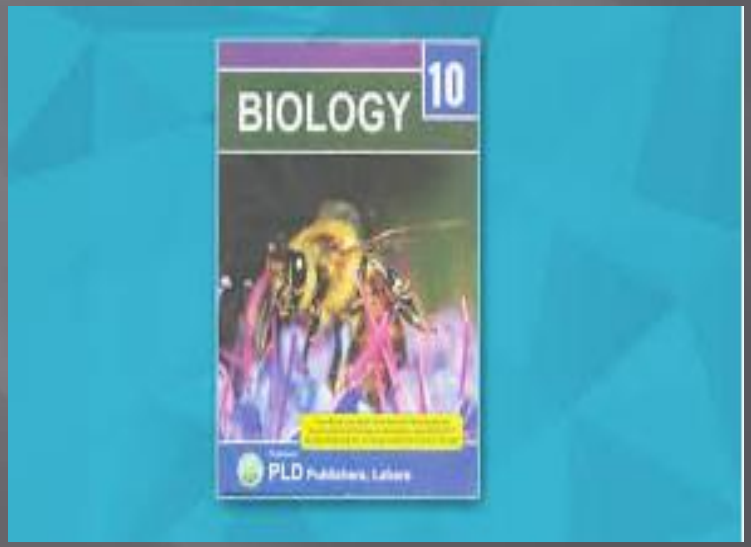
Pakistan School
Kingdom of Bahrain

BIOLOGY LESSON 10TH



Ch.3. COORDINATION & CONTROL

- TOPIC. RECEPTORS IN HUMANS
- SUB-TOPIC. EYE

Pages (41 to 44)

INTRODUCTION

- We know that the organs or parts which are specifically built to detect particular type of stimuli are called sense organs or receptors.

Main human receptors are given below.

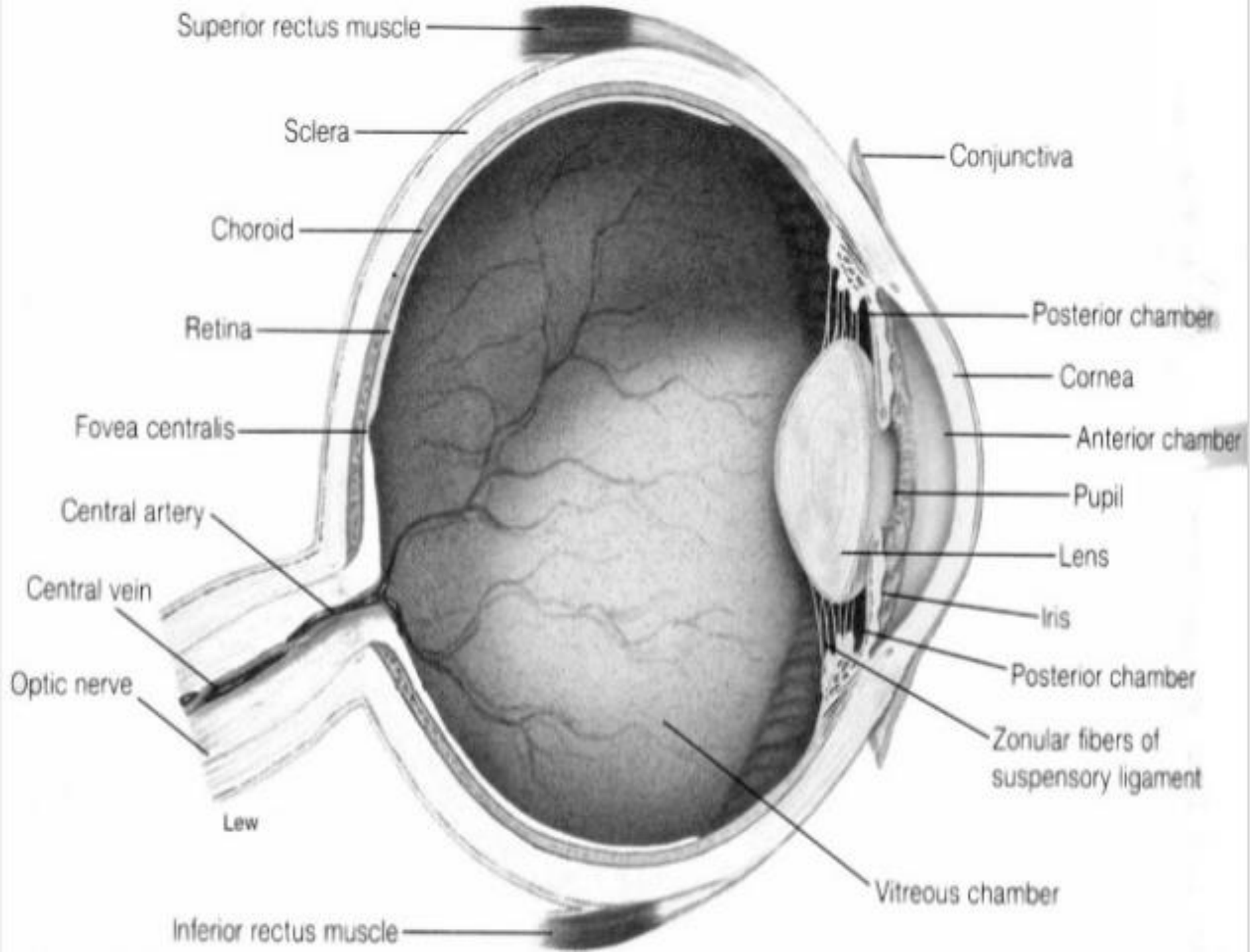
i. Eyes
ii. Ears
iii. Nose
iv. Taste buds
v. Receptors of Touch, Heat and Cold etc.

