

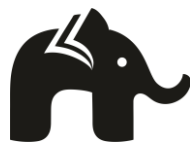


PRACTICE MCQS

CLASS 10 SCIENCE (TERM - I)
**LIGHT: REFLECTION AND
REFRACTION**

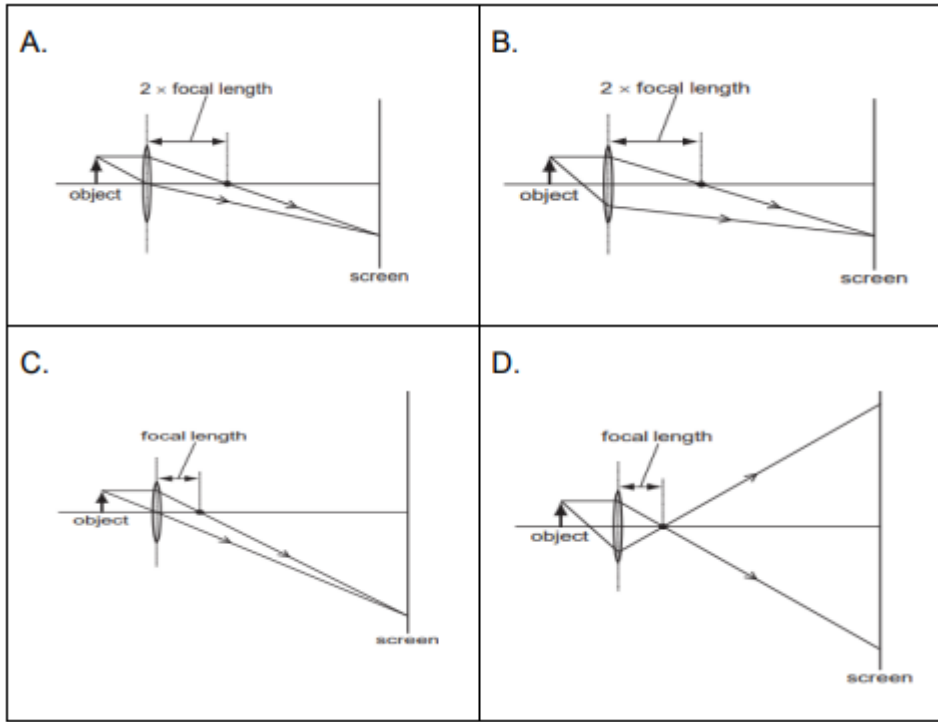
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Question 1:

Which diagram shows image formation of an object on a screen by a converging lens?



Answer: (c)

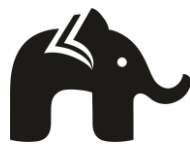
A converging lens is a lens that converge rays of light that are travelling parallel to its principal axis. According to the rules, the ray coming parallel to the principal axis passes through focus. The ray of light passing optical centre will pass straight.

Question 2:

Which of the following can make a parallel beam of light when light from a point source is incident on it?

- (a) Concave mirror as well as convex lens.
- (b) Convex mirror as well as concave lens.
- (c) Two plane mirrors placed at 90° to each others.
- (d) Concave mirror as well as concave lens.

Answer: (a) Concave mirror as well as convex lens.



When point source of a light is focused to a convex or concave mirror emergent rays make a parallel beam of light.

Question 3:

Consider these indices of refraction:

glass: 1.52; air: 1.0003; water: 1.333.

Based on the refractive indices of three materials, arrange the speed of light through them in decreasing order.

- (a) The speed of light in water > the speed of light in air > the speed of light in glass.
- (b) The speed of light in glass > the speed of light in water > the speed of light in air.
- (c) The speed of light in air > the speed of light in water > the speed of light in glass.
- (d) The speed of light in glass > the speed of light in air > the speed of light in water

Answer: (c) The speed of light in air > the speed of light in water > the speed of light in glass.

Higher the refractive index, lesser is the speed of light in that medium and vice versa.

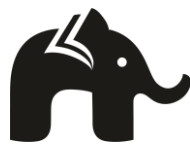
Question 4:

If a beam of red light and a beam of violet light are incident at the same angle on the inclined surface of a prism from air medium and produce angles of refraction r and v respectively, which of the following is correct?

