PHYSICS

NCERT - NCERT PHYSICS(HINGLISH)

LIGHT - REFLECTION AND REFRACTION

Solved Examples

1. A convex mirror used for rear view on an automobile has a radius of curvature of 3.00 m. If a bus is located at 5.00 m from this

mirror, find the position, nature and magnification of the image.

2. An object $4cm$ in size is placed at a distance of $25.0cm$ from a concave mirror of focal length 15.0 cm. Find the position, nature and height of the image.
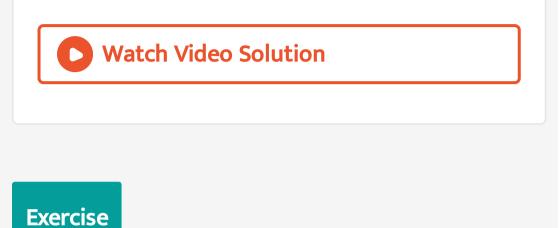
3. A concave lens has focal length of 15 cm. At what distance should an object from the lens be placed so that it forms an image at 10 cm from the lens ? Also, find the magnification of the lens.

4. A $2.0cm$ tall object is placed perpendicular to the principal axis of a convex lens of focal length 10 cm. The distance of the object from

the lens is 15 cm. Find the nature, position and size of the image. Also, find its magnification.

▶ **Watch Video Solution**

1. Define the principal focus of a concave mirror.

▶ **Watch Video Solution**

2. The radius of curvature of a spherical mirror is 20 cm. What is its focal length?

▶ **Watch Video Solution**

3. Name a mirror that can give an errect and enlarged image of an object.

▶ **Watch Video Solution**

4. In motor vehicles, a convex mirror is attached near the driver's seat to give him the view of the traffic behind. What is the special function of this convex mirror which a plane mirror can not do ?

5. (a) What is focal length of a convex mirror of radius of curvature $20cm$?

(b) What is radius of curvature of a mirror of focal length $-50cm$?

6. A concave mirror produces three times magnified real image of an object placed at 10 cm in front of it. Where is the image located ?

7. A ray of light travelling in air enters obliquely into water. Does the light ray bend towards the normal or away from the normal ? Why ?

8. (a) The refractive index of glass is 1.5. What is the speed of light in glass ? (Speed of light in vaccum is $3 \times 10^8 ms^{-1}$).

(b) Is the speed of light in glass independent

of colour of light ? If not, which of the two colours, red and violet travels slower in a glass prism ?

9. Find out, from Table 10.3, the medium having highest optical density. Also find the medium with lowest optical density.

Material medium	Refractive index	Material medium	Refractive index
Air	1.0003	Canada Balsam	1.53
Ice	1.31		
Water	1.33	Rock salt	1.54
Alcohol	1.36		
Kerosene	1.44	Carbon disulphide	1.63
Fused quartz	1.46	Dense flint glass	1.65
Turpentine oil	1.47	Ruby	1.71
Benzene	1.50	Sapphire	1.77
Crown glass	1.52	Diamond	2.42

10. You are given kerosene, turpentine and water. In which of these does the light travel fastest ?

11. The refractive index of diamond is 2.42. What is the meaning of this statement ?

12. Define one dioptre of power of a lens.

13. A convex lens forms a real and inverted image of a needle at a distance of $50cm$ from it. Where is the needle placed in front of the convex lens if the image is equal to size of the object ? Also, find the power of the lens.

14. Find the power of a concave lens of focal length $2m$.

15. Which one of the following materials cannot be used to make a lens ?

A. Water

B. Glass

C. Plastic

D. Clay

Answer: d

▶ **Watch Video Solution**

16. The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should be the position of the object?

A. Between the principal focus and the

   centre of curvature

B. At the centre of curvature

C. Beyond the centre of curvature

D. Between the pole of the mirror and its

   principal focus.

Answer: d

▶ **Watch Video Solution**

17. Where should an object be placed in front of a convex lens to get a real to get real image of the size of the object ?

A. At the principal focus of the lens

B. At twice the focal length

C. At infinity

D. Between the optical centre of the lens and its principal focus

Answer: b

18. A spherical mirror and a thin spherical lens each have a focal length of $-15cm$. The mirror and lens are likely to be

    A. both concave

    B. both convex

    C. the mirror is concave and the lens is convex

D. the mirror is convex, but the lens is

concave

Answer: a

▶ **Watch Video Solution**

19. No matter how far you stand from a

spherical mirror, your image appears erect.

The mirror is likely to be

A. plane

B. concave

C. convex

D. either plane or convex

Answer: d

▶ **Watch Video Solution**

20. Which of the following lenses would you prefer to use while reading small letters found in a dictionary ?

A. A convex lens of focal length 50 cm

B. A concave lens of focal length 50 cm

C. A convex lens of focal length 5 cm

D. A concave lens of focal length 5 cm

Answer: c

21. We wish to obtain an erect image of an object, using a concave mirror of focal length 15 cm. What should be the range of distance

of the object from the mirror? What is the nature of the image? Is the image larger or smaller than the object? Draw a ray diagram to show the image formation in this case.

22. Name the type of mirror used in the following situations :

(a) Head lights of a car.

(b) Side rear view mirror of a vehicle.

(c) Solar furnace.

Support your answer with reason.

23. One half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? Verify your answer experimentally. Explain your observations.

24. An object $5cm$ in length is held $25cm$ away from a converging lens of focal length $10cm$. Draw the ray diagram and find the position, size and the nature of the image formed.

> ▶ **Watch Video Solution**

25. A concave lens has focal length of 15 cm. At what distance should an object from the lens be placed so that it forms an image at 10 cm

from the lens ? Also, find the magnification of the lens.

26. An object is placed at a distance of $10cm$ from a convex mirror of focal length $15cm$. Find the position and nature of the image ?

27. The magnification produced by a plane mirror is $m = +1$. What does this mean ?

28. An object $5.0cm$ in length is placed at a distance of $20cm$ in front of a convex mirror of radius of curvature $30cm$. Find the position of image, its nature and size.

29. An object of size $7.0cm$ is placed at $27cm$ in front of a concave mirror of focal length $18cm$. At what distance from the mirror, should a screen be placed, so that a sharp focussed image can be obtained ? Find the size and nature of the image ?

30. Find the focal length of a lens of power $-2.0D$. What type of lens is this ?

31. A doctor has prescribed lens of power $+1.5D$. Find the focal length of the lens. Is the prescribed lens diverging or converging ?

▶ Watch Video Solution