

◀ MULTIPLE CHOICE QUESTION BANK ▶

Based on Practical Skills (Experiments : Determination of focal lengths of concave mirror and convex lens, laws of reflection, laws of refraction and refraction through a glass slab).

1. A sharp image of a distant object is obtained on a screen using a convex lens. In order to determine the focal length of a lens, you need to measure the distance between the
- lens and the object
 - lens and screen
 - object and the screen
 - lens and the screen and also object and the screen.
- [C.B.S.E. 2007 (Delhi), 2011]*

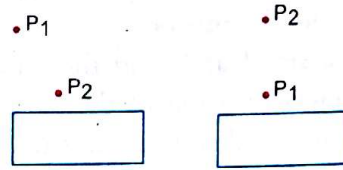
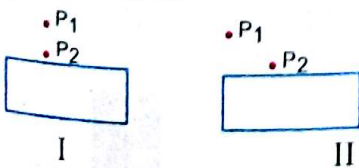
2. A student obtains a blurred image of an object on a screen by using a concave mirror. In order to obtain a sharp image on the screen, he will have to shift the mirror
- towards the screen
 - away from the screen
 - either towards or away from the screen depending upon the position of the object.
 - to a position very far away from the screen
- [C.B.S.E. 2007(Delhi); C.B.S.E. 2007 (c), 2011, 2012]*

3. The image of a distant object is obtained on a screen by using a concave mirror. The focal length of the mirror can be determined by measuring the distance between
- the object and the mirror
 - the object and the screen
 - the mirror and the screen
 - the mirror and the screen as well as that between the object and the screen.
- (C.B.S.E. 2007)*

4. A student obtained a sharp image of the grill of a window on a screen, using a convex lens. For getting better results, the teacher suggested focussing of a distant tree instead of the grill. In which direction should the lens be moved for this purpose ?

- Away from the screen
 - Very far away from the screen
 - Behind the screen
 - Towards the screen.
- (C.B.S.E. 2007)*

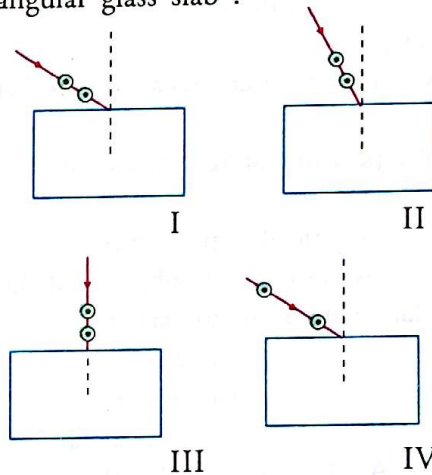
5. Two dots P_1 and P_2 shown in each of the following diagrams I, II, III, and IV denote the positions of two points in respect of distance and direction for performing an experiment on tracing the path of a ray of light passing through a rectangular glass slab. In which one of the four cases, one is likely to get best results ?



- I
- II
- III
- IV

[C.B.S.E. 2007(Delhi), 2011]

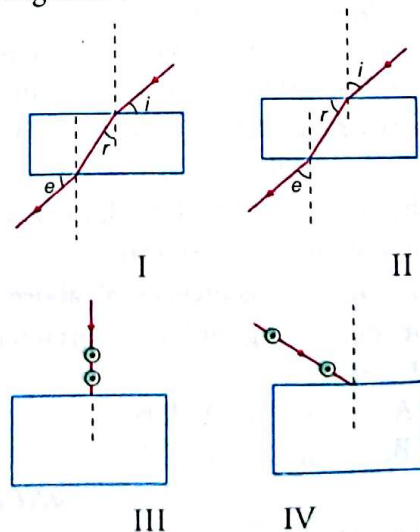
6. Which one of the following is the best set-up for tracing the path of a ray of light through a rectangular glass slab ?



