

# 3.2 Light

## Question Paper

<b>Level</b>	IGCSE
<b>Subject</b>	Physics (0625)
<b>Exam Board</b>	Cambridge International Examinations(CIE)
<b>Topic</b>	Properties of waves, including light and sound
<b>Sub Topic</b>	3.2 Light
<b>Booklet</b>	Question Paper

**Time Allowed:** 47 minutes

**Score:** /39

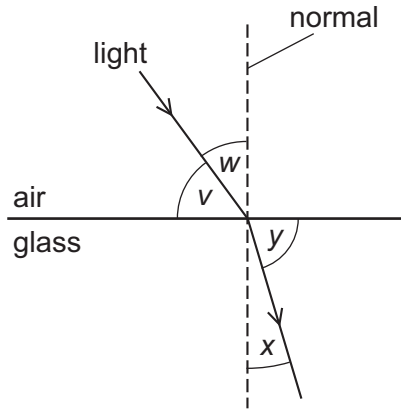
**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	75%	60%	45%	35%	25%	<25%

1 The diagram shows light travelling from air into glass.

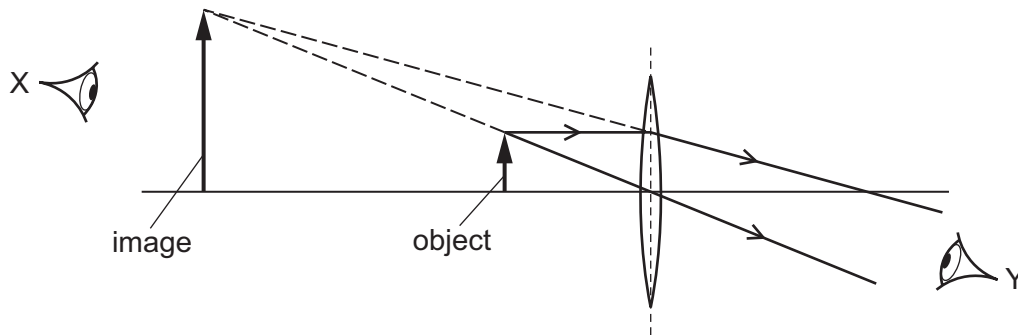
Four angles  $v$ ,  $w$ ,  $x$  and  $y$  are shown.



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

- A**  $n = \frac{\sin v}{\sin y}$      
 **B**  $n = \frac{\sin v}{\sin x}$      
 **C**  $n = \frac{\sin w}{\sin y}$      
 **D**  $n = \frac{\sin w}{\sin x}$

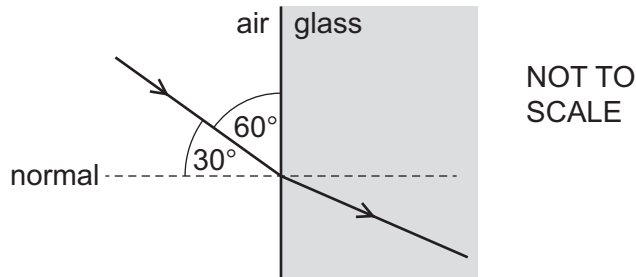
2 The diagram shows a converging lens forming an image of an object.



Which statement about the image is correct?

- A** It is real and can be seen by an eye at X.  
**B** It is real and can be seen by an eye at Y.  
**C** It is virtual and can be seen by an eye at X.  
**D** It is virtual and can be seen by an eye at Y.

- 3 The diagram shows light passing from air into glass.

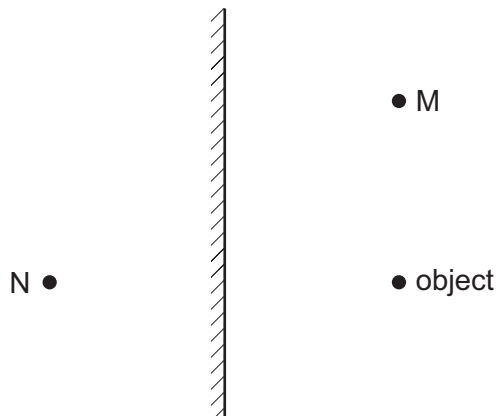


The glass has a refractive index of 1.5.

What is the angle of refraction in the glass?

- A**  $19^\circ$       **B**  $22^\circ$       **C**  $35^\circ$       **D**  $49^\circ$

- 4 The diagram shows an object in front of a plane mirror. The mirror forms an image of the object.



At which labelled point is the image formed, and which type of image is formed?

	where the image is formed	type of image
<b>A</b>	at M	real
<b>B</b>	at M	virtual
<b>C</b>	at N	real
<b>D</b>	at N	virtual

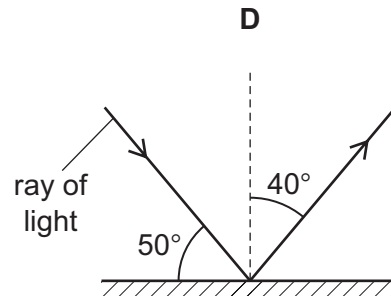
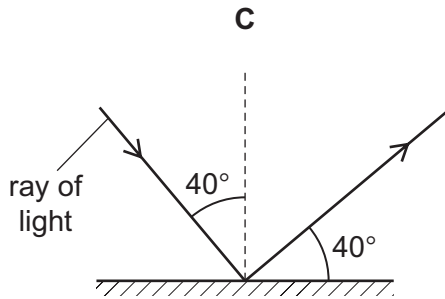
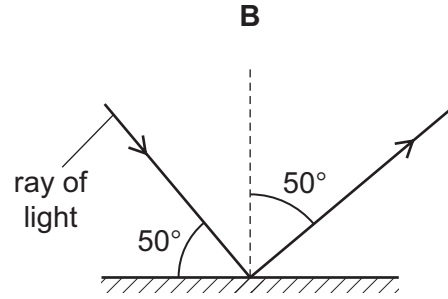
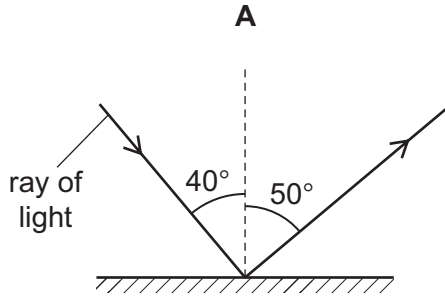
- 5 Light enters a glass block at an angle of incidence of  $46^\circ$ .

The light refracts at an angle of refraction of  $26^\circ$ .