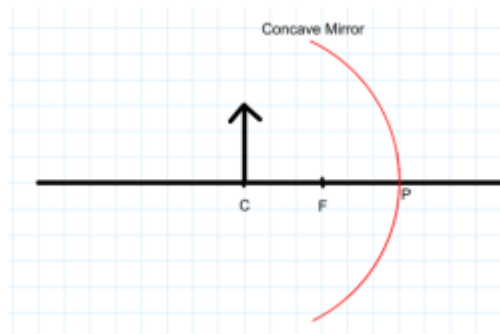
- (a) $r = v$
- (b) $r > v$
- (c) $r = 1/v$
- (d) $r < v$

Answer: (d) $r < v$

While passing through the prism, red light bends the least and violet light the most.



Question 5:



Examine the above figure and state which of the following option is correct?

[one small box in the figure is equal to 1 cm]

- (a) The mirror has a focal length of -6 cm and will produce an image of magnification +1.
- (b) The mirror has a focal length of -3 cm and will produce an image of magnification -1.
- (c) The mirror has a focal length of -3 cm and will produce an image of magnification +1.
- (d) The mirror has a focal length of -6 cm and will produce an image of magnification -1.

Answer: (b) The mirror has a focal length of -3 cm and will produce an image of magnification -1.

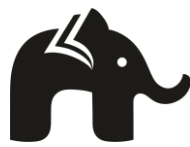
Question 6:

If the power of a lens is - 4.0 D, then it means that the lens is a

- (a) concave lens of focal length -50 m
- (b) convex lens of focal length +50 cm
- (c) concave lens of focal length -25 cm
- (d) convex lens of focal length -25 m

Answer: (c) concave lens of focal length -25 cm

$P = -4D$



$$P = \frac{100}{f(\text{cm})}$$

$$f(\text{cm}) = \frac{100}{p}$$

$$\frac{100}{-4} = -25 \text{ cm.}$$

Negative focal length means concave lens. Concave lens of focal length -25cm.

Question 7:

Rays from Sun converge at a point 15 cm in front of a concave mirror. Where should an object be placed so that size of its image is equal to the size of the object?

- (a) 30 cm in front of the mirror
- (b) 15 cm in front of the mirror
- (c) Between 15 cm and 30 cm in front of the mirror
- (d) More than 30 cm in front of the mirror

Answer: (a) 30 cm in front of the mirror

If rays converge at a point 15cm from the mirror, then,

$$f = -15\text{cm}$$

$$\text{then, } C = -30\text{cm}$$

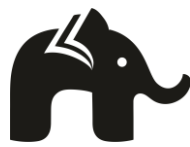
An object kept at C makes an image of the same size as object.

Question 8:

If the real image of a candle flame formed by a lens is three times the size of the flame and the distance between lens and image is 80 cm, at what distance should the candle be placed from the lens?

- (a) -80cm
- (b) -40 cm
- (c) $-\frac{40}{3}$ cm
- (d) $-\frac{80}{3}$ cm

Answer: (d) $-\frac{80}{3}$ cm



$$m = -3$$

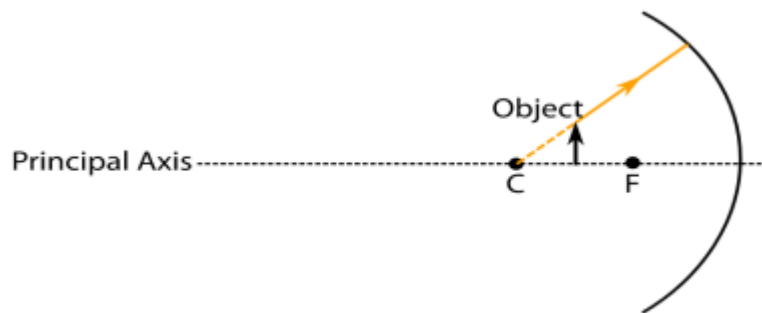
$$v = 80\text{cm}$$

$$m = \frac{v}{u}$$

$$-3 = \frac{80}{u}$$

$$u = \frac{80}{-3} = \frac{-80}{3}\text{cm.}$$

Question 9:



While looking at the above diagram, Nalini concluded the following

- i. The image of the object will be a virtual one.
- ii. The reflected ray will travel along the same path as the incident ray but in opposite direction.
- iii. The image of the object will be inverted.
- iv. This is a concave mirror and hence the focal length will be negative.