- I
- II
- III
- IV

(C.B.S.E. 2007, 2011)

7. The path of a ray of light passing through a rectangular glass slab was traced and angle measured. Which one out of the following is correct representation of an angle of incident i , angle of refraction r and angle of emergence e as shown in the diagrams ?



- I
- II
- III
- IV

[C.B.S.E. 2007(Delhi), 2011]

8. Out of the following, the best way to do the experiment on finding the focal length of a concave mirror by obtaining the image of a distant object, is to
- hold the mirror in hand and keep the screen in a stand kept behind the mirror.
 - hold the mirror in a stand and hold the screen in hand, with the screen in front of the mirror.
 - keep both the mirror and screen in suitable stands with the screen put in front the mirror.
 - keep both the mirror and the screen in suitable stands with the screen put behind the mirror.

[C.B.S.E. 2007(C) Delhi, 2011]

9. Given below are few steps (not in proper sequence) following in the determination of focal length of a given convex lens by obtaining a sharp image of a distant object.

- Measures the distance between the lens and screen
- Adjust the position of the lens to form a sharp image
- Selected a suitable distant object
- Hold the lens between the object and the screen with its face parallel to the screen

- c, a, d, b
- c, d, b, a
- c, a, b, d
- a, b, c, d

[C.B.S.E. 2007 (C), 2011]

10. Four students, A, B, C and D did their experiment on finding the focal length of a convex lens by obtaining the image of a distant object as follows:

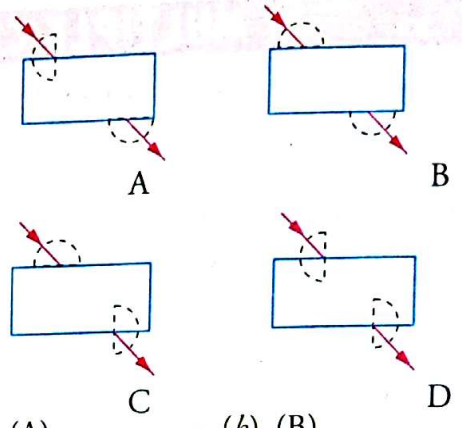
Student A Used the window grille in the laboratory as the object, and a white paper sheet held in hand, as the screen.
 Student B Used a distant tree in the shade as the object, and a white thick board, held in stand, as the screen.
 Student C Used a well illuminated laboratory window grille as the object and a white paper sheet held in a stand as the screen.
 Student D Used a well illuminated distant tree as the object and a white thick board, held in a stand as the screen.

Which one of the four sequences of above set-ups represents the decreasing order of preference for performing the experiment ?

- D, B, C, A
- C, D, A, B,
- D, C, A, B,
- B, D, C, A,

[C.B.S.E. 2007(C) Delhi,]

11. In the glass slab experiment, the correct placement of the protractor (or 'dee'), for measuring the angles of incidence and emergence, is shown in which figure ?



- (A)
- (B)
- (C)
- (D)

[C.B.S.E. 2007 (C) Delhi, 2011]

12. A student carries out the experiment of tracing the path of a ray of light through a rectangular glass slab, for two different values of angle of incidence $\angle i = 30^\circ$ and $\angle i = 45^\circ$. The set of values of the angle of refraction ($\angle r$) and angle of emergence ($\angle e$), she is likely to observe in the two cases are

- $[\angle r = 30^\circ, \angle e = 20^\circ]$ and $[\angle r = 45^\circ, \angle e = 28^\circ]$
- $[\angle r = 20^\circ, \angle e = 30^\circ]$ and $[\angle r = 45^\circ, \angle e = 28^\circ]$
- $[\angle r = 20^\circ, \angle e = 30^\circ]$ and $[\angle r = 28^\circ, \angle e = 45^\circ]$
- $[\angle r = 30^\circ, \angle e = 20^\circ]$ and $[\angle r = 28^\circ, \angle e = 45^\circ]$

[C.B.S.E. 2007 (C) Delhi, 2012]

13. An experiment to trace the path of a ray of light through a glass slab was performed by four students I, II, III and IV. They reported the following measurements of angle of incidence i , angle of refraction r and angle of emergence e . Which one of the students has performed the experiment correctly ?

