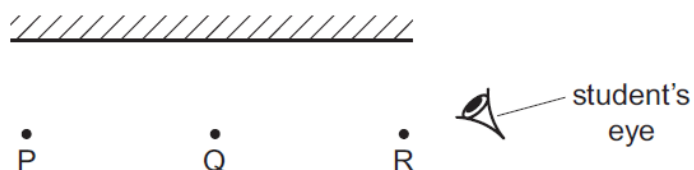


1. Nov/2020/Paper_11/No.27

Three objects P, Q and R are placed in front of a plane mirror.



The student's eye is positioned as shown.

Which of the images of P, Q and R can the student see in the mirror?

	P	Q	R
A	✓	✓	✓
B	✓	✓	x
C	✓	x	x
D	x	x	x

key

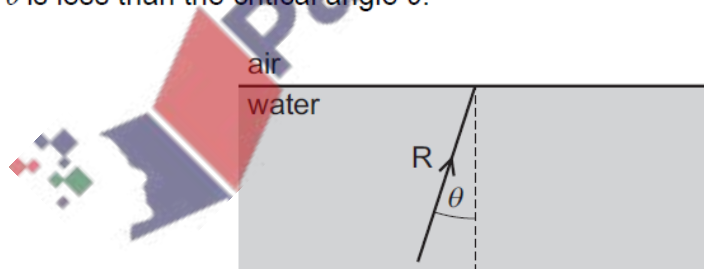
✓ = can see

x = cannot see

2. Nov/2020/Paper_11/No.28

A ray of light R is incident on a water-to-air surface with an angle of incidence θ .

The angle θ is less than the critical angle c .

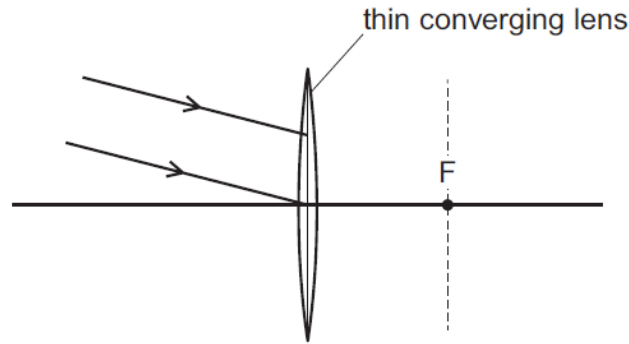


Which statement describes the subsequent path of R?

- A** It travels back into the water with an angle of reflection equal to c .
- B** It travels back into the water with an angle of reflection greater than c .
- C** It travels into air with an angle of refraction greater than θ .
- D** It travels into air with an angle of refraction smaller than θ .