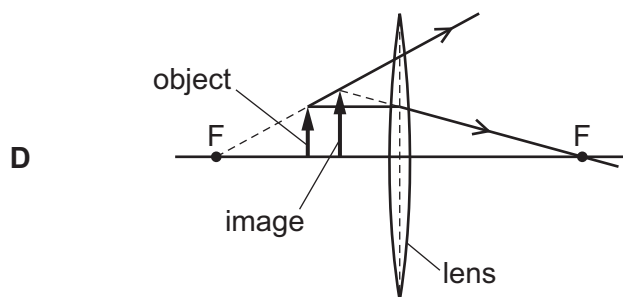
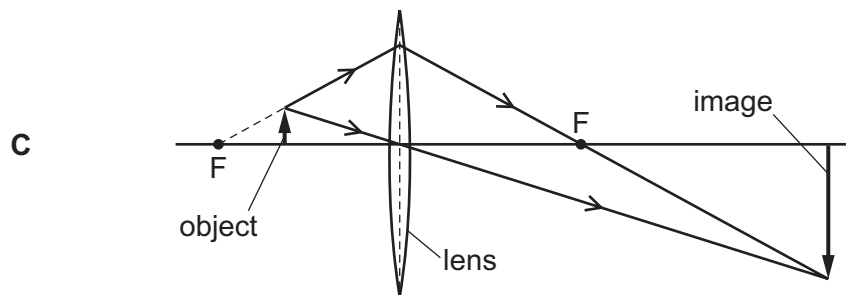
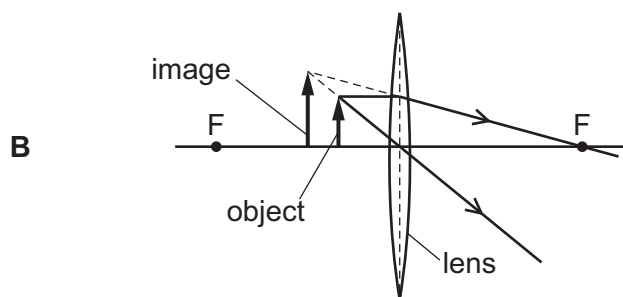
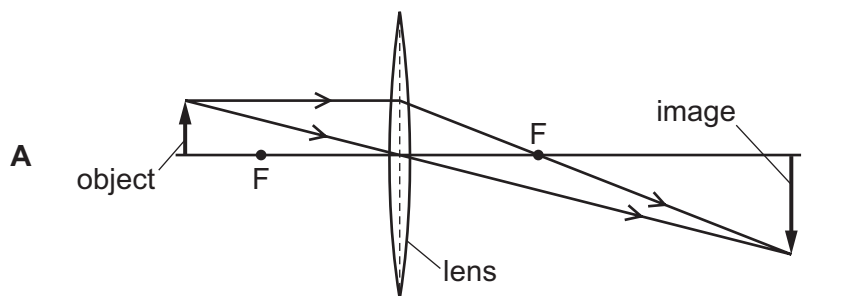
What is the refractive index of the glass?

- A** 0.57      **B** 0.61      **C** 1.64      **D** 1.77

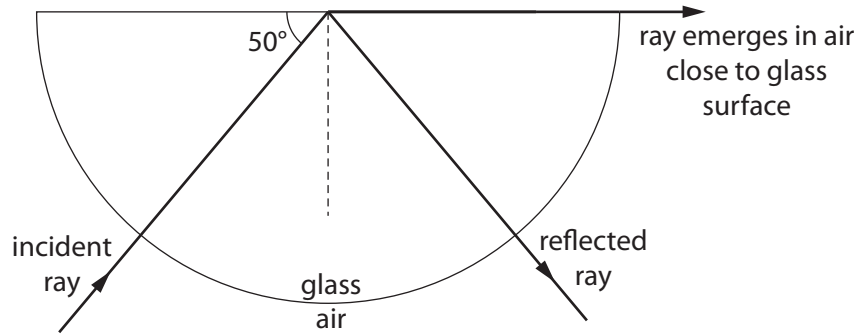
6 Which diagram correctly shows a ray of light reflected by a plane mirror?



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

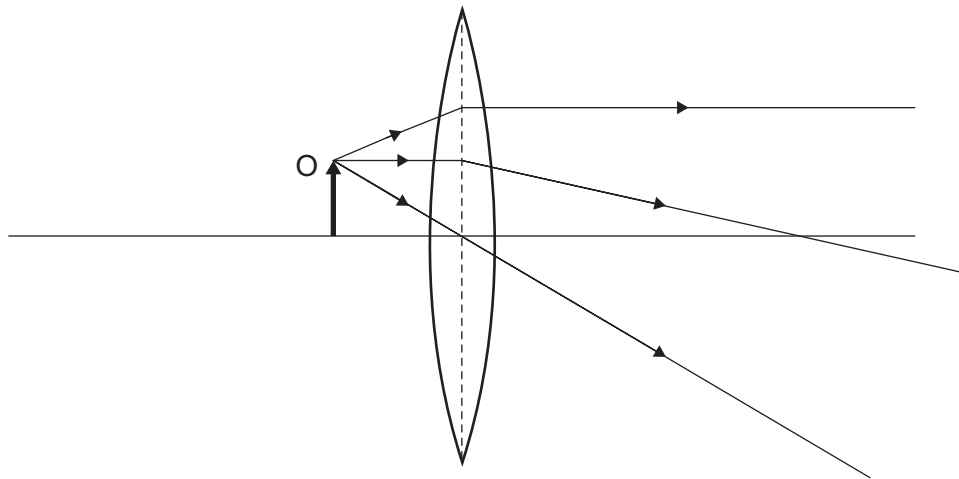


- 8 The diagram shows a ray of monochromatic light passing through a semi-circular glass block.



What is the refractive index of the glass?

- A** 0.64                      **B** 0.77                      **C** 1.31                      **D** 1.56
- 9 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?

- A** real and diminished  
**B** real and enlarged  
**C** virtual and diminished  
**D** virtual and enlarged

10 The diagram shows the electromagnetic spectrum, in order of increasing wavelength.

Three types of radiation, P, Q and R, are missing from the spectrum diagram.