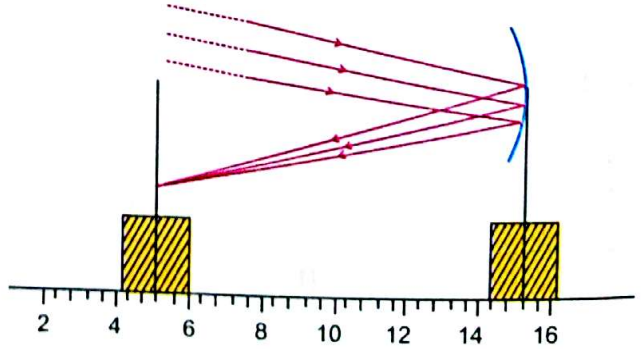
Student	Angle i	Angle r	Angle e
I	60°	35°	59°
II	45°	40°	40°
III	35°	30°	40°
IV	50°	55°	50°

- I
- II
- III
- IV

[C.B.S.E. 2007 (C), 2011]

14. The focal length of the concave mirror in the experimental set up, shown below equals.

- 10.3 cm
- 11.0 cm
- 11.7 cm
- 12.2 cm.



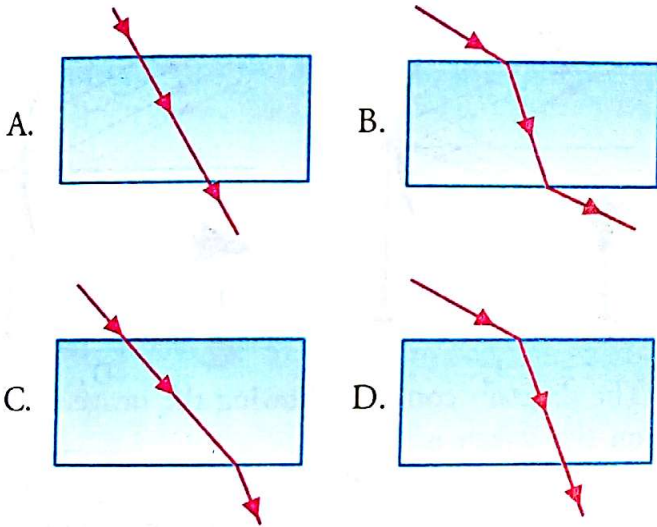
(C.B.S.E. 2011)

15. A student performs the experiment on tracing the path of a ray of light passing through a rectangular glass slab for different angles of incidence. He measures the angle of incidence $\angle i$, angle of refraction $\angle r$ and angle of emergence $\angle e$ for all his observations. He would find that in all cases.

- (a) $\angle i$ is more than $\angle r$ but (nearly) equal to $\angle e$
- (b) $\angle i$ is less than $\angle r$ but (nearly) equal to $\angle e$
- (c) $\angle i$ is more than $\angle e$ but (nearly) equal to $\angle r$
- (d) $\angle i$ is less than $\angle e$ but (nearly) equal to $\angle r$.

(C.B.S.E. 2008)

