

# BHARATIYA VIDYA BHAVAN'S V M PUBLIC SCHOOL, VADODARA

## QUESTION BANK

### Ch Light : Reflection and Refraction

#### One mark questions

- Q1 What happens when a ray of light falls normally on the surface of a plane mirror?
- Q2 If the focal length of a convex mirror is 25 cm , what is its radius of curvature?
- Q3 What is the nature of image formed by a concave mirror if the magnification produced by the mirror is a) +4 b) -2 ?
- Q4 An arrow 2.5 cm high is placed at a distance of 25 cm from a diverging mirror of focal length 20 cm . Find the nature , position and size of the image formed.
- Q5 What is meant by refraction of light? Draw a labeled ray diagram to show the refraction of light.
- Q6 State any two uses of convex lenses.
- Q7 A lens has a focal length of -10 cm . What is the power of the lens and what is its nature?
- Q8 The refractive index of glass is 1.5 . Calculate the speed of light in glass. (speed of light in air is  $3 \times 10^8$  m/s).
- Q9 Why a stick half immersed in water appears to be bent at the surface?
- Q10 Define one diopetre power of a lens.

#### Two mark questions

- Q1 What is the difference between a real image and a virtual image? Give one example of each type of image.
- Q2 Identify the nature of the mirror and mention two characteristics of the image formed when magnification  $m$  is equal to +6.

Q3 A beam of light passes from a medium A to medium B. If the angle of incidence is  $60^\circ$  and angle of refraction is  $30^\circ$ . Calculate the refractive index of medium B with respect to medium A. Q4 Light

enters from air into crown glass slab having refractive index 1.52. If speed of light in air is

$3 \times 10^8$  m/s then find the speed of light in the glass slab.

Q5 A convex lens of power +5D is placed at a distance of 40cm from a wall. At what distance from the lens should a candle be placed so that its sharp image is formed on the wall ?

Q6 Two lenses are of powers  $P_1 = +0.5D$  and  $P_2 = -2.5D$ . Out of the two, identify the converging lens and the diverging lens. Give reason for your choice. Find the focal length of each.

Q7 An object is placed at a distance equal to  $2f$  in front of a convex lens. Draw a labeled ray diagram to show the image formation. State the characteristics of the image formed.

Q8 An object is placed at a distance of 12cm in front of a concave mirror. It forms a real image 4 times larger than the object. Where should a screen be placed in front of a mirror so as to obtain a sharp image ?

Q9 Speed of light in a given medium is found to be  $2.4 \times 10^8$  m/s. What is the refractive index of the medium ? Give that the speed of light in vacuum is  $3 \times 10^8$  m/s.

Q10 An object is placed at a distance of 1m from a convex lens of focal length 40cm. Find the position of the image formed from the lens.

### Three mark questions

Q1(i) An object 2cm in size is placed 30cm in front of concave mirror of focal length 50cm. At what distance from the mirror should the screen be placed in order to obtain a sharp image?

(ii) What will be the nature and size of the image formed ? Draw a ray diagram to show the formation of the image in this case.

Q2 A converging mirror forms a real image of height 4cm of an object of height 1cm placed 20cm away from the mirror.

(i) Calculate the image distance.

(ii) What is the focal length of the mirror ?

- Q3 A large concave mirror has a radius of curvature of 1.5m. A person stands 10m in front of the mirror. Where is the person's image ?
- Q4 (i) Why does a driver prefer to use a convex mirror as a rear view mirror in a vehicle?  
(ii) How will you distinguish between a plane mirror, a concave mirror and a convex mirror without touching them?
- Q5 An object is placed at a distance of 10cm from a convex mirror of focal length 5cm.  
(i) Draw a ray diagram showing the formation of image.  
(ii) State two characteristics of the image formed.  
(iii) Calculate the distance of the image from the mirror.
- Q6 An object 20cm from a spherical mirror gives rise to a virtual image 15cm behind the mirror. Determine the magnification of the image and type of mirror used.
- Q7 Draw a labeled ray diagram to show how a ray of light is refracted when it passes:  
(i) From air into an optically denser medium.  
(ii) From an optically denser medium into air.
- Q8 An object 3cm high is placed 24cm away from a convex lens of focal length 8cm. Find the position, height and nature of the image.
- Q9 An object 60cm from a lens gives a virtual image at a distance of 20cm in front of the lens. What is the focal length of the lens ? Is the lens converging or diverging ? Give reason for your answer.
- Q10 i) What do you understand by the power of a lens.  
(ii) Name one factor on which the power of a lens depends.  
(iii) Define the unit of power of the lens.

### Five mark questions

- Q1 (i) Draw ray diagrams to show the formation of images when the object is placed in front of a concave mirror.  
(a) Between its pole and focus  
(b) Between its center of curvature and focus

Describe the nature, size and position of the image formed in each case.

(ii) State one use of concave mirror based on the formation of image as in the case (a) above.

Q2 (i) State the laws of refraction.

(ii) Define absolute refractive index of a medium and relative refractive index for a given pair of media.

(iii) Refractive index of medium A is 1.80 and that of medium B is 1.50. Find the refractive index of medium A with respect to medium B.

Q3 (i) A thin converging lens forms a) Real magnified image.

b) Virtual magnified image of an object placed in front of it. Write the position of the objects in each case. Draw labeled ray diagrams to show the image formation.

ii) A 2 cm tall object is placed 40 cm from a diverging lens of focal length 15 cm. Find the position and size of the image.

Q4 (i) Write snells law.

(ii) Which one is optical denser, water or kerosene ?

(iii) An object of 7cm in size is placed at 27cm in front of concave mirror of focal length 18cm. At what distance from a mirror should a screen be placed so that a sharp and focused image can be obtained ? What is the size of the image ?

Q5 (i) Write the relation between the object distance( $u$ ) , image distance( $v$ ) and focal length ( $f$ ) of a lens. Also state the formula for magnification of lens.

(ii) Draw a ray diagram to show the image formation of a concave lens when the object is placed at infinity.

(iii) An object placed 50cm from a lens produces a virtual image at a distance of 10cm in front of the lens. Calculate of the focal length of the lens and magnification produced.

Q6 (i) Draw a labeled ray diagram to show the formation of image in a convex mirror when the object is at infinity.

(ii) State three characteristics of the image formed in this case.

(iii) Give two uses of convex mirror.

Q7 (i) With the help of a diagram, show how when light falls obliquely on the side of the rectangular glass slab, the emergent ray is parallel to the incident ray.

(ii) Show the lateral displacement of the ray on the diagram.

(iii) State two factors on which the lateral displacement of the emergent ray depends.

Q8 (i) Explain with the help of a labeled ray diagram why a pencil partly immersed in water appears to be bend at the water surface.

(ii) State whether the bending of pencil will increase or decrease if water is replaced by another liquid which is optically more denser than water. Give reason for your answer.

Q9 (i) What is meant by the refractive index of the substance ?

(ii) Which has higher refractive index water or glass ?

(iii) Light enters from air into diamond which has a refractive index of 2.42. Calculate the speed of light in diamond. The speed of light in air is  $3 \times 10^8$  m/s.

Q10 Draw ray diagrams to represent the nature, position and relative size of the image formed by a convex lens for the object placed :

(i) At  $2F_1$

(ii) Between  $F_1$  and optical centre O of the lens.

Which of the above two cases shows the use of convex lens as a magnifying glass ? Give reason for your choice.