

## Keywords

**Refraction of light:** The phenomenon of bending of a ray of light when it travels from one transparent medium to another

**Angle of incidence:** Angle between the incident ray and the normal in medium one, is called the angle of incidence.

**Angle of refraction:** The angle between the refracted ray and the normal to the surface in medium two.

**Refractive index:** The ratio of speed of light in vacuum to the speed of light in a medium.

**Concave mirror:** It is a spherical mirror whose inner curved surface is the reflective surface.

**Convex mirror:** It is a spherical mirror with a reflective outer curved surface.

**Principal axis:** The line going through the center of curvature of the mirror

**Pole:** It is the point at which principal axis touches the surface of the mirror and is denoted as point P.

**Radius of curvature:** It is the distance between center of curvature and pole and is denoted as R.

**Focal Length:** It is the distance along the principal axis from the focus to the pole and is denoted as f.

**Real image:** The image which can be obtained on a screen.

**Virtual image:** The image which cannot be obtained on a screen.

**Dispersion of Light:** The splitting of white light into its seven constituent colors.

## Chapter at a Glance

- Ray of light travels along a straight line path but as the ray moves from one medium to another it bends and its path gets deviated.
- The speed of light in air is  $3 \times 10^8$  m/s but when it enters another medium, the value of the speed of light changes.
- Ratio of sine of angle of incidence to sine of angle of refraction is called the refractive index for the second medium with respect to the first medium.
- Focal Length is half of the radius of curvature.
- There are two types of spherical mirrors — concave and convex mirrors.
- To draw a ray diagram we must consider at least two rays and the reflecting surface of the mirror should be always faced towards left.
- The object should always be kept perpendicular to the principal, axis.
- The image which can be obtained on a screen is called a real image.
- The image which cannot be obtained on a screen is called a virtual image.
- When white light splits into a band of seven colors on a screen it is called a spectrum.

**Light****DPP - 1**

**Tick the correct option.**

1. The speed of light in glass is ( $3 \times 10^8$  m/s,  $2 \times 10^8$  m/s)
2. A medium in which the speed of light is more is known as optically (denser/rarer) medium.
3. The splitting up of white light into its seven constituent colors on passing through a transparent medium is known as (diffusion/dispersion) of light.
4. The incident ray, the refracted ray and the normal to the refracting surface, all lie in the (same/different) plane.
5. (Concave/convex) mirrors are used in headlights of motor vehicles.

**Fill in the blanks.**

6. Light is a form of .....
7. Light produces the sensation of .....
8. The refraction of light takes place at the boundary between the two .....
9. Refractive index of second medium with respect to the first medium is denoted by the symbol .....
10. A curved mirror is that mirror whose reflecting surface is part of a hollow ..... of glass.
11. A pencil held obliquely and partly immersed in water appears to be .....
12. An object placed under water appears to be .....
13. A pool of water appears to be less ..... than it actually is.
14. When a thick glass slab is placed over some printed matter the letters appear ..... when viewed from the top.
15. A lemon kept in water in a glass tumbler appears to be ..... when viewed from the sides.
16. The stars appear to ..... on a clear night.
17. The refraction of light causes advanced sunrise and delayed .....

**Write T for true and F for false statements. Correct the false statements.**

18. Speed of light varies in different mediums.
19. When a ray of light goes from a denser medium to a rarer medium, it bends towards the normal at the point of incidence.
20. The focus F always lies in the center of the line joining center of curvature C.

**Name the following.**

1. The change in the direction of light when it passes from one medium to another obliquely.
2. Unit of refractive index.
3. The spread out patch of light or band of colors on the screen.

**Define the following terms.**

4. Refraction of Light
5. Angle of refraction
6. Refractive index
7. Convex mirror
8. Radius of curvature
9. Focal Length
10. Virtual image
11. Dispersion of Light

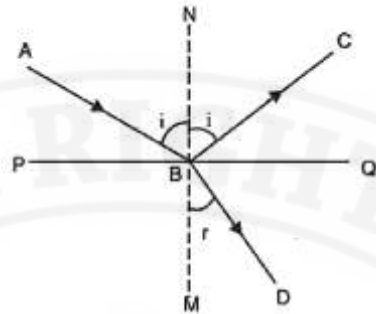
**Give reasons for the following.**

12. We are able to see objects that do not emit their own light.
13. Light bends when travelling from one medium to another.
14. A shining steel spoon represents both a concave mirror and a convex mirror.
15. White light splits up into seven different colours on passing through a transparent medium like a prism.
16. A rainbow is seen in the sky after rain.
17. Answer by choosing whether a concave or a convex mirror is used in the following situations.
  - a) Headlights of motor vehicles,
  - b) rear view mirror on the side of a vehicle,
  - c) used by dentists to observe teeth,
  - d) anti-theft mirrors in shopping complexes,
  - e) shaving mirrors,
  - f) concentrating sunlight in solar furnaces,
  - g) used in lighthouses,
  - h) street lamps
18. Draw ray diagrams for the following rule:
  - a) A ray of light which is parallel to the principal axis of a concave mirror, passes through its focus after reflection from the mirror.
  - b) A ray of light which is parallel to the principal axis of a convex mirror, appears to be coming from its focus after reflection from the mirror.
  - c) A ray of light which is incident at the pole of a convex mirror is reflected back making the same angle with the principal axis.
  - d) A ray of light passing through the centre of curvature of a concave mirror is reflected back along the same path.
  - e) A ray of light passing through the focus of a concave mirror becomes parallel to the principal axis after reflection.

