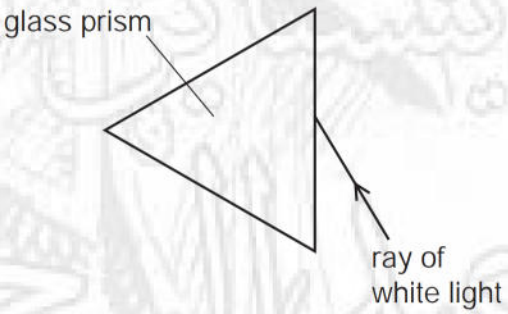


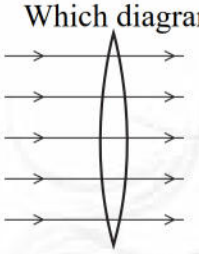
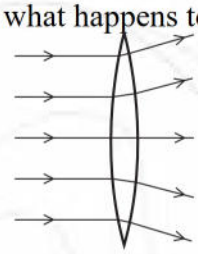
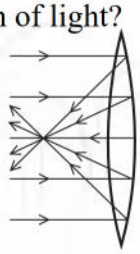
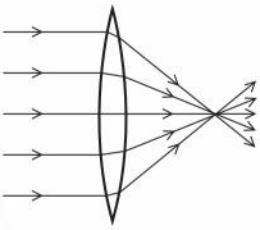
The diagram shows a ray of white light incident on a triangular glass prism.

The ray enters the prism.
Which row correctly states if the light is refracted, and if the light is dispersed?

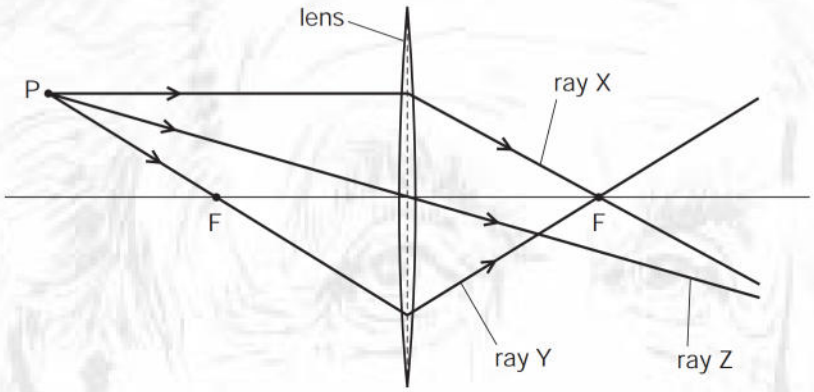
	refracted	dispersed
ⓐ	no	yes
ⓑ	no	no
ⓒ	yes	no
ⓓ	yes	yes



A parallel beam of light falls on a converging lens.
Which diagram shows what happens to the beam of light?

ⓐ  ⓑ  ⓒ  ⓓ 

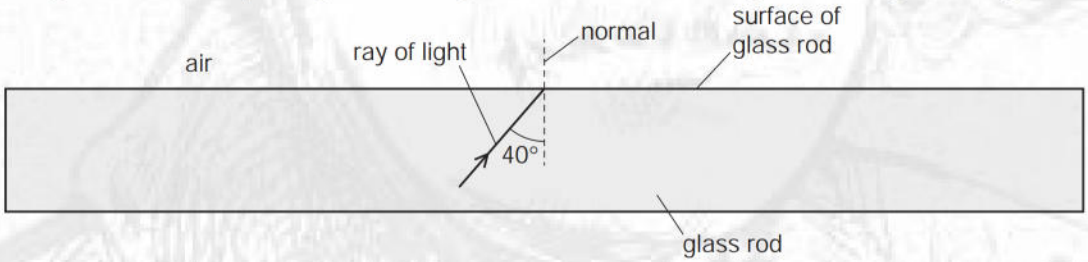
A student draws a diagram representing three rays of light from point P passing through a converging lens. Each point labelled F is a principal focus of the lens.



Which of the rays has the student drawn correctly?

ⓐ ray Z only ⓑ ray Y only ⓒ ray X and ray Z ⓓ ray X and ray Y

The diagram shows a ray of light inside a glass rod. The critical angle for the light in the glass is 42°



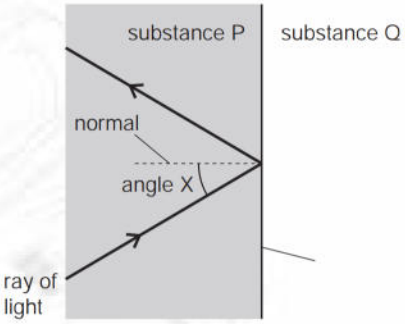
	any light reflected?	any light refracted?
ⓐ	no	yes
ⓑ	no	no
ⓒ	yes	no
ⓓ	yes	yes

A plane mirror is fitted to a wall.
Which statement about the image formed by the mirror is correct?