OBJECTIVES OF THE LESSON

- At the end of this lesson students will be able to

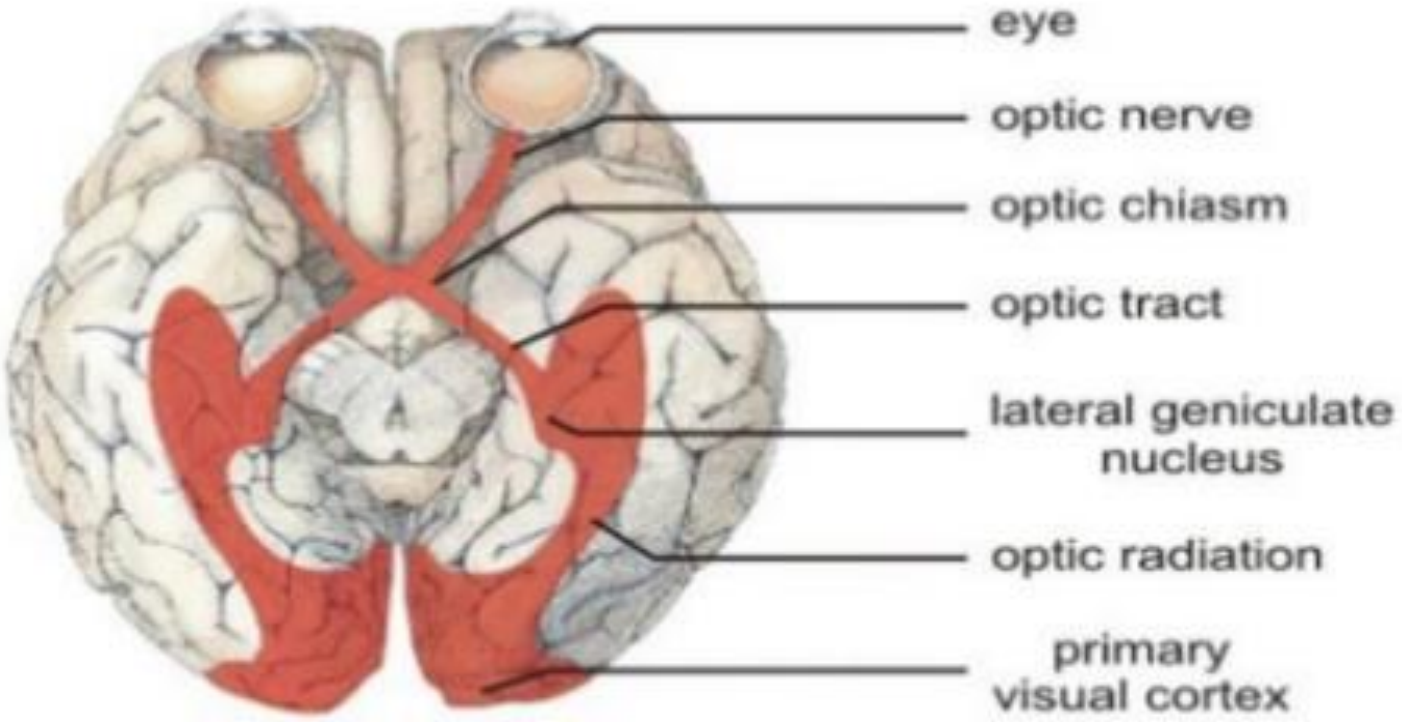
- Describe structure of human eye and recognize its various parts.

- Identify some disorders of the eye.


Superior rectus muscle
Sclera
Choroid
Retina
Fovea centralis
Central artery
Central vein
Optic nerve
Lew
Inferior rectus muscle
Conjunctiva
Posterior chamber
Cornea
Anterior chamber
Pupil
Lens
Iris
Posterior chamber
Zonular fibers of suspensory ligament
Vitreous chamber

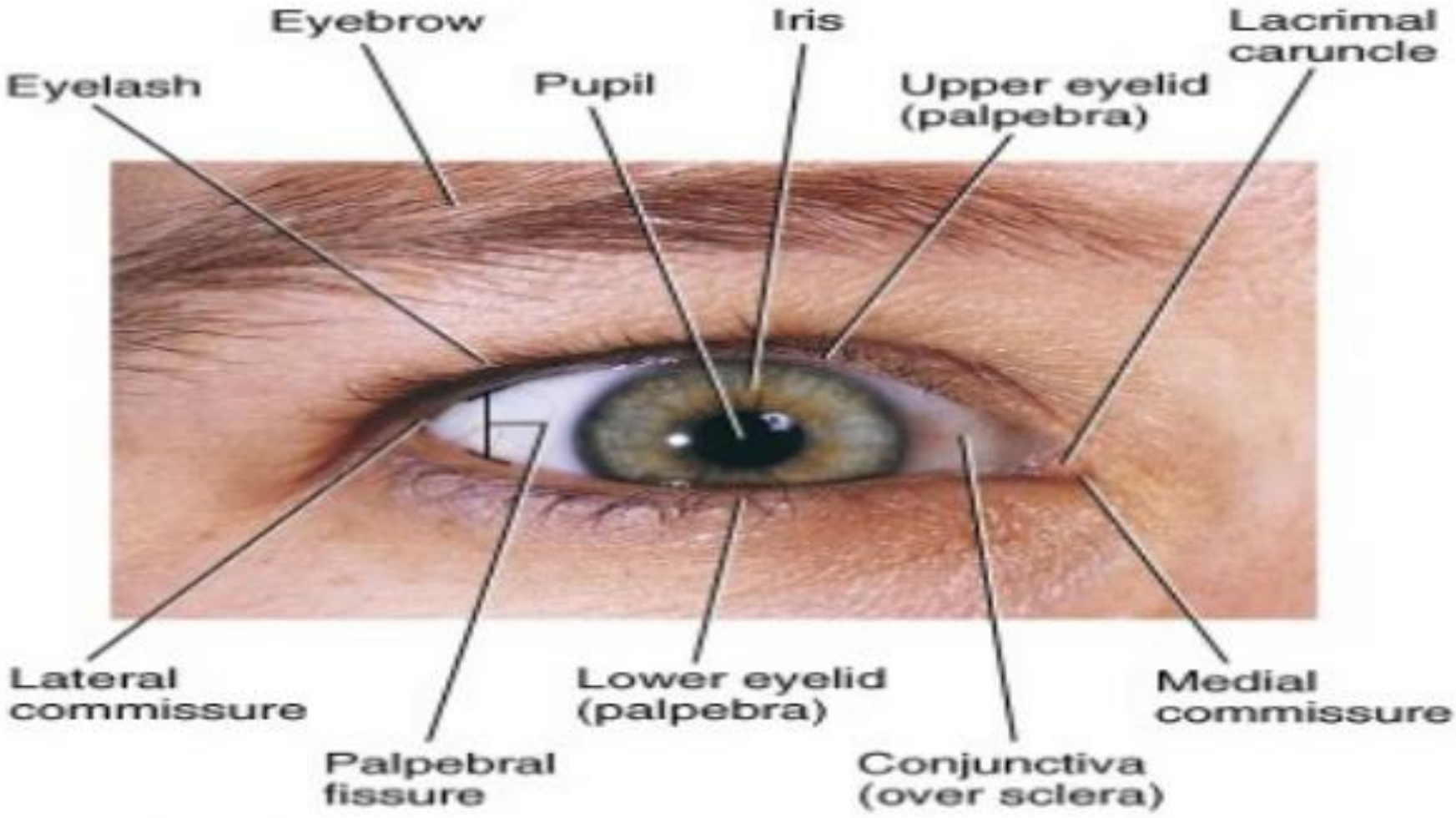
Introduction

- The eye is a specialized sense organ that helps us to understand our environment. It is a sensory unit composed of three parts: receptor, sensory pathway, and a brain center.



