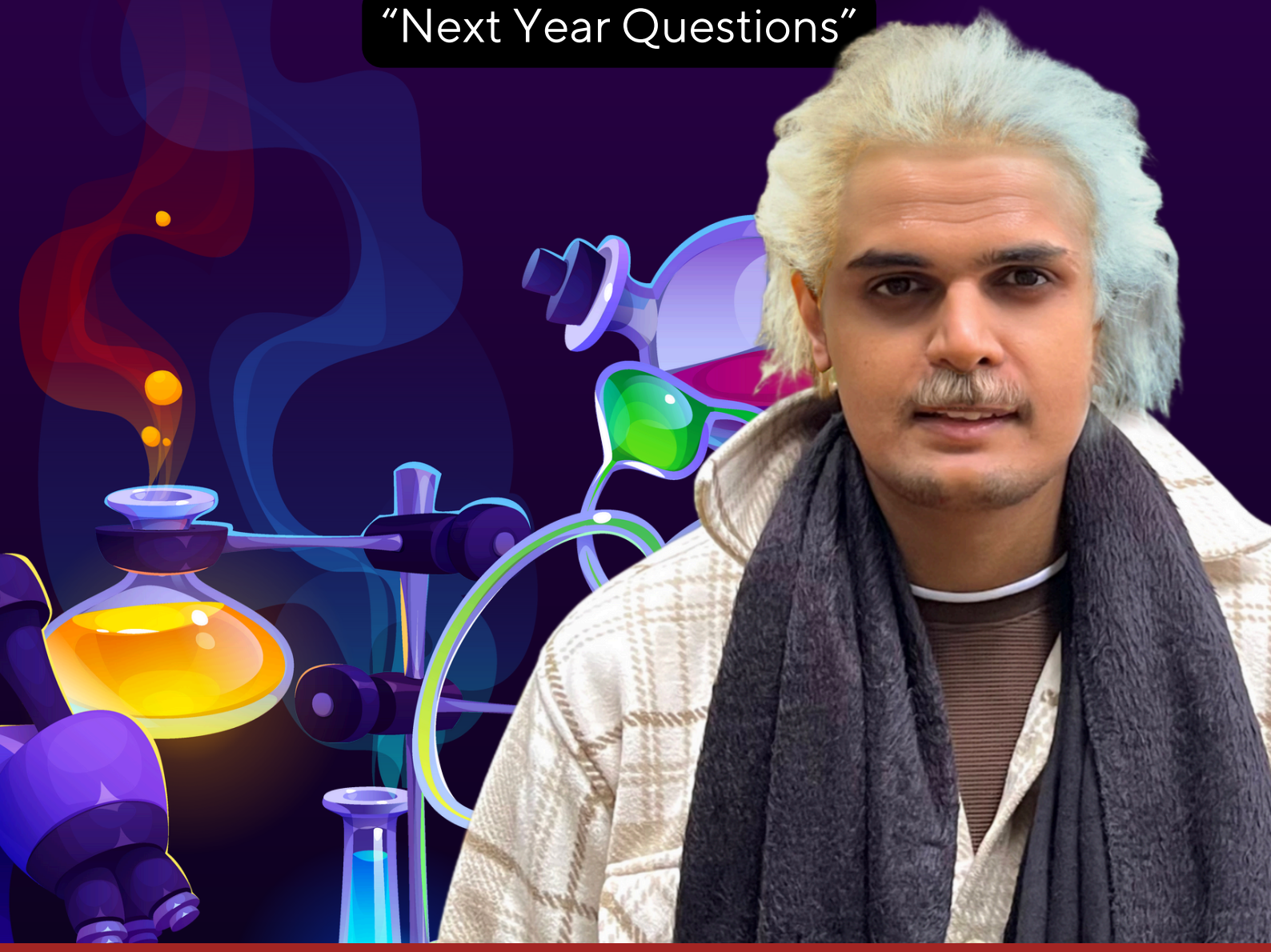
Next Toppers

Class X

अभय

NYQs

"Next Year Questions"