ⓐ The image is smaller than the object. ⓑ The image is real.
ⓒ The image is upside down. ⓓ The image is left to right (laterally inverted).

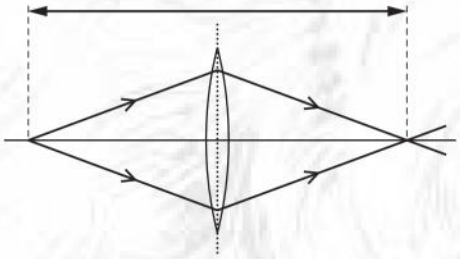
The diagram shows a ray of light travelling in a substance P. The ray reaches a boundary with a substance Q. Total internal reflection occurs at the boundary

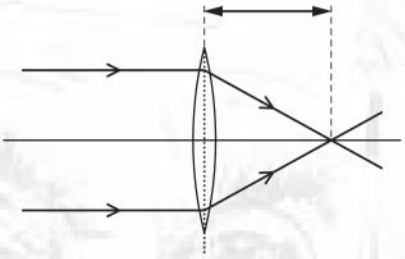
Which row contains correct statements about angle X and about the optical density of substance Q?

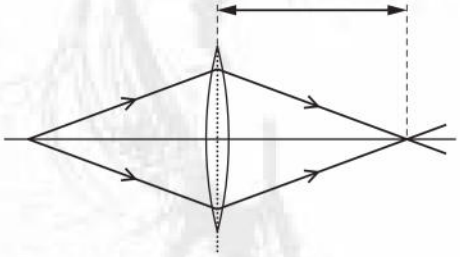


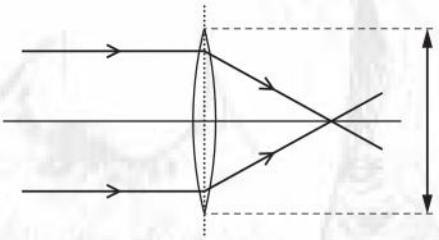
	angle X	substance Q
ⓐ	smaller than the critical angle	less dense than substance P
ⓑ	smaller than the critical angle	more dense than substance P
ⓒ	greater than the critical angle	less dense than substance P
ⓓ	greater than the critical angle	more dense than substance P

Which labelled distance is the focal length of the lens?

ⓐ 

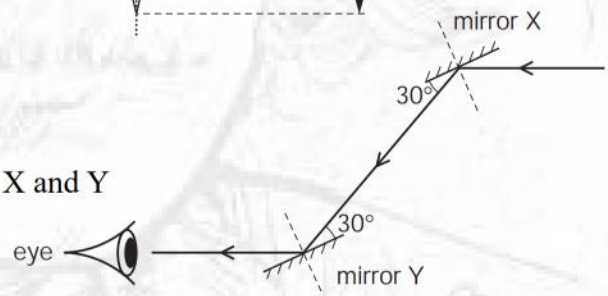
ⓑ 

ⓒ 

ⓓ 

A ray of light is reflected by two parallel plane mirrors X and Y

Which statement is correct?

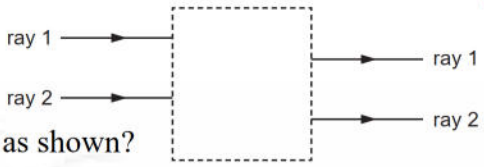


ⓐ The angle of incidence at mirror X is 30°.
ⓑ The angle of reflection at mirror X is 120°.
ⓒ The angle of incidence at mirror Y is 60°.
ⓓ The angle of reflection at mirror Y is 0°.

Which statement about a converging lens is not correct?

ⓐ A ray parallel to the principal axis of the lens is refracted through the principal focus.
ⓑ The distance between the centre of the lens and the principal focus is the focal length.
ⓒ All rays of light refracted by the lens pass through the principal focus.
ⓓ The principal focus of the lens is a point on the principal axis.

Rays of light enter and leave a box



What could be inside the box to make the rays behave as shown?

ⓐ a triangular prism ⓑ a plane mirror ⓒ a parallel-sided glass block ⓓ a converging lens

A boy wears a shirt with a letter F on the front.

He stands in front of a plane mirror.
What does he see in the mirror?

