Vision

1-The eye & Refraction

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OBJECTIVES:-

At the end of this lecture, the student should be able to:-

-Describe different components of the eye and function of each and -- -understand the eye protection media

- Describe the refraction of light as it passes through the eye to the retina, identifying the refractive media of the eye

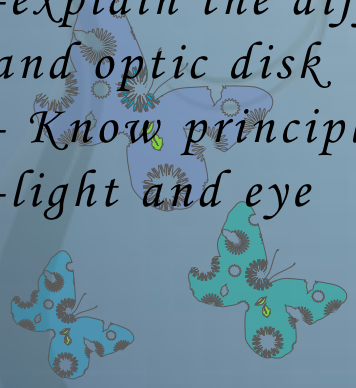
-Know glocuma and binocular vision

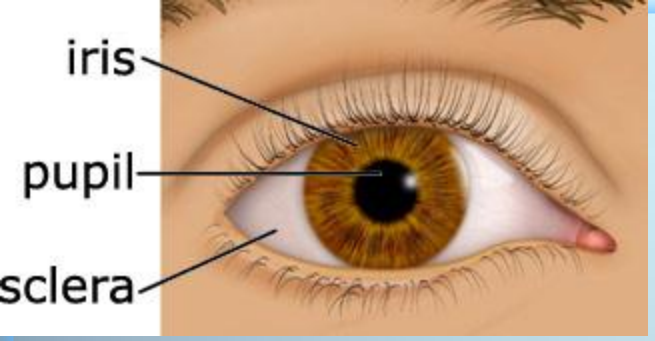
-Know layers of retina, blind spot, and fovea centralis

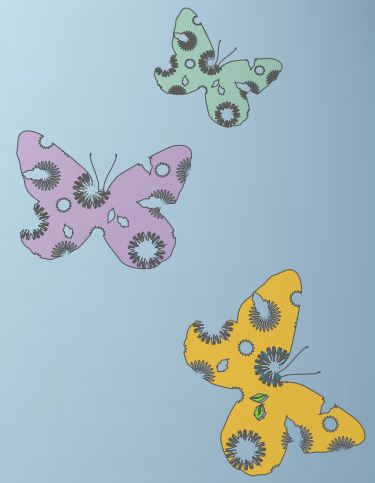
-explain the different light sensitivities of the fovea, peripheral retina and optic disk

