

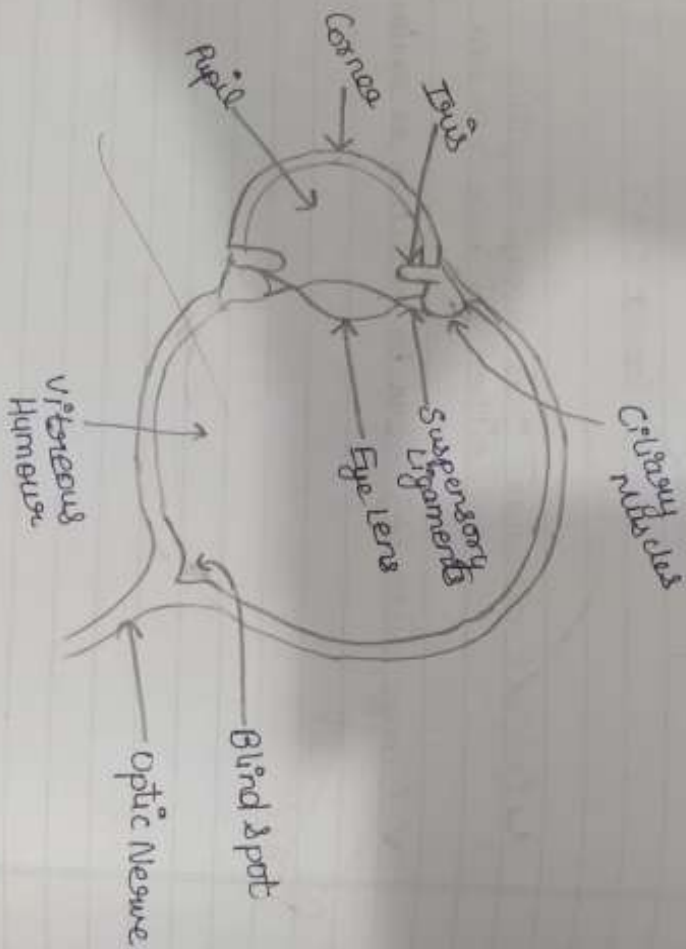


Fig: Human Eye

13/08/19

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CHAPTER

THE HUMAN EYE AND THE COLORFUL WORLD

Construction of Eye

- Cornea - front part of the eye. made of transparent substance and bulging outwards. outer surface is convex in shape.
- Iris - A coloured diaphragm. Iris is a flat coloured, wing-shaped membrane behind the cornea of the eye.
- Pupil - There is a hole in middle of iris called pupil.
- Eye lens - a convex lens made of transparent, soft and flexible material like a jelly. It can change its shape.
- Ciliary Muscles - change thickness of eye lens while focusing.
- Retina - The screen on which the image is formed in the eye is called retina.
- Optic Nerve - the nerve that carry the signal to the brain.

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Fig: Human Eye

Working of The Eye

- * The light rays coming from the object kept in front of our eyes, pass through the cornea of the eye, pass through the pupil of eye and fall on eye lens. The eye lens is a convex lens, so it converges the light rays and produces a real and inverted image of object on retina.
- * The image formed on the retina is conveyed to brain by optic nerve and give rise to sensation of vision.

Function of Iris And Pupil

- * The iris controls the amount of light entering the eyes.
 - If the amount of light received by eye is large during day time, then iris contracts the pupil and reduces amount of light.
 - If the amount of light received by the eye is small during night, then iris expands the pupil.
- * The adjustment of size of pupil takes some time.

* Rods - are rod-shaped cells present in the retina of an eye which are sensitive to dim light.

* Cones - are cone shaped cells present in the retina of an eye which are sensitive to bright light.

Cones cells cause the sensation of colours. The cones do not function in dim light. That is why when it is getting dark at night, it becomes impossible to see colour.

An Important Discussion

- The light rays coming from distant objects are parallel.

The light coming from a nearby object are diverging.

- The convex eye lens of low converging power is the one having a large focal length and quite thin. The convex eye lens of high converging power is the one having a short focal length and it is quite thick.

Accommodation

- The ability of an eye to focus the distant object as well as the nearby objects on the retina by changing the focal length of its lens is called accommodation.

- A normal eye has a power of accommodation of far point as infinity and close as 25 cm.

"You must be the change you want to see in the world." - Mahatma Gandhi

Quora



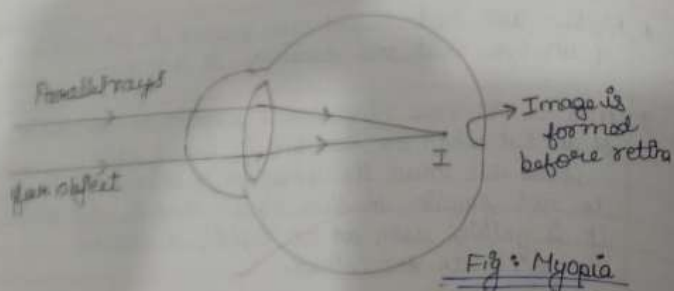


Fig: Myopia

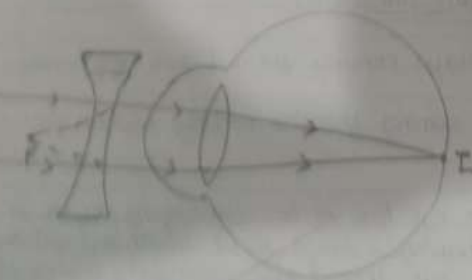


Fig: Hypermetropia Correction

- The range of vision of human eye is from infinity to 25 cm.