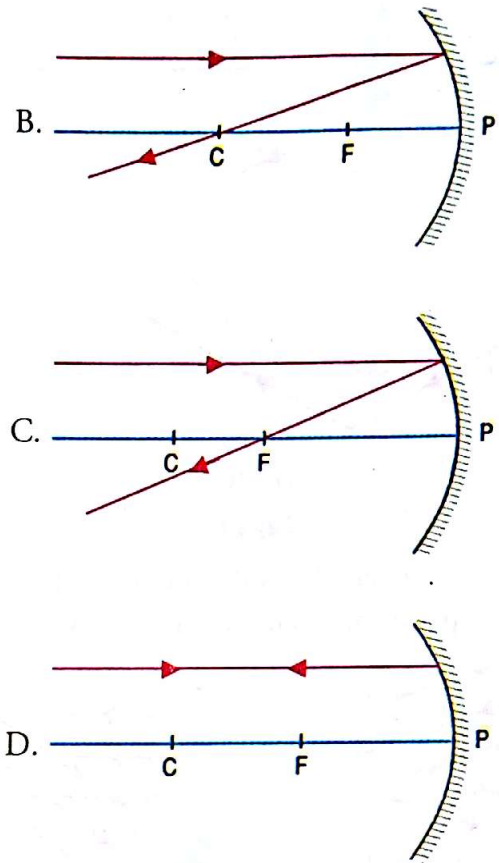
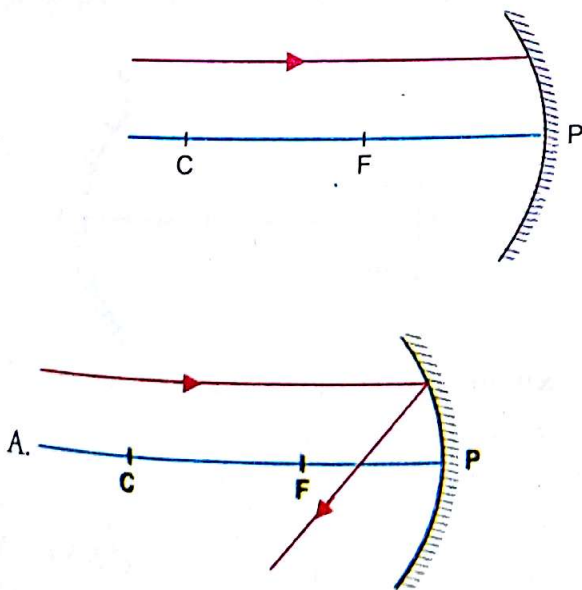
16. The path of a ray of light coming from air passing through a rectangular slab traced by four students are shown by figures A, B, C and D. Which one of them is correct ?



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

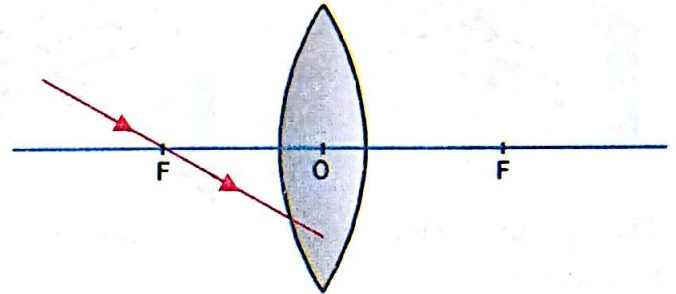
(C.B.S.E. 2011, 2012)

17. A ray of light incident on a concave mirror as shown in figure. Four students traced the ray of light as shown in figures, A, B, C and D. Which one is correct ?