ⓐ 

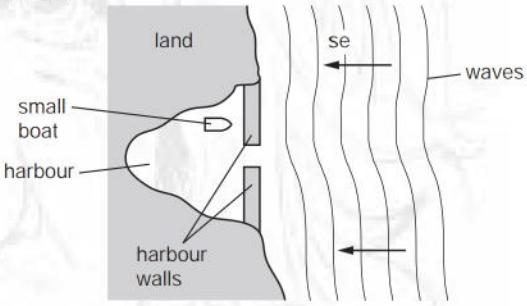
ⓑ 

ⓒ 

ⓓ 

A small boat in a harbour is protected from waves on the sea by harbour walls.

Some waves can curve round the harbour walls and reach the boat.
What is the name of this effect?



ⓐ refraction ⓑ reflection
ⓒ dispersion ⓓ diffraction

Which statement about a converging lens is not correct?

ⓐ The distance between the centre of the lens and the principal focus is the focal length.
ⓑ A ray parallel to the principal axis of the lens is refracted through the principal focus.
ⓒ The principal focus of the lens is a point on the principal axis.
ⓓ All rays of light refracted by the lens pass through the principal focus.

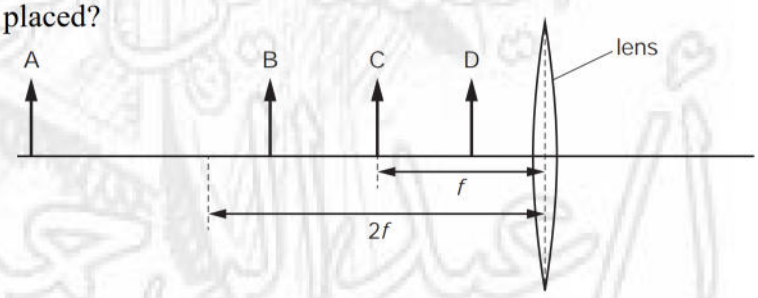
Light waves pass from air into glass and are refracted.

What always remains constant when this happens?

ⓐ wavelength ⓑ speed ⓒ frequency ⓓ direction

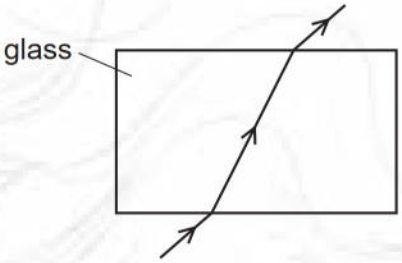
An object is placed in front of a converging lens. The lens has a focal length f.
The lens produces a real, enlarged image of the object.
In which labelled position is the object placed?

ⓐ A ⓑ B
ⓒ C ⓓ D

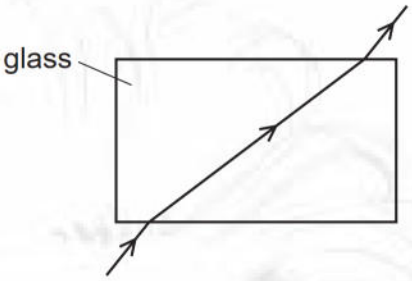


Which diagram shows how a ray of light could pass through a glass block in air?

ⓐ



ⓑ



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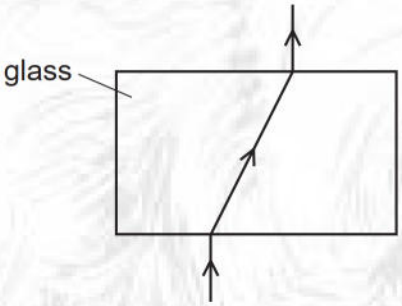

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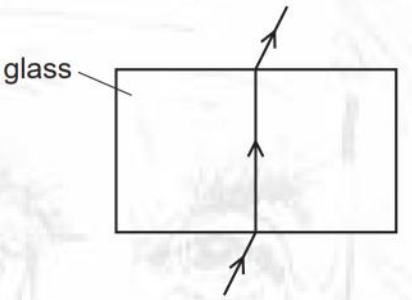
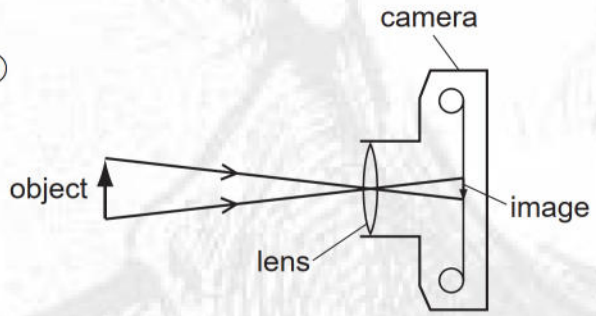
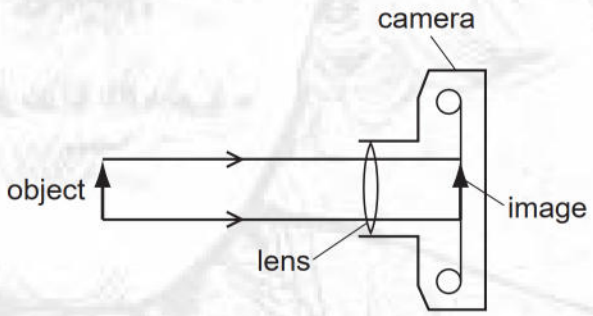


