

Maxprap. Chapter wise Series Class 10th - Physics

Class : 10th

Topic : Light Reflection and Refraction

Max. Marks : 50

Duration : 2 Hrs

Sections: A (MCQs), B (Short Answer-I), C (Short Answer-II), D (Long Answer), E (Case-Based).

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 23 questions divided into five Sections A, B, C, D and E. (iii). Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 5 questions of 2 marks each. Section C comprises of 4 questions of 3 marks each. Section D comprises of 2 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.

Section A

Questions 1 to 10 carry 1 mark each

1. The speed of light in water is 2.25×10^8 m/s. If the speed of light in a vacuum be 3.00×10^8 m/s, the refractive index of water:
a) 1.32 b) 1.34 c) 1.33 d) 1.35
2. The refractive indexes of four substances P, Q, R, and S are 1.77, 1.50, 2.42, and 1.31 respectively. When light travelling in air is incident on these substances at equal angles, the angle of refraction will be the maximum in:
a) substance R b) substance Q c) substance S d) substance P
3. No matter how far you stand from a mirror, your image appears erect. The mirror is likely to be :
a) Convex b) Either plane or convex c) Plane d) Concave
4. The image formed by a concave mirror is virtual, erect, and magnified. The position of object is:
a) between focus and centre of curvature b) at pole
c) at focus d) between pole and focus
5. A diverging mirror is:
a) a shaving mirror b) a plane mirror c) a convex mirror d) a concave mirror
6. The refractive index of water with respect to air is $\frac{4}{3}$. The refractive index of air with respect to water will be:
a) 0.75 b) 0.50 c) 0.25 d) 1.75
7. To obtain a magnification of +2 with a concave mirror of radius of curvature 60 cm the object distance must be

- a) - 15 cm b) - 45 cm c) - 30 cm d) - 90 cm

8. A convex lens has a focal length of 40 cm. Calculate its power.

- a) 2.5 D b) 3.5 D c) 4.5 D d) 6.6 D

Assertion(A)/Reason(R) Based (9-10): In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

9. Assertion (A): Higher is the refractive index of a medium or denser the medium, lesser is the velocity of light in that medium.

Reason (R): Refractive index is inversely proportional to velocity.

10. Assertion (A): A concave lens of very short focal length causes higher divergence than one with longer focal length.

Reason (R): The power of a lens is directly proportional to its focal length.

SECTION – B

Questions 11 to 15 carry 2 marks each

11. The image formed by a concave mirror is observed to be virtual, erect and larger than the object. where should be the position of object? Justify your answer .

12. Why do we prefer a convex mirror as a rear view mirror in vehicles?

13.

- a) A security mirror used in a big showroom has radius of curvature 5 m. If a customer is standing at a distance of 20 m from the cash counter, find the position, nature and size of the image formed in the security mirror.
b) Neha visited a dentist in his clinic. She observed that the dentist was holding an instrument fitted with a mirror. State the nature of this mirror and reason for its use in the instrument used by dentist.

14.

- a) If the image formed by a lens is diminished in size and erect, for all positions of the object what type of lens is it?
b) Name the point on the lens through which a ray of light passes un deviated.
c) An object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from lens is 30 cm. Find
a. the position,
b. the magnification and

c. the nature of the image formed.

15. The image of an object formed by a mirror is real, inverted and is of magnification - 1. If the image is at a distance of 40 cm from the mirror, where is the object placed? Where would the image be if the object is moved 20 cm towards the mirror? State reason and also draw ray diagram for the new position of the object to justify your answer.

SECTION – C

Questions 16 to 19 carry 3 marks each

16. 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.

17. What is atmospheric refraction? Explain with the help of a labelled diagram that the position of a star as seen by us is not its true position.

18. How are the power and focal length of a lens related? You are provided with two lenses of focal length 20 cm and 40 cm respectively. Which lens will you use to obtain more convergent light?

19.

- a) Name the spherical mirror used as:
 - a. shaving mirror
 - b. Rear view mirror in vehicles
 - c. Reflection in search - light.
- b) Write any three difference between a real and a virtual image.

SECTION – D

Questions 20 to 21 carry 5 marks each

20. Write laws of refraction. Explain the same with the help of ray diagram, when a ray of light passes through a rectangular glass slab.

21. An object is placed at a distance of 60 cm from a concave lens of focal length 30 cm.

- a) Use the lens formula to find the distance of the image from the lens.
- b) List four characteristics of the image (nature, position, size, erect/inverted) formed by the lens in this case.

Draw a ray diagram to justify your answer to the part(ii).

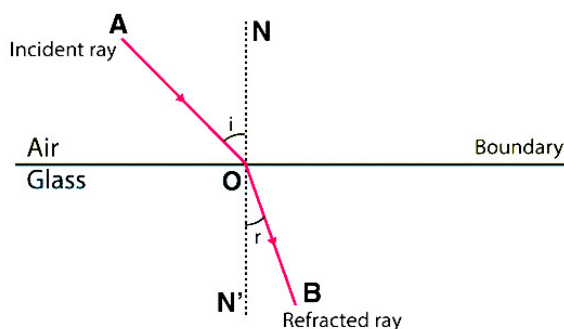
SECTION – E (Case Study Based Questions)

Questions 22 & 23 carry 4 marks each

22. Read the following text carefully and answer the questions that follow:

The refraction of light on going from one medium to another takes place according to two laws which are known as the laws of refraction of light. These laws are

Laws of Refraction



- a) The ratio of sine of the angle of incidence to the sine of the angle of refraction is always constant for the pair of media in contact.

$$\frac{\sin i}{\sin r} = \mu = \text{constant}$$

This constant is called the refractive index of the second medium with respect to the first medium. The Refractive index is also defined as the ratio of the speed of light in a vacuum to the speed of light in the medium.

- b) The incident ray, refracted ray and normal all lie in the same plane. This law is called Snell's law of refraction.

Questions

- a) When light travels from air to glass, which is greater the angle of incidence and the angle of refraction? (1)
- b) What is the refractive index of the second medium with respect to the first medium, when the angle of incidence is 45° and the angle of refraction is 30° as light travels from air to the second medium? (1)
- c) If the refractive index of glass is 1.5 and speed of light in air is 3×10^8 m/s. what is the speed of light in glass? (2)

OR

If the refractive index of material a with respect to material b is 2, what is the refractive index of material b with respect to material a? (2)

23. Read the following text carefully and answer the questions that follow:

Study the data given below showing the focal length of three concave mirrors A, B and C and the respective distances of objects placed in front of the mirrors:

Case	Mirror	Focal Length (cm)	Object Distance (cm)
1	A	20	45
2	B	15	30
3	C	30	20

- a) In which one of the above cases the mirror will form a diminished image of the object? Justify your answer. (1)
- b) List two properties of the image formed in case 2. (1)

- c) What is the nature and size of the image formed by mirror C? Draw ray diagram to justify your answer. (2)

OR

An object is placed at a distance of 18 cm from the pole of a concave mirror of focal length 12 cm. Find the position of the image formed in this case. (2)

Light (Reflection and Refraction) Paper Details – Analysis		
Objective Questions		
MCQ	1 marks x 8 question = 8	
Assertion Reason	1 marks x 2 question = 2	
Subjective		
Short type I	2 marks x 5 question = 10	
Short type II	3 marks x 4 question = 12	
Long Type	5 marks x 2 question = 10	
Case Studies Based		
Case 1	4 marks	
Case 2	4 marks	

Total = 50 marks Your Score =