Which one of the above statements are correct?

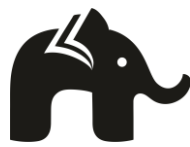
- (a) i and ii
- (b) i and iii
- (c) ii, iii and iv
- (d) i, ii, iii and iv

Answer: (c) ii, iii and iv

Question 10:

The refractive index of flint glass is 1.65 and that for alcohol is 1.36 with respect to air. What is the refractive index of the flint glass with respect to alcohol?

- (a) 0.82

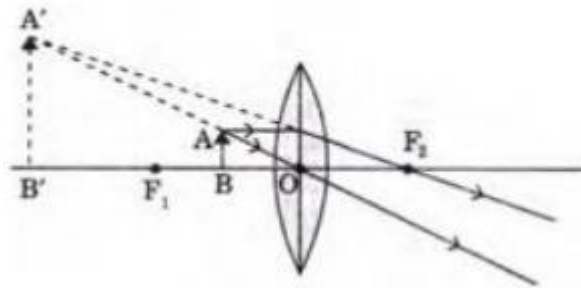


- (b) 1.21
- (c) 1.11
- (d) 1.01

Answer: (b) 1.21

$$\begin{aligned} \text{Refractive index of flint glass w.r.t alcohol} &= \frac{\text{R.I of flint glass}}{\text{R.I of alcohol}} \\ &= \frac{1.65}{1.36} = 1.21 \end{aligned}$$

Question 11:



The above lens has a focal length of 10 cm. The object of height 2 mm is placed at a distance of 5 cm from the pole. Find the height of the image.

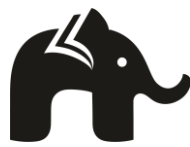
- (a) 4 cm
- (b) 6.67 mm
- (c) 4 mm
- (d) 3.33 mm

Answer: (c) 4 mm

$f = +10\text{cm}$ (Convex lens)

$h_o = 2\text{mm} = 0.2\text{cm}$

$u = -5\text{cm}$



$$\frac{1}{f} = \frac{1}{v} - \frac{1}{5}$$
$$\frac{1}{v} = \frac{1}{10} - \frac{1}{5}$$
$$\frac{1-2}{10} = \frac{-1}{10}$$
$$V = -10\text{cm.}$$
$$m = \frac{v}{u} = \frac{h_2}{h_1}$$
$$m = \frac{-10}{-5} = \frac{h_2}{0.2}$$
$$h_2 = 0.4\text{cm.}$$
$$h_2 = 4\text{mm}$$

Question 12:

If a virtual, erect and enlarged image is formed by a lens, then which of the following options are correct?

- (a) It is a concave lens and the object is placed between pole and focus.
- (b) It is a convex lens and the object is placed between focus and centre of curvature.
- (c) It is a convex lens and the object is placed between pole and focus.
- (d) It is a concave lens and the object is placed between focus and centre of curvature.

Answer: (c) It is a convex lens and the object is placed between pole and focus.

Question 13:

Consider the situation where:

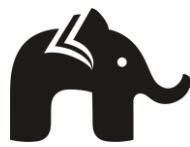
An object is 3 cm (height)

Mirror is concave with 6 cm focal length.

Object is placed at the centre of curvature.

Which of the following options are correct?

- (a) The mirror will produce an image of magnification +1.5.
- (b) The mirror will produce an image of magnification -1.



- (c) The mirror will produce an image of magnification +1.
- (d) The mirror will produce an image of magnification -1.5.

Answer: (b) The mirror will produce an image of magnification -1.

Question 14:

When an object is placed on the principle axis of a convex lens between first focus and optical centre, then position of image will be

- (a) on same side of the lens as the object between first focus and optical centre
- (b) on same side of the lens as the object and away from the first focus
- (c) on opposite side of the lens as the object between second focus and optical centre
- (d) on opposite side of the lens as the object and away from the second focus

Answer: (b) On same side of the lens as the object and away from the first focus.

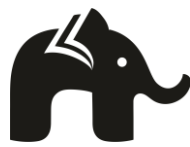
According to the given solution of position of object from lens, image will be formed on the same side of the lens as the object and away from the first focus.

Question 15:

If the refractive index of water with respect to air is 1.33 and of that of glass with respect to air is 1.5 then

- (a) water is optically denser than glass.
- (b) air is optically densest of all the three media.
- (c) air's optical density is between glass and air.
- (d) glass is optically denser than water.