Which diagram correctly represents rays of light passing through a converging lens in a camera?

ⓐ



ⓑ



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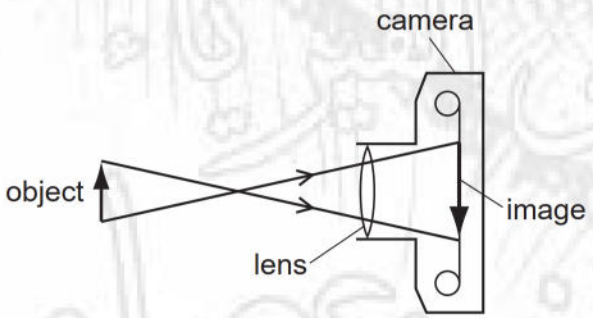
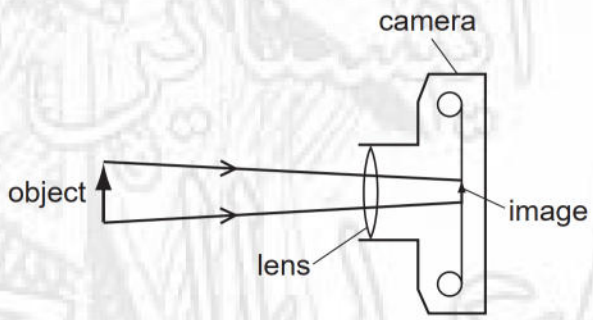


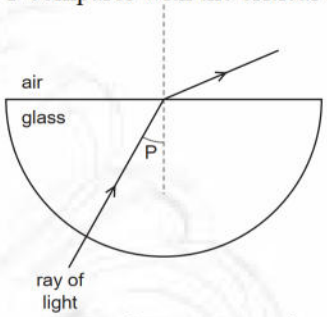
ⓓ



The diagram shows a ray of light passing through a semicircular glass block into air.

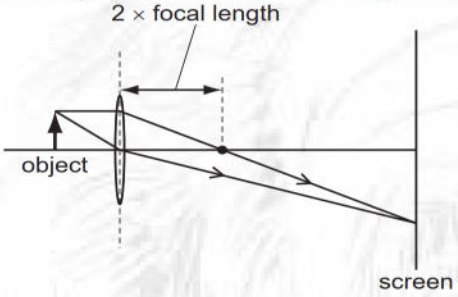
Which row gives the correct name for angle P and states how angle P compares with the critical angle?

	name of angle P	angle P compared with the critical angle
ⓐ	angle of incidence	larger than the critical angle
ⓑ	angle of incidence	smaller than the critical angle
ⓒ	angle of refraction	larger than the critical angle
ⓓ	angle of refraction	smaller than the critical angle



Which diagram shows how an image of an object is formed on a screen by a converging lens?

ⓐ



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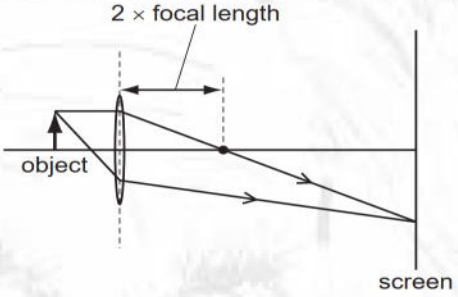

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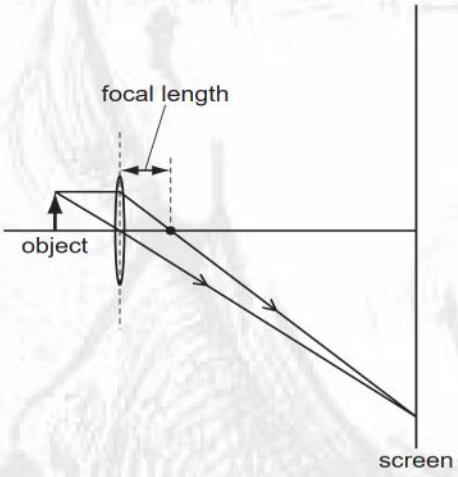

