NCERT Questions with Solutions

Q. 1. What is meant by power of accommodation of the eye?

Ans. The ability of the eye lens to adjust its focal length is called power of accommodation of the eye. This enables us to see distant objects and nearby object clearly.

Q. 2. A person with a myopic eye cannot see objects beyond 1.2 m distinctly. What should be the type of the corrective lens used to restore proper vision?

Ans. A person with a myopic eye should use a concave lens of focal length 1.2 m so as to restore proper vision.

Q. 3. What is the far point and near point of the human eye with normal vision?

Ans : For a human eye with normal vision the far point is at infinity and the near point is at 25 cm from the eye.

Q. 4. A student has difficulty reading the blackboard while sitting in the last row. What could be the defect the child is suffering from? How can it be corrected?

Ans. The student is suffering from myopia or short-sightedness.

This defect can be corrected by using concave (diverging) lens of an appropriate power.

Q. 5. The human eye can focus objects at different distance by adjusting the focal length of the eye lens. This is due to

(a) Presbyopia b) accommodation (c) near-sightedness (d) far-sightedness

Ans : (b) accommodation.

Q 6. The human eye forms the image of an object at its

(a) Cornea (b) iris (c) pupil (d) retina

Ans: (d) retina.

Q.7. The least distance of distinct vision for a young adult with normal vision is about

(a) 25 m (b) 2.5 cm (c) 25 cm (d) 2.5 m Ans : (c).

Q. 8. The change in focal length of an eye lens is caused by the action of the

(a) Pupil (b) retina (c) ciliary muscles. (d) iris Ans. (c) .

Q. 9. A person needs a lens of power 5.5 D for correcting his distant vision. For correcting his near vision he needs a lens of power + 1.5 D. What is the focal length of the lens required for correcting (i) distant vision, and (ii) near vision?

Ans :

(i) Power of lens needed for correction distant vision of the person P_1 = 5.5 D

Focal length of lens required for correcting distant vision $f_1 = 1/p_1 = 1/- 5.5 = -18$cm

(ii) For correcting near vision power required P2 = + 1.5 D

Focal length of lens required for correcting near vision $f_2 = 1/p_2 = 1/-1.5 = 0.666$ m = 66.7 cm

Q.10. The far point of a myopic the person is 80 cm in front of the eye. What is the nature and power of the lens required to correct the problem?

Ans : To correct the myopia the person concerned should use concave lens (diverging lens) of suitable focal length.

For myopic eye: Far point of normal eye = u = at infinity $\Rightarrow$ u = - ∞

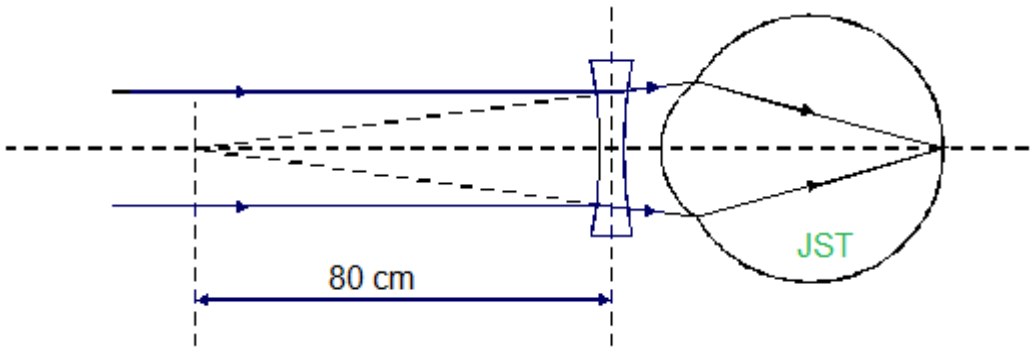
The virtual image is formed at the far point of myopic person $\Rightarrow$ v = - 80 cm

From lens formula,

$\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{f} = \frac{1}{-80} - \frac{1}{-\infty}$

$\Rightarrow$ f = - 80 cm = - 80/100 m

Power of the lens P = 1/f = - 100/80 = - 1.25 D



Q11. The near point of a hypermetropic eye is 1m. What is the power of the lens required to correct this defect? Assume that the near point of the normal eye is 25 cm.

