Revision Notes

Class – 10 Science

Chapter 11 - Human eye and colourful world

The front part of the eye is covered with a transparent spherical membrane known as the cornea. Light enters the eye through the cornea. Space present just behind the cornea contains a fluid known as aqueous humour.

Just behind the cornea is a muscular diaphragm, which is dark coloured and is known as the iris which has a small circular opening in the middle called the pupil. The black colour of the pupil is due to no light being reflected from it. The iris is responsible for controlling the amount of light entering the eye by adjusting the size of the pupil.

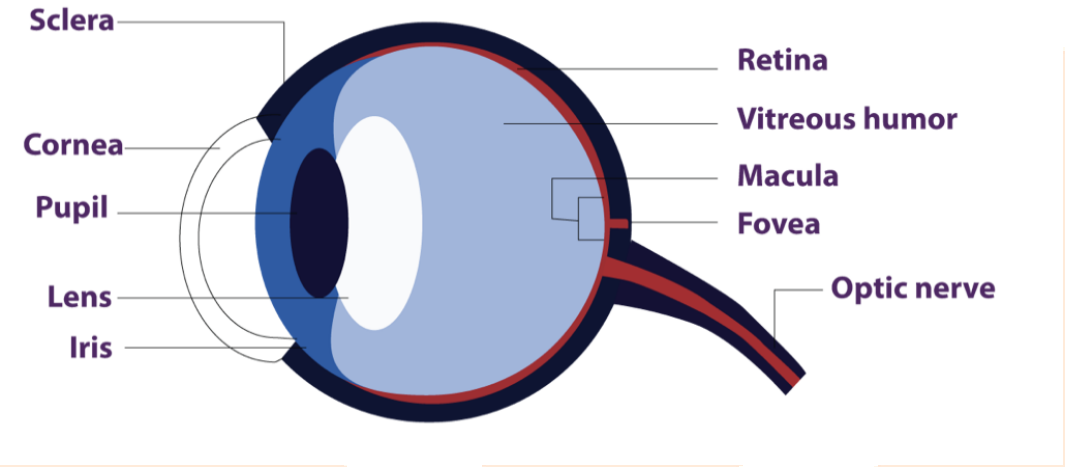
The lens of our eyes is a convex lens made of a transparent jelly-like proteinaceous material. The eye lens is hard in the middle and becomes soft towards the outer edges. The ciliary muscles hold the eye lens in its position. The ciliary muscles are responsible for changing the curvature and focal length of the eye lens.

The inner back surface of the eyeball is the retina. It is a semi-transparent membrane that is light sensitive and behaves as the screen of a camera. The light-sensitive receptors present in the retina are rods and cone cells. When the light falls on these receptors they are responsible for sending electrical signals to the brain via the optic nerve. The space between the retina and eye lens is filled with vitreous humour.

The light coming from an object enters the eye through the cornea and pupil. The eye lens is responsible for converging these light rays to form a real, inverted and diminished image on the retina. The light-sensitive cell present in the retina gets excited as the light incidents and generates electrical signals. These electric signals are sent to the brain via the optic nerves and the brain interprets these electrical signals in such a manner that we are able to see an image that is erect and is of the same size as that of the object. Accommodation of the eye is said to be the ability of the eye to focus on objects lying at certain distances.

Whereas the range of vision is the distance between the near point and the far point.

Colour vision occurs through cone cells of the retina which are excited only in bright light. You cannot differentiate between red, violet or purple flowers in a garden in moonlight, because of the rod cells function and not of cone cells.



(Source:- https://www.vedantu.com/biology/diagram-of-eye)

Defects of Eye

1. Colour blindness or colour vision deficiency is a condition in which a person is unable to distinguish between certain colours. The most common cause could be genetic. Cone cells, which are colour sensitive receptors containing single visual pigments which are selective for red, green, and blue light, are present in the normal human eye. Disturbances in colour vision occur when the amount of pigment per cone is either reduced or are absent.

2. Nyctalopia is an inability of a person to see in relatively low light. It is considered a symptom of several eye diseases. Night blindness could be inborn or can occur due to any injury or malnutrition. Lack of Vitamin A could also play an important role in this. The outer layer of the retina is composed of more rods than cones. The rod cells are responsible for the vision in low light and the reason why loss of side vision often results in night blindness.

3. 3. Cataract is an opacity in the crystalline lens of the eye. In the early stage of age-related cataract, the crystalline lens power can be increased, causing near-

sightedness (or myopia) which leads to the gradual yellowing and full opaqueness in the lens which reduces the perception of blue colours. Cataracts develop due to a number of reasons which includes long-term exposure to ultraviolet rays, exposure to radiation are usually due to a result of denaturation of lens proteins.

4. Hypermetropia is an eye defect in which a person is incapable of seeing near objects but his distant vision is clear. In a normal eye the light rays coming from the object fall on the retina but in the case of a hypermetropic eye, these light rays gets focused behind the retina.

5. Myopia is an eye defect in which a person is not able to see distant objects clearly. Since a person can not see distant objects clearly this defect is also known as nearsightedness.

6. Astigmatism is the commonly occurring eye defect that results in distorted images, since light rays are unable to meet at common focus. Astigmatism may lead to Hypermetropia or Myopia.

7. Presbyopia is the condition in which the centre of the eye lens becomes hard making it capable of accommodating near vision. This condition is quite common with person over the age of 50 and even those with myopia.