- It is spherical in shaped
- It is about 2.5 cm in diameter
- situated in the orbital cavity

External Anatomy of the Eye



Accessory Organs & Eye Protection

- Orbital cavities (bony sockets) – house & protect the eye

- Adipose tissue – cushions the eye

- Lacrimal glands – produce tears that lubricate & have a germicidal effect

- Eyebrows – protect against foreign articles, perspiration, & direct rays of light

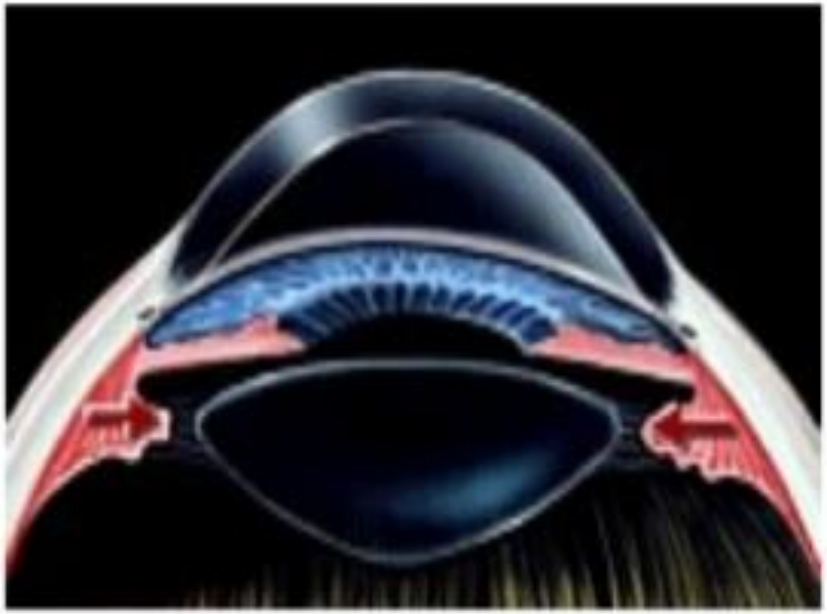
- Eyelids – folds of skin that cover the surface of the eye; close by reflex action when an object approaches

- Eyelashes – secrete oils that prevent lids from sticking together

Muscles of eye:-

- ***Extrinsic muscles*** – muscles located outside of the eye that control certain eye movements such as moving the eyeball from side to side or rolling the eyes

- ***Intrinsic muscles*** – muscles located inside the eye that help hold the lens in place & modify its shape



Layers:- There are three layer of the eye

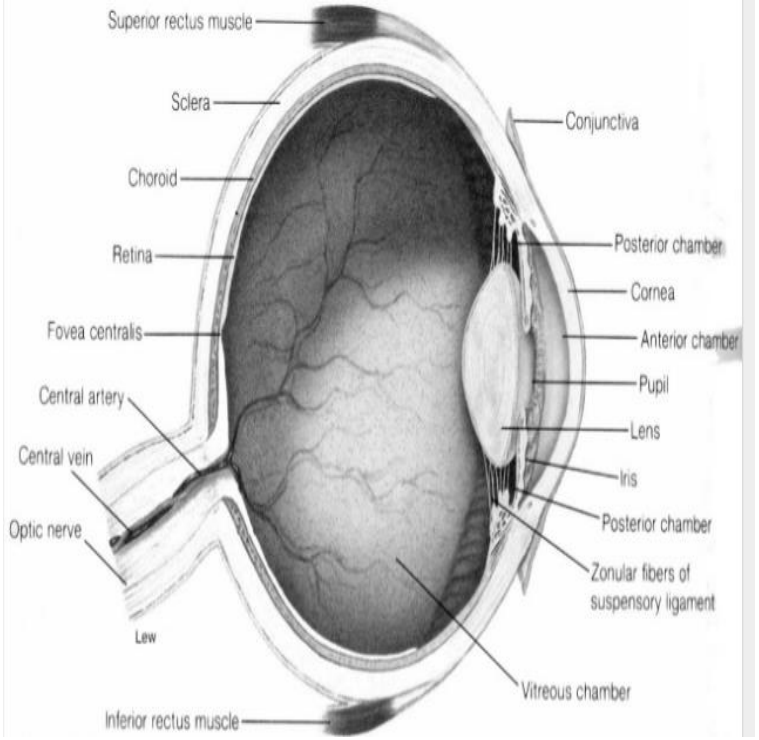
1.Sclera – *white, outer layer of the eyeball;*
tough, fibrous membrane that helps to maintain the spherical shape of the eyeball

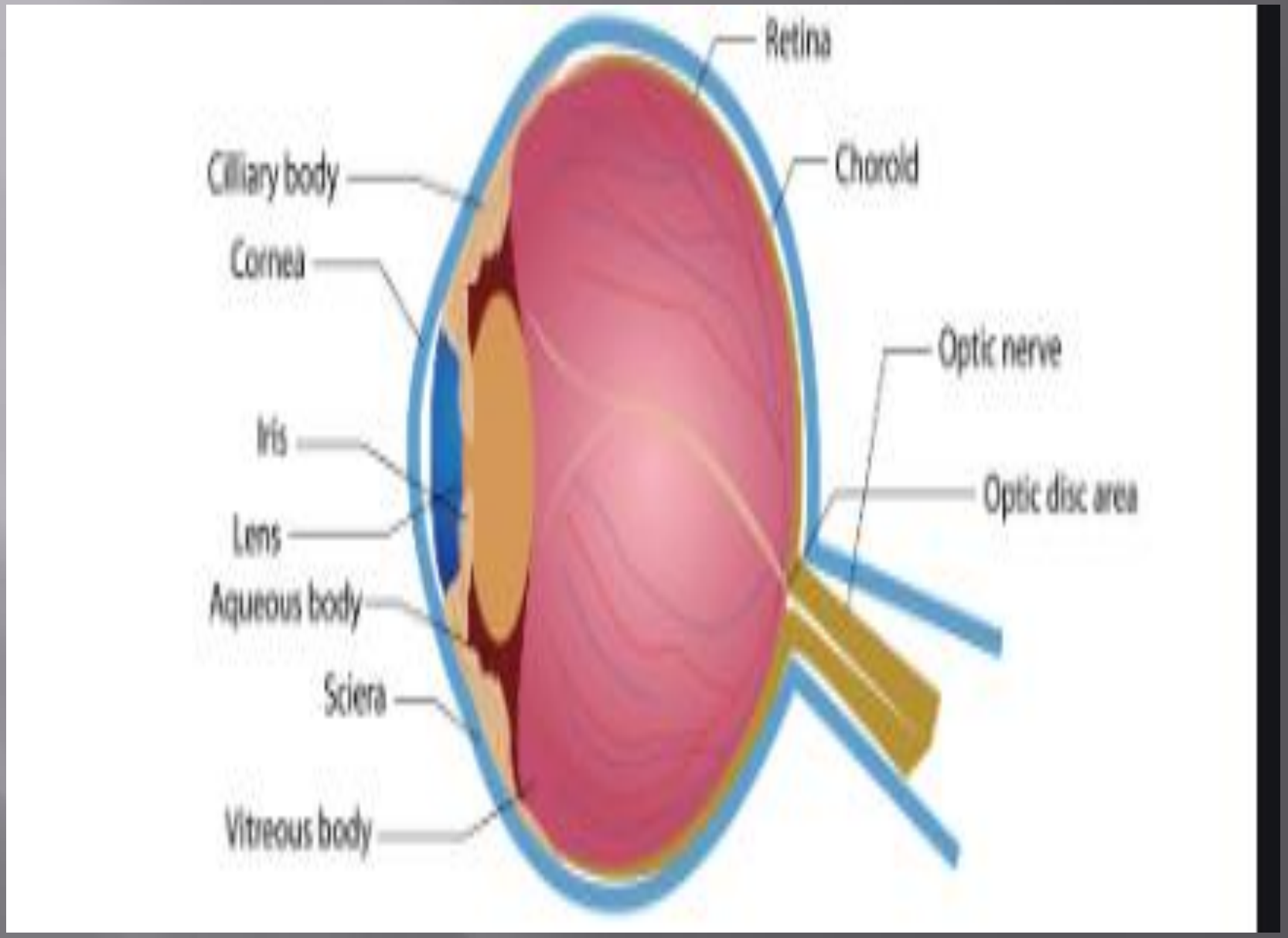
- Cornea – part of sclerotic coat; transparent, front part of eyeball through which light waves pass – no blood vessels but lots of nerve endings