Ans. Convex lens of suitable focal length is used for correction of hypermetropic eye.

Object distance = near point of the normal eye = - 25 cm,

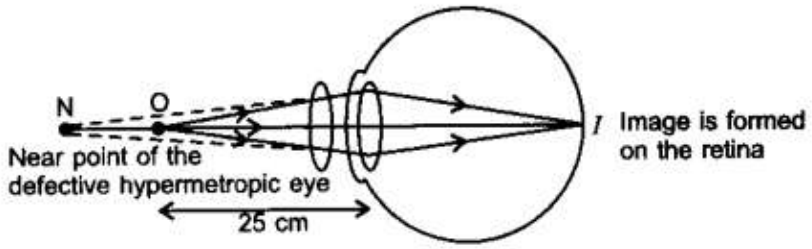
Convex lens is used forms its virtual image at near point of hypermetropic eye

$\Rightarrow$ v = -1m = - 100 cm.

Using lens formula, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u} \Rightarrow \frac{1}{f} = \frac{1}{-100} - \frac{1}{-25}$

$\Rightarrow \frac{1}{f} = \frac{-1+4}{100} \Rightarrow f = \frac{100}{3}$ cm $= f = \frac{1}{3}\, m$

Power of correcting lens = P = 1/f = +3D



Q12. Why is a normal eye not able to see clearly the objects placed closer than 25 cm ?

Ans: This is because the focal length of the eye lens cannot be decreased below a certain minimum limit that 25cm during accommodation.

Q13. What happens to the image distance in the eye when we increase the distance of an object from the eye?

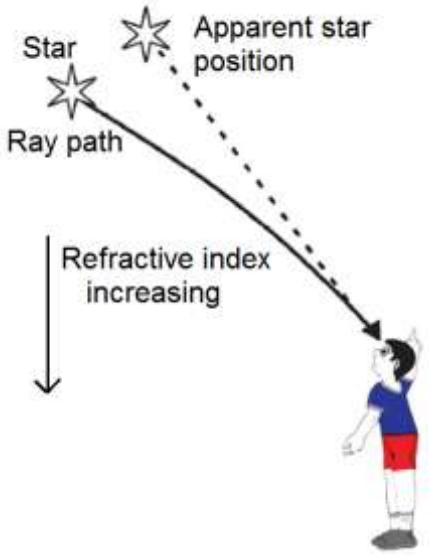
Ans : The image is formed on the retina even on increasing the distance of an object from the eye.

When we increase the distance of an object from the eye lens becomes thinner and its focal length increases to focus image on retina.

Q14. Why do stars twinkle?

Ans. Stars twinkle due to atmospheric refraction of starlight.

The density of air varies place to place therefore, the path of rays of light coming from the star goes on varying slightly, the apparent position of the star formed randomly. Thus, the stars twinkle.



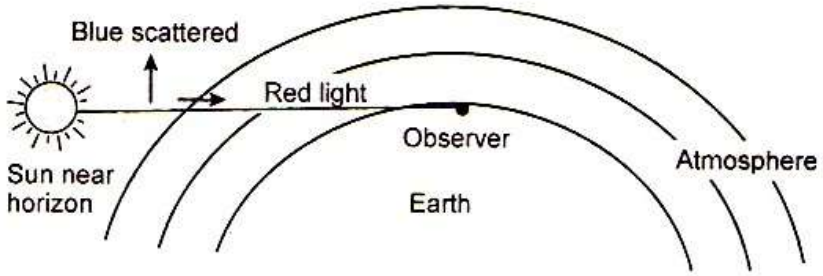
Q15. Explain why the planets do not twinkle.

Ans. Planets are much closer to the earth so not much refraction occurs. Therefore, planets appear equally bright and there is no twinkling of planets.

Q.16. why does the Sun appear reddish early in the morning?

Ans : In the early morning, the sun is situated near the horizon. Light from the Sun passes through thicker layers of air and cover larger distance before reaching our eyes.

Therefore, blue light scattered the most and red light least. This is why the sun appear reddish early in the morning.



Q17. Why does the sky appear dark instead of blue to an astronaut?

Ans.: In space there is no air therefore light ray cannot scatter thus, sky appears dark to an astronaut.