- Know principles of optics and errors of refraction

-light and eye





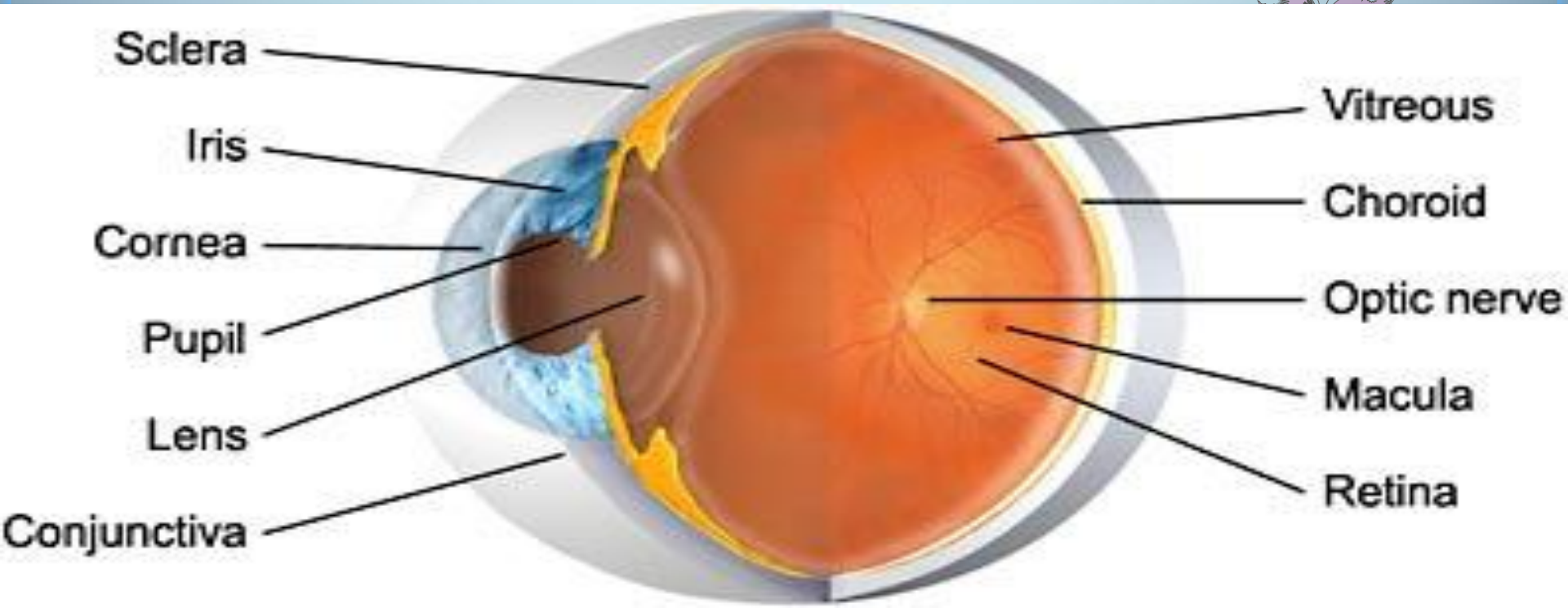


Anatomy of the eye:_

1- Sclera *(for protection- spherical appearance)-*

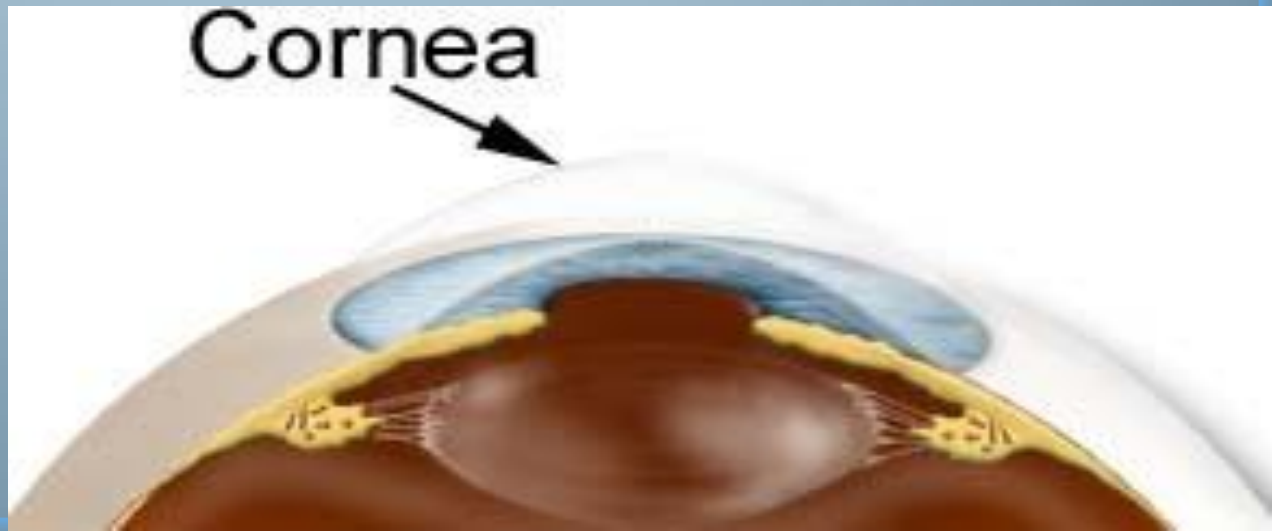
-choroids *inside sclera (BV to supply retina with blood)*

- post 2/3 of choroid has ***retina*** *innermost layer*


Sclera
Iris
Cornea
Pupil
Lens
Conjunctiva
Vitreous
Choroid
Optic nerve
Macula
Retina

2- cornea (modified ant 1/6 of sclera) to allow light to enter the eyes, transparent , avascular.

--Refractive or diopteric power 40-45 D at its anterior surface.