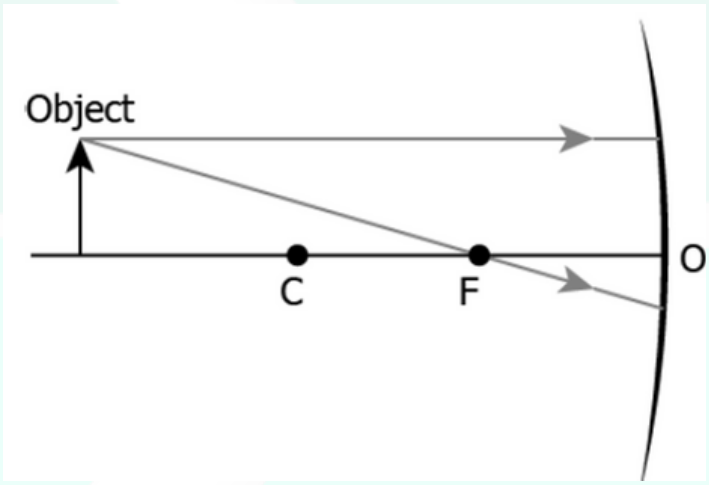
Light

PRASHANT KIRAD

Light

Q1. Which statement is true for the reflection of light?
(a) The angle of incidence and reflection are equal.
(b) The reflected light is less bright than the incident light.
(c) The sum of the angle of incidence and reflection is always greater than 900.
(d) The beams of the incident light, after reflection, diverge at unequal angles.

Q2. The image shows the path of incident rays to a concave mirror. Where would the reflected rays meet for the image formation to take place?
(a) Behind the mirror
(b) Between F and O
(c) Between C and F
(d) Beyond C



Q3. Magnification produced by a rear view mirror fitted in vehicles:
(a) is less than one
(b) is more than one
(c) is equal to one
(d) can be more than or less than one, depending upon the position of the object in front of it

Q4. A student conducts an experiment using a convex lens. He places the object at a distance of 60 cm in front of the lens and observes that the image is formed at a distance of 30 cm behind the lens. What is the power of the lens?
(a) 0.005 dioptre
(b) 0.05 dioptre
(c) 5 dioptre
(d) 50 dioptre

Q5. In optics an object which has higher refractive index is called
(a) Optically rarer
(b) Optically denser
(c) Optical density
(d) Refractive index

Q6. If the image formed by a spherical mirror for all positions of the object placed in front of it is always erect and diminished , what type of mirror is it? Draw a labelled ray diagram to support your answer.

Q7.Name the type of mirrors used in the design of solar furnaces. Explain how high temperature is achieved by this device.

Q8. Draw ray diagrams for the following cases when a ray of light:
(i) passing through centre of curvature of a concave mirror is incident on it.
(ii) parallel to principal axis is incident on convex mirror.
(iii) is passing through focus of a concave mirror incident on it.

Q9. An object 4 cm in height, is placed at 15 cm in front of a concave mirror of focal length 10 cm. At what distance from the mirror should a screen be placed to obtain a sharp image of the object. Calculate the height of the image.

Q10. A spherical mirror produces an image of magnification -1 on a screen placed at a distance of 40 cm from the mirror.
(i) Write type of mirror.
(ii) What is the nature of the image formed?
(iii) How far is the object located from the mirror?
(iv) Draw the ray diagram to show the image formation in this case.

Q11. (a) Define the following terms in the context of spherical mirrors:
(i) Pole
(ii) Centre of curvature
(iii) Principal axis
(iv) Principal focus

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Q12. What is meant by power of a lens?