Answer: (d) glass is optically denser than water.

**Question 16:**

In an experiment, trace the path of ray of light through a rectangular glass slab, three students P, Q and R tabulated their observations as

	P	Q	R
$\angle i$	60°	60°	60°
$\angle r$	50°	40°	35°
$\angle e$	62°	56°	60°

The student who has performed the experiment with all resources and sincerity is

- (a) P
- (b) Q
- (c) R
- (d) Both P and R

Answer: (c) R

In the experiment of refraction through a glass slab, angle of incidence is equal to angle of emergence.

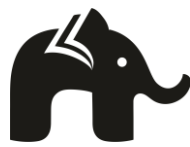
This is observed only by student R.

Question 17:

A convex lens has a focal length of 10 cm. The object of height 2 mm is placed at a distance of 5 cm from the pole. Find the height of the image.

- (a) 4 cm
- (b) 6.67 mm
- (c) 4 mm
- (d) 3.33 mm

Answer: (c) 4 mm



$$h_1 = 2\text{mm} = 0.2\text{cm.}$$
$$u = -5\text{cm.}$$
$$\frac{1}{f} = \frac{1}{v} - \frac{1}{5}$$
$$\frac{1}{v} = \frac{1}{10} - \frac{1}{5}$$
$$\frac{1-2}{10} = \frac{-1}{10}$$
$$V = -10\text{cm.}$$
$$m = \frac{v}{u} = \frac{h_2}{h_1}$$
$$m = \frac{-10}{-5} = \frac{h_2}{0.2}$$
$$h_2 = 0.4\text{cm}$$

Or $h_2 = 4 \text{ mm}$

Question 18:

Nalini draws a ray diagram for an object in front of a concave mirror. She draws a ray starting from the top of the object and falling on the mirror perpendicularly. The ray after reflection will

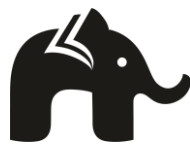
- (a) pass through focus.
- (b) pass through pole.
- (c) pass through the centre of curvature.
- (d) pass through any point on the principal axis.

Answer: (c) pass through the centre of curvature.

Question 19:

An object is placed at a distance of 10 cm in front of a concave mirror. It forms a real image three times larger than the object. The distance of image from the mirror is

- (a) -30 cm
- (b) 30 cm
- (c) 10 cm
- (d) -10 cm



Answer: (a) -30 cm

Give, $u = -10$ cm

$m = -3$ (for real image by concave mirror)

$$-v/u = -3$$

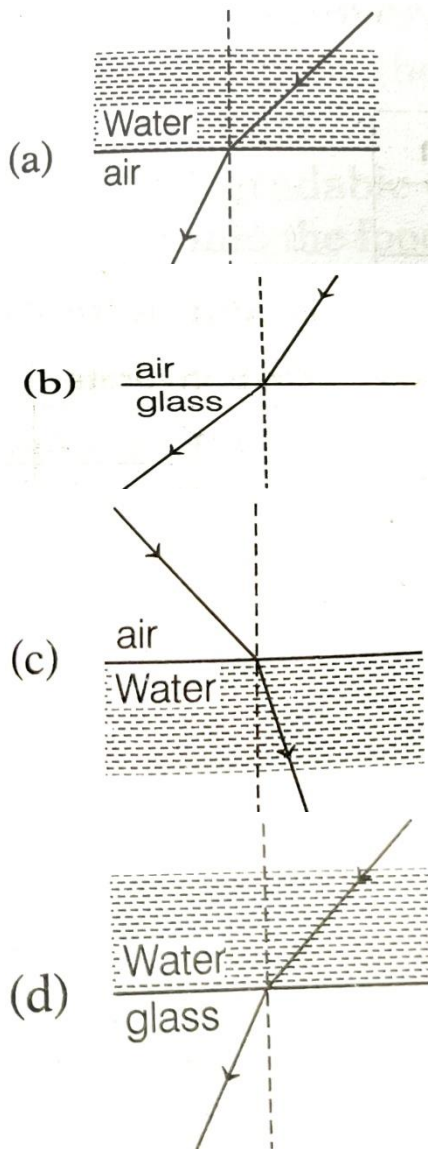
$$-v/(-10) = -3$$

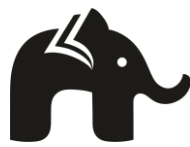
$$v/10 = -3$$

$$v = -30 \text{ cm}$$

Question 20:

Which of the following diagrams shows the ray of light refracted correctly?