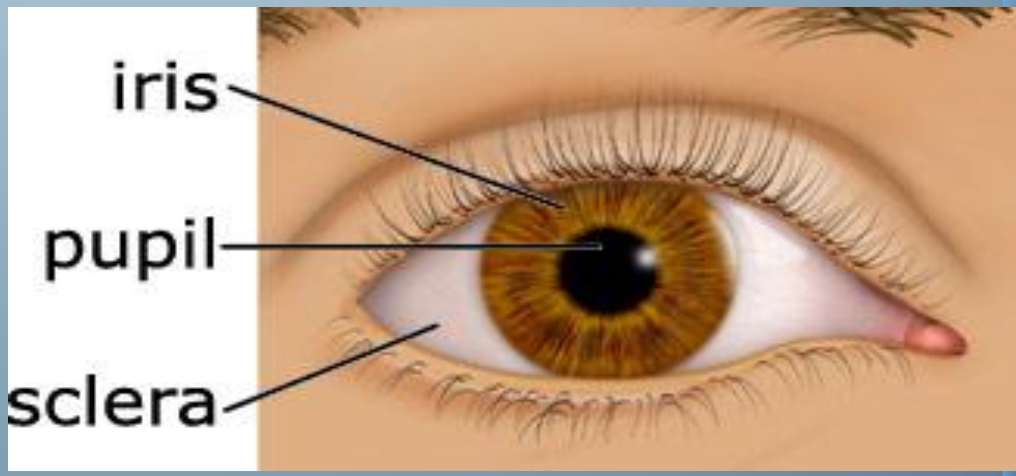
3- conjuctiva

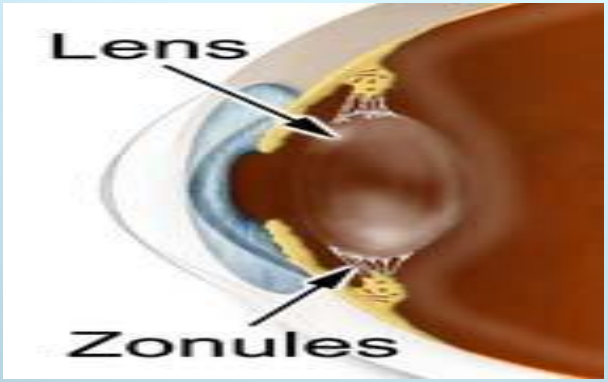
- Transparent membrane cover anterior surface of eye,reflected on inner surface of eye lids

- Covered with thin film of tears for protection,wetness, cleaning

4- pupil / behind center of cornea, allow light to enter the eye

5- Iris colored part (radial muscle dilates the pupil (supplied by sympathetic) + circular muscles constrict the pupil (by parasympathetic).





6-cilliary muscles (body)

thick ant part of choroid to which attached suspensory ligaments (zonule)

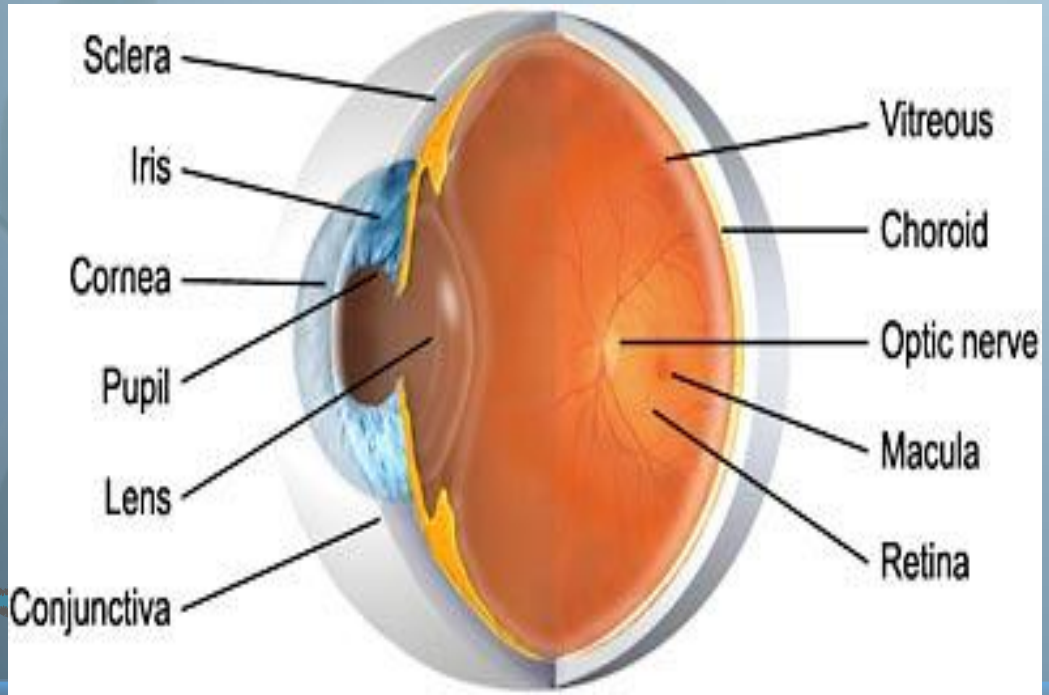
7- lens (transparent, biconvex, semisolid, diopteric power 15-20 D, held in place by zonule

(lens ligament= suspensory ligament)

attached to ant part of cilliary body (choroid)

Q.what is cataract?

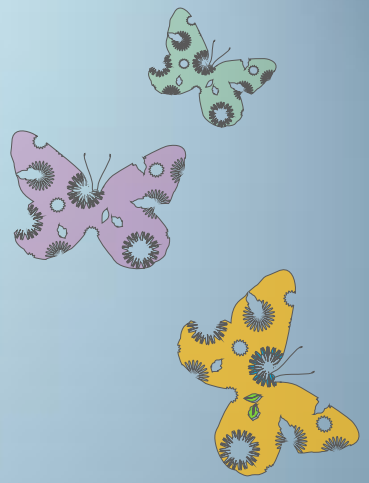
8- Uvea = choroid + iris + cilliary muscles

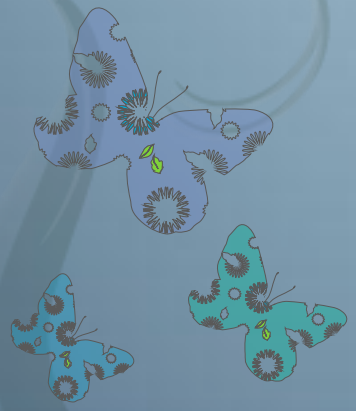

Sclera
Iris
Cornea
Pupil
Lens
Conjunctiva
Vitreous
Choroid
Optic nerve
Macula
Retina


Choroid
Retina
Sclera

Anterior chamber of the eye ✹
/Between iris & cornea.