- Canals of Schlem – venous passages that drain the fluid that accumulates behind the cornea; located where the sclera & cornea meet

- Conjuctiva – thin, transparent mucous membrane that covers the eyeball

2.Choroid layer – middle layer of the eye; supplies blood vessels to the eye and contains dark pigment granules that prevent the reflection of light in the eye




Retina
Chorold
Ciliary body
Cornea
Optic nerve
Iris
Optic disc area
Lens
Aqueous body
Sciera
Vitreous body

- Ciliary body – intrinsic muscle; smooth muscle fibers support & modify lens shape

- Iris – colored portion of eye formed by circularly and radially arranged smooth muscle fibers; regulates amount of light entering they eye by constricting or dilating the pupil

- Pupil – rounded opening of the iris through which light passes

- ***3.Retina*** – *innermost layer of the eye;* lines its surface and contains photoreceptors (cells responsible for converting light into nerve impulses – rods & cones)

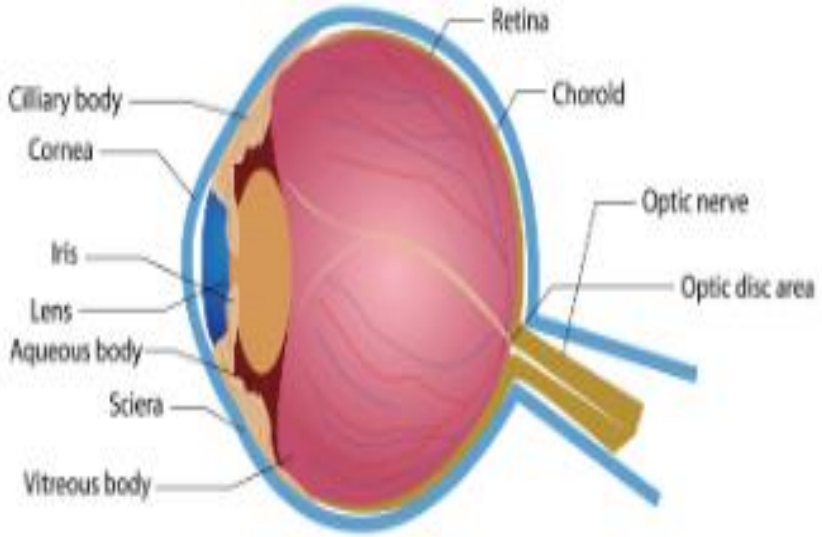
Eye Parts

- Rods – cylindrical photoreceptors found in greatest concentration on the edges of the retina; most common type of receptor; allow us to see in low light and provide for peripheral vision

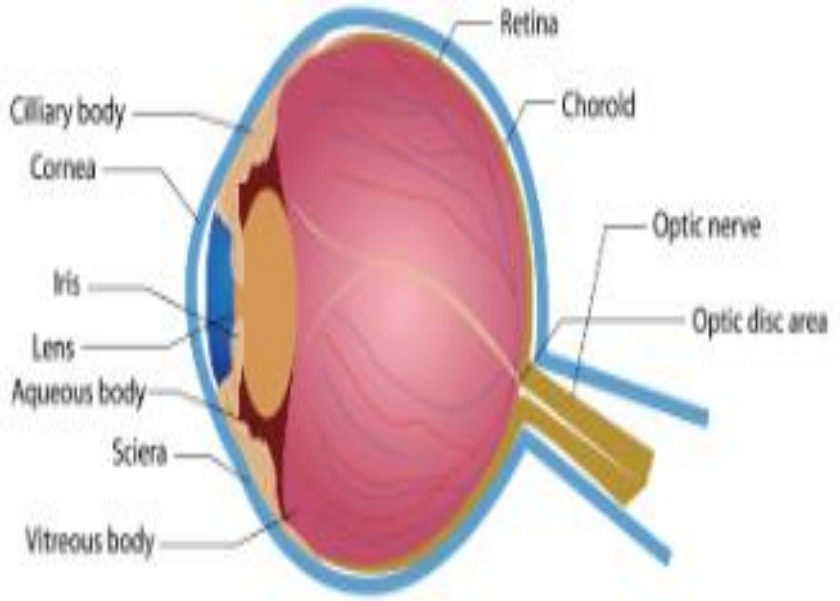
- Cones – Conical photoreceptors found in greatest concentration near the center of the retina; there are three varieties of cones, each most sensitive to a particular wavelength (color) of light – blue, green, & red; allow for visual acuity (sharp vision) and color vision

- Fovea centralis – a depression, or pit, in the center of the retina that contains only cones; provides for the most acute vision & color sensitivity

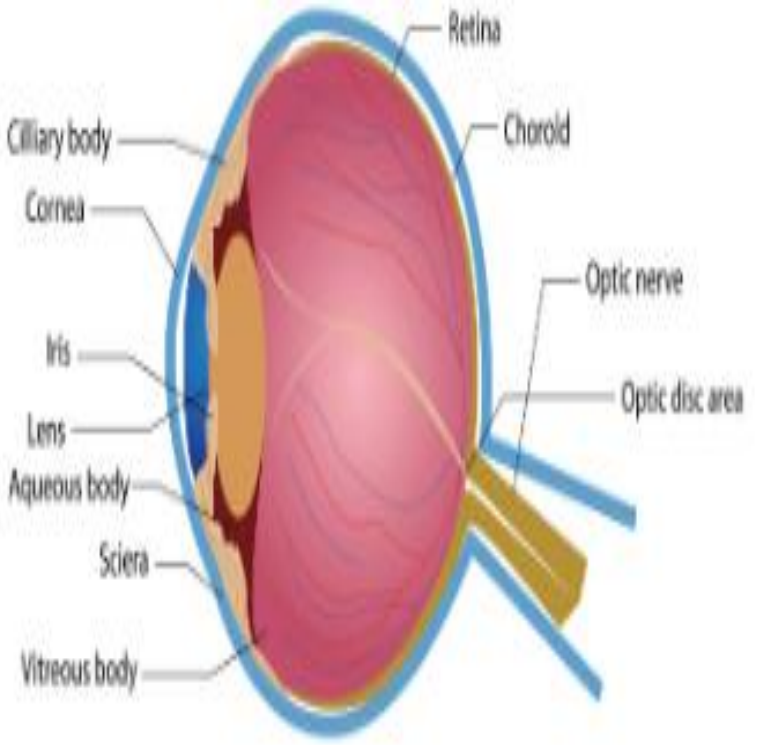
- Optic disk (blind spot) – area where optic nerve attaches to the retina; does not contain any photorecptors



