- Vision --2nd note
- 3rd class

Accomodation reflex (near response)

- **3 changes** occur in the eye during accommodation

- 1.**convergence of eyeball** due to contraction of medial rectus.

- 2) **curvature of lens increase** due to contraction of ciliary muscle

- 3).**constriction of pupil** due to contraction of sphincter pupillae of iris.

Defects of image forming mechanism

- **emmetropic** eye-normal eye—parallel light rays focus on retina
- **Ametropic** eye- --- parallel light rays are not focused on retina , ie, focus either behind or in front of retina
- **Errors of refraction**

  Myopia

  Hypermetropia

  Presbyopia

  Astigmatism

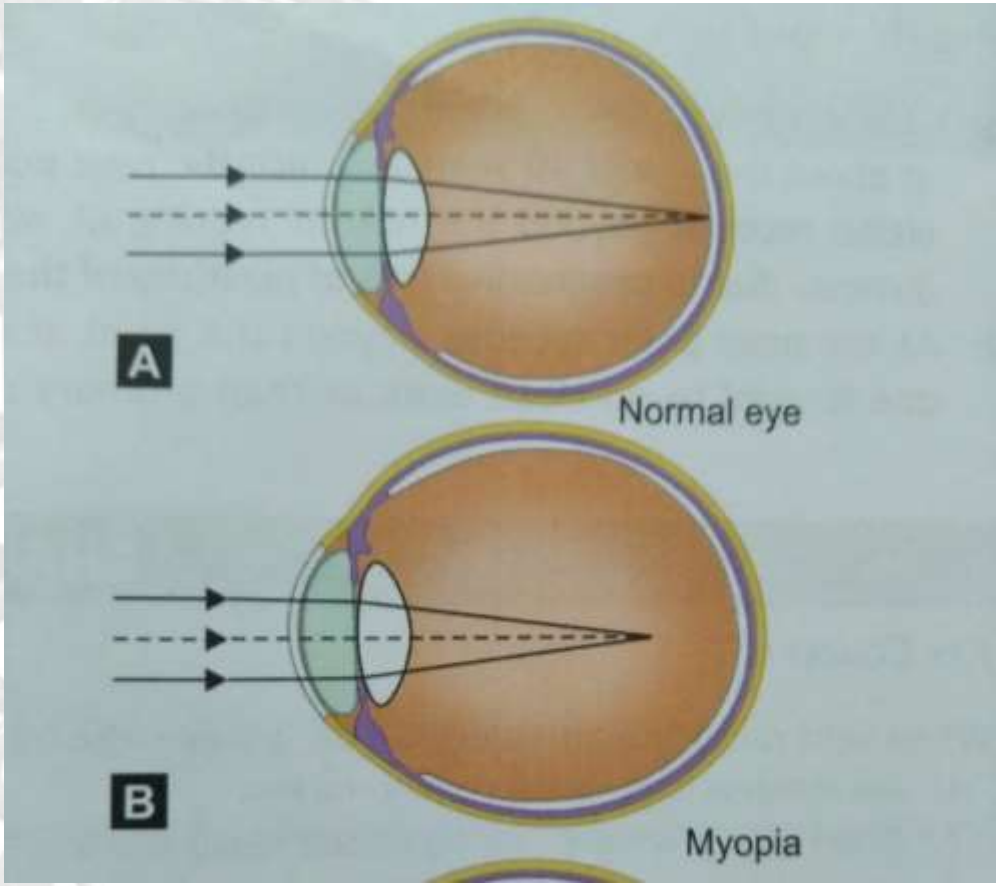
Myopia (short sight)

- Parallel light rays from distant objects are focused in front of the retina. Therefore image will be blurred.
- Causes—