-posterior chamber of the eye /
Between iris & cilliary muscles
- Iris between both





Refractive media of the eye:-

1-Cornea (greatest refraction of light)

-diopteric power 40-45 D at ant surface

-(2/3 refractive power of eye)

2-Aquous humour

--(Fluid produced by cilliary body --to post chamber>>>>>>> to pupil>>>>>>> to ant chamber

to canal of schlemm at angle of ant chamber >>>>>>>-

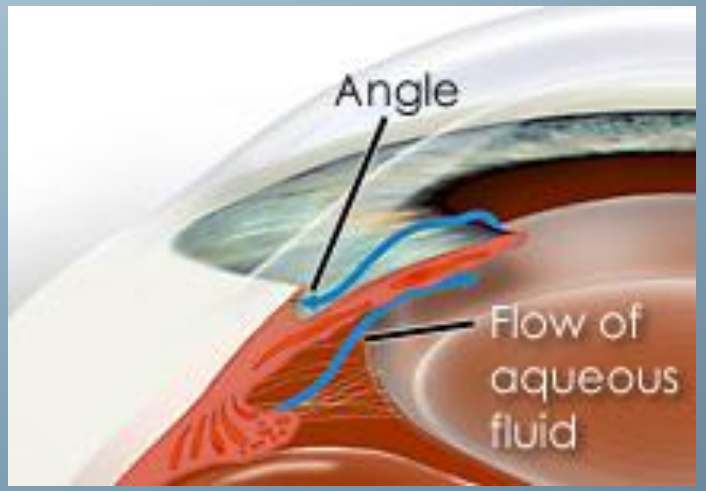
to veins

Function//

-nourishing retina & other eye structures -

causes intraocular pressure 10-20mm Hg

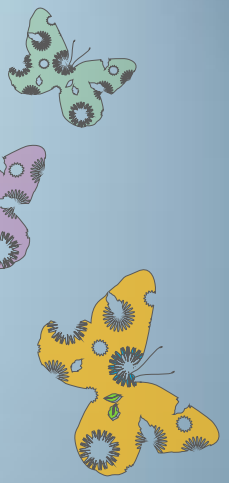
What is glucoma ?
(intraocular pressure more than 20mm Hg)
-Why it causes damage of optic nerve?

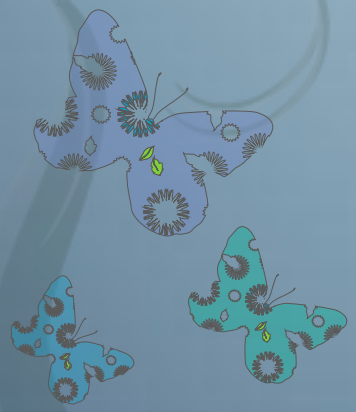


3-lens:- diopteric power 15-20 D

-(1/3 refractive power of eye) , more important than cornea. why?

4-Vitrous humour _(between retina & lens for nourishing retina & keep spheroid shape of the eye)





External protection of the eye

1- bony orbit

2- lids blinking keep cornea moist

3 -conjuctiva

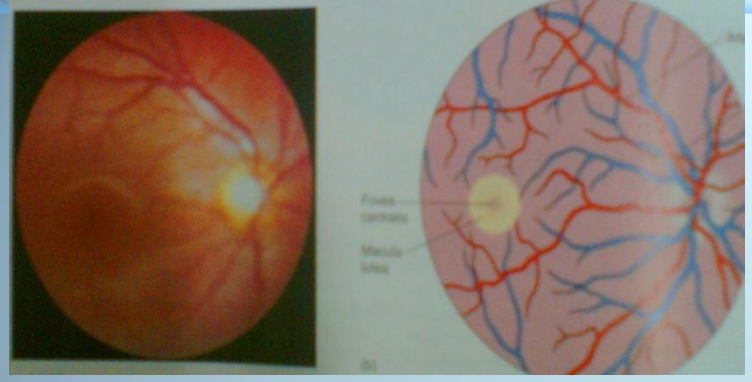
4-tears from lacrimal gland has antibacterial, lubricating effect ,keep cornea moist & clear.)