- Lens – flexible, biconvex, crystal-like structure that brings rays of light into focus and produces an image on the retina

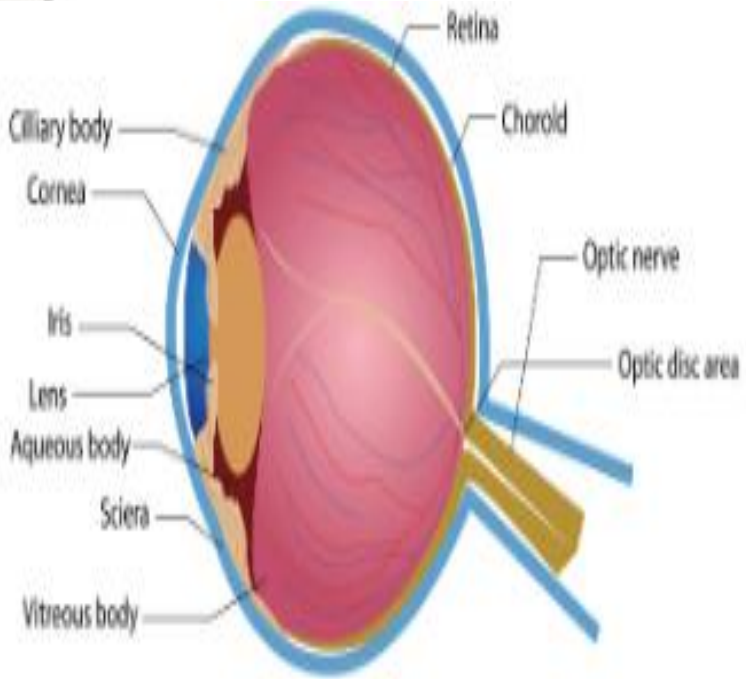


- Suspensory ligament – holds the lens in place; attached to the ciliary body, which controls the amount of tension exerted on the lens

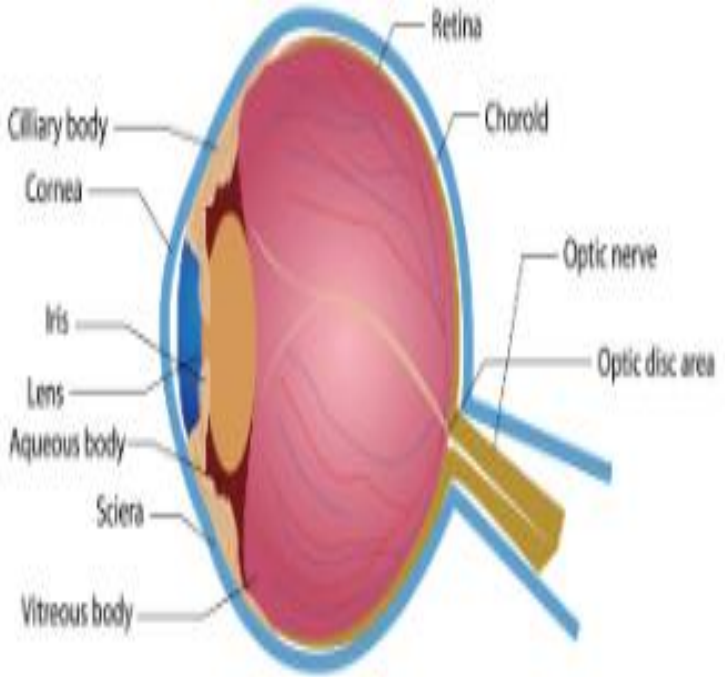


Fluid in eye:-

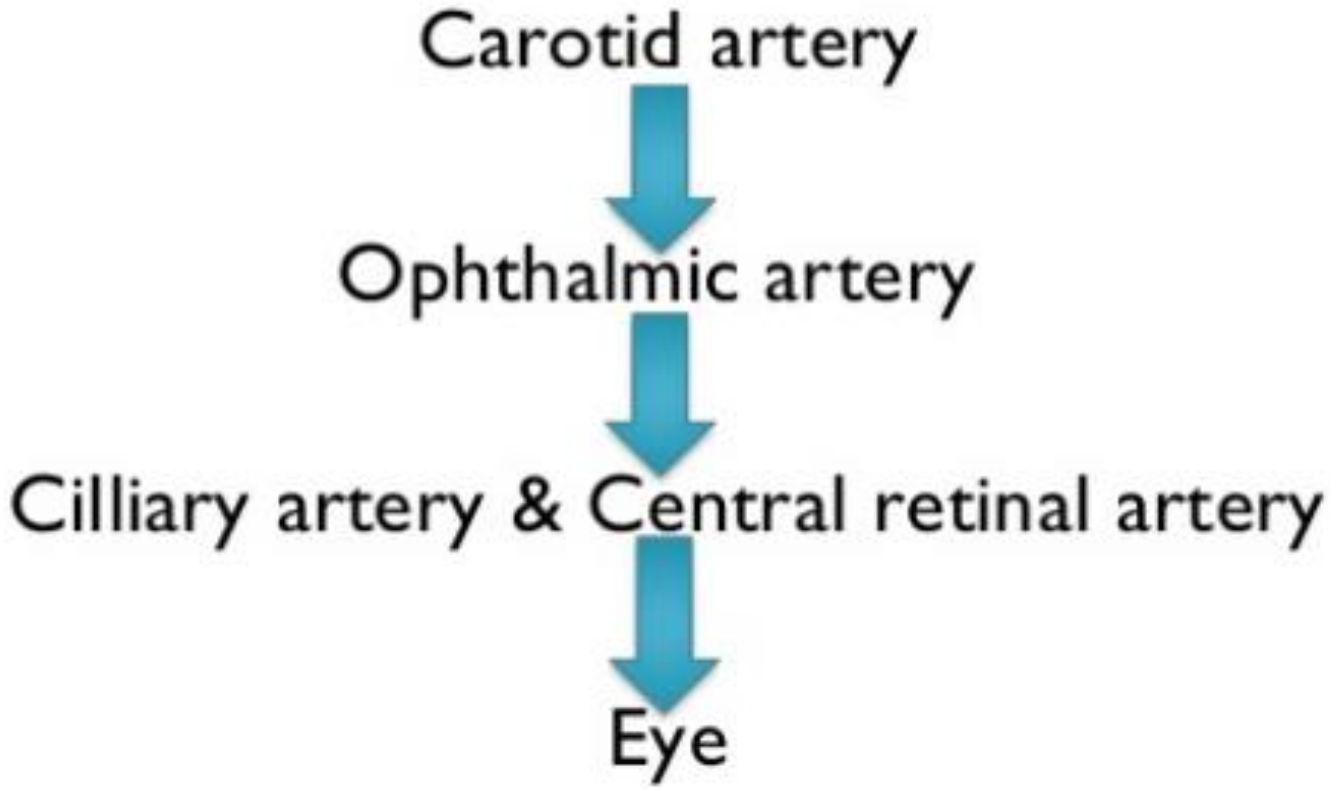
- Aqueous humor – watery fluid that provides nutrition and helps maintain the shape of the cornea; found in the smaller, anterior chamber of the eye