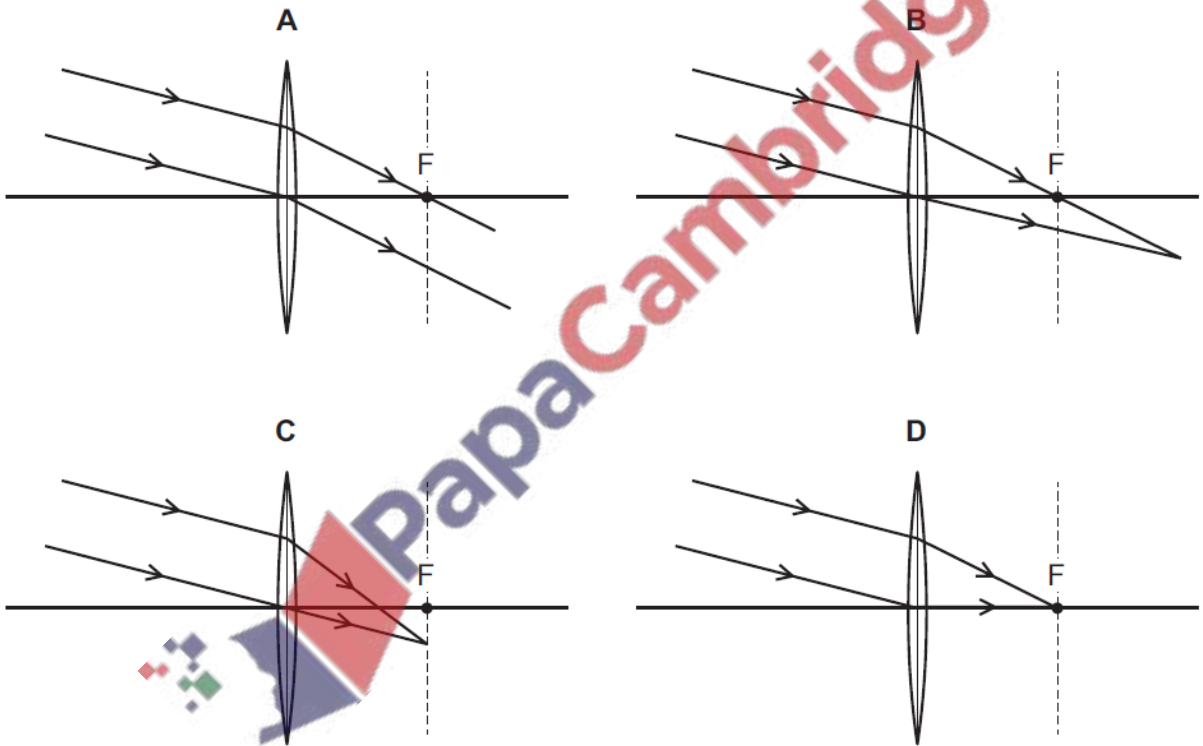
3. Nov/2020/Paper_11/No.29

A parallel beam of light is incident on a thin converging lens.



F is one focal point of the lens.

Which ray diagram shows the light after it has passed through the lens?



4. Nov/2020/Paper_12/No.23

A plane mirror on a vertical wall forms an image of an object placed in front of it.

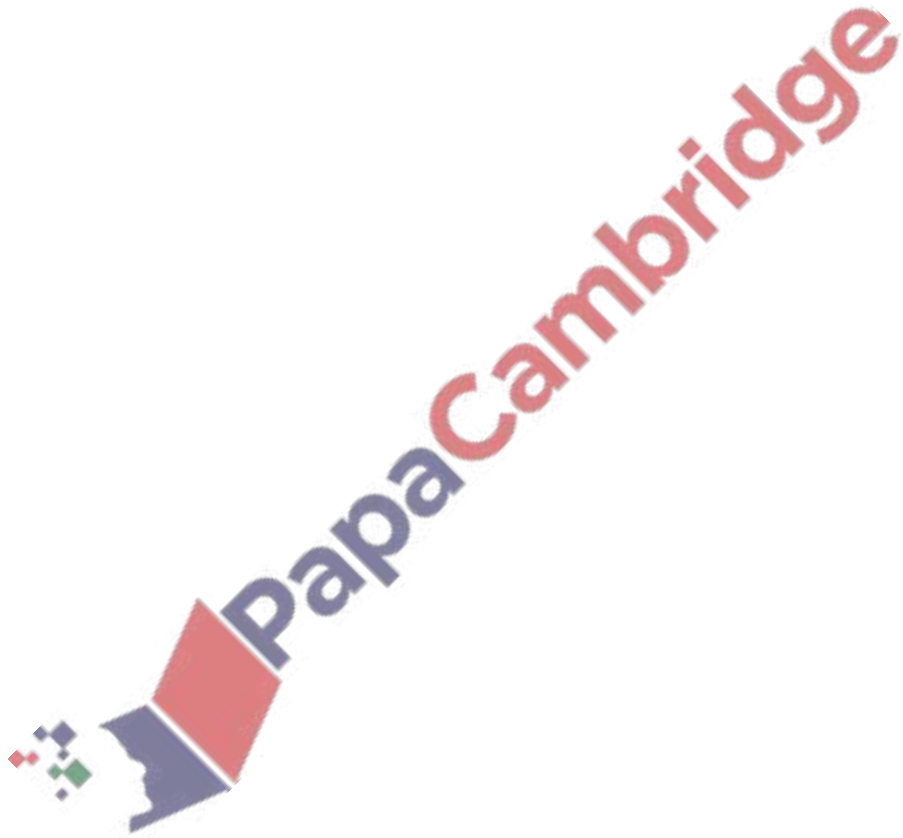
Which characteristics describe the image?

- A real, inverted and smaller than the object
- B real, upright and the same size as the object
- C virtual, upright and smaller than the object
- D virtual, upright and the same size as the object

5. Nov/2020/Paper_12/No.24

Which statement about light passing from air to glass is correct?

- A The frequency of the light waves decreases.
- B The speed of the light waves decreases.
- C The wavelength of the light waves increases.
- D The wavelength of the light waves remains unchanged.