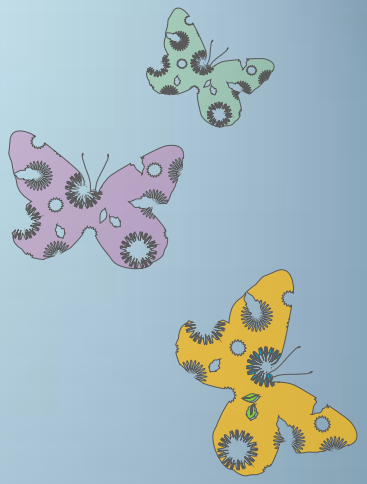
RETINA ✹

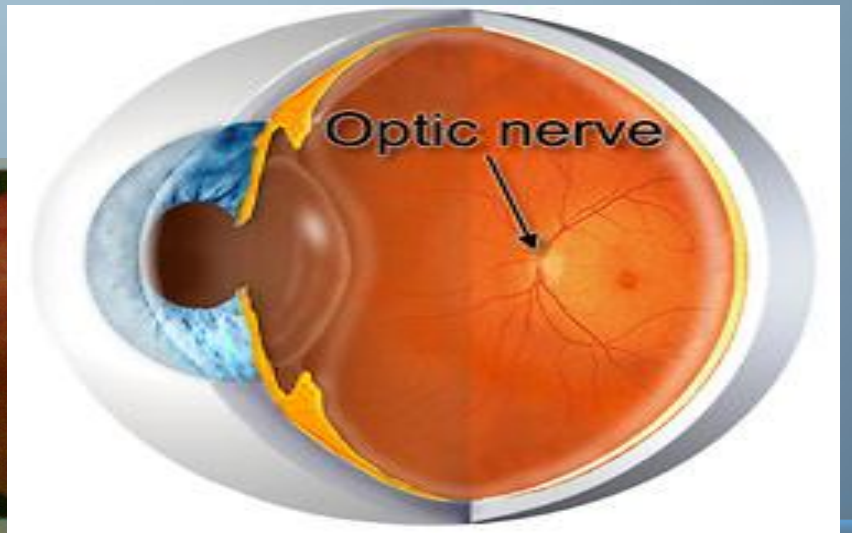
1-Photoreceptors （RODS + CONES）

2-OPTIC DISC (blind spot. Why?) ✹
- 3mm medial & above post pole of eye
- optic nerve leave & retinal bld vessles enter + no photoreceptors)

3-FOVEA CENTRALIS :-depression in ✹ macula lutea - yellow pigmented spot at post pole of eye + only cones






Optic nerve

BINOCULAR VISION for :-

1- Large visual field

2- cancel the effect of blind spot

3- stereoscopic vision

4- one eye lesion does not affect vision

-Biconvex lens(converge) & -biconcave lens(diverge)

-Diopter (measure of refractive power = RF) = 1 / Principal focal distance in meters

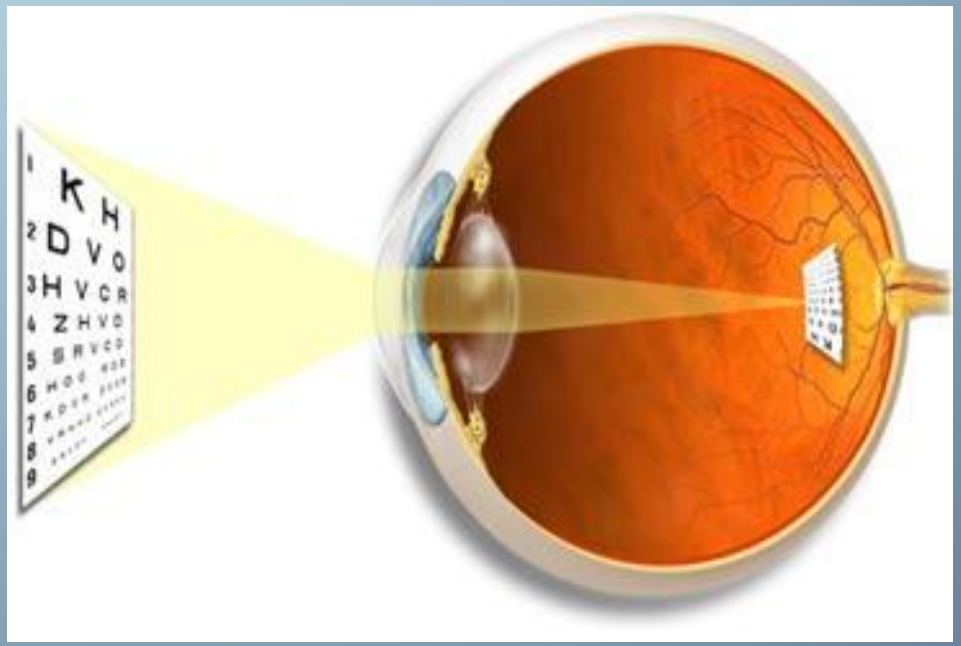
Exp/ if Principal focal distance of a lens is 25cm,how much is RF?