Defects Of Vision And Their Correction

The ability to see is called vision.

There are three common defects of vision -

1. Myopia -

Myopia is that defect of vision due to which a person cannot see the distant objects clearly though he see the nearby objects clearly.

The far point of eye in Myopia is less than infinity.

This defect is caused:

- due to high converging power or short focal length
- due to eye ball being too long

Myopia is corrected by using spectacles containing concave lens.

2. Hypermetropia -

is that defect of vision in which a person cannot see nearby objects clearly.

The near point of eye is more than 25 cm.

This defect is caused:

- due to low converging power of eye lens



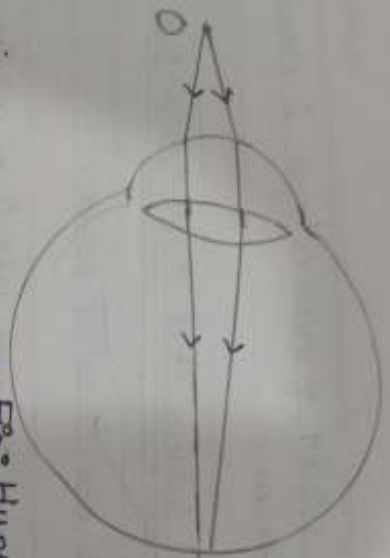


Image is formed

Fig: Hypermetropia

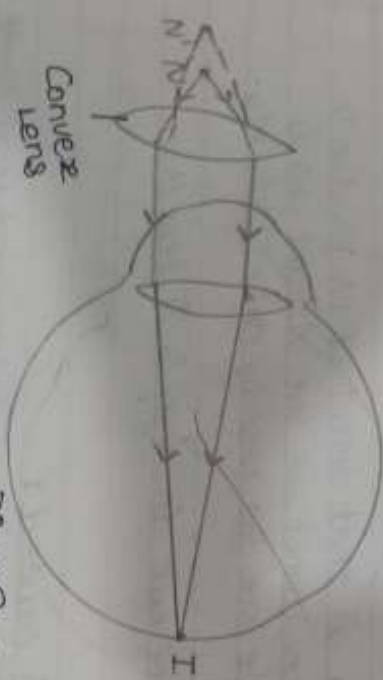


Fig: Correction of Hypermetropia

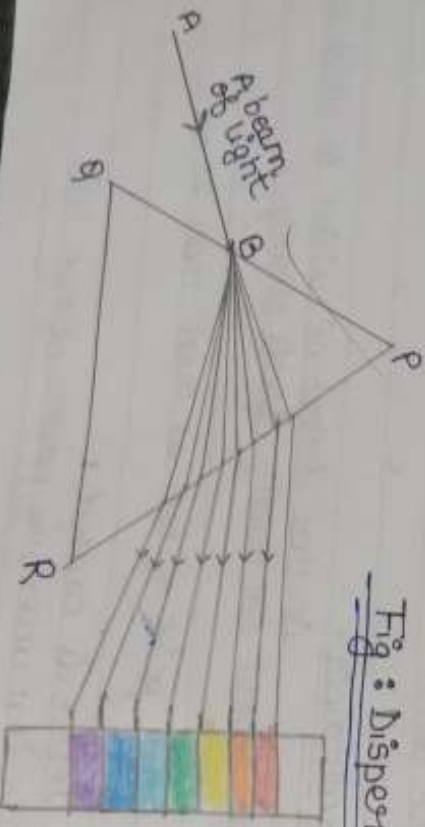


Fig: Dispersion

- due to eye ball being too short.

Hypermetropia is corrected by using spectacles containing convex lens.

3. Presbyopia -

is that defect of vision due to which an old person cannot see nearby objects clearly due to loss of power of accommodation of eye.

It is corrected in same way as hypermetropia

Cataract - The medical condition in which the lens of eye of a person becomes progressively cloudy resulting in blurred vision is called cataract.

Ques - Why do we have two eyes for vision and not just one?

- Having two eyes gives a wider field of view. If we open then we can only see 150° but if we can open both eyes, then we can see 180°.
- Having two eyes enables us to judge more accurately.

Dispersion of light

The splitting up of white light into seven colours passing through a transparent medium is dispersion.

The red colour is deviated the least, the violet colour is deviated the most.

Atmospheric Refraction-

- The refraction of light caused by Earth's atmosphere is atmospheric refraction.
- The air in upper atmosphere is optically rarer, as we come down, the air becomes denser.

Due to atmospheric refraction, some phenomena in nature will occur-

- Twinkling of stars
- The stars seem higher than they actually are
- Advance sunrise
- Delayed sunset

Tyndall Effect

- The scattering of light by particles in its path is called Tyndall Effect.

Scattering of Light

When sunlight enters the atmosphere of the Earth, the atoms and molecules of different gases present in the atmosphere absorb this light. Then these atoms and molecules of gases