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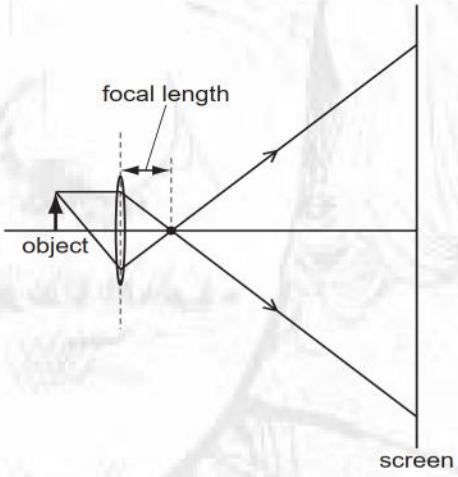
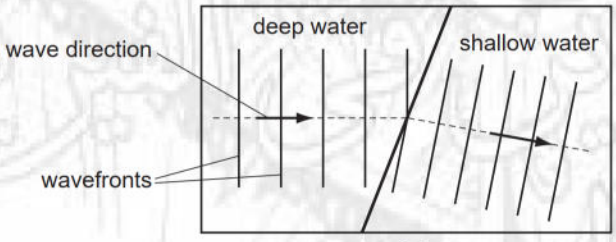


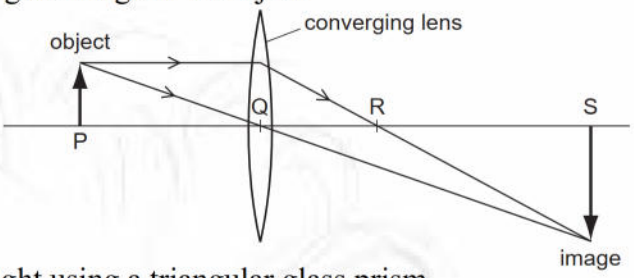
Water waves may be used to demonstrate refraction by making them pass into water of a different depth. Why does the water wave change direction as it passes into the shallow water?



ⓐ The speed of the wave decreases.
ⓑ The frequency of the wave decreases.
ⓒ The speed of the wave increases.
ⓓ The frequency of the wave increases.

The diagram represents a converging lens forming an image of an object.

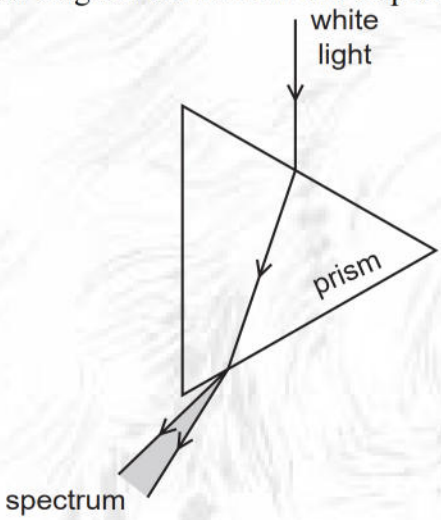
Which distance is the focal length of the lens?



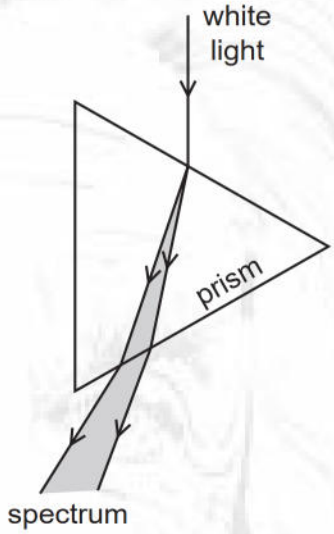
ⓐ QR ⓑ PQ
ⓒ QS ⓓ PR

A teacher demonstrates the dispersion of white light using a triangular glass prism.
Which diagram shows how this dispersion happens?