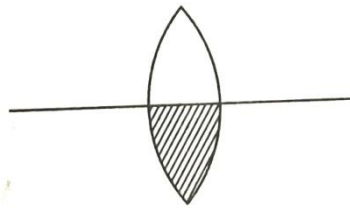


Answer: (d)

When a ray of light goes from optically rarer medium to optically denser medium, it bends towards the normal. Glass is optically denser than water. So, when light ray goes from water to glass, it bends towards the normal.

Question 21:

The lower half of a convex lens is covered with black paper. The effect on the image on the screen would be



- (a) the lower half of the image disappears
- (b) the upper half of the image disappears
- (c) the image remains the same
- (d) the image becomes less brighter than before

Answer: (d) the image becomes less bright than before

Question 22:

If the magnification of converging lens is + 1, the image formed is

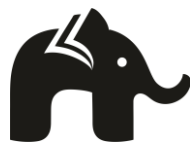
- (a) real, inverted, same size
- (b) virtual, erect, same size
- (c) real, inverted, magnified
- (d) virtual, erect, magnified

Answer: (b) virtual, erect, same size

Question 23:

If the object is placed between focus and centre of curvature, the position of image will be

- (a) at focus



- (b) between focus and pole
- (c) beyond centre of curvature
- (d) none of the above

Answer: (a) at focus

Question 24:

A concave mirror produces a magnification of +4. The object is placed

- (a) At the focus
- (b) Between focus and centre of curvature
- (c) Between focus and pole
- (d) Beyond the centre of curvature

Answer: (c) Between focus and pole

$$m = +4$$

Magnification is with the positive sign (+), which implies that the image is virtual and erect.

Also, $m > 1$, the size of the image is greater than that of the object.

These conditions are only possible when the object is placed between its focus (F) and pole (P) in front of the mirror.

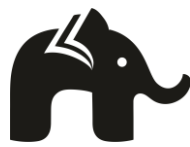
Assertion Reason Based Questions

Answer these questions selecting the appropriate option given below:

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true and R is not the correct explanation of A
- (c) A is true but R is false
- (d) A is False but R is true

Question 25:

A: Convex mirror is preferred for rear view mirror in vehicles.



R: The field view of a convex mirror is lesser than that of concave mirror.

Answer: (c) A is true but R is false

The field view of a convex mirror is wider than that of concave mirror, so we prefer convex mirror as rear view mirror in vehicles.

Question 26:

A: When focal length of lens increases, then its power decreases.

R: Power of a lens is inversely proportional to focal length of lens.

Answer: (a) Both A and R are true and R is the correct explanation of A

Power of a lens is equal to reciprocal of the focal length, f .

$$P = 1/f \text{ (m)}$$

When focal length of a lens increases, then its power decreases.

Question 27:

A: Denser the medium, lesser is the velocity of light in that medium.

R: Refractive index is inversely proportional to velocity.

Answer: (a) Both A and R are true and R is the correct explanation of A

Denser the medium means having high value of refractive index.

$$n = \text{Speed of light in vacuum (c) / Speed of light in medium (v)}$$

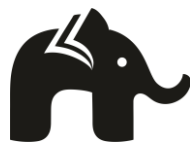
$$n \propto 1/v$$

Question 28:

A: Propagation of light through an optical fibre is due to total internal reflection taking place at the core-clade interface.

R: Refractive index of the material of the core of the optical fibre is greater than of air.

Answer: (b) Both A and R are true and R is not the correct explanation of A



Optical fibre communication is based on the phenomenon of total internal reflection at core-clade interface. The refraction index of the material of the cladding, hence, light sinking at core-cladding interface gets totally internal reflected. The light undergoes and reaches the other end of the fibre.