The three angles of a glass prism are 45° , 45° and 90° as shown in Fig. 4.1.

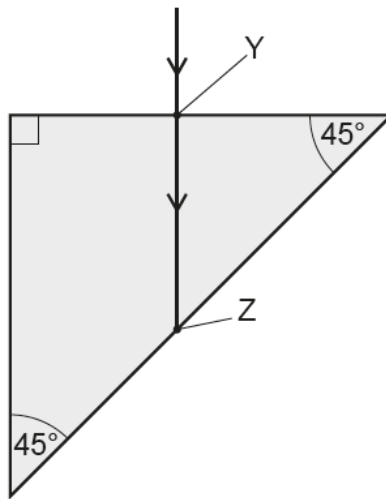


Fig. 4.1

At point Y, a ray of light of a single frequency travels in air and strikes the side of the prism at 90° . The ray passes into the glass prism.

(a) Light travels more slowly in glass than in air.

(i) State what happens to the wavelength of the light in the ray as it enters the glass.

..... [1]

(ii) State what happens to the frequency of the light in the ray as it enters the glass.

..... [1]

(b) The refractive index of glass is 1.6.

(i) Calculate the critical angle for light in glass.

critical angle = [2]

(ii) On Fig. 4.1, sketch the path of the light after it strikes the side of the prism at Z and after it returns to the air. [2]

[Total: 6]

A thin converging lens is made of a transparent material of refractive index 1.4.

(a) A ray of light travelling in air strikes the surface of the lens at an angle of incidence of 55° .

(i) Calculate the angle of refraction.

angle of refraction = [2]

(ii) Place a tick (✓) in **one** of the boxes in the third column of Table 8.1 to indicate how the light ray deviates and what happens to the speed of the light in the ray as it enters the lens.

Table 8.1

direction of deviation	speed of light	
away from the normal	decreases	
away from the normal	does not change	
away from the normal	increases	
towards the normal	decreases	
towards the normal	does not change	
towards the normal	increases	

[1]

(iii) State what happens to the frequency of the light in the ray as it enters the glass.

..... [1]

(b) The focal length of the lens is 2.5 cm.

(i) State what is meant by *focal length*.

.....
 [1]

(ii) Fig. 8.1 is a full-scale diagram that shows an object O of height 3.0 cm and the lens.

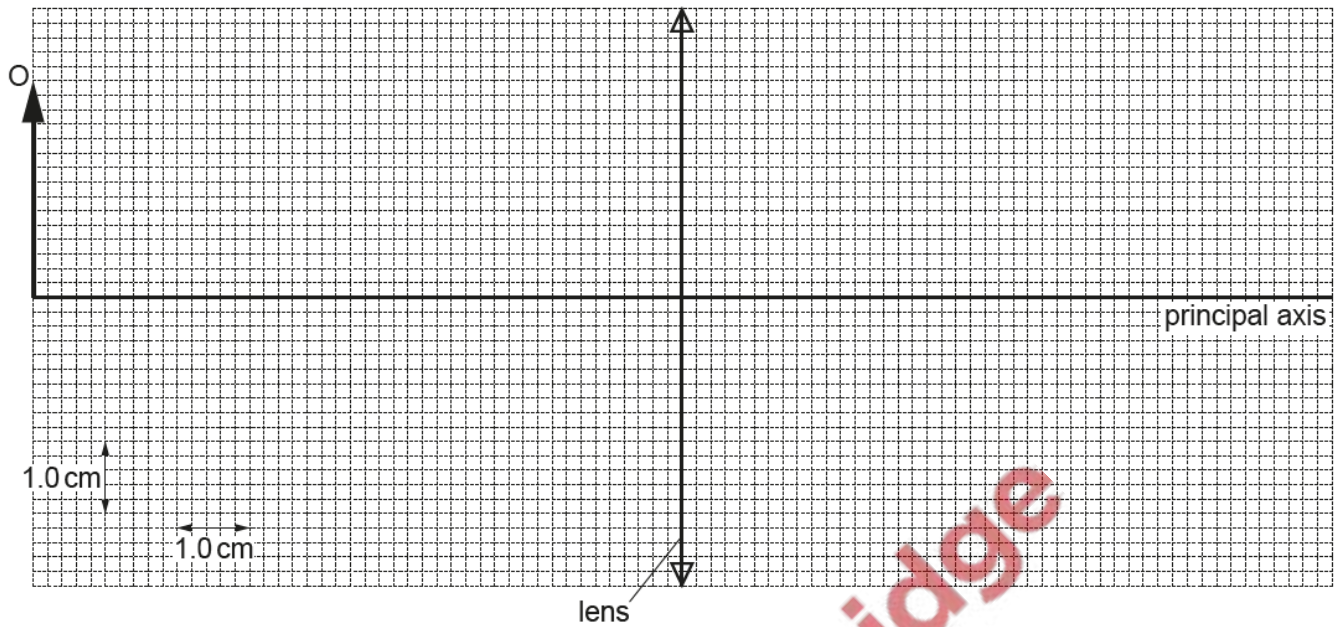


Fig. 8.1 (full scale)