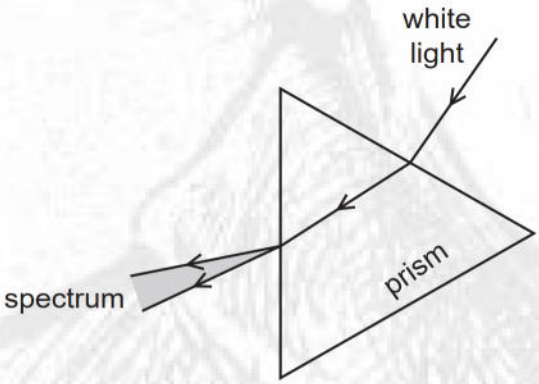
ⓐ



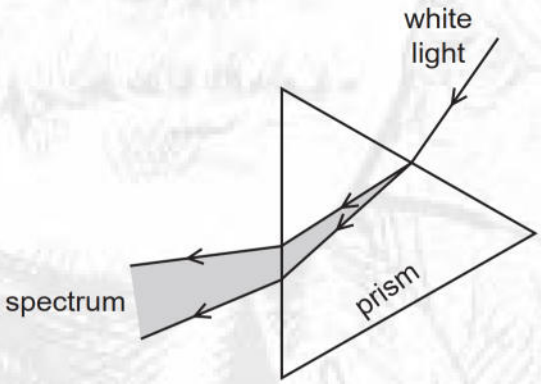
ⓑ



ⓒ

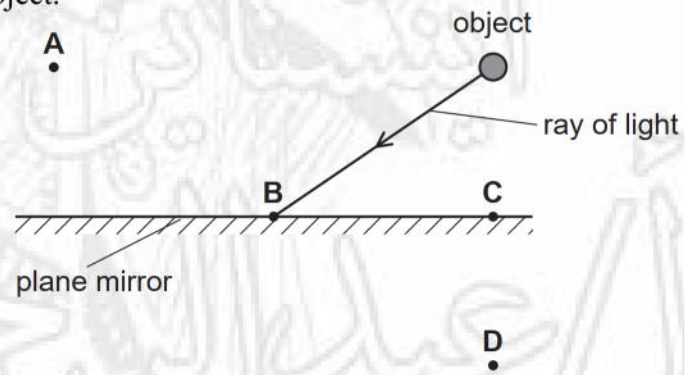


ⓓ



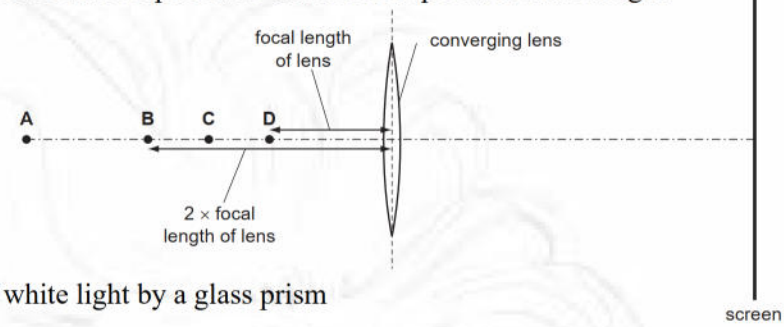
A plane mirror is used to form an image of an object.
At which labelled point is the image formed?

ⓐ A ⓑ B
ⓒ C ⓓ D

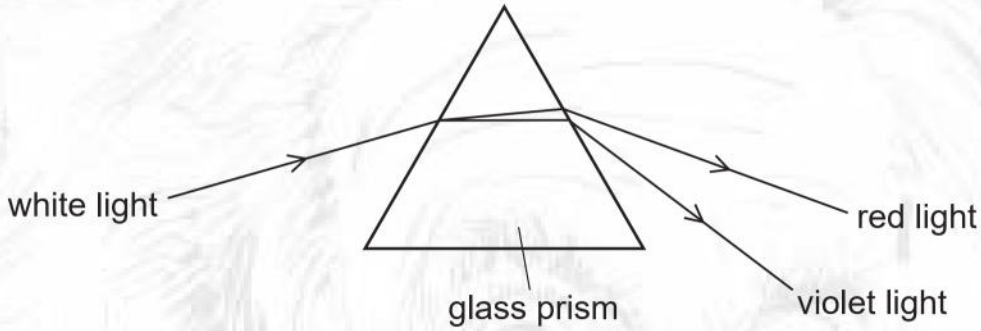


A converging lens in a projector is used to make an enlarged image of a small piece of film on a screen.
At which labelled point could the piece of film be placed so that the lens produces this image?

ⓐ A ⓑ B ⓒ C ⓓ D



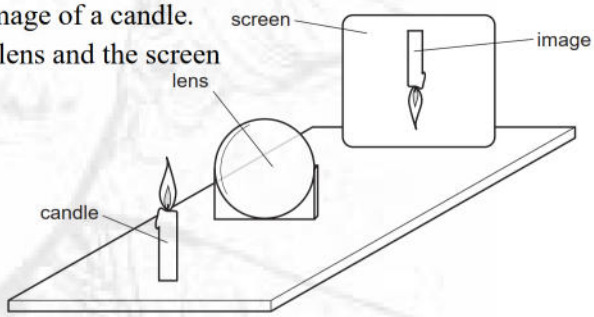
The diagram shows the dispersion of white light by a glass prism



Why does dispersion occur when white light enters the glass?