$\gamma$ -rays	X-rays	P	visible light	Q	microwaves	R
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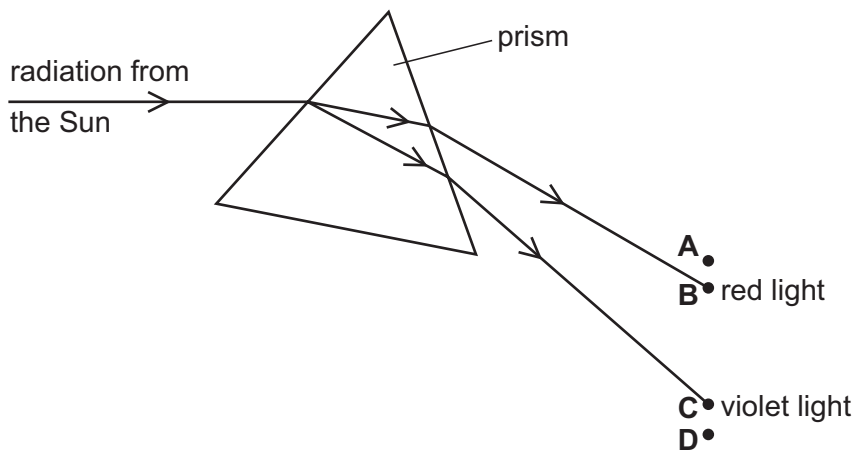
Which types of electromagnetic radiation are represented by P, by Q and by R?

	P	Q	R
<b>A</b>	infra-red	radio waves	ultraviolet
<b>B</b>	infra-red	ultraviolet	radio waves
<b>C</b>	ultraviolet	infra-red	radio waves
<b>D</b>	ultraviolet	radio waves	infra-red

11 Radiation from the Sun is dispersed by a prism. The prism does not absorb any of the radiation.

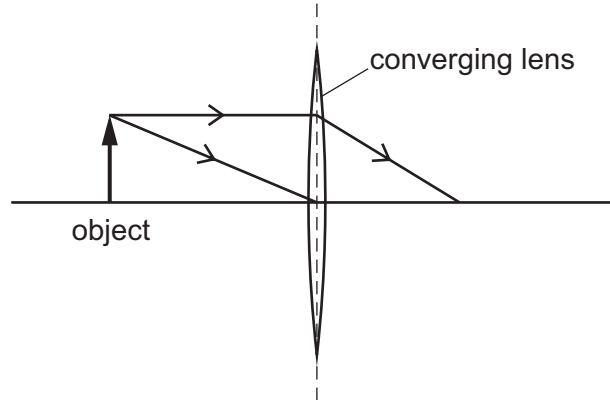
Four identical thermometers are placed, one at each of the labelled positions.

In which position does the thermometer show the greatest rise in temperature?



12 An object is placed in front of a thin converging lens.

The diagram shows the paths of two rays from the top of the object.



An image of the object is formed on a screen to the right of the lens.

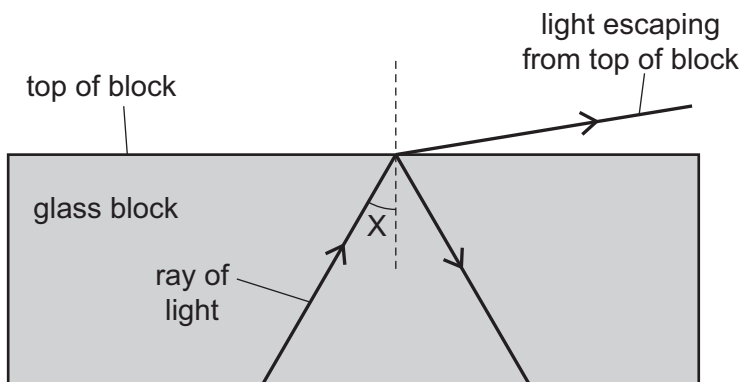
How does this image compare with the object?

- A It is larger and inverted.
- B It is larger and the same way up.
- C It is smaller and inverted.
- D It is smaller and the same way up.



- 13 A scientist tries to direct a ray of light in a glass block so that no light escapes from the top of the block.

However, some light does escape.

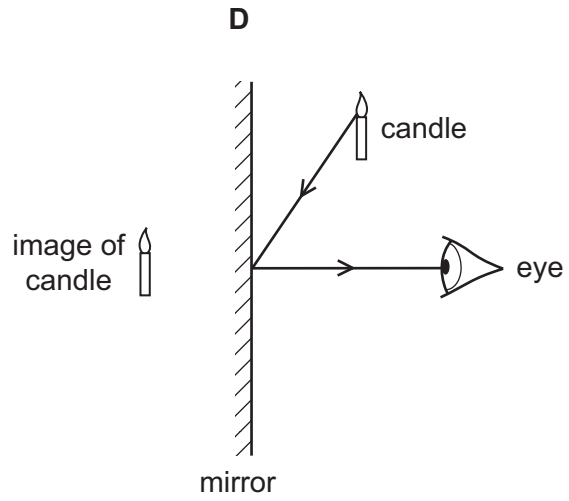
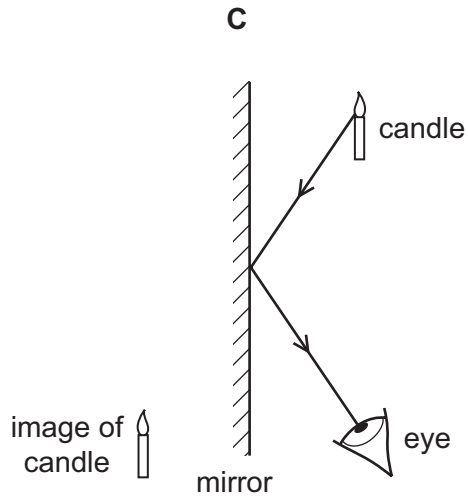
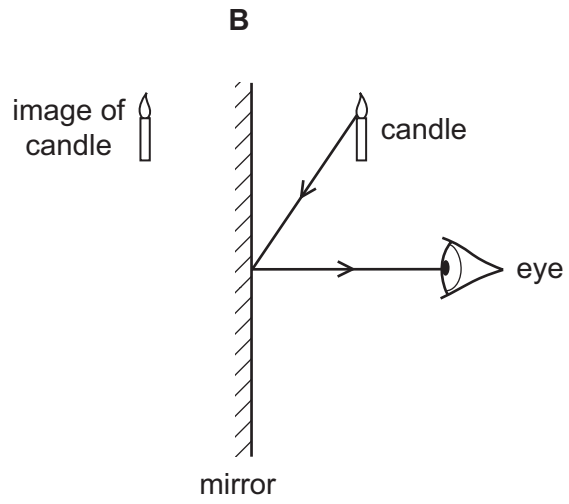
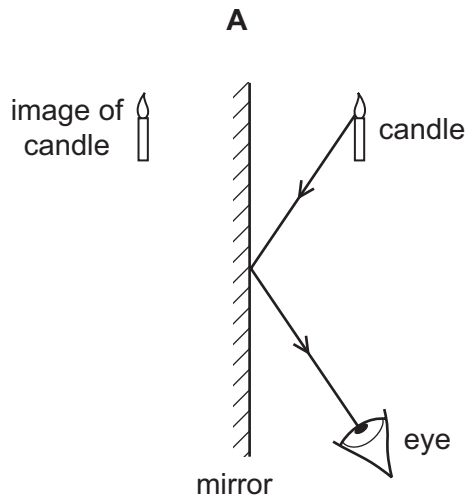


The scientist changes angle  $X$  and stops the light escaping from the top.

