Chapter No. 10

LIGHT- REFLECTION AND REFRACTION

HOTS Questions and Answers

1. Where is the image formed in a convex mirror, when the object is anywhere in front of it ?
2. A person uses concave mirror for shaving, where should he position his face in front of it ?
3. A ray of light is incident on a concave mirror along its principal axis. What will be the angle of reflection?
4. What will happen to ray of light when it travels from rarer medium to a denser medium ?
5. What does negative sign in the value of magnification of a mirror indicate?
6. Name the point inside the lens through which a ray of light goes undeviated?
7. Which of the two has a great power? A lens of short focal length or a lens of large focal length?
8. Name the lens which always gives an erect and diminished image?
9. Which mirror is used as rear view mirror in vehicles and why ?
10. Define one dioptre?
11. The size of an object is 2cm.The magnification produced by a mirror is +1. What is the size of the image?
12. When a ray of light passes from a denser medium to a rarer medium which angle is greater: angle of incidence or angle of refraction?
13. An image formed in a spherical mirror has magnification -2.Is the image real or virtual?
14. The power of a lens is -2D. Is the lens convex or concave?
15. Focal length of a convex mirror is 10cm.Find the radius of curvature of the mirror?
16. An object is placed at a distance of 50cm from a convex mirror. State two characteristics of the image formed.
17. Write two uses of concave mirror.
18. An object 1cm high produces a real image 1.5 cm high, when placed at a distance of 15 cm from concave mirror. Calculate the position of the image.
19. Find the power of a concave lens of focal length 2m.
20. Which phenomenon occurs when light falls on(a) highly polished surface (b) a transparent medium ?
21. What will happen to a ray of light when it falls normally on a surface ?
22. What is absolute refractive index ?
23. If refractive index of glass is 1.65, What is the speed of light in glass. ?
24. The magnification " m " for a mirror is +1 what does this signify ?

ANSWERS OF THE ABOVE QUESTIONS

1. Between pole and focus, behind the convex mirror.
2. Between pole and principal focus.

3. Angle of reflection = 0
4. Bends towards the normal .
5. Image is real.
6. Optical centre.
7. Lens of short focal length.
8. Concave lens.
9. Convex mirror, wider field of view.
10. One dioptre is the power of a lens of focal length one meter.
11. +2cm, because m=I/O , +1=I/2 =+2
12. Angle of refractions.
13. Real.
14. Concave lens.
15. 20cm.
16. (1) Image is virtual and erect.
    (2) Image is diminished.
17. (1) Used as reflectors for automobile headlights.
    (2) Used as shaving mirror.
18. – v/u = h'/h , -v/-15 = -1.5/1
    v = 15x 1.5 = -22.5cm.
19. – p = 1/f
    =1/-2 = -0.5D.
20. (a) Reflection of light.
    (b) Refraction of light.
21. No bending of light ray occurs. It means light rays goes straight from one medium to another.
22. When first medium is taken as vaccum, the refractive index of second medium is called as
absolute refractive index.
23. Refractive Index of glass = $\frac{\text{Speed of Light in vaccum}}{\text{Speed of Light in glass}}$

→ $1.65 = \frac{3 \times 10^8}{Vg}$ → $Vg = \frac{3 \times 10^8}{1.65}$

→ 1.8×10^8 m/s

24. (a) Image is of same size as the object.
    (b) Image is virtual and erect .

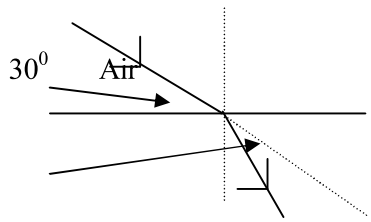
More Questions for Practice

1. What is angle of incidence?
2. A ray of light passing through centre of curvature of a concave mirror retraces its path on reflection, Why?
3. An object is placed at the focus of a concave mirror, Where is the image formed?
4. What is meant by refraction of light?
5. Define principal focus of a concave mirror?
6. State Snell's law of refraction?
7. Will the lateral displacement increase/decrease if glass block is made more thicker?

8. Why convex lens is called conversing lens?
9. Printed letters appears diminished, when viewed through a lens. What is the nature of lens.?
10. At What angle a ray of light should strike the surface of glass, So that it does not suffer any refraction?
11. Does the value of speed of light change with medium?
12. What is the cause of refraction of light?
13. Which lens is used as a magnifying glass?
14. What is an optically denser medium of light?
15. What is the difference between reflection and refraction?
16. If a ray of light traveling in air is incident on the water surface obliquely, Draw a ray diagram and show the change in its path in water?
17. Define refractive index in terms of a speed of light in two media. What is the unit of refractive index?
18. A ray of light strikes the mirror at 15^{o}, What is the angle of reflection?
19. What is refractive index of air? Why the refractive index of other medium is taken with respected to air?
20. Distinguish between real and virtual images?
21. For what position of an object, a virtual image is formed by a convex lens? Give ray diagram?
22. Find the position and nature of image formed in a concave mirror for the following position of an object. (a) At infinity (b) Beyond C.
23. An object is placed at a distance of 10cm from convex mirror of focal length 15cm; find the position and nature of image?
24. A thin lens has a focal length of -25cm. What is the power of the lens? Is it convex or concave?
25. Calculate the distance at which an object should be placed in front of convex lens of focal length 10cm to obtain an image double its size?
26. Why a mirror does has one principal focus while a lens has two principal foci?
27. Focal length of the lens in a photographic camera is 5cm.What is the power and nature of the lens?
28. Define linear magnification. Does it have any unit?
29. Why a concave mirror has a real principal focus, while convex mirror has a virtual principal focus?
30. Which of the following lenses would you prefer to use while reading the small letters found in dictionary.
    a. A convex lens of focal length 30 cm.
    b. A concave lens of focal length 30 cm.
    c. A concave lens of focal length 5 cm.
    d. A convex lens of focal length 5 cm.

31. Show that the refractive index of a medium 1 with respect to medium 2 is reciprocal to the refractive index of medium 2 with respect to 1 i.e. $\mathbf{n_{12} = 1 / n_{21}}$

32. From the diagram given below calculate
    a) angle of incidence
    b) angle of refraction .



c) the refractive index of the substance X. 30^0

X

33. A man standing in front of special mirror finds his image having a small face,big tummy and
legs of normal size .what are the shapes three parts of mirror?

34. A diverging lens of focal length 15cm forms an image of 10cm from the lens. Draw a scale
diagram for the formation of image.