ⓐ The speed of red light decreases more than that of violet light.
ⓑ The frequency of red light decreases more than that of violet light.
ⓒ The speed of violet light decreases more than that of red light.
ⓓ The frequency of violet light decreases more than that of red light.

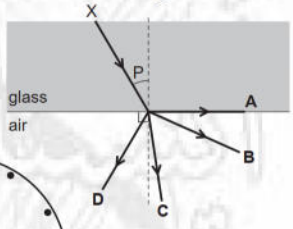
A thin converging lens is used to produce, on a screen, a focused image of a candle. Various focused images are produced on the screen by moving the lens and the screen backwards and forwards. Which statement is always correct?



ⓐ The image is at the principal focus (focal point) of the lens.
ⓑ The image is bigger than the object.
ⓒ The image is closer to the lens than the object is.
ⓓ The image is inverted.

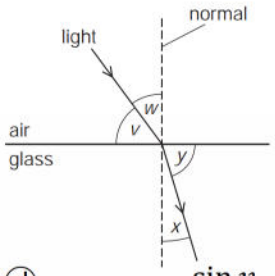
The diagram shows a ray of light travelling from X. Angle P is less than the critical angle.
In which direction does the ray continue?

ⓐ A ⓑ B ⓒ C ⓓ D



The diagram shows the image of a clock in a plane mirror.
What time is shown?

ⓐ 02:25 ⓑ 02:35 ⓒ 09:25 ⓓ 09:35



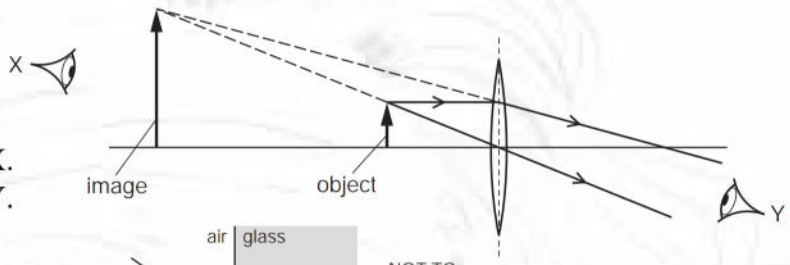
The diagram shows light travelling from air into glass.
Four angles v, w, x and y are shown.

Which formula is used to calculate the refractive index n of the glass?

ⓐ $n = \frac{\sin v}{\sin y}$ ⓑ $n = \frac{\sin w}{\sin x}$ ⓒ $n = \frac{\sin w}{\sin y}$ ⓓ $n = \frac{\sin v}{\sin x}$

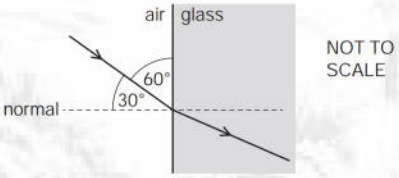
The diagram shows a converging lens forming an image of an object.

Which statement about the image is correct?



ⓐ It is real and can be seen by an eye at X.
ⓑ It is real and can be seen by an eye at Y.
ⓒ It is virtual and can be seen by an eye at X.
ⓓ It is virtual and can be seen by an eye at Y.

The diagram shows light passing from air into glass



The glass has a refractive index of 1.5.
What is the angle of refraction in the glass?

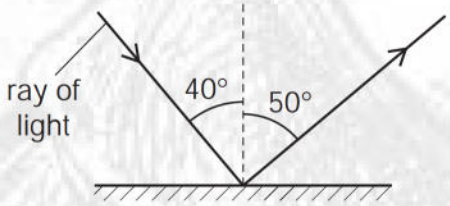
ⓐ 49° ⓑ 35° ⓒ 22° ⓓ 19°

Light enters a glass block at an angle of incidence of 46°.
The light refracts at an angle of refraction of 26°.
What is the refractive index of the glass?

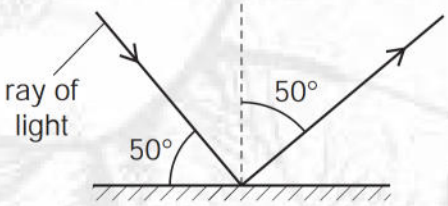
ⓐ 1.77 ⓑ 1.64 ⓒ 0.61 ⓓ 0.57

Which diagram correctly shows a ray of light reflected by a plane mirror?