By drawing on Fig. 8.1, locate and mark the image I of O. [4]

(iii) Determine the distance of I from the lens and calculate the magnification of O produced by the lens.

distance =

magnification =

[3]

(c) Describe how a converging lens is used in a camera.

.....

.....

.....

.....

.....

.....

.....

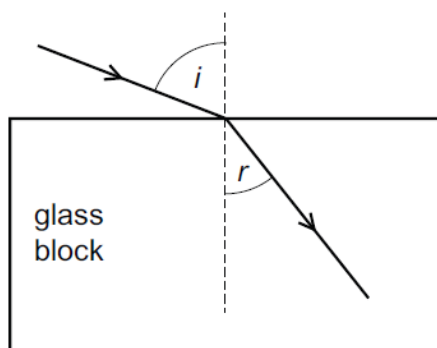
.....

[3]

[Total: 15]

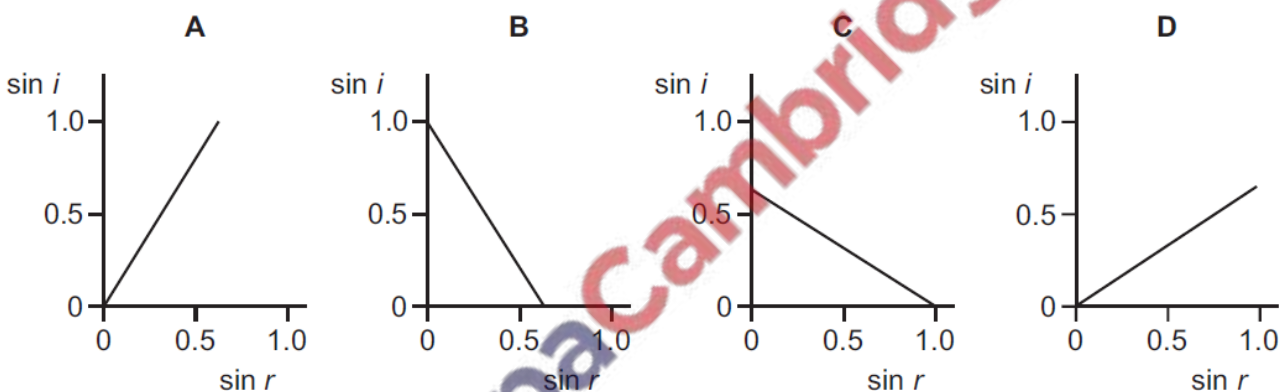
8. June/2020/Paper_11/No.26

Light enters a glass block at an angle of incidence i and it produces an angle of refraction r in the glass.



Several different values of i and r are measured, and a graph is drawn of $\sin i$ against $\sin r$.

Which graph is correct?

