CBSE Class 12 physics
Important Questions
Chapter 9
Ray Optics and Optical

1 Mark Questions

1. A person is standing before a concave mirror cannot see his image, unless he is beyond the centre of curvature? Why?

Ans. When man stands beyond focus is i.e. between focus and centre of curvature, his real and inverted image is formed beyond C is beyond him and thus he cannot see the image. But when he stands beyond C, image is formed between focus and centre of curvature is in front of him and thus he is able to see his image.

2. For what angle of incidence, the lateral shift produced by a parallel sided glass plate is maximum?

Ans. We know

$$d = \frac{t}{\cos r} \sin(90^\circ - r) \quad (when\ \angle i = 90^\circ)$$

$$d = \frac{t}{\cos r} \cos r$$

D = t

Lateral shift is maximum

3. You read a newspaper, because of the light if reflects. Then why do you not see even a faint image of yourself in the newspaper?

Ans. The image is produced due to regular reflection of light but when we read a newspaper, because of diffused (irregular) reflection of light we are not able to see even a faint image.

4. A substance has critical angle of 45° for yellow light what is its refractive index?

Ans. $\mu = \dfrac{1}{\sin C}$

$$\mu = \dfrac{1}{\sin 45^\circ} = \dfrac{1}{\dfrac{1}{\sqrt{2}}}$$

$$\mu = \sqrt{2}$$

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5. An object is placed between the pole and focus of a concave mirror produces a virtual and enlarged image. Justify using mirror formula?

Ans. $\dfrac{1}{\upsilon} + \dfrac{1}{u} = \dfrac{1}{f}$

$$\upsilon = \dfrac{uf}{u-f}$$

For a concave mirror

$$f = -ve$$

$$u = -ve$$

Given V < f so υ is positive, hence image is virtual.

Now magnification $m = \dfrac{\upsilon}{u}$

since $\upsilon > o$ and $u < o$

$\therefore m = +ve$, Hence enlarged image is produce

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6. A converging and diverging lens of equal focal lengths are placed coaxially in contact. Find the focal length and power of the combination?

Ans. $\dfrac{1}{F} = \dfrac{1}{f_1} + \dfrac{1}{f_2}$

For converging lens $f_1 = +f$

For diverging lens $f_2 = -f$

$\Rightarrow \dfrac{1}{F} = \dfrac{1}{f} - \dfrac{1}{f}$

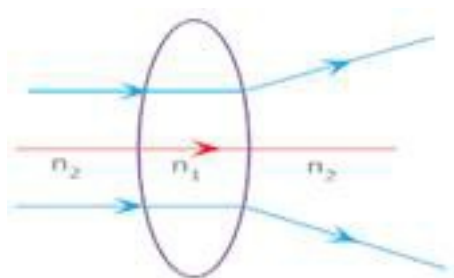$\Rightarrow F = \dfrac{1}{0} \Rightarrow \infty = F$

$Now\ \text{P} = \dfrac{1}{F} = \dfrac{1}{\infty} = 0$

P=0

Hence

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7. The refractive index of a material of a convex lens is n_1 it is immersed in a medium of refractive index n_2. A parallel beam of light is incident on thelens. Trace the path of the emergent rays when $n_2 > n_1$.

Ans. When $n_2 > n_1$ then the convex lens behaves as a concave

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8. In a telescope the focal length of the objective and the eye piece are 60cm and 5cm respectively. What is? (1) Its magnification power (2) Tube length
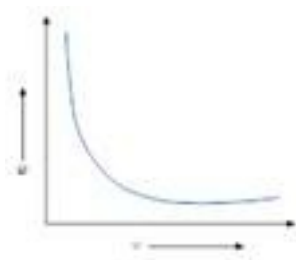
Ans. magnification $M = \dfrac{-fo}{fe} = \dfrac{-60}{5} = -12$

$$L = fo + fe$$

Tube length $L = 60 + 5 = 65 cm.$

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9. Show the variation of u and v in case of a convex mirror?

Ans.

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10. Two lenses having focal length $f_1 and f_2$ are placed coaxially at a distance x from each other. What is the focal length of the combination?

Ans. $\dfrac{1}{F} = \dfrac{1}{f_1} + \dfrac{1}{f_2} - \dfrac{x}{f_1 f_2}$:

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11. Does short-sightedness (myopia) or long-sightedness (hypermetropia) imply necessarily that the eye has partially lost its ability of accommodation? If not, what might cause these defects of vision?

Ans. A myopic or hypermetropic person can also possess the normal ability of accommodation of the eye-lens. Myopia occurs when the eye-balls get elongated from front to back. Hypermetropia occurs when the eye-balls get shortened. When the eye-lens loses its ability of accommodation, the defect is called presbyopia.