- Too long eyeball

or

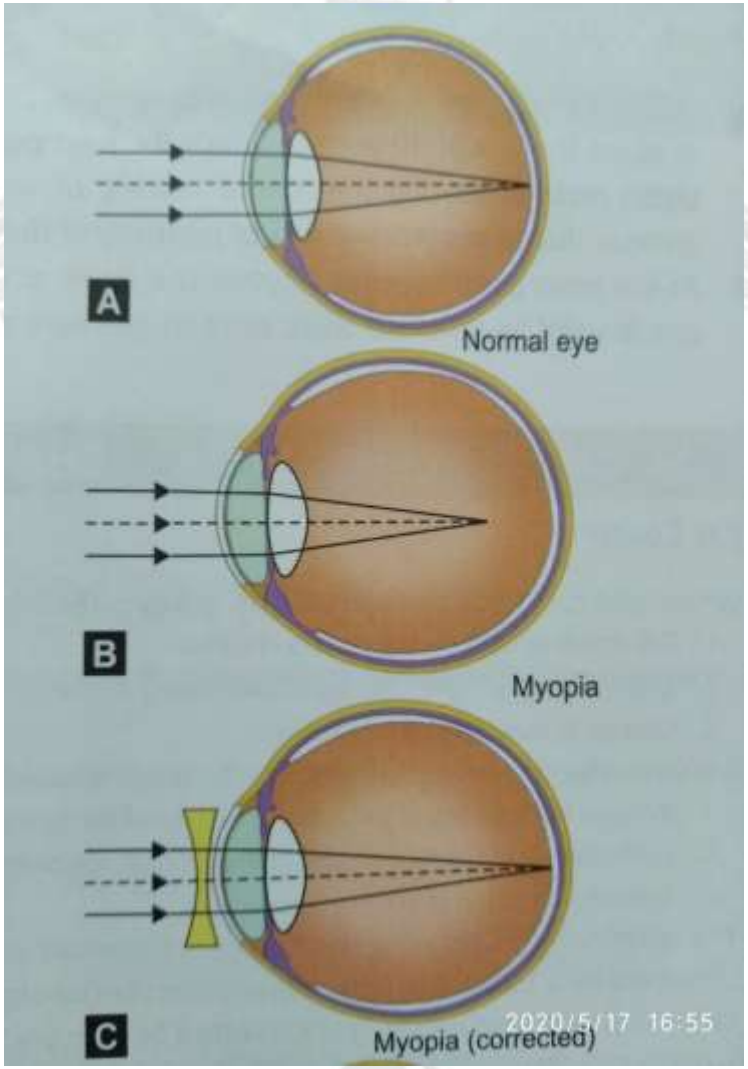
Increased Refractive power of lens



- Characteristic features of Myopia

1. **Person can see near objects clearly , but cannot see distant objects clearly**
2. **There is a definite far point** (normally it is at infinity , ie, more than 6 meters or 20 feet)
3. **Near point becomes nearer** (as axial length of eyeball increases)
4. **Due to 2 and 3 far point and near point comes closer, range of accommodation decreases**

- 5 **Presbyopia gets corrected by myopia correction** – by concave lens



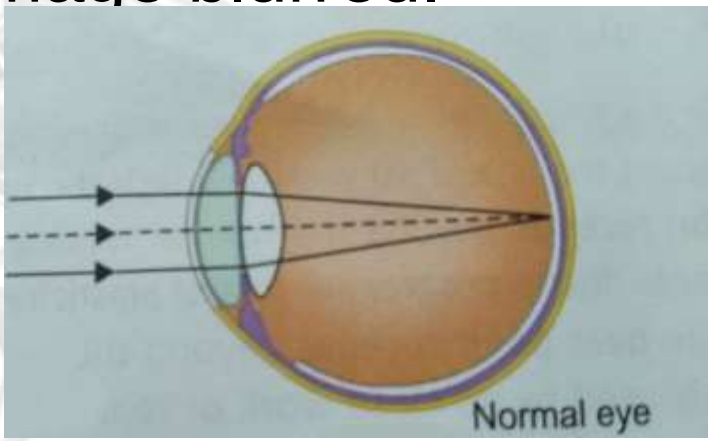
Hypermetropia (long sight)

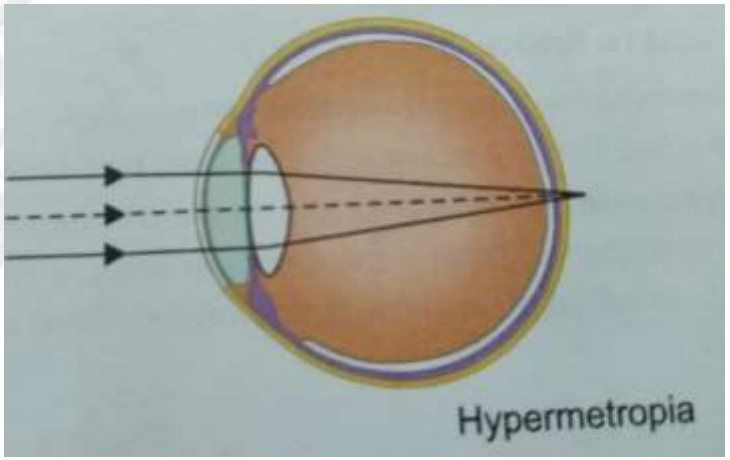
- Parallel light rays from distant objects are focused behind retina.—image blurred.
- Causes—

