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Myopia

The defect of an eye in which it cannot see the distant objects clearly is called myopia. A person with myopia can see nearby objects clearly. Myopia is caused due to:

* High converging power of lens
* Eye–ball being too long

Due to high converging of the eye–lens the image is formed in front of the retina and a person cannot see clearly the distant objects. In another case, if the eye– ball is too long than the retina is at larger distance from the eye–lens. In this case also the image is formed in front of the retina even though the eye–lens has correct converging power.

Myopia or short–sightedness can be corrected by wearing spectacles containing concave lens. This is because when a concave lens of suitable power is used for the myopic eye then the concave lens first diverge 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 focussed 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.

Hypermetropia

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. This defect of eye is caused due to:

* Low converging power of eye–lens
* Eye–ball being too short

In case of hypermetropia the image of an object is formed behind the retina and therefore, a person cannot see clearly nearby objects.

The near–point of an eye having hypermetropia is more than 25 cm. *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 converge 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

Correction of Hypermetropia: 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).