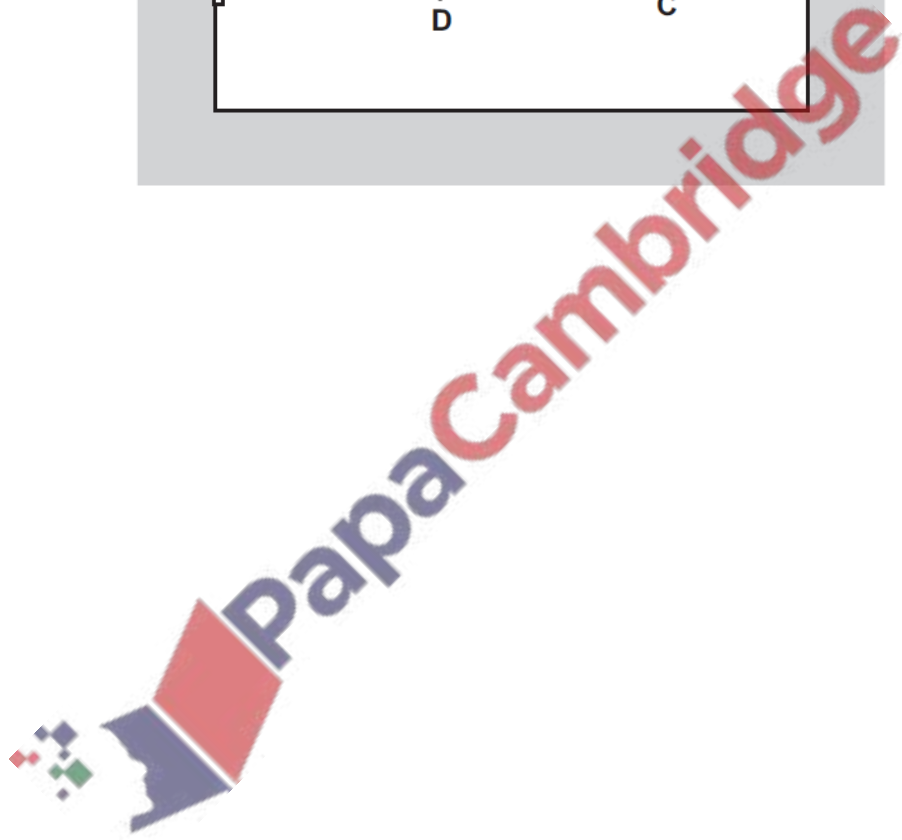
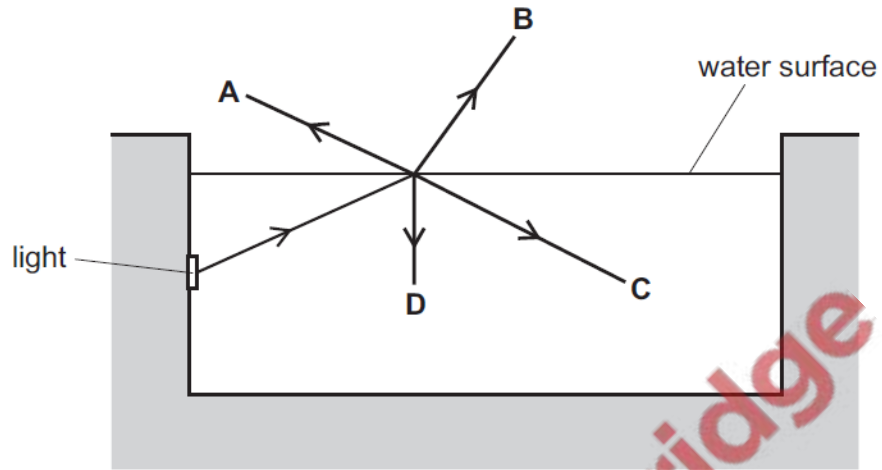


9. June/2020/Paper_11/No.27

A swimming pool is lit by an underwater light.

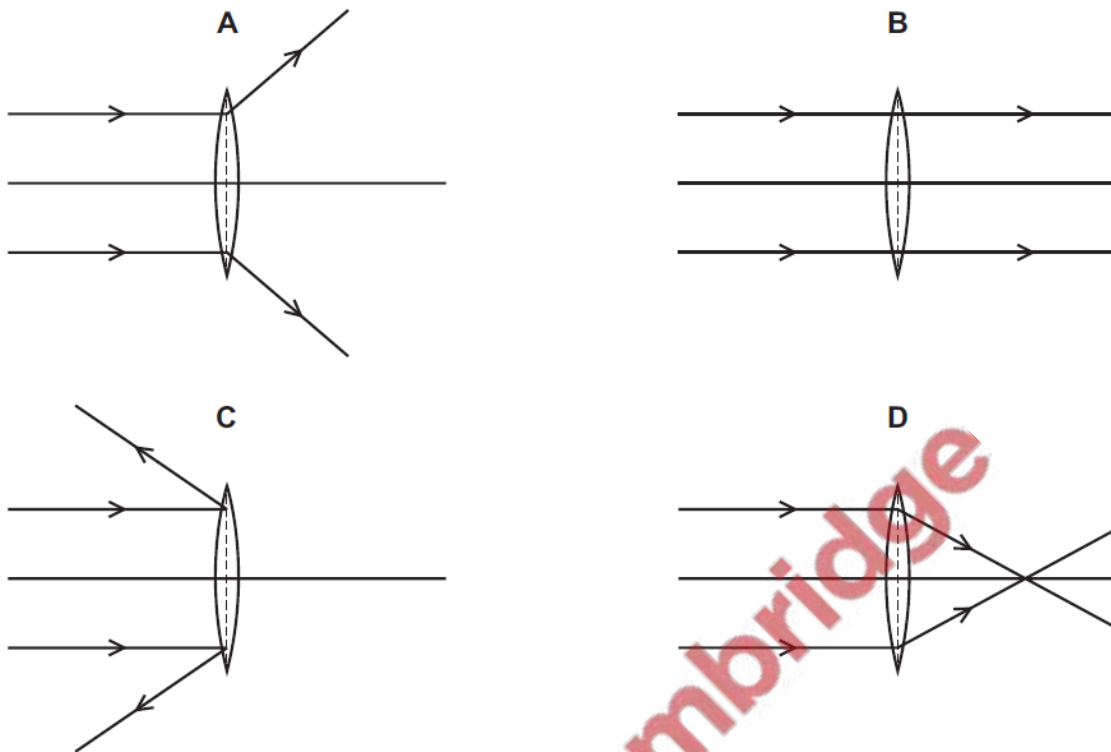
A ray of light is incident on the water surface.