-

--The greater the curvature of the lens, the greater the refractive power of the eye

Emmetropic eye;-normal eye has image on retina, has diopteric power 60D

Lens--retina distance =15mm



Errors of refraction:-

1-Hypermetropia (hyperopia = farsightedness)

(small eyeball, focus behind retina,

Headache & blurred vision

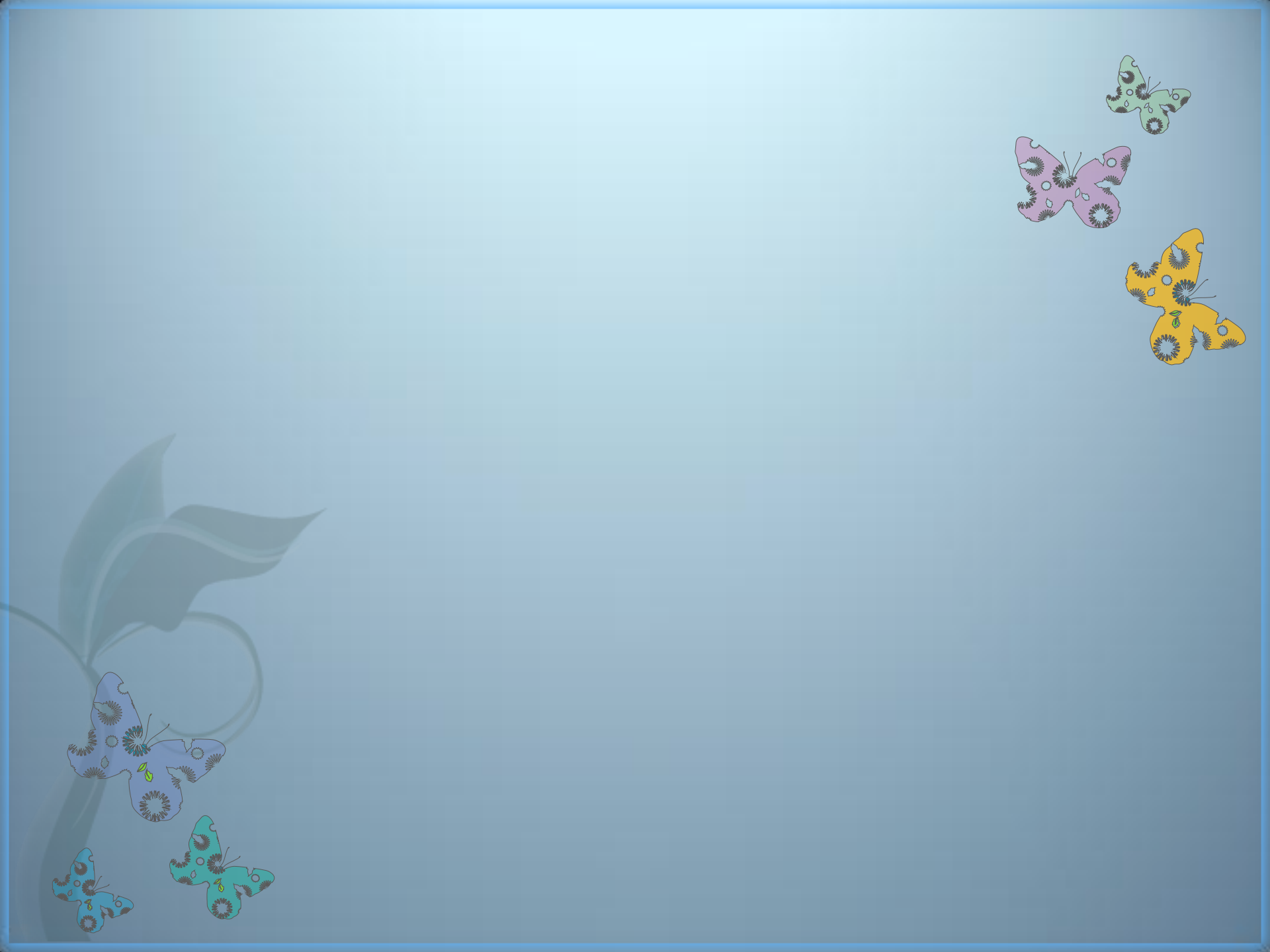
-continuous accomodation to bring image on retina>>>>>>muscular effort>>>>>cause headache, prolonged covergence by accomodation->>>>squint

correction by biconvex lens

2-Myopia(nearsightedness)

(genetic, large eye ball, long antero-posterior diameter, or extensive close work as in studying>>>>cause focus in front of retina

-- correction by biconcave lens (to diverge rays before strike lens)



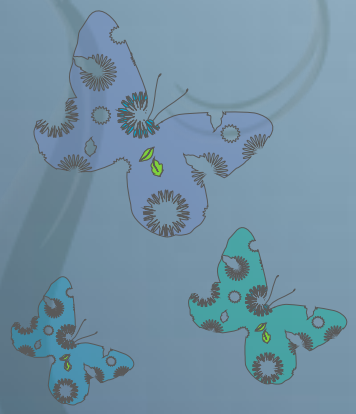
3-Presbyopia (eye near point receeds by age due to loss of accomodation