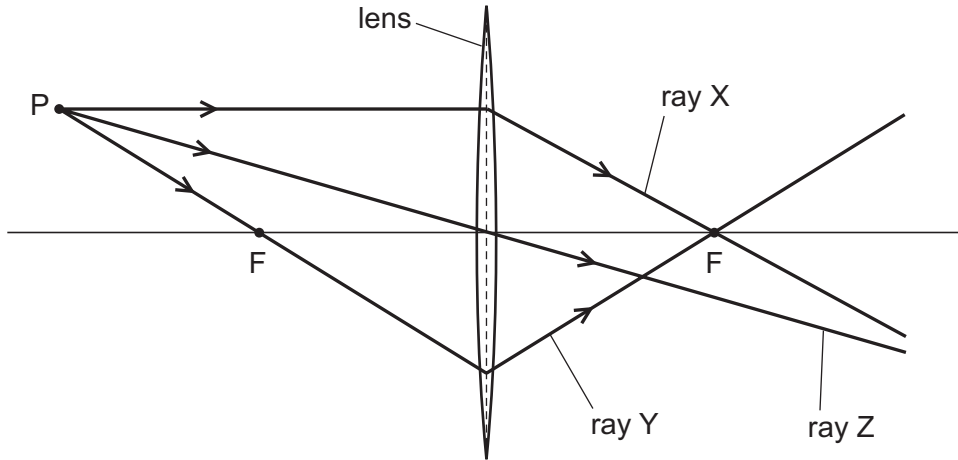
Which row in the table describes the change to angle  $X$  and the name of the effect produced?

	change to angle $X$	name of effect produced
<b>A</b>	decrease	total internal reflection
<b>B</b>	decrease	total internal refraction
<b>C</b>	increase	total internal reflection
<b>D</b>	increase	total internal refraction

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

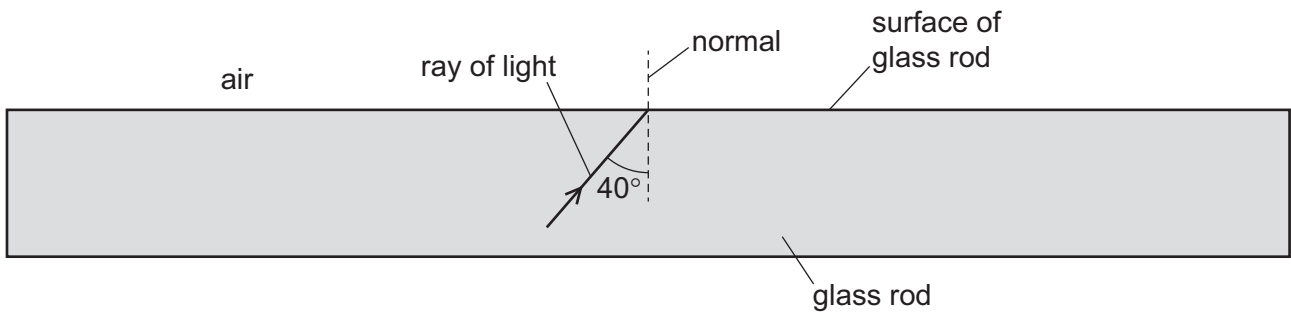


- 15 A student draws a diagram representing three rays of light from point P passing through a converging lens. Each point labelled F is a principal focus of the lens.



Which of the rays has the student drawn correctly?

- A ray X and ray Y
  - B ray X and ray Z
  - C ray Y only
  - D ray Z only
- 16 The diagram shows a ray of light inside a glass rod. The critical angle for the light in the glass is  $42^\circ$ .



Which row shows what happens to the light when it reaches the surface of the glass rod?

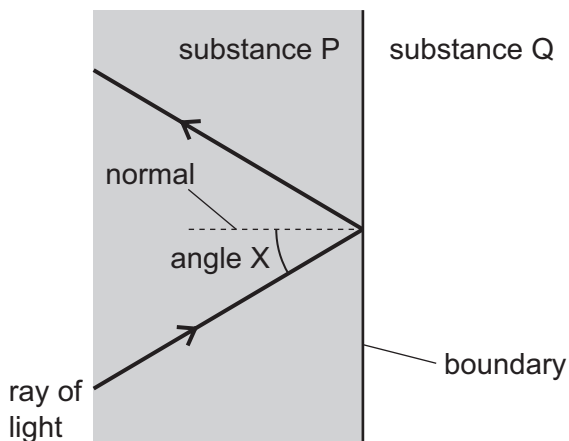
	any light reflected?	any light refracted?
A	no	no
B	no	yes
C	yes	no
D	yes	yes

17 A plane mirror is fitted to a wall.

Which statement about the image formed by the mirror is correct?

- A The image is real.
- B The image is left to right (laterally inverted).
- C The image is smaller than the object.
- D The image is upside down.