What is the correct path for the ray of light?



10. June/2020/Paper_11/No.28

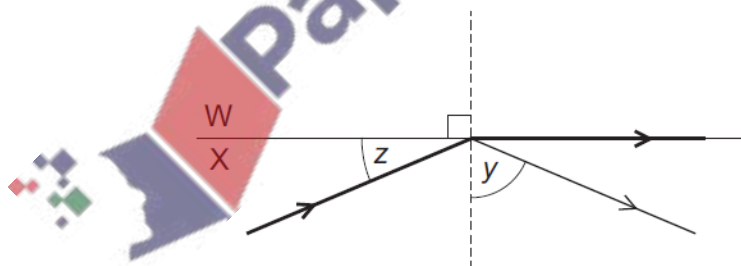
Which diagram shows the action of a converging lens on a parallel beam of light?



11. June/2020/Paper_12/No.31

The diagram shows a ray of light incident on the boundary between two mediums W and X.

The mediums have different refractive indexes.



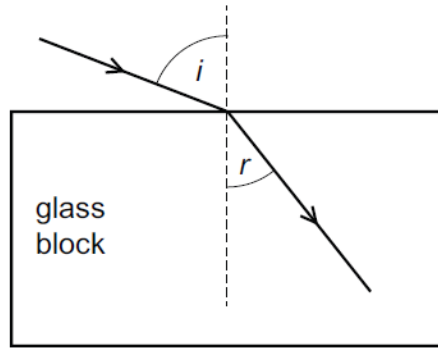
Some light is reflected and some passes along the surface between the two mediums. Angle y is greater than angle z .

Which statement is correct?

- A W has a greater refractive index than X and angle y is equal to the critical angle.
- B W has a greater refractive index than X and angle z is equal to the critical angle.
- C X has a greater refractive index than W and angle y is equal to the critical angle.
- D X has a greater refractive index than W and angle z is equal to the critical angle.

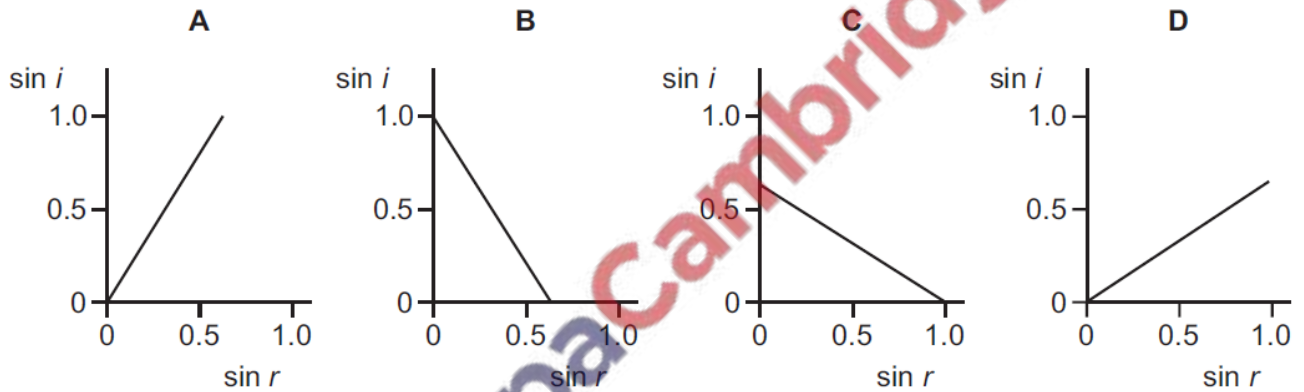
12. June/2020/Paper_12/No.32

Light enters a glass block at an angle of incidence i and it produces an angle of refraction r in the glass.