Case Study based Questions

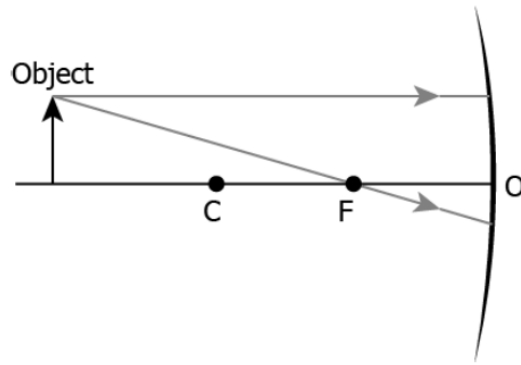
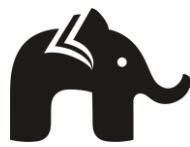
Question 29:

The curved surface of a spoon can be considered as a spherical mirror. A highly smooth polished surface is called mirror. The mirror whose reflecting surface is curved inwards or outwards is called a spherical mirror. Inner part works as a concave mirror and outer bulging part acts as a convex mirror. The centre of the reflecting mirror is called pole and radius of the sphere of which the mirror is formed is called radius of curvature.

1. The focal length of a mirror is 15 cm. The radius of curvature is
 - (a) 15 cm
 - (b) 30 cm
 - (c) 45 cm
 - (d) 60 cm

2. In a convex spherical mirror, reflection of light takes place at
 - (a) a flat surface
 - (b) a bent-in surface
 - (c) a bulging-out surface
 - (d) an uneven surface

3. The image shows the path of incident rays to a concave mirror.



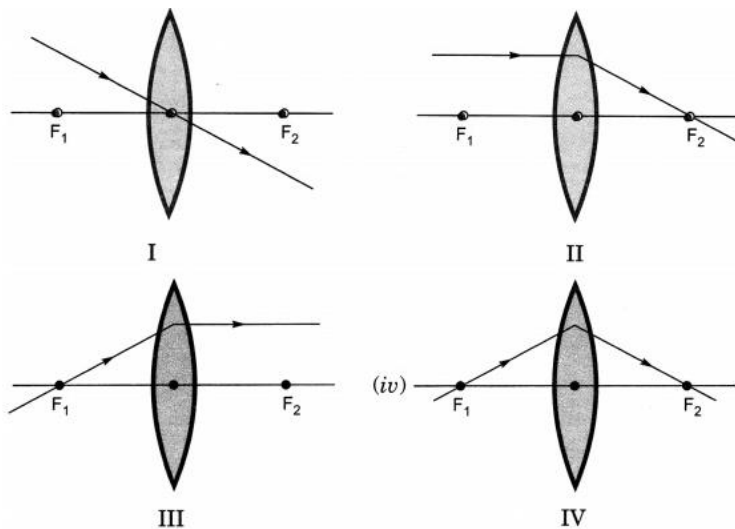
Where would the reflected rays meet for the image formation to take place?

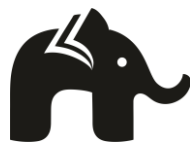
- (a) behind the mirror
- (b) between F and O
- (c) between C and F
- (d) beyond C

4. The angle of incidence for a ray of light having zero reflection angle is

- (a) 0
- (b) 30°
- (c) 45°
- (d) 90°

5. The diagrams showing the correct path of the ray after passing through the





- (a) II and III only
- (b) I and II only
- (c) I, II and III
- (d) I, II and IV

Answer:

1. (b) $f = 15 \text{ cm}$

$$R = 2F$$

$$R = 2 * 15$$

$$R = 30 \text{ cm}$$

2. (c) In a spherical mirror, normal drawn at any point passes through the centre of curvature.

3. (c) between C and F

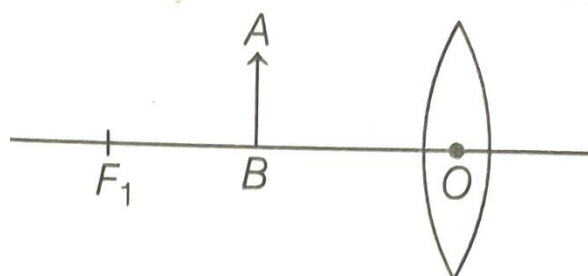
4. (a) 0

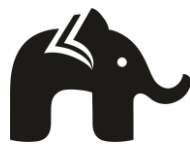
When a ray of light is incident normally on a plane mirror, angle of incidence is equal to angle of reflection. Hence, angle of incidence is zero degree angle of reflection is zero degree.

