

10th CLASS-PHYSICAL SCIENCE

REFRACTION OF LIGHT AT PLANE SURFACES

½ Mark Questions

1. Name the phenomena due to the direction of light changes at interface of the two media when it travels from one medium to another obliquely?
2. What happens to the speed of light at the interface of two media during refraction?
3. **X:** When light ray travels from a rare medium to denser medium the refracted ray bends towards normal.
Y: when light travels from rarer medium to denser medium the angle of refraction is less than the angle of incidence.
Which of the above statement is correct?
4. **X:** When light ray travels from denser medium to rarer medium the refracted ray bends away from the normal.
Y: When light travels from a denser medium to rarer medium the angle of refraction is more than the angle of incidence.
Z: When light ray incident normally at the interface of media and travelling from denser medium to rarer medium the angle of refraction is equal to the angle of incidence.
Which of the above statement is correct?
5. Write the value of speed of light in vacuum.
6. Name any one of the dimensionless quantity?
7. **X:** Refractive index gives us an idea of how fast or how slow light travels in a medium
Y: The speed of a light in a medium is low when refractive index of medium is low
Which of the above statement is correct?
8. Find the speed of light in a glass when the refractive index of the glass is $\frac{3}{2}$?
9. Write the refractive index value of the diamond.
10. Match the material medium with suitable refractive index from the following

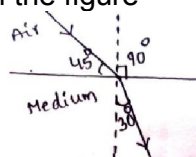
Material medium

- 1) Air ()
- 2) Ice ()
- 3) Water ()
- 4) Kerosene ()

Refractive index

- P) 1.44
- Q) 1.33
- R) 1.31
- S) 1.0003

11. Write the equation of Snell's law
12. The refractive indices of four substances P, Q, R and S are 1.50, 1.36, 1.77 and 1.31 respectively.
Arrange the substances in ascending order related to speed of light
13. The refractive index of glass for light going from air to glass is $\frac{3}{2}$. Find the refractive index of air for light going from glass to air
14. Write the relation between the refractive index (n) and speed of light in that medium (v).
15. **X:** The refractive index of the kerosene is greater than the refractive index of water.
Y: Optically denser medium may not possess greater mass density.
Which of the above statement is correct ?
16. Find the refractive index of the medium from the figure



17. Write the angle of refraction at critical angle of incidence.
18. Write the conditions which are needed to take total internal reflection.
19. **X:** If temperature of air increases the refractive index of air decreases
Y: The refractive index of air does not depend on its temperature
Which of the above statement is correct?

20. A ray of light incident at interface of two media making some angle. Let "i" be the angle of incident and "c" be the critical angle. Match the following conditions with suitable phenomenon

Condition

Phenomenon

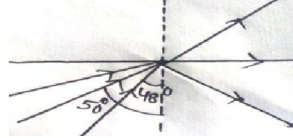
- | | | |
|------------|----------|--|
| 1) $i > c$ | () | P) Refraction (Light ray enter into rare medium) |
| 2) $i = c$ | () | Q) T.I.R (Light ray gets refracted into denser medium) |
| 3) $i < c$ | () | R) Light ray moves along the interface of two media |

21. Name the phenomena behind the working of Optical fibre?

22. Arrange the substances water, ice, kerosene in ascending order based on their refractive index values?

23. Find the critical angle of material when the refractive index of the material is 2.

24. Identify the value of critical angle from the given figure



25. At what angle of incidence T.I.R takes place from the above figure

26. At what angle of incidence light ray goes into the rare medium from the above figure

27. Choose the suitable answers of section B with section A

Section A

Section B

- | | | |
|------------------------------|----------|------------------------|
| 1) Diamond | () | P) c/v |
| 2) Refractive index | () | Q) v_2/v_1 |
| 3) Relative refractive index | () | R) Low critical angle |
| | | S) High critical angle |

28. Name the perpendicular distance between extended emergent ray and incident ray of rectangular glass slab

29. Write the formula to find the effective index of glass slab by using vertical shift

30. What happens to the lateral shift produced by the glass slab when the angle of incidence increases?

31. What happens to the refractive index of the glass slab when the angle of incident increases?

32. Write the angle of deviation produced by the glass slab.

33. Write the value of angle of emergence and angle of refraction when a ray of light falls normally to the surface of a glass slab.

34. The thickness of the glass slab is 3 cm and its refractive index is 2. Find the vertical shift of the glass slab?

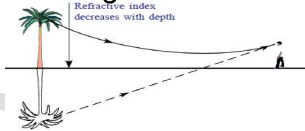
35. Find the refractive index of vacuum medium.

36. Find the refractive index of denser medium with respect to rarer medium when incident angle is equal to critical angle

37. Choose the incorrect statement from the following.

- The formation of a mirage is the best example where refractive index of a medium varies throughout the medium.
- Total internal reflection is the main reason for brilliance of diamonds.
- Total internal reflection is the basic principle behind working of optical fibre.
- Twinkling of star is due to total internal reflection.

38. From the given figure, which physical phenomena we observe?



39. The most and the least value pair of refractive index having substances among the following is:

- | | |
|--------------------|--------------------|
| a) vacuum, water | b) water, vacuum |
| c) vacuum, diamond | d) diamond, vacuum |

40. The most and the least value pair of speed of light having substances among the following is:

(Refractive indices: ice-1.31, water-1.33, kerosene-1.44 and Fused quartz-1.46)

- | | |
|----------------------|----------------------|
| a) water, kerosene | b) kerosene, water |
| c) ice, fused quartz | d) fused quartz, ice |

KEY

1. Refraction of light
2. Changes
3. X and Y
4. X, Y and Z are correct
5. 3×10^8 m/s
6. Refractive index (or) Relative refractive index
7. X
8. 2×10^8 m/s
9. 2.42
10. $1 \rightarrow S, 2 \rightarrow R, 3 \rightarrow Q, 4 \rightarrow P$
11. $n_1 \sin i = n_2 \sin r$
12. $R < P < Q < S$
13. $2/3$
14. $n \propto 1/v$
15. X and Y
16. $\sqrt{2}$ (or) 1.414
17. 90°
18. i) Light ray travels from denser medium to rarer medium ii) i value is greater than c value
19. X
20. $1 \rightarrow Q, 2 \rightarrow R, 3 \rightarrow P$
21. Total internal reflection
22. Ice, water, kerosene
23. 30°
24. 50°
25. $> 50^\circ$ (more than critical angle)
26. 48° (less than critical angle)
27. $1 \rightarrow R, 2 \rightarrow P, 3 \rightarrow Q$
28. Lateral shift
29. Refractive index (n) = Thickness of the glass slab / Thickness of the glass slab - Vertical shift
30. Increased
31. remains same
32. 0°
33. 0° and 0°
34. 1.5
35. 1
36. $n_{12} = 1/\sin c$
37. d
38. Mirage
39. d
40. c