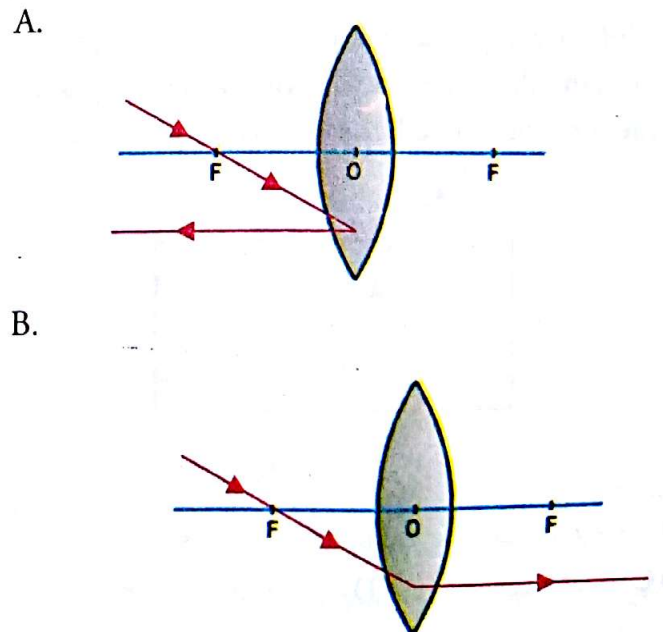


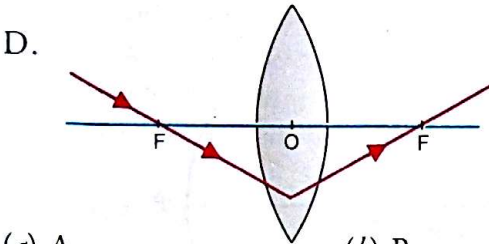
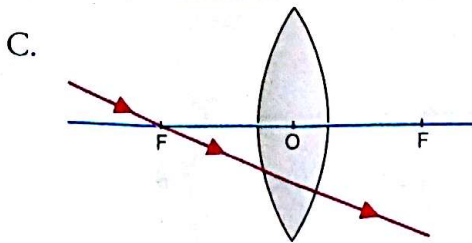
- (a) A
- (b) B
- (c) C
- (d) D.

18. A ray of light falls on a convex lens as shown in figure



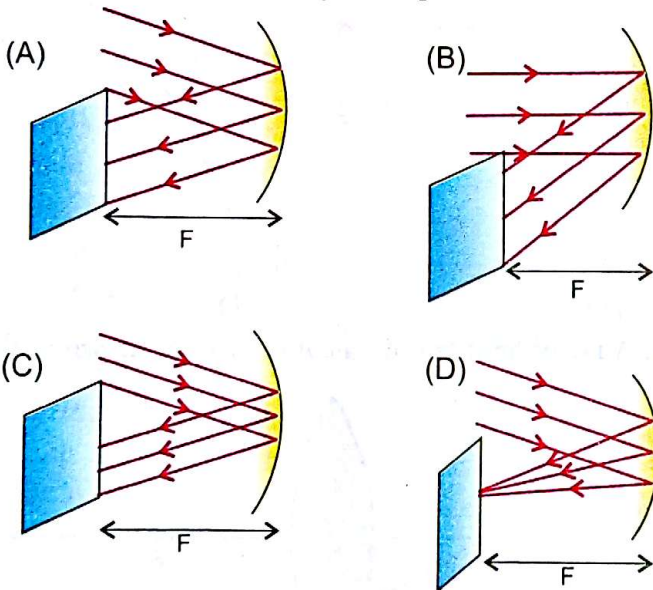
Four students traced the ray of light after refraction from the lens. Which is correct ?





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

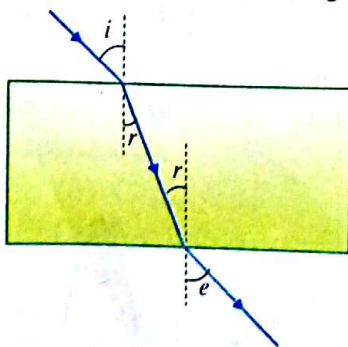
19. Four students measured focal length of a concave mirror while performing an experiment as shown.