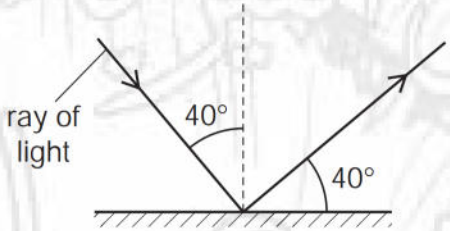
ⓐ



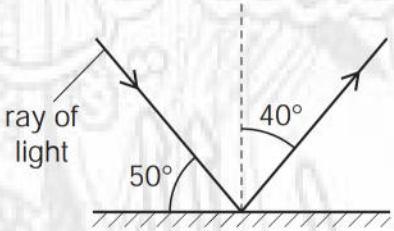
ⓑ



ⓒ

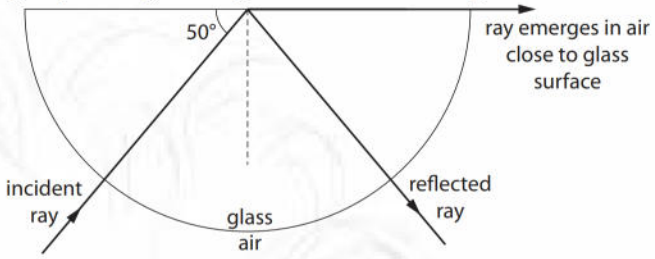


ⓓ



The diagram shows a ray of monochromatic light passing through a semi-circular glass block

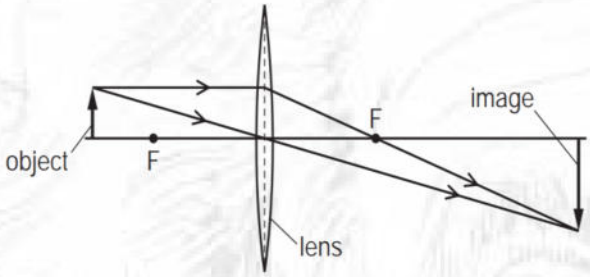
What is the refractive index of the glass?



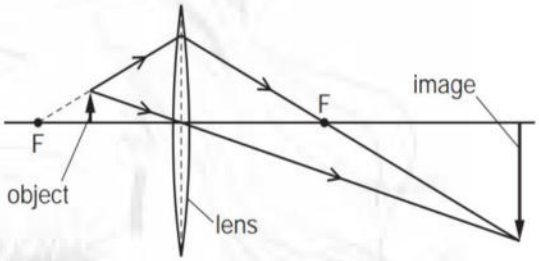
ⓐ 1.56 ⓑ 1.31
ⓒ 0.77 ⓓ 0.64

Which diagram shows how a converging lens is used as a magnifying glass?

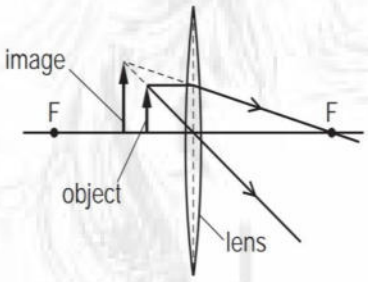
ⓐ



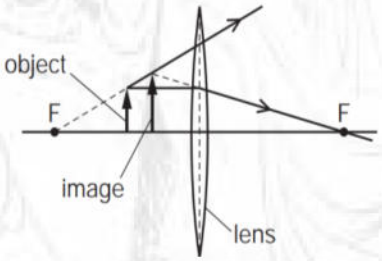
ⓑ



ⓒ

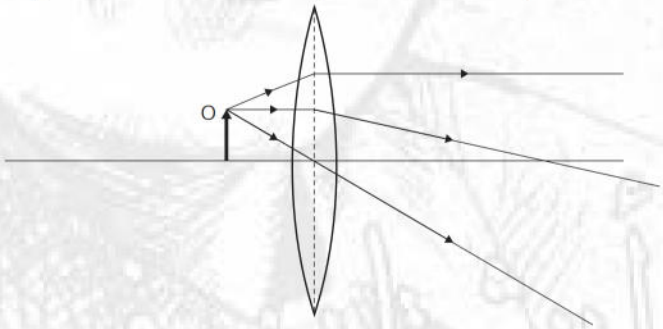


ⓓ



An object O is placed close to a thin converging lens.
The diagram represents three rays from the top of O passing through the lens.

Which type of image is produced by the lens when the object O is in this position?



ⓐ real and diminished
ⓑ real and enlarged
ⓒ virtual and diminished
ⓓ virtual and enlarged

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