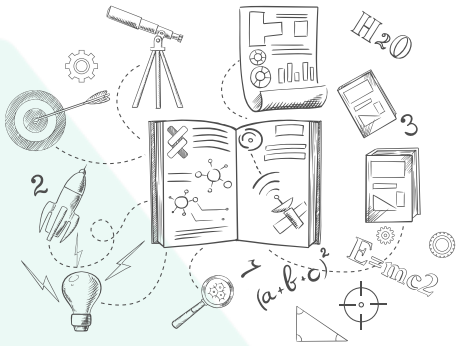
Q13. “A ray of light incident on a rectangular glass slab immersed in any medium emerges parallel to itself.” Draw labelled ray diagram to justify the statement”

Q14. The image of an object formed by a lens is of magnification -1. If the distance between the object and its image is 60 cm, what is the focal length of the lens? If the object is moved 20 cm towards the lens, where would the image be formed? State reason and also draw a ray diagram in support of your answer.

Q15. What are the laws of reflection of light?

SOLUTION

Ans1.a



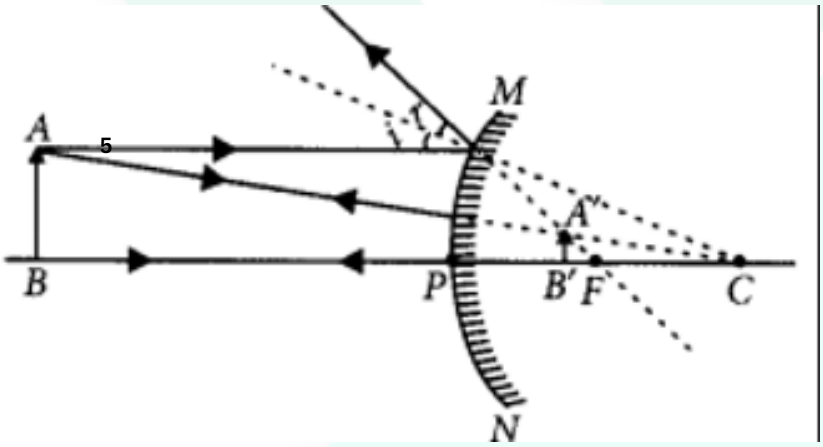
Ans 2. c

Ans 3. A

Ans 4. C

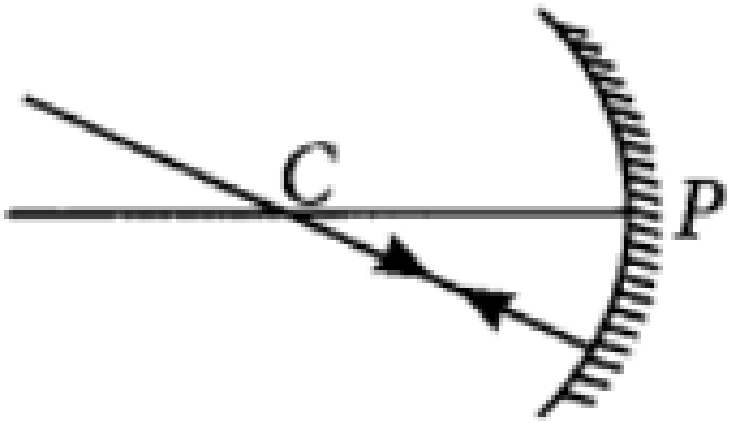
Ans 5.B

Ans6.If the image formed by a spherical mirror is always erect and diminished then it is convex mirror.

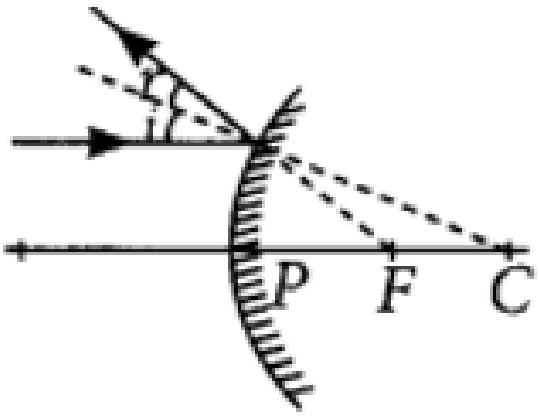


Ans7. Concave mirrors are used in the designing of solar furnaces. When a solar furnace is placed at the focus of a large concave mirror, it focuses a parallel beam of light on the furnace. Therefore, a high temperature is attained at the point after some time.