- Vitreous humor – thick, gel-like substance that fills the largest chamber of the eye and helps to hold its spherical shape



Blood supply:-



Tapetum

- Iridescent layer in eye that causes glow in dark appearance when light shines in - many animals have this

DISORDERS OF THE EYE

- There are following some common disorders of the eye.

i. **Myopia** (short sight)

ii. **Hypermetropia** (long sight)

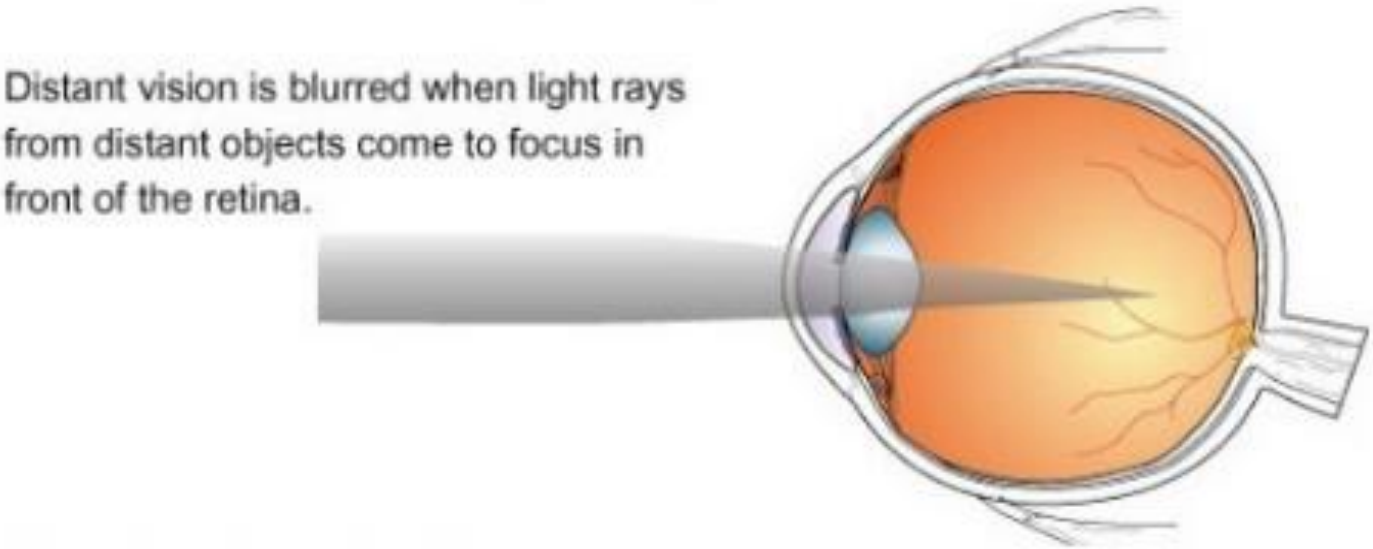
iii. **Night blindness**

iv. **Colour blindness**

Myopia (near-sightedness)

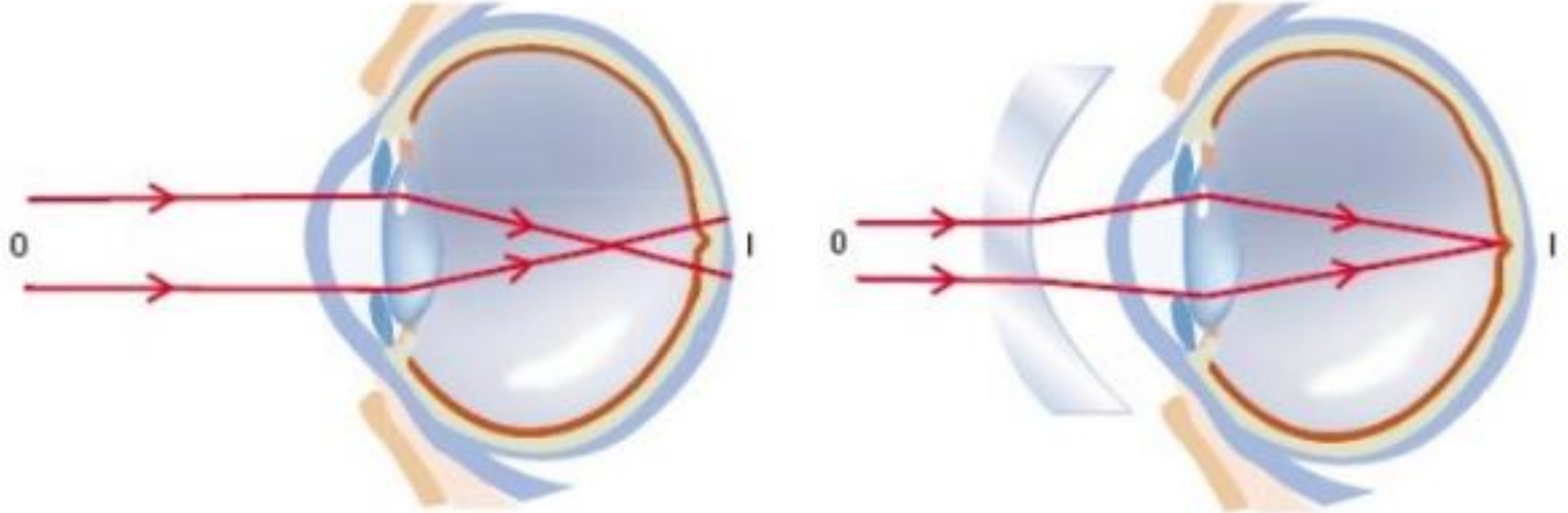
Cause:

- Distance between lens and retina is too long (long eyeball)
- Cornea & lens converge light too strongly (strong refractive power)



Myopia (near-sightedness)

- Corrected with a diverging lens
- Negative meniscus: lens shape where edge of lens is thicker than the middle but modified from a basic diverging lens to make it more cosmetically appealing



Myopia (near-sightedness)