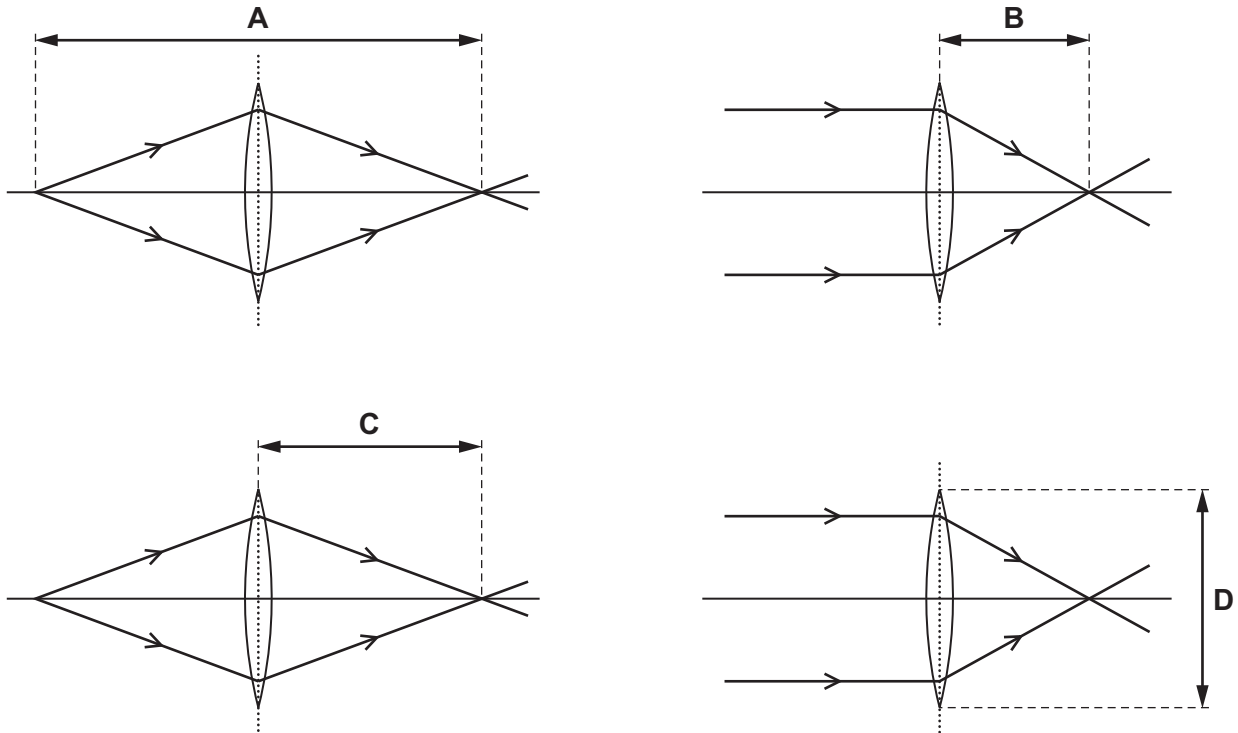
18 The diagram shows a ray of light travelling in a substance P. The ray reaches a boundary with a substance Q. Total internal reflection occurs at the boundary.



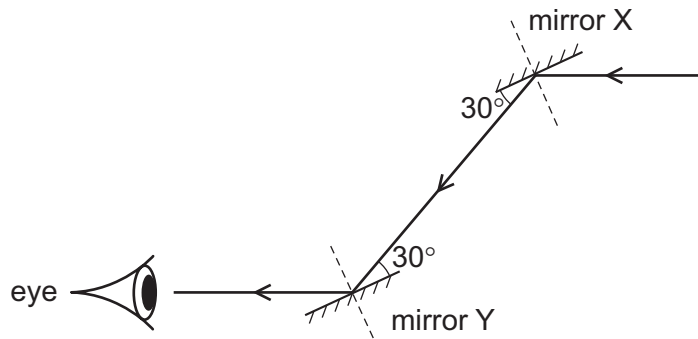
Which row contains correct statements about angle X and about the optical density of substance Q?

	angle X	substance Q
<b>A</b>	smaller than the critical angle	less dense than substance P
<b>B</b>	smaller than the critical angle	more dense than substance P
<b>C</b>	greater than the critical angle	less dense than substance P
<b>D</b>	greater than the critical angle	more dense than substance P

19 Which labelled distance is the focal length of the lens?



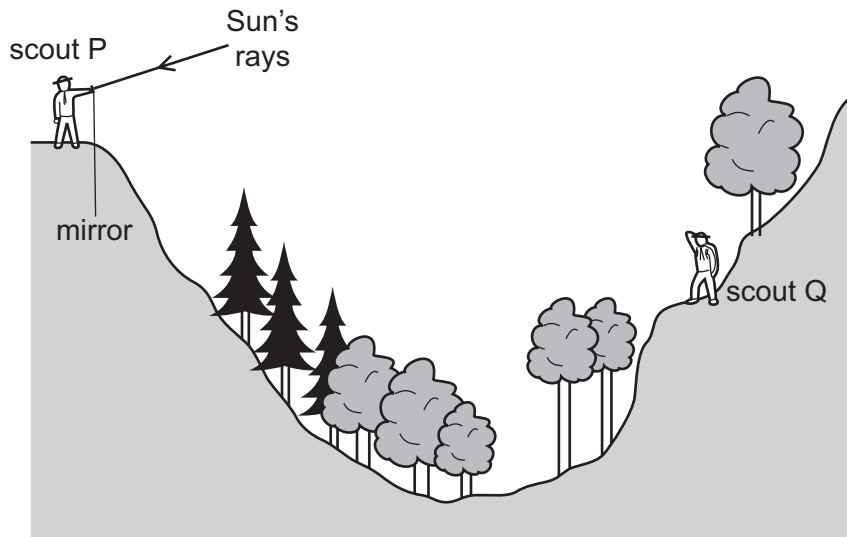
20 A ray of light is reflected by two parallel plane mirrors X and Y.



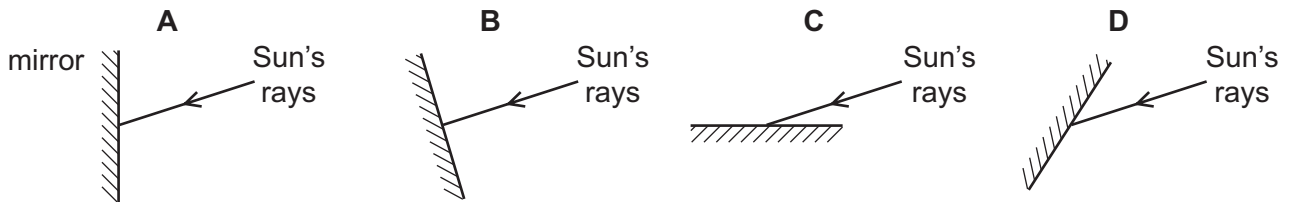
Which statement is correct?

- A The angle of incidence at mirror X is  $30^\circ$ .
- B The angle of incidence at mirror Y is  $60^\circ$ .
- C The angle of reflection at mirror X is  $120^\circ$ .
- D The angle of reflection at mirror Y is  $0^\circ$ .

21 Scout P signals to scout Q on the other side of a valley by using a mirror to reflect the Sun's rays.



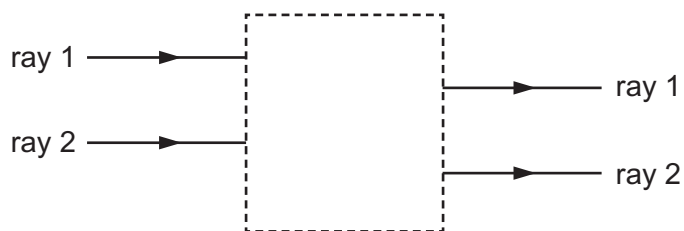
Which mirror position would allow the Sun's rays to be reflected to scout Q?