The picture which depicts the correct image formation is :

- (a) A (b) B
(c) C (d) D. (C.B.S.E. 2011)

20. While tracing the path of a ray of light passing through glass slab as shown in the diagrams, four students interpreted the results as given below :

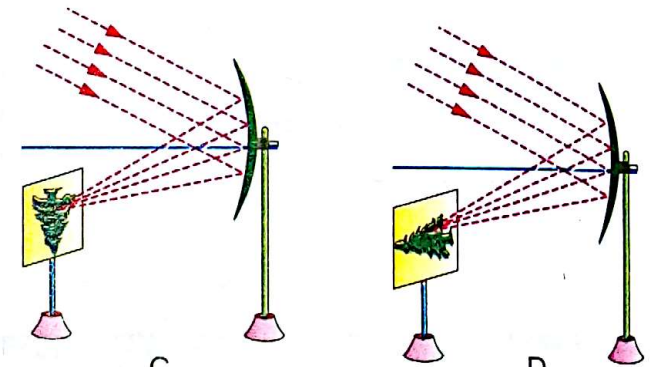
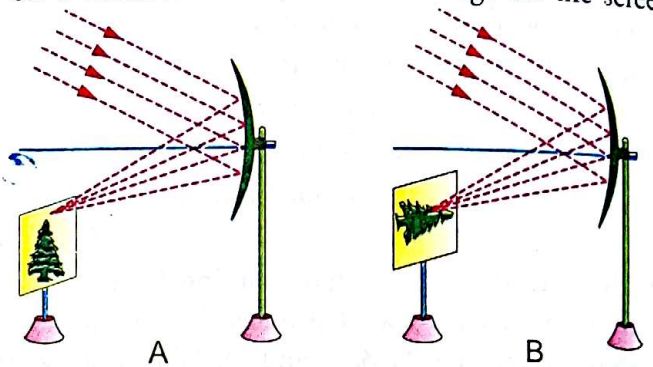


- (A) $\angle r > \angle e = \angle i$ (B) $\angle r = \angle e < \angle i$
(C) $\angle i = \angle r < \angle e$ (D) $\angle i = \angle e > \angle r$.

The student who has made the correct interpretation is
(a) A (b) B (c) C (d) D

(C.B.S.E. 2011, 2012)

21. Parallel rays, from the top of a distant tree, incident on a concave mirror, form an image on the screen.

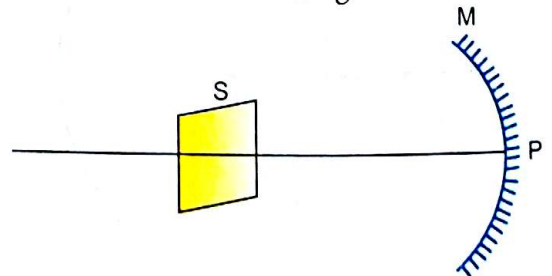


The diagram correctly showing the image of the tree on the screen is

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

(C.B.S.E. 2011, 2012)

22. In the adjoining figure 'S' is the position of the screen on which a sharp image of a distant object (nearly 600 m away from the concave mirror of focal length 10 cm) is formed by the mirror 'M'. If the object moves towards the mirror by some distance, say 50 cm, then to obtain the sharp image of the object on the same screen again the



- (a) screen should be moved towards the object.
(b) screen need not be moved.
(c) mirror should be moved towards the screen.
(d) screen and mirror both should be moved towards the object by same distance. (C.B.S.E. 2011)

23. A student performed an experiment for finding focal length of a concave mirror using a distant object. What was the best method followed by him ?

- (a) hold the mirror in hand and keep the screen in a stand kept behind the mirror.
 (b) hold the mirror in a stand and hold the screen in hand with the screen in front of the mirror.
 (c) keep both the mirror and screen in suitable stands with the screen put behind the mirror.
 (d) keep both the mirror and screen in suitable stands with the screen put in front of the mirror.