Several different values of i and r are measured, and a graph is drawn of $\sin i$ against $\sin r$.

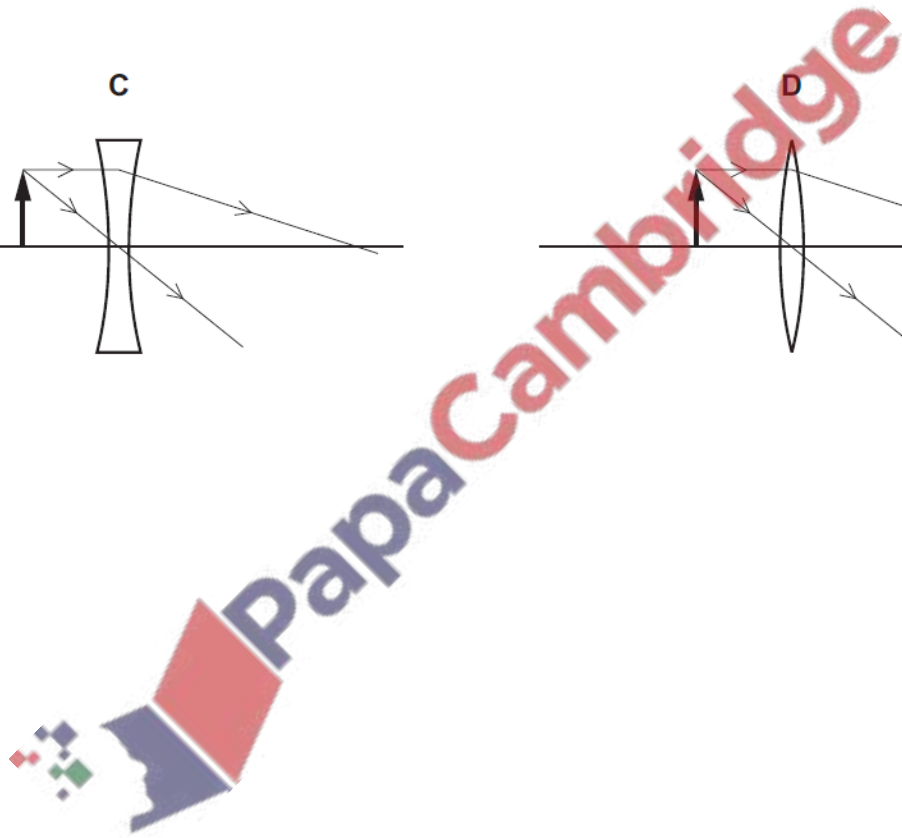
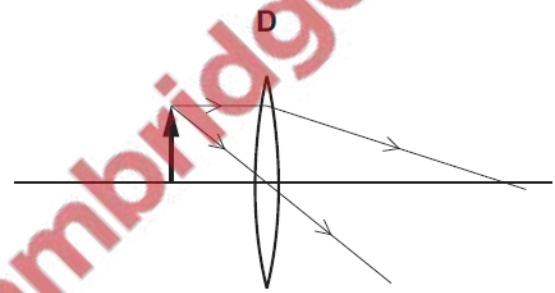
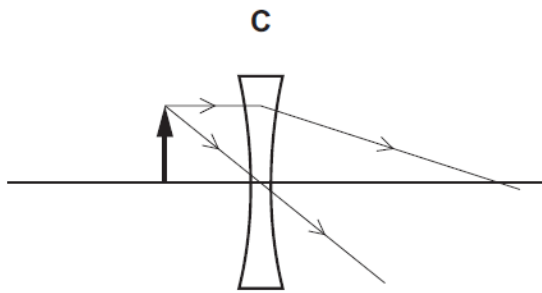
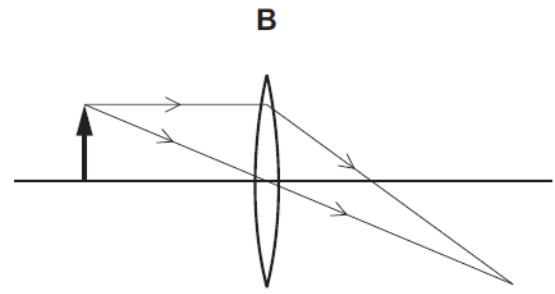
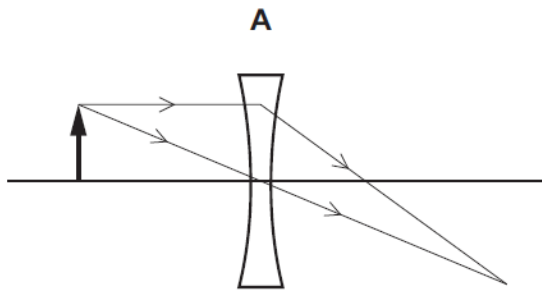
Which graph is correct?