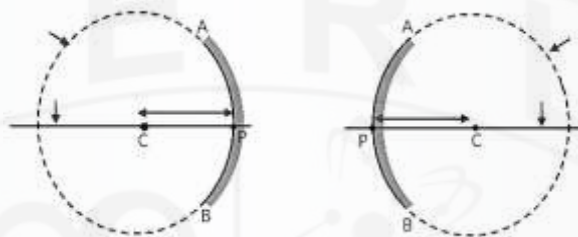
**Light**

**DPP - 3**

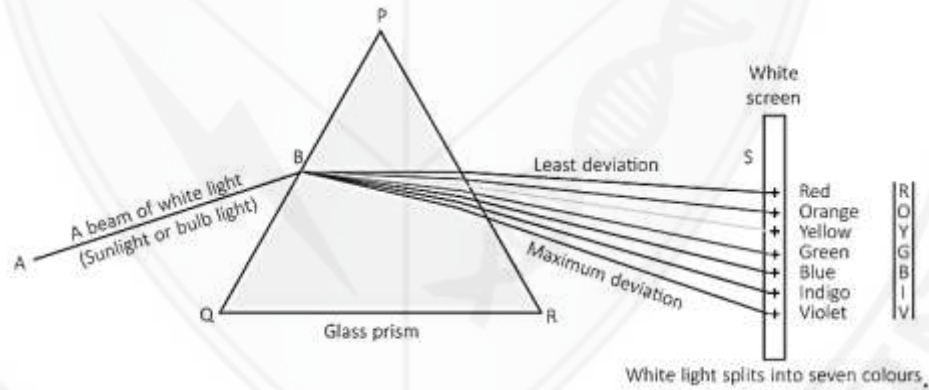
1. Identify the incident ray, reflected ray, refracted ray, point of refraction, angle of incidence, angle of refraction, normal, and angle of reflection in the given diagram



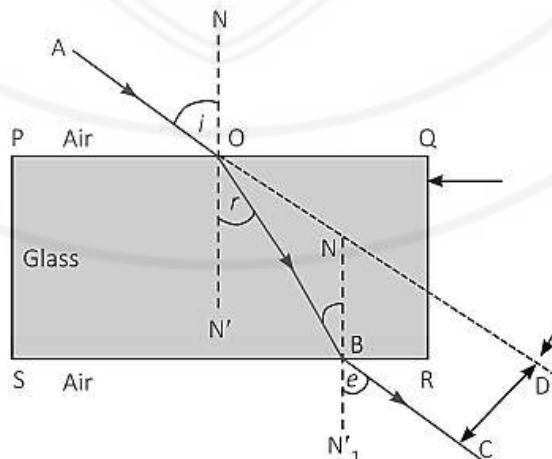
2. Identify and label the following terms in the given diagrams.  
Principal axis, radius of curvature, center of curvature, pole, concave mirror, convex mirror



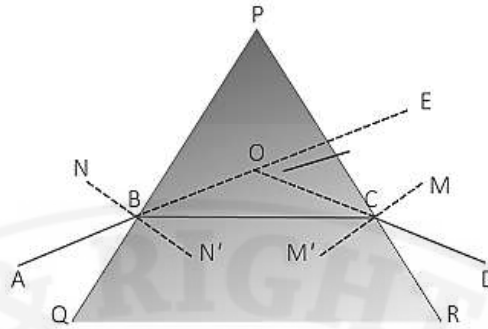
3. Draw a diagrammatic representation showing the position of focal point and focal length in a concave mirror and a convex mirror.
4. Identify the phenomenon given in the diagram



5. Label the given diagram.



6. Complete the following on the basis of the diagram given below.



- PQR is a .....
- ..... is the incident ray.
- ..... is the ray after refraction from air to glass medium.
- ..... is the emergent ray which is going from denser medium ( ..... ) to rarer medium ( ..... ).
- ..... is the angle of deviation.
- The emergent ray ..... is not to the incident ray .....
- How do we obtain the angle of deviation?

**Solve the following numericals.**

- Velocity of light in a medium is  $2.25 \times 10^8$  m/s. What is the refractive index of this medium?
- What do you conclude about the speed of light in diamond if its refractive index is 2.41?

**Answer the following**

- What is diffusion of light?
- What is a medium? Give suitable examples.
- State the two rules of refraction.
- State the two laws of refraction.
- State the formula for refraction in terms of speed of light.
- Arrange the media in increasing order of their optical densities:- air, alcohol, glass, diamond and water, turpentine oil
- What do the components of the given equation denote? What is the equation called? Who gave this law?

$$\sin i / \sin r = \text{constant } (\mu)$$