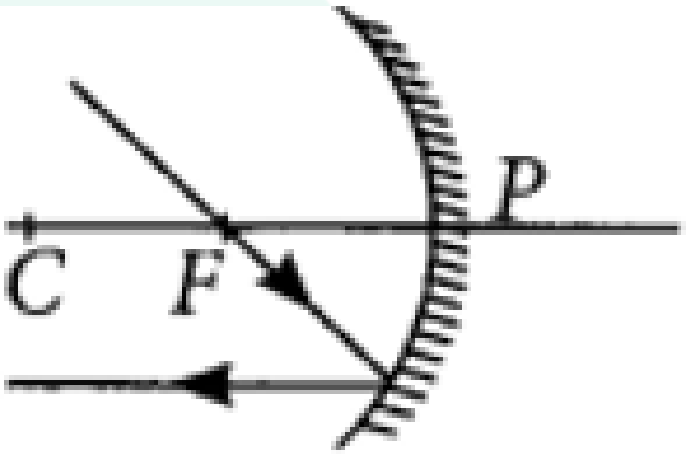
Ans8 (i)



(ii)

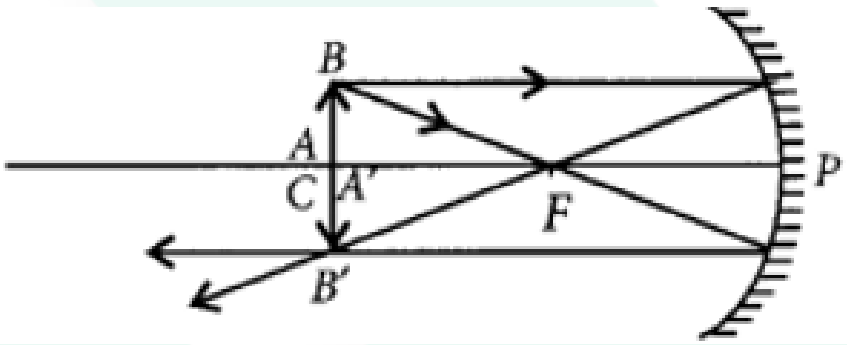


(iii)



Q9. Given : object distance, u = -15 cm,
object height, h = 4 cm, focal length f = -10 cm;
Image distance, v = ?
Using mirror formula,
$1/v+1u=1/f \Rightarrow 1/v+1/(-15)=1/-10 \Rightarrow 1/v=1/15-1/10$
or $1/v=10-15/150=-5/150=-1/30$ or v = -30
In order to obtain a sharp image of the object on the screen, screen should be placed at a distance of 30 cm in front of the mirror.
$m=h/h'=-v/u$
Substitute values:
$m= -(-30)/-15=2$
$h'=m\times h=2\times 4= +8cm$