  --Too short eyeball

  or

  -- Dercreased refractive power of lens





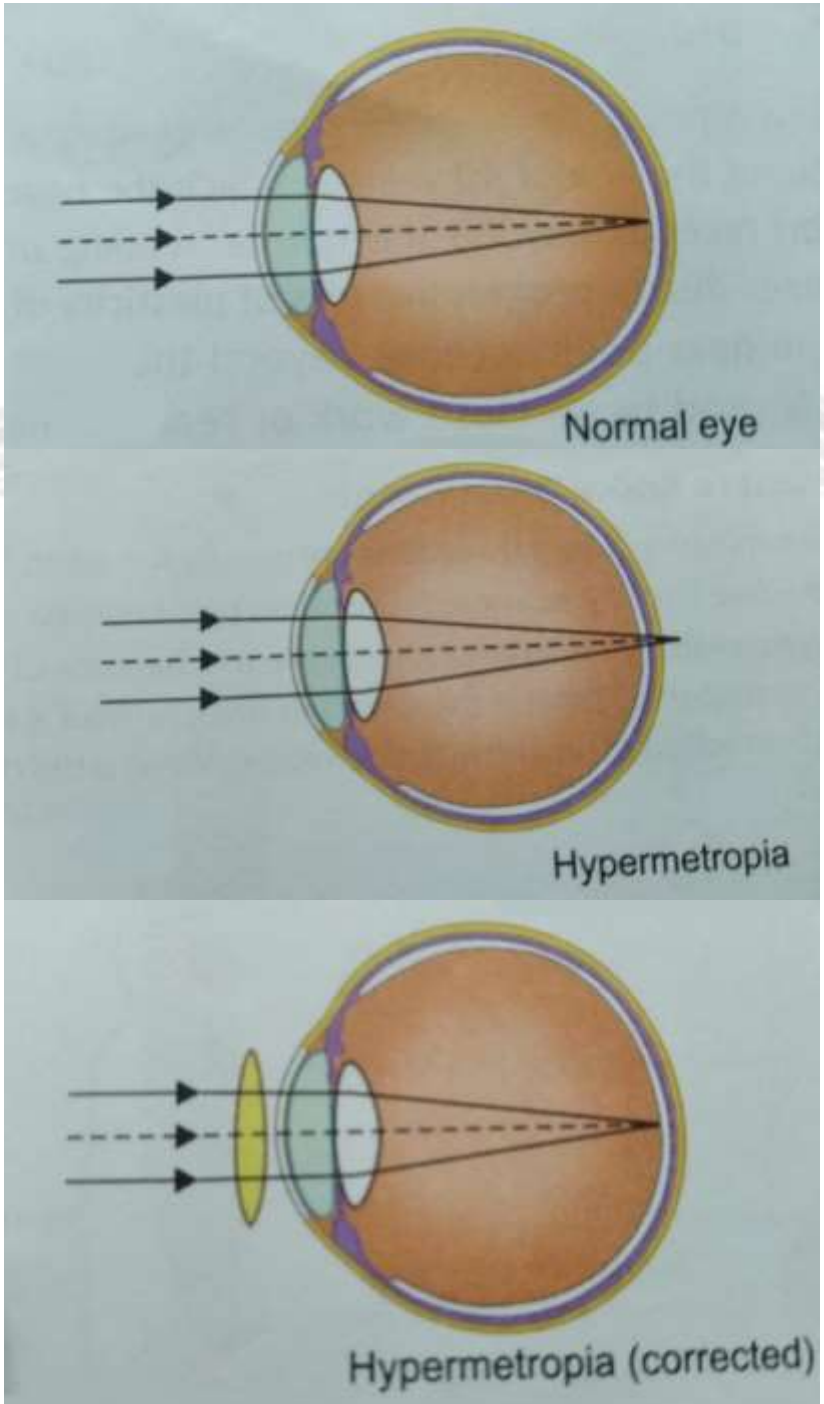
- **Characteristic features**
- **1**) a person can see far objects clearly only while using some accommodation ,but cannot see near objects clearly
- (*Parallel rays from distant objects are focussed on a point behind the retina when* ***ciliary muscles are relaxed****. So the eye has to accommodate to focus even distant objects on retina.* accommodation for near point is more difficult.)

- **2)** Hypertrophy of the ciliary muscle occurs **(***because person uses accommodation all the times, for seeing far objects and for near objects)*

- 4) Prolonged convergence of visual axis associated with accommodation may lead to severe head ache, blurring of vision and finally squint
- 3) near point moves far away from eye

(*as axial length of eye ball decreases*)

Correction ---- **biconvex lens**



Astigmatism

- Stigma means **point**

- In astigmatism Parallel light rays are not brought to a sharp **point** focus on retina.
- For a point object -- point image is not obtained--- a line image is obtained---image blurred

- **reason**
- —difference in horizontal and vertical curvatures of cornea and rarely due to same defect in lens.
- Such cornea has different curvatures in different planes. (like spoon, egg surface)

- Focus of vertical image is not same as focus of horizontal image
- Unequal refraction at different meridians

- He will find difficult to focus all the lines of graph paper.
- Astigmatism -2 types ---curvature and index astigmatism
- Curvature astigmatism—here defect lies in the curvatures of cornea.

- If vertical curvature is greater, astigmatism is said to be with the rule.

- if horizontal curvature is greater, astigmatism is against the rule .

- Index astigmatism--- when refra indices of different parts of lens are different due to malposition of lens ---index astigmatism

- Correction ---cylindrical lens

Cataract

- In old age, lens becomes opaque- due to denaturation of lens proteins.
- In later stage calcium deposition also occur

- Correction

- Surgical removal of opaque lens with replacement of another lens