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Question
Discuss the defects of the eye

Answer
1.) MYOPIA or NEARSHIGHTED
Myopia occurs when the eyeball is too long, relative to the focusing power of the cornea and lens of the eye. This causes light rays to focus at a point in front of the retina, rather than directly on its surface If you're nearsighted, the first number ("sphere") on your eyeglasses prescription will be preceded by a minus sign (–). The higher the number, the more nearsighted you are.
Cause: When the focal length of the eye lens gets diminished, the power of the eye gets increased so much which results in Myopia.
There may any of two reasons:
- When the curvature of the cornea gets increased, or
- When the eyeball gets extended.

Remedy: This defect is remedied by using a concave lens close to the eye. The focal length of the lens is so chosen that parallel rays from distant object after passing through the lens appear to diverge from P, the far point of the myopic eye. These rays, therefore, meet at a point on the retina and form clear image.

2.) HYPEROPIA or FARESIGHTED
This vision problem occurs when light rays entering the eye focus behind the retina, rather than directly on it. The eyeball of a farsighted person is shorter than normal.
Farsightedness can be corrected with glasses to change the way light rays bend into the eyes. If your glasses begins with plus numbers, like +1.50, you are farsighted.
Causes: There may be any of two reasons behind the occurrence of this defect
- The focal length of the lens of the eye becomes too large, or
- When the size of eyeball gets diminished, light rays from the object at a short distance can't be brought to focus on the retina to form a clear vision.

Remedy: This defect is remedied in the same way as done for presbiopic eye. A convex lens should be used near the eye, and the focal length of the lens being so chosen that by this lens a virtual image of the object at N is created at N1.

3.) ASTIGMATISM
Instead of the cornea having a symmetrically round shape (like a tennis ball), it is shaped more like a rugby ball, with one meridian being significantly more curved than the meridian perpendicular to it. Astigmatism usually causes vision to be blurred or distorted to some degree at all distances.
In other words, Sometimes, the front surface of the cornea loses its spherical shape and its curvature becomes unequal in different meridian planes, called astigmatism. In astigmatic, the focal length of the lens varies at different meridian planes. As a result, a line object placed at a same distance but differently oriented cannot be seen by the eye equally clear as their images are not clearly focused on the retina simultaneously.
Symptoms of uncorrected astigmatism; are eye strain and headaches, especially after reading or other prolonged visual tasks.

Note: Astigmatism is usually combined with Myopia or Hyperopia.
Cause: This defect occurs when the spherical shape of the cornea deformed. As a result, it has unequal curvature in different meridian planes.
Remedy: This defect is corrected by using a cylindrical lens which has different curvature in different meridian planes. The curvature and the axis of the lens are so chosen that together with the eye, the cylindrical lens produce and optical system whose focal length is the same in every meridian plane.

4.) PRESBYOPIA
Presbyopia generally is believed to stem from a gradual thickening and loss of flexibility of the natural lens inside your eye.
Presbyopia usually occurs beginning at around age 40, when people experience blurred near vision when reading, sewing or working at the computer. Everyone becomes presbyopic.
Causes and its remedy: Presbiopia occurs when the ciliary muscles get weakened and the flexibility of crystalline lens gets reduced. Most cases of presbiopia are dealt with simple reading eyeglasses made of convex lenses. The people with both eye defects myopia and hypermetropia often need bi-focal lenses. The upper section of the bi-focal lens contains a concave lens which is used to see an object lying at a large distance, and the lower portion of the bi-focal lens has convex lens to have a clear image of an object lying at a short distance.