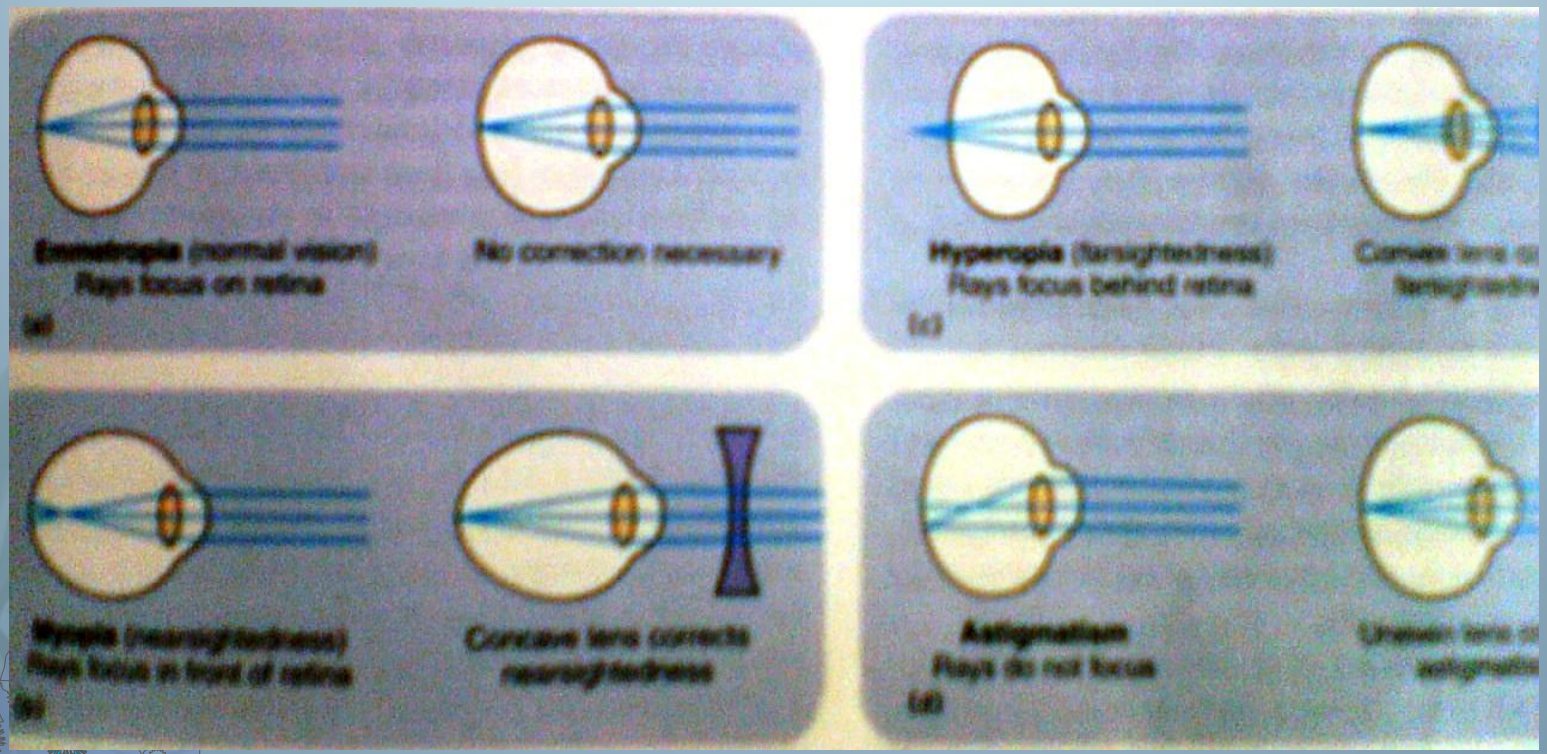
- correction by biconvex lens

4-Astigmatism (uneven & ununiform corneal curvature

-rays refracted to different foci >>>>>>> blurred vision

-correction by cylindrical lens



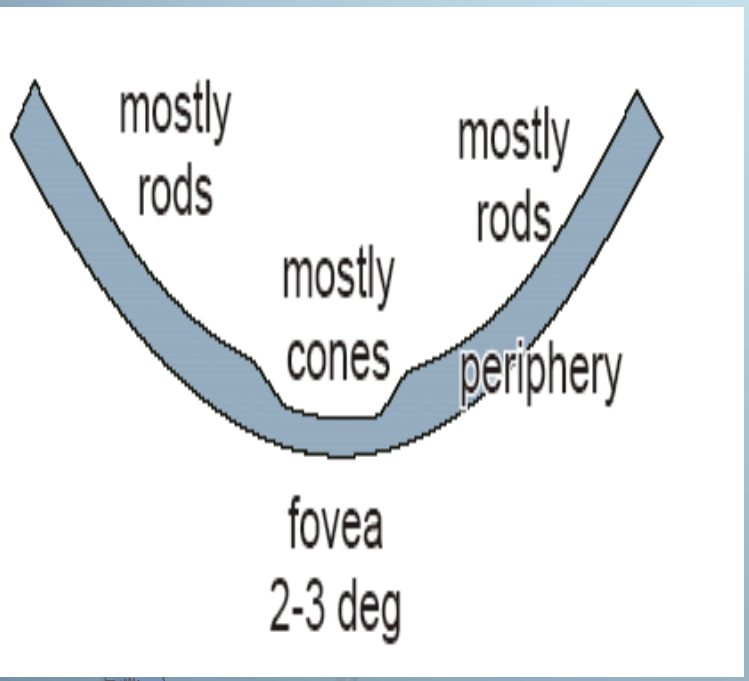

No correction necessary
Hyperopia (farsightedness)
Rays focus behind retina
Concave lens corrects
nearsightedness

LAYERS OF RETINA (10 layers), the most important are :-

1-pigment cell layer (vit A) (outermost layer) .what is its value?