5. (c) I, II and III

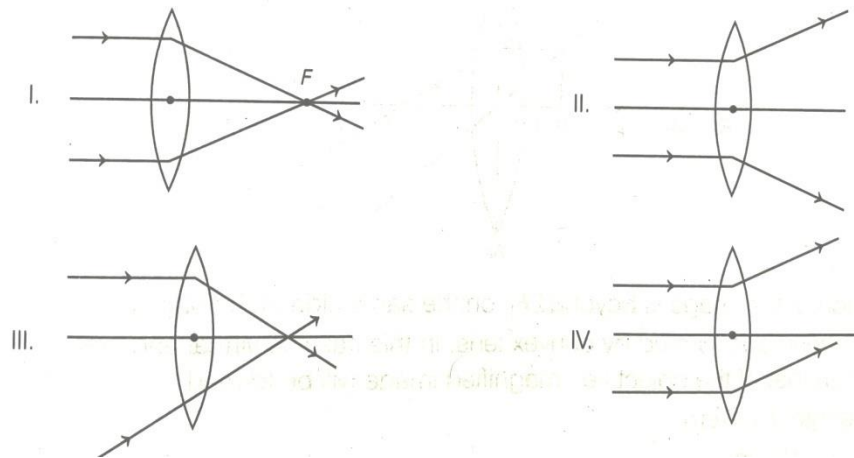
Question 30:

In an experiment, the formation of image for an object AB placed in front of a convex lens is shown in figure, with an incomplete ray diagram.





1. Which of the following diagram represents the correct?



- (a) I
- (b) II
- (c) III
- (d) IV

2. The image will be formed

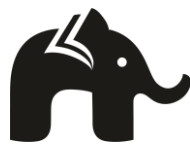
- (a) at focus F_1
- (b) at centre of curvature C_1
- (c) beyond $2F_1$
- (d) at infinity

3. The nature and size of the image formed by the convex lens will be

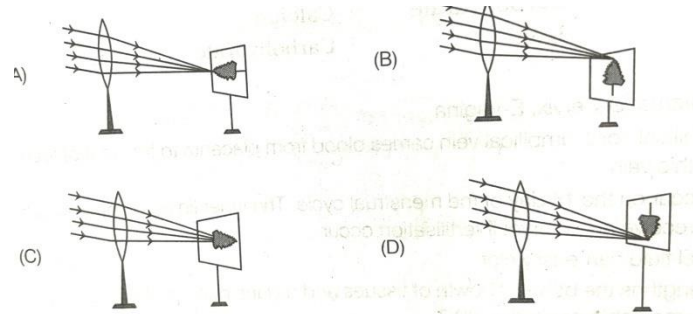
- (a) real and inverted, diminished
- (b) real and inverted, magnified
- (c) virtual and erect, of same size as that of object
- (d) virtual and erect, magnified

4. If the focal length of the lens is 8 cm and object is placed at 12 cm from optical centre the image will be formed at

- (a) 2.4 cm from O
- (b) 4.8 cm from O
- (c) 24 cm from O
- (d) 48 cm from O



5. While performing the experiment on the determination focal length of a convex lens, four students obtained the image of the same distant tree on the screen.

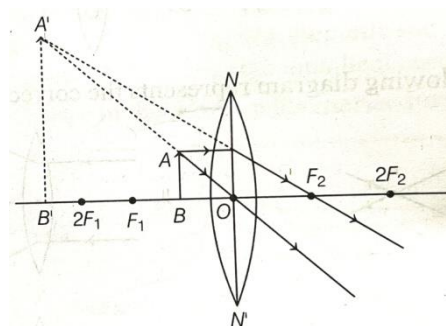


Which diagram shows the formation of image correctly?

- (a) A
- (b) B
- (c) C
- (d) D

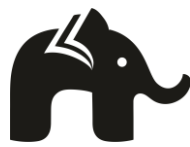
Answer:

1. (a) The convex lens has the property to converge the parallel beam of light rays at a point.
2. (c) The image formed is at $2F_1$ on the same side of the object.



3. (d) The nature of the image formed by convex lens is virtual and erect. The size of the image is larger than that of the object.

4. (b)
 $f = 8 \text{ cm}$



$$u = 12 \text{ cm}$$

According to lens formula, $1/f = 1/v - 1/u$

$$1/8 = 1/v - 1/12$$

$$v = 2/5 = 4.8 \text{ cm}$$

5. (d) In case of concave lens, when the object is at placed at infinity, the image is formed at the focus of the lens. The nature of image is real and inverted.