22 Which statement about a converging lens is **not** correct?

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

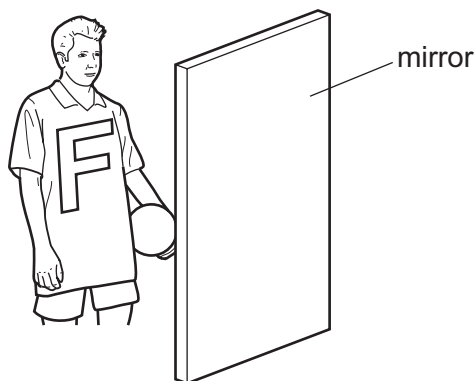
23 Rays of light enter and leave a box.



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

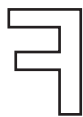
- A a converging lens
- B a parallel-sided glass block
- C a plane mirror
- D a triangular prism

24 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**



**B**



25 Light waves pass from air into glass and are refracted.

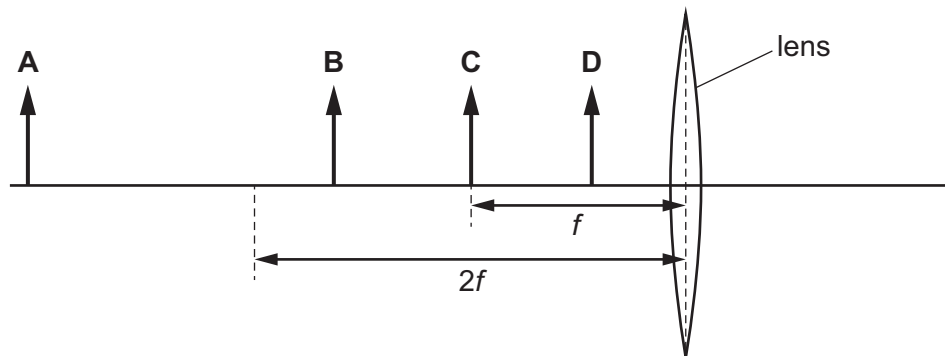
What always remains constant when this happens?

- A direction
- B frequency
- C speed
- D wavelength

26 An object is placed in front of a converging lens. The lens has a focal length  $f$ .

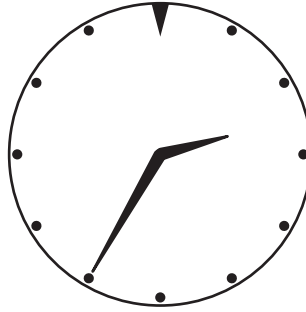
The lens produces a real, enlarged image of the object.

In which labelled position is the object placed?





27 The diagram shows the image of a clock in a plane mirror.



What time is shown?

- A** 02:25      **B** 02:35      **C** 09:25      **D** 09:35

28 A student wishes to measure the speed of sound in air. She plans to measure the time between making a sound and hearing the echo from a cliff.

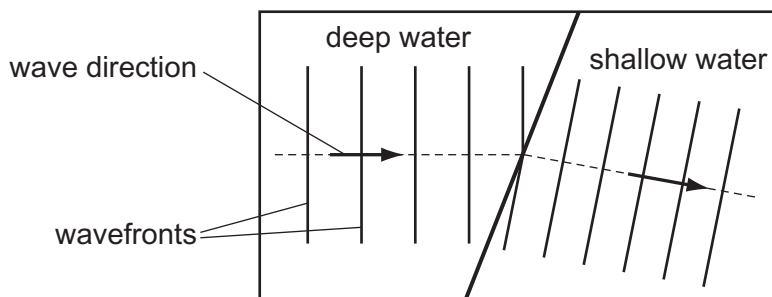


She will use the equation:  $\text{speed} = \frac{\text{distance}}{\text{time}}$ .

Which type of sound should she make and which distance should she use in her calculation?

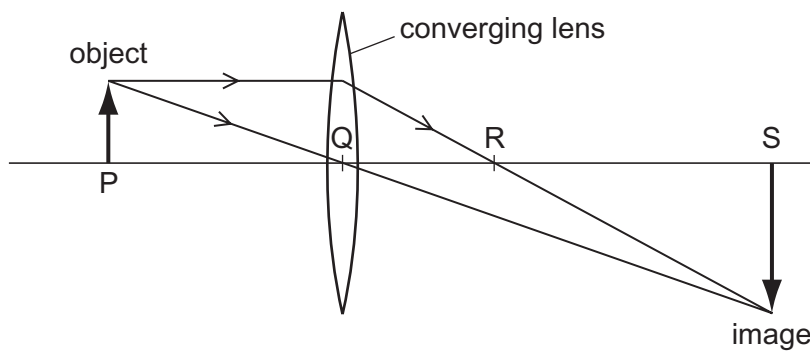
	type of sound	distance to use
<b>A</b>	continuous sound	$\frac{\text{distance to cliff}}{2}$
<b>B</b>	continuous sound	distance to cliff $\times 2$
<b>C</b>	short, sharp sound	$\frac{\text{distance to cliff}}{2}$
<b>D</b>	short, sharp sound	distance to cliff $\times 2$

- 29 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?

- A The frequency of the wave decreases.
  - B The frequency of the wave increases.
  - C The speed of the wave decreases.
  - D The speed of the wave increases.
- 30 The diagram represents a converging lens forming an image of an object.