13. June/2020/Paper_12/No.33

A converging glass lens is used to produce a virtual, magnified image.

Which ray diagram shows the rays passing through the converging lens?



14. June/2020/Paper_21/No.6

A dentist uses a plane mirror to see the back of a tooth.

- (a) A plane mirror produces an image of an object.

Describe the position of this image.

.....
.....
..... [2]

- (b) Fig. 6.1 shows the plane mirror used by the dentist to see the point labelled X on the tooth.

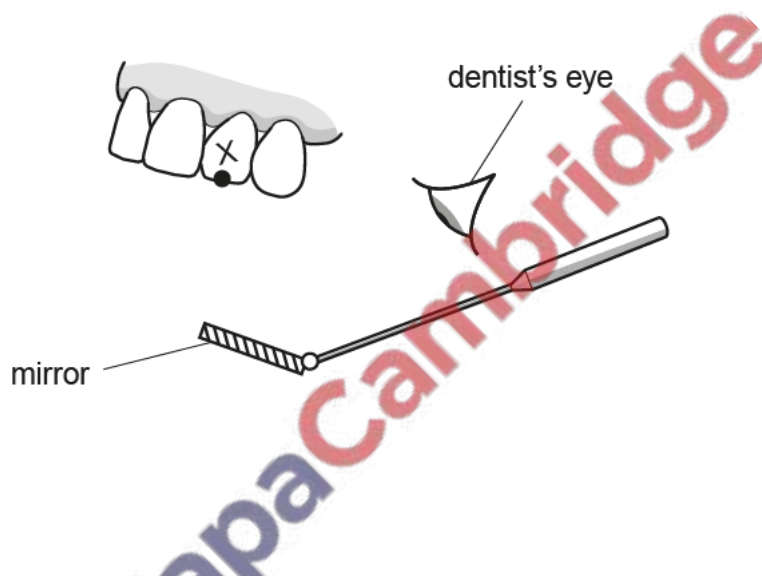


Fig. 6.1

On Fig. 6.1:

- (i) mark the position of the image of X formed by the mirror [1]
(ii) draw a ray of light from X to show how the dentist can see the tooth. [2]

- (c) State **one** characteristic of the image formed by the plane mirror other than its position.

.....
..... [1]

[Total: 6]

(a) Two mirrors, A and B, are inclined at an angle of 60° to each other.

Light strikes mirror A at an angle of 30° , as shown in Fig. 4.1.

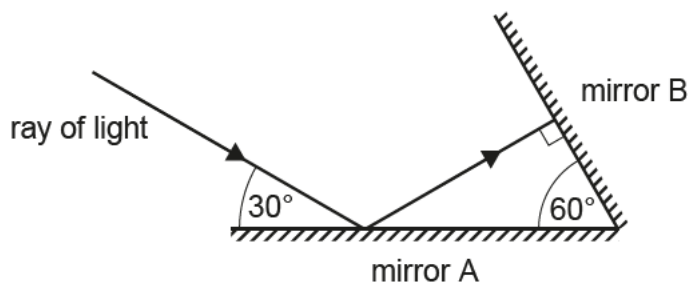


Fig. 4.1

(i) Determine the angle of incidence at mirror A.

angle of incidence at A = [1]

(ii) Determine the angle of incidence at mirror B.

angle of incidence at B = [1]

(iii) Describe the path of the reflected ray after it leaves mirror B.

.....
 [1]

(b) A plane mirror hanging on a wall is used to form the image of an object.

State **three** characteristics of the image formed.

1.
 2.
 3.
- [3]

[Total: 6]