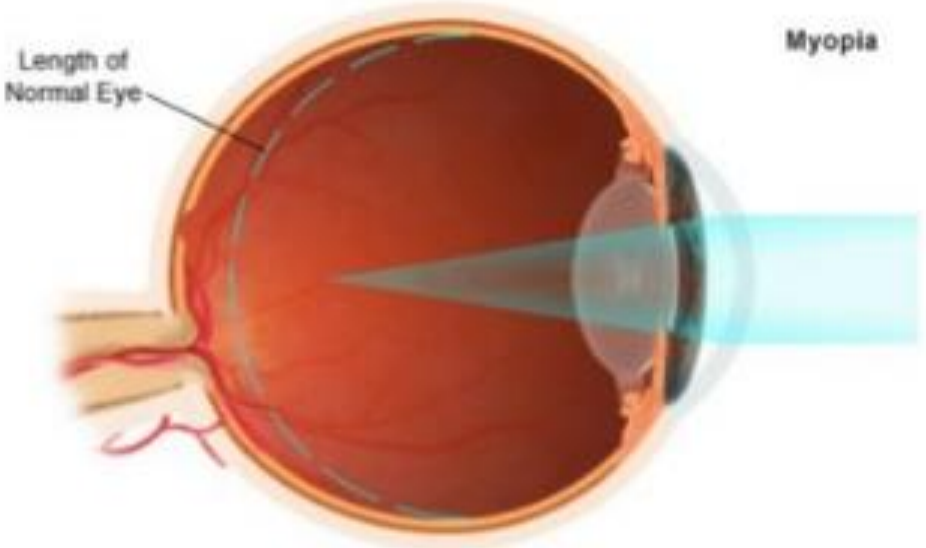
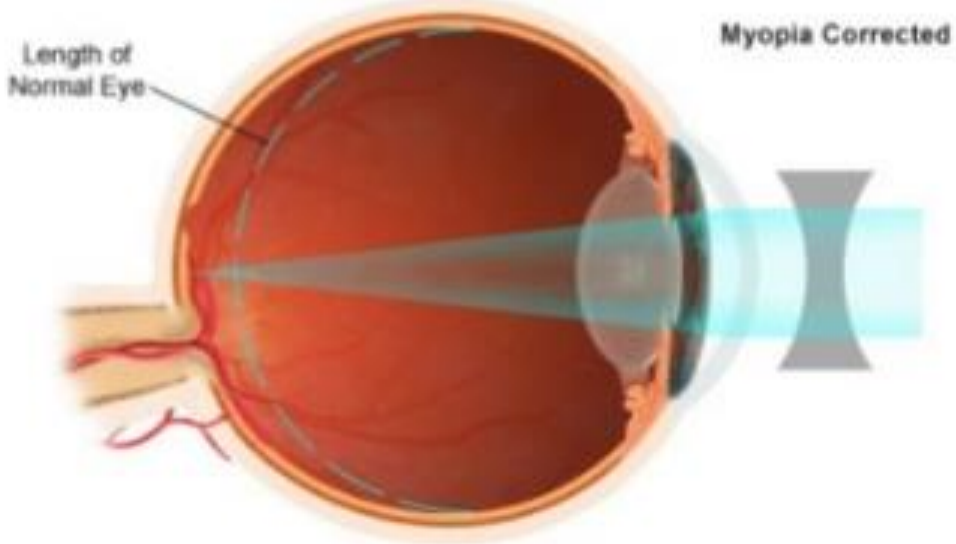
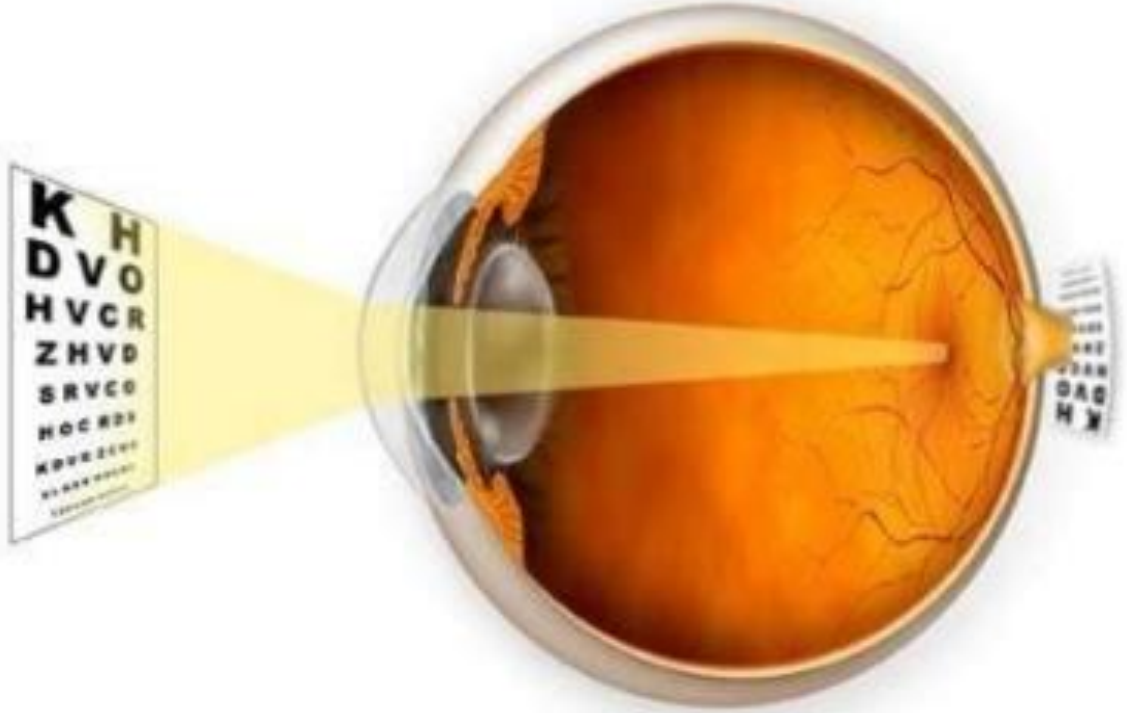


Image focuses BEFORE reaching the retina



negative meniscus (-):
a diverging lens

Hyperopia
(far sightedness)