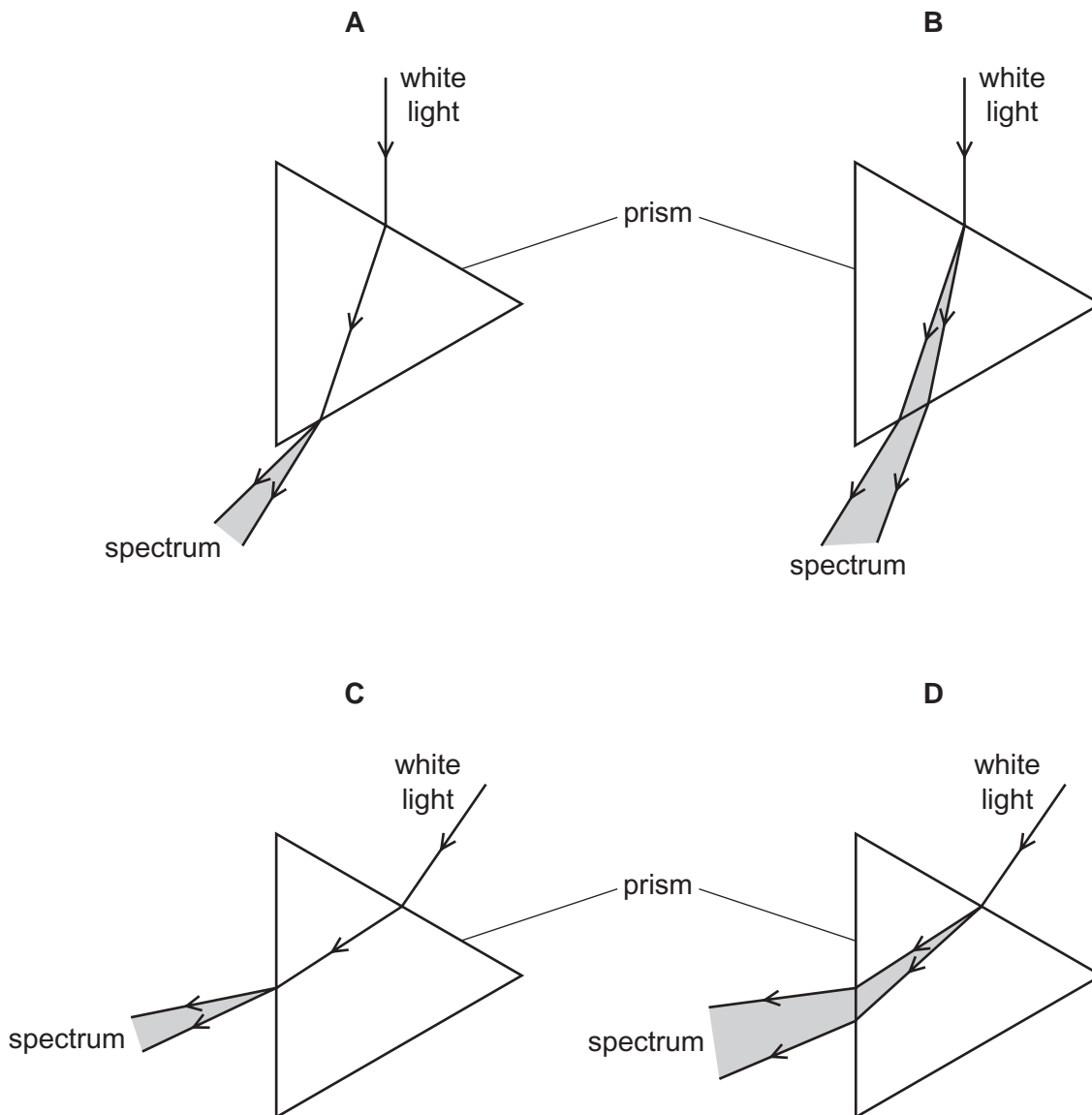


Which distance is the focal length of the lens?

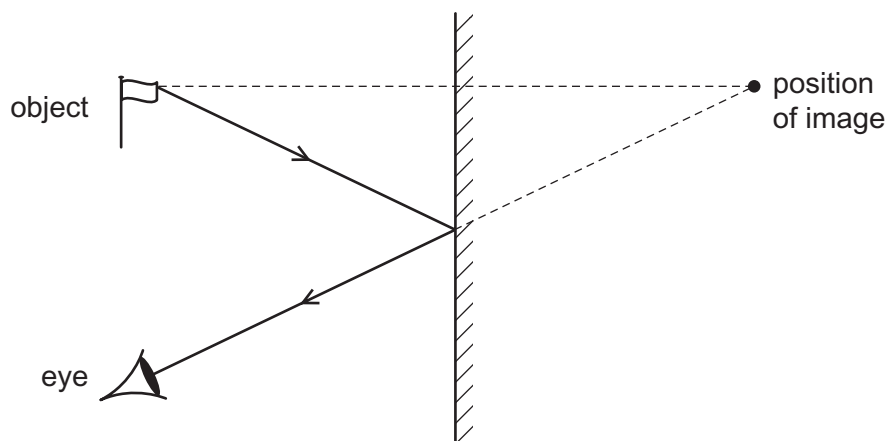
- A PQ
- B PR
- C QR
- D QS

31 A teacher demonstrates the dispersion of white light using a triangular glass prism.

Which diagram shows how this dispersion happens?



32 The image formed by a plane mirror is upright.

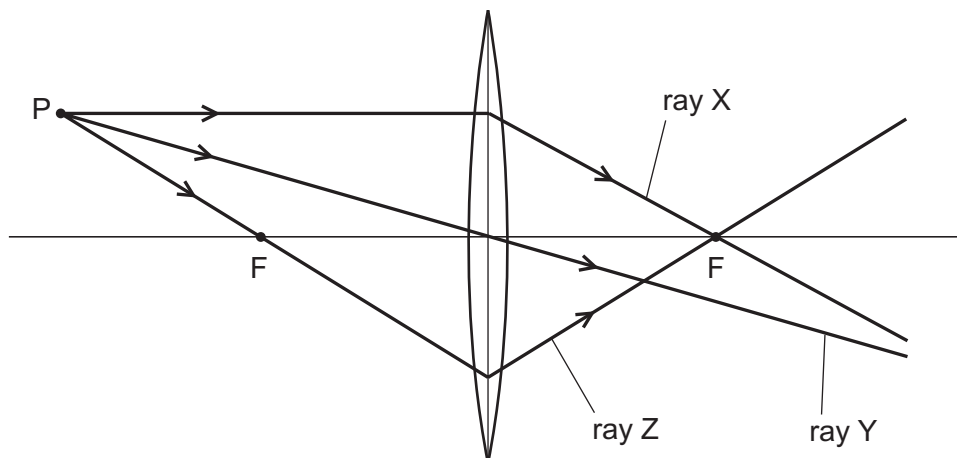


What are the other characteristics of the image?

	laterally inverted (left to right)	magnified (larger than the object)	virtual
<b>A</b>	no	yes	yes
<b>B</b>	yes	no	no
<b>C</b>	yes	no	yes
<b>D</b>	yes	yes	no

33 A student draws three rays of light from point P through a converging lens.

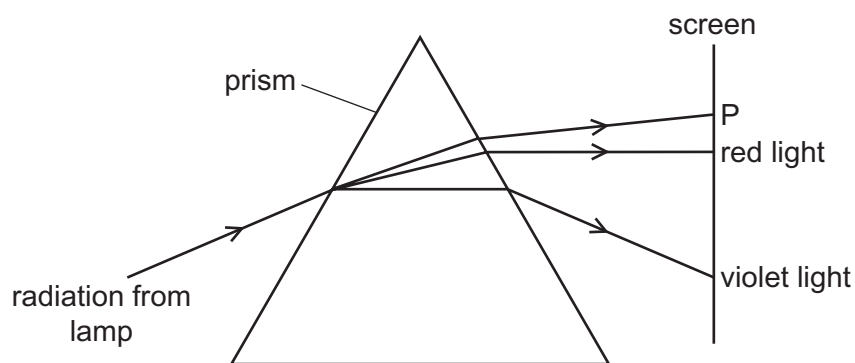
Each point labelled F is a principal focus of the lens.