(absorb light &prevent its reflection back)

2- rodes & cones (their outer& inner segments), but not cell bodies(rodes 120 million & cones 6 million) - describe their distribution.)


mostly
rods
mostly
rods
mostly
cones
periphery
fovea
2-3 deg

3-outer nuclear layer(cell bodies of rodes & cones)

4-outer plexiform layer mainly of Horizontal cells.

5-Inner nuclear layer (bipolar cells)

6-inner plexiform layer.(amacrine cells)

7-Ganglion cell layer

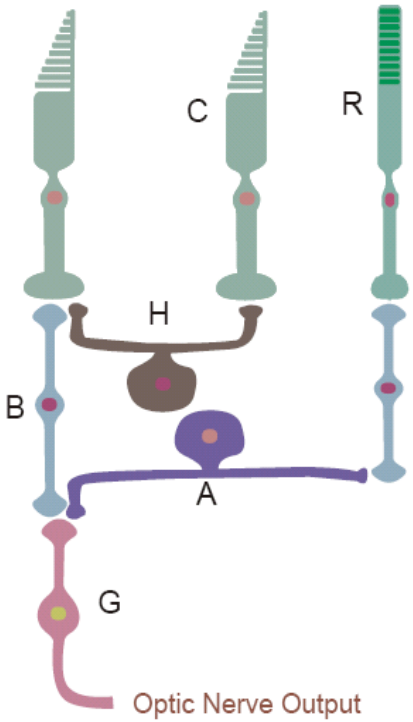
8-Optic nerve fibers (1.2 million fibers)

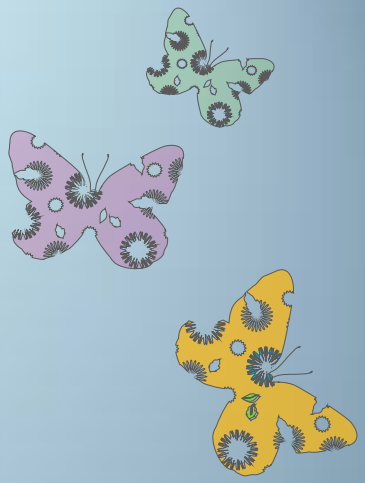
-# Horizontal cells (outer plexiform layer)

(Make synaptic connections with receptors

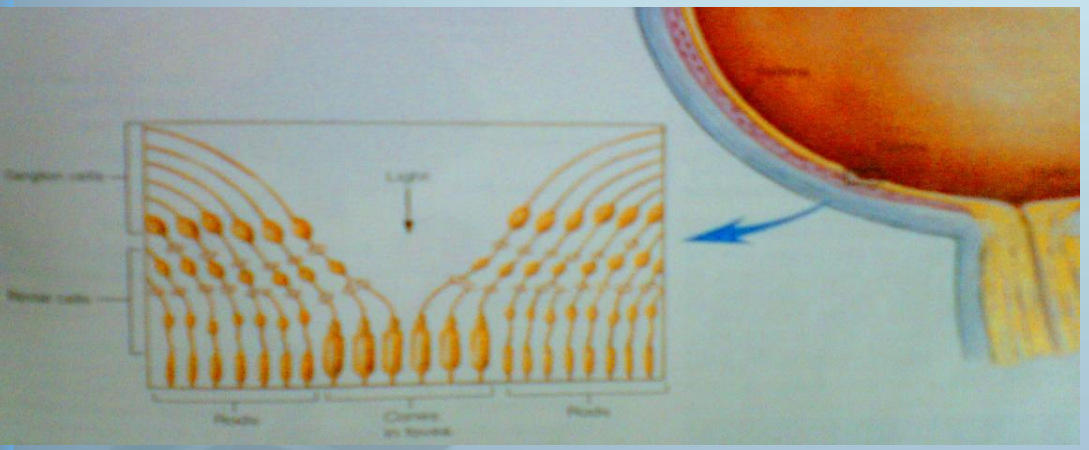
Amacrine cells (inner plexiform layer)

(make synaptic connections with ganglion cells)


C
R
H
B
A
G
Optic Nerve Output



Light& the eye:_



-Light absorbed by pigment cell layer that contain melanin pigment
- impulses pass from rodes & cones to rest of layers finally to ganglion cell layer ------- to optic nerve

Thank you for listening