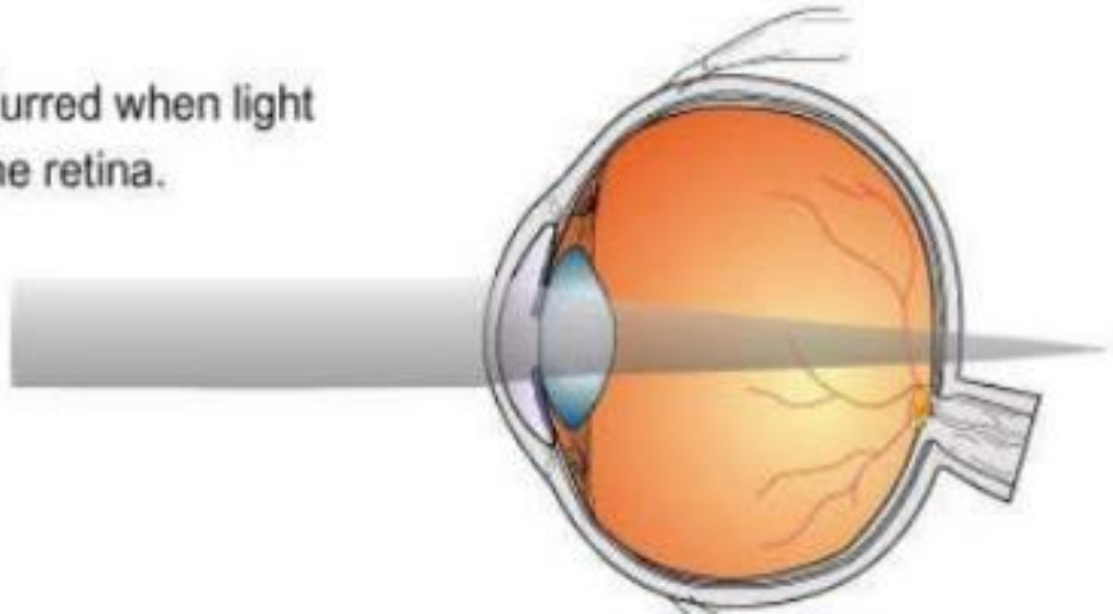
- inability of the eye to focus light from near objects
- no difficulty seeing distant objects
- Babies are born slightly hyperopic. As eye grows, condition fixes itself.
- image focused behind retina

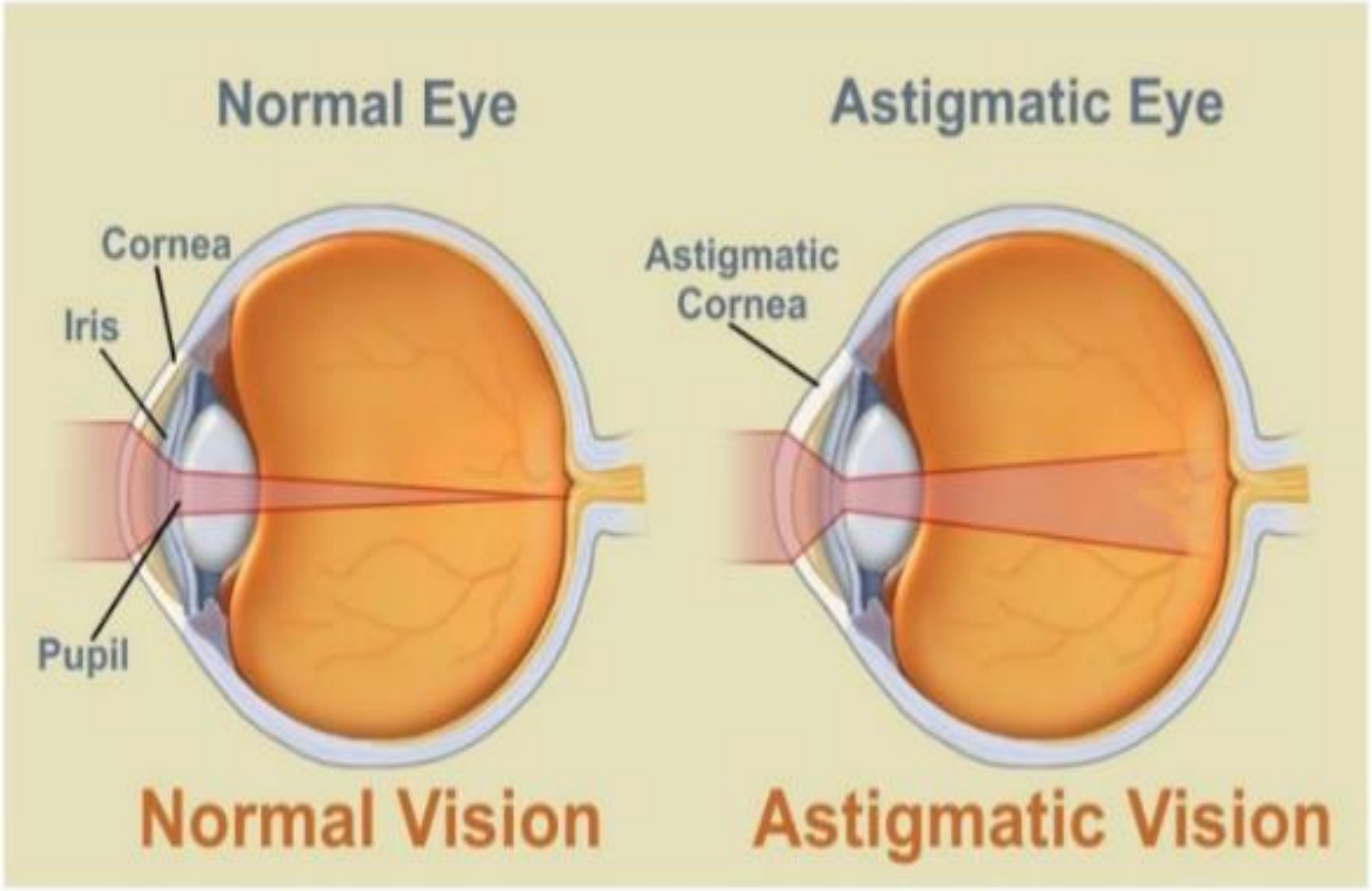
Hyperopia (far sightedness)

Cause:

- Distance between lens and retina is too small (short eyeball)
- Cornea & lens is too weak (doesn't diverge rays enough)

Distance vision is blurred when light rays focus behind the retina.




Normal Eye
Astigmatic Eye
Cornea
Iris
Pupil
Astigmatic
Cornea
Normal Vision
Astigmatic Vision

NIGHT BLINDNESS

- Rods contain a pigment called **Rhodopsin**. Body synthesizes rhodopsin from vitamin A and that is why the deficiency of vitamin A causes poor night vision this problem is called **night blindness**.

COLOUR BLINDNESS

- Cones also contain a pigment called **Iodopsi**n.

There are **three** main types of **cones** and each type has a specific iodopsin that recognizes one of three primary colours i.e. **blue,green** and **red**.If any type of cone is not working well it becomes difficult to recognize that colour and such person is also not able to distinguish different colours.This disease is called **colour blindness** and it is a genetic problem.

ACTIVITY

- **Answer the following questions.**

i. Name three layers of eye.
ii. What is the function of rods in eye ?
iii. Define colour blindness.
iv. Name three primary colours.
v. What is iodopsin?

CLOSURE

- There are ----------main layers of eye.
- Blind spot is part of ----------layer.
- Deficiency of vitamin----------causes----------.
- There are three primary colours, blue, green and----------

HOME WORK

- Draw a labeled diagram of an eye and state function of each part.

- Describe in detail the disorders of human eye and their treatment with the help of internet search.

THE END!!!

- Thank you for your cooperation and attention!!
- Hope you learned some new, exciting things.