24. A student has to determine the focal length of a convex lens by focusing the image of a distant object on the screen. For conducting this experiment he wants to use the minimum material. Out of the following four sets A, B, C and D the best choice for him is :

set A : Convex lens, Lens holder, candle, screen with stand

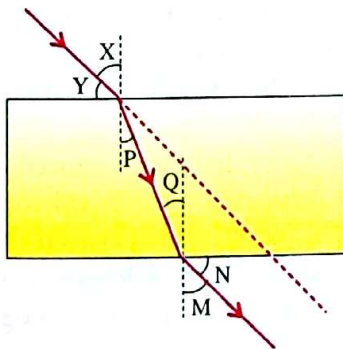
set B : Convex lens, lens holder, screen with stand, measuring scale.

set C : Convex lens, lens holder, concave lens, measuring scale

set D : Convex lens, burning candle, screen with stand, a lens holder

- (a) A (b) B (c) C (d) D
 (C.B.S.E. 2011)

25. For the refraction through a rectangular glass slab the diagram is given below



The angle of incidence, angle of a emergence and angle of refraction and respectively.

- (a) X, P, M (b) X, M, P
 (c) Y, M, P (d) Y, N, P. (C.B.S.E. 2011)

26. For the experiment on finding the focal length of a convex lens by obtaining the image of a distant object following apparatus is available on the table :

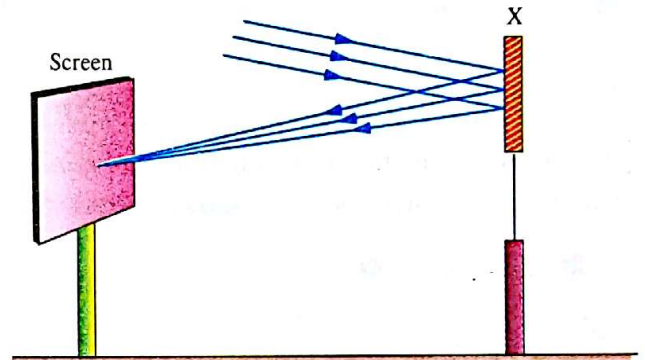
(A) A stand with a metal needle fixed to it
 (B) A stand with a given convex lens fitted in it
 (C) A wax candle with a match box

- (D) A thick cardboard white screen fitted in a stand
 (E) A metre scale

A student can perform the experiment by using the apparatus listed as

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

27. A student focussed the image of a distant object on the screen as shown in the figure by using a device X. This device 'X' could be



- (a) Plane mirror (b) Concave mirror
 (c) Convex mirror (d) Convex lens

(C.B.S.E. 2011)

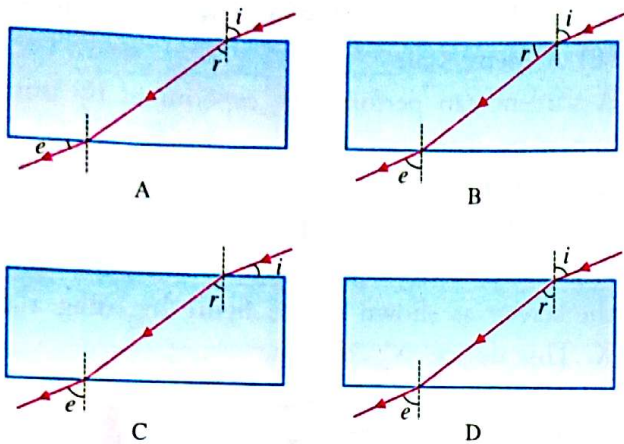
28. Three students measured the focal length of a convex lens using parallel rays from a distant object . All of them measured the distance as given
 Student A : distance between lens and screen
 Student B : distance between object and screen
 Student C : distance between object and lens.
 Which student get the correct focal length of lens ?

- (a) student A only
 (b) student B and C both
 (c) student A and B both
 (d) student C only . (C.B.S.E. 2011)

29. Select the set of minimum materials required for determining the focal length of a convex lens by obtaining an image of a distant object.