Which of the rays are drawn correctly?

- A ray Y only
- B ray Z only
- C ray X and ray Y
- D ray X and ray Z

34 The diagram shows radiation from a lamp passing through a prism.

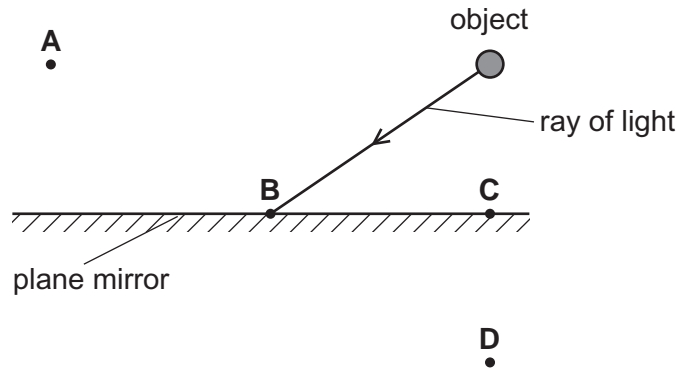


Which type of radiation is found at P?

- A  $\gamma$ -rays
- B infra-red
- C ultraviolet
- D X-rays

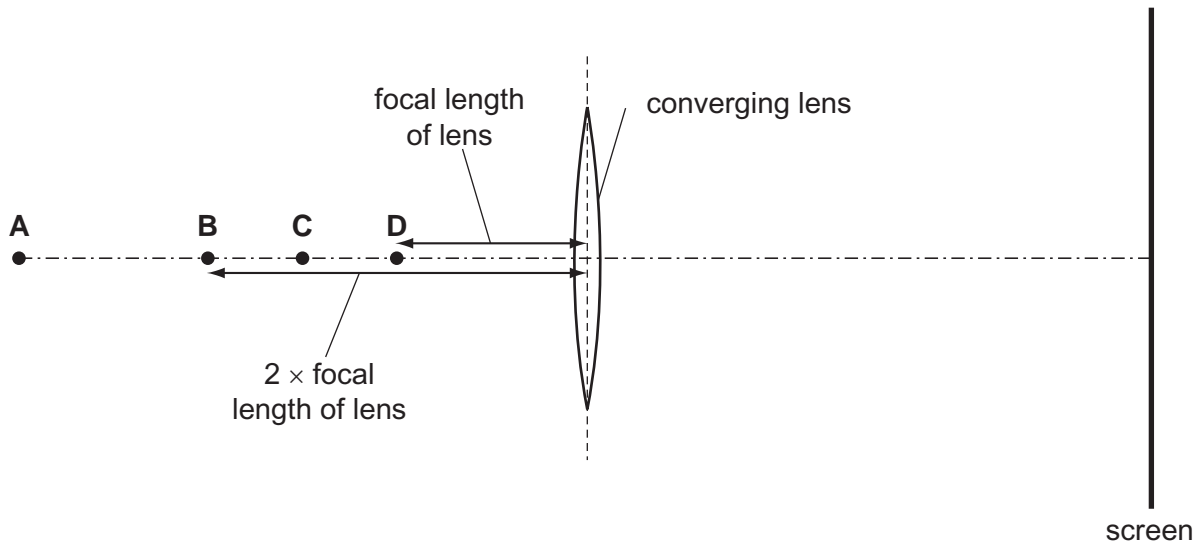
35 A plane mirror is used to form an image of an object.

At which labelled point is the image formed?

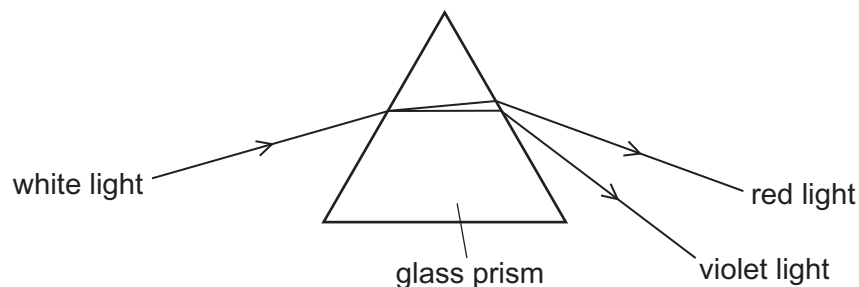


36 A converging lens in a projector is used to make an **enlarged** image of a small piece of film on a screen.

At which labelled point could the piece of film be placed so that the lens produces this image?

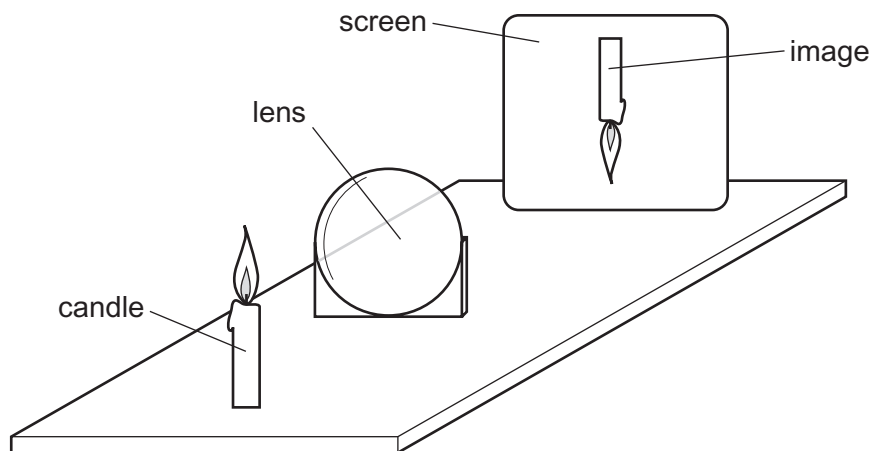


- 37 The diagram shows the dispersion of white light by a glass prism.



Why does dispersion occur when white light enters the glass?

- A The frequency of red light decreases more than that of violet light.
  - B The frequency of violet light decreases more than that of red light.
  - C The speed of red light decreases more than that of violet light.
  - D The speed of violet light decreases more than that of red light.
- 38 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?

- A The image is at the principal focus (focal point) of the lens.
- B The image is bigger than the object.
- C The image is closer to the lens than the object is.
- D The image is inverted.

- 39 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?