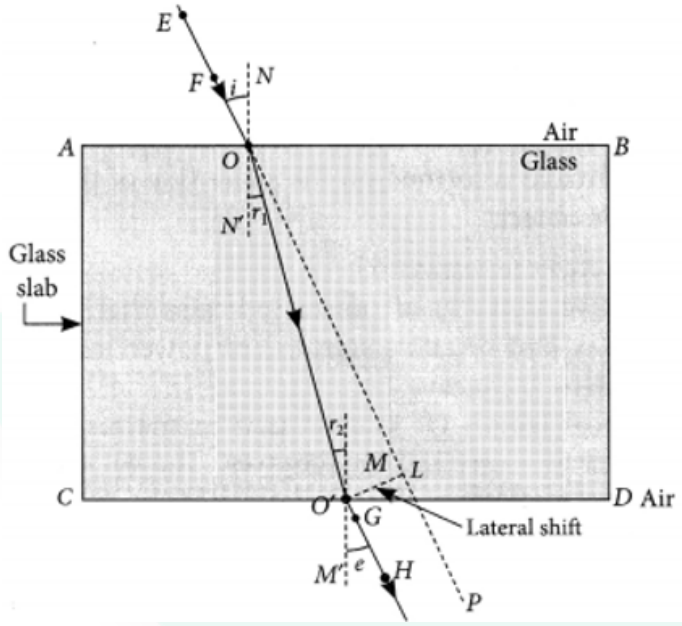
Ans10. (i) This is a concave mirror.
(ii) The image is real and inverted and of same size.
(iii) As m = − 1
∴ m = −v/u ⇒ -1 = −v/u ⇒ u = v
Hence, object is located at centre of curvature i.e., at distance of 40 cm from the pole of the mirror,



Ans11. (a) (i) Pole : The centre of the reflecting surface of a spherical mirror is a point called the pole. It lies in the surface of the mirror and its represented by the letter P.
(ii) Centre of curvature: The reflecting surface of a spherical mirror is a part of a sphere which has a centre. This point is called the centre of curvature of spherical mirror and is represented by the letter C.
(iii) Principal axis : An imaginary line passing through the pole and the centre of curvature of a spherical mirror and normal to the mirror at its pole is called principal axis.
(iv) Principal focus : Incident rays parallel to principal axis, after reflection either converge to as appear to diverge from a fixed point on the principal axis known as principal focus of the spherical mirror.

Ans12. Power is the degree of convergence or divergence of light rays achieved by a lens.
It is defined as the reciprocal of its focal length.
i.e., P = 1/f

Ans13.

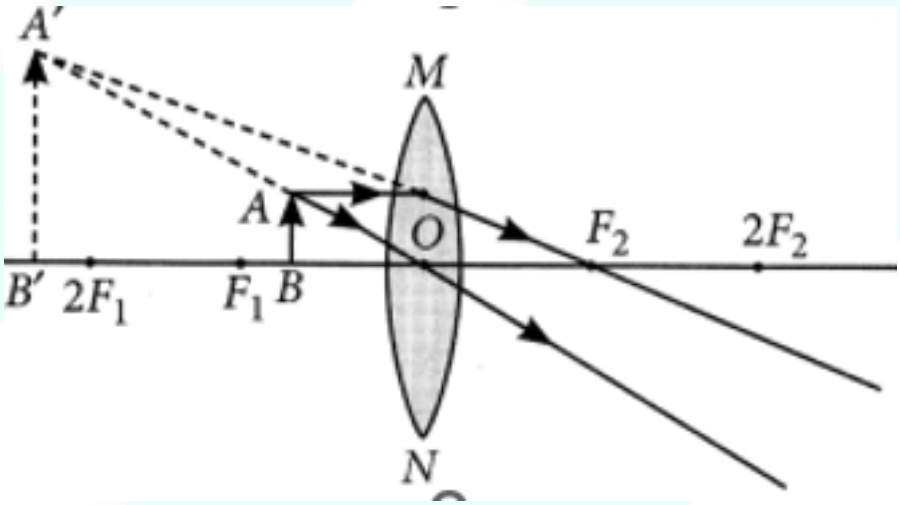


Ans14. Magnification of -1 indicates that the image is real and inverted and is of the same size as of the object. The object must be at 2f and image also at 2f on the other side.

Total distance between image and object

Also 4f = 60 cm ⇒ f = 15 cm

If object is moved 20 cm towards the lens, then the object will be between focus and optical centre of the lens and image formed will be virtual and erect and on the same side of the lens.



Ans15. The law of reflection states that:

1.The angle of incidence is equal to the angle of reflection.

2.The incident ray, the reflected ray, and the normal all lie in the same plane