- (a) A lens holder, a convex lens, a concave lens, measuring scale
 (b) A convex lens, a lens holder, a screen with stand, a candle and a match box.
 (c) A convex lens, a lens holder, a screen with stand, a measuring scale.
 (d) A convex lens, a lens holder, a screen with stand, burning candle. (C.B.S.E. 2012)

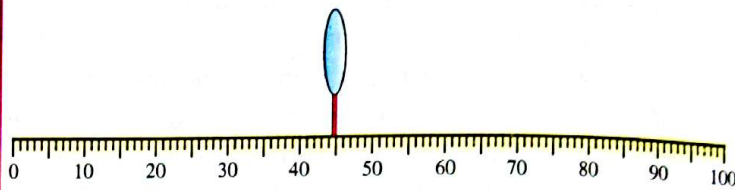
30. In which of the following diagrams the correct representation of angle of incidence (i) angle of refraction (r) and angle of emergence(e) is shown :



(C.B.S.E. 2012)

31. A teacher set up the apparatus for determining focal length of a convex lens as shown below. She told

them that the approximate focal length of the lens was 20 cm.



She asked them to place the screen so that a distinct image of a distant tree is obtained on it by slight adjustment. Four students A, B, C, D respectively place the screen at the mark of

(a) 5 cm (b) 65 cm (c) 25 cm (d) 95 cm.

(C.B.S.E. 2012)

Answers

1. (b) 2. (c) 3. (c) 4. (d) 5. (c) 6. (d) 7. (d) 8. (c) 9. (b) 10. (a)
 11. (d) 12. (c) 13. (a) 14. (b) 15. (a) 16. (b) 17. (c) 18. (b) 19. (d) 20. (d)
 21. (c) 22. (a) 23. (d) 24. (b) 25. (b) 26. (c) 27. (b) 28. (a) 29. (c) 30. (d) 31. (b)

HINTS & EXPLANATIONS TO MCQS

- Distant object means, $u = -\infty$. Therefore, from $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$, we get $\frac{1}{f} = \frac{1}{v}$ or $f = v$. Thus, rays of light from a distant object come as a parallel beam, which is focussed on the screen. Therefore, by measuring the distance between lens and the screen, focal length of the lens can be determined.
- To locate the focus of the mirror.
- A parallel beam of light coming from a distant object ($u = -\infty$), meets at the focus of the mirror. Therefore, focal length of mirror = Distance between the mirror and the screen on which the rays after reflection meet.
- To locate the focus of the lens.
- Pins P_1 and P_2 should be distant apart and the line joining these pins should make an angle less than 90° (i.e. acute angle) with the normal to the point of incidence.
- Refer Q.No. 5.
- Angle i , r and e are measured between the ray of light and normal to the surface of the glass slab.
- Rays of light after reflecting from a concave mirror meet in front of the mirror. Mirror and screen should be fixed in stands so that the distance between them is measured using a metre scale.
- To find the focal length of a convex lens, object should be at very large distance and it should be well illuminated so that enough amount of light is reflected from it towards the lens. Moreover, to

get a sharp image, screen should be white and thick.

- Normal is drawn at the point of incidence.
- $\angle i = \angle e$, when refraction of light takes place through glass slab.
- $\angle i \approx \angle e$. When we perform experiment, $\angle i$ is not exactly equal to $\angle e$, between an experimental error.
- f = distance between mirror and screen.
- A ray travelling parallel to the principal axis passes through the focus of the concave mirror after reflection.
- Parallel beam of light is focussed at a point after reflecting from a concave mirror. This point is called focus. The distance between the concave mirror and the focus is the focal length of the mirror.
- When ray of light passes through a glass slab, incident ray and emergent rays are parallel to each other i.e. $\angle i = \angle e$. However, $\angle r \ll \angle e$.
- Same as Q. No. 20.
- When an object moves towards a concave mirror, the distance of the image from the mirror increases.
- When parallel beam of light falls on a concave mirror, it is focussed at a point.
- Focal length of a convex lens = distance between the lens and the screen on which parallel rays of light are focussed.
- $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$
 For distant object, $u = \infty$.
 $\therefore v = f$.