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QUESTIONS

Write short notes on any two eye defects

1). MYOPIA

This is also known as Near Sightedness or Short Sightedness

This is a defect of vision in which far objects appear blurred but near objects are seen clearly. The image is focused in front of the retina rather than on it usually because the eyeball is too long or the refractive power of the eye's lens too strong.

Cause of Myopia (Near Sightedness or Short Sightedness)

The far point of a person suffering from Myopia or Near Sightedness becomes nearer than infinity.

This problem may arise because of

- (a) excessive curvature of the eye lens
- (b) elongation of eye ball.

Because of excessive curvature of the eye lens or elongation of eye ball image of object placed at infinity formed before retina instead of retina and object appears blurred or nor visible.

Correction of Myopia (Near Sightedness or Short Sightedness)

Myopia or Near Sightedness or Short Sightedness can be corrected by using a diverging lens (Concave lens) of suitable power. Converging lens diverge rays of light coming from the object and object appears placed farther than actual place. This is because when a concave lens of suitable power is used for the myopic eye then the concave lens first diverges the parallel rays of light coming from distant object. Therefore, first a virtual image is formed at the far point of the myopic eye. Now since the rays of light appear to be coming from eye's far point, they are easily focused by the eye-lens and image is formed on retina. Concave lens is used for myopic eye so as to decrease the converging power of the eye-lens. This makes image at retina which enables a person having Myopic eye defect see clearly.

Formula for calculating power of concave lens to correct myopia is:

$$1/\text{image distance (v)} - 1/\text{object distance (u)} = 1/\text{focal length (f)}$$

2). HYPERMETROPIA

This is also known farsightedness.

This is a defect of vision wherein there is difficulty in viewing objects that are near but one can view far objects easily. Since the eyeball is too short or eye lens's refractive power is too weak hence the image instead is of being forming upon the retina, its forms behind the retina.

Hypermetropia or long-sightedness is a defect of an eye where a person cannot see nearby objects clearly. The near-point of hypermetropic eye is more than 25 cm away.

Causes of Hypermetropia or Far Sightedness

This defect of eye is caused due to:

- (a) the decrease in curvature of eye lens which makes focal length of eye lens too long.
- (b) the eyeball becomes smaller than normal.

Because of long focal length or small eye ball image of an object placed at normal distance formed behind the retina and person suffering from this defect sees that blurred image of object.

Correction of Hypermetropia or Far Sightedness

The condition of hypermetropia can be corrected by putting a convex lens in front of the eye. This is because when a convex lens of suitable power is placed in front of the hypermetropic eyes, then the convex lens first converges the diverging rays of light coming from a nearby object at the near point of the eye at which the virtual image of the nearby object is formed. Since the light rays now appear to be coming from the eye's near point, the eye-lens can easily focus and form the image on retina. Convex lens is used for hypermetropia so as to increase the converging power of the eye-lens.

The convex lens forms a virtual image of the object (lying at normal near point N) at the near point N' of this eye.

Formula for calculating power of convex lens to correct hypermetropia is:

$$1/v - 1/u = 1/f$$

In this formula, object distance that is u, is normal near point of the eye (25 cm).

Presbyopia or Old-age Long-sightedness

Presbyopia is a natural defect that occurs with the age. In presbyopia, the ciliary muscles become weak and are no longer able to adjust the eye lens. The eye muscles become so weak that no longer can a person see nearby objects clearly. The near point of a person with presbyopia is more than 25cm.

A person with presbyopia can also have just myopia or just hypermetropia.

Another point to be noted is that a person can have both myopia and hypermetropia. In such a condition, spectacles having bifocal lens are worn.

Bifocal Lens

Bifocal lens means lens with dual focus. Such bifocal lenses are made of convex and concave both lenses. Concave lens is fitted at the upper part while convex lens is fitted for lower part of bifocal lens.

Upper part of lens is meant to see the object placed at distance while lower part of lens is used while reading or see the object placed nearby.

These all types of defects of eye are called refractive defects as in such case rays of light coming from object cannot refracted from eye lens properly.

These days the refractive defects of eye can be corrected using contact lens or through surgery. Contact lens is similar to lenses fit in the spectacles. But contact lens is directly placed at the surface of eye while normal lenses are fitted in spectacles.