

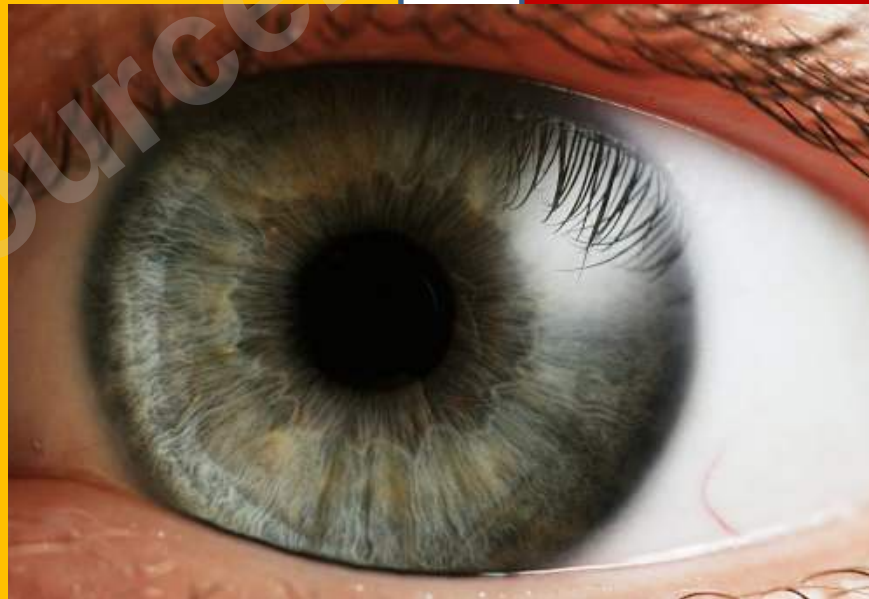


SSIP April – May 2020

LIFE SCIENCES

Topic(s) : EYE

Venue:



SSIP AIMS/GOALS

The four interconnected outcomes that drive the professional development activities for SSIP are:

1. Enhancing Teachers knowledge: deep understanding of subject matter knowledge and students ideas on the content
2. Enhancing quality teaching and assessment for learning: effective instructional approaches that teachers may use to ensure improved understanding by most learners.
3. Developing ICT integration skills :Use of ICT to improve teaching and learning
4. Building professional learning communities: allow teachers to start collaborating and form professional networks in non-formal settings in context of their schools

PROGRAMME

DAY THREE			
SESSION	TIME ALLOCATION	ACTIVITY	RESOURCES
SESSION ONE	08:00 – 10:30	Module 2: Unit 1: Structure and functions of the parts of the human eye, using a diagram. Unit 2: Binocular vision and its importance. Unit 3: Changes that occur in the human eye during accommodation and pupillary reflex, using diagrams. Unit 4: The nature and treatment of visual defects, using diagrams. Activity 2.1 – 2.6 Module 3: Unit 1: Structure of the human ear and the functions of the different parts, using a diagram. Unit 2: Functioning of the human ear in hearing and balance. Unit 3: The nature and treatment of hearing defects. Activity 3.1 – 3.3	Course material Power point Video clips
	10:30 – 10:45	TEA BREAK	

ATP FOR TERM 2

29/04 – 03/05 (4 days)	15			Receptors ☐ Functions of receptors, neurons and effectors in responding to the environment ☐ The body responds to a variety of different stimuli such as light, sound, touch, temperature, pressure, pain and chemicals (taste and smell). (No structure and names necessary except for names of the receptors in the eye and ear). Human eye ☐ Structure and functions of the parts of the human eye, using a diagram ☐ Binocular vision and its importance ☐ The changes that occur in the human eye for each of the following, using diagrams: ☐ Accommodation ☐ Pupillary mechanism ☐ The nature and treatment of the following visual defects, using diagrams: • Short-sightedness • Long-sightedness • Astigmatism • Cataracts <u>Practical worksheet 7</u>			60		
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MODULE 3

Overview of Module 3

In this module we will look at the concept of 'The Eye'

Content

You will study this module through the following units:

Unit 1: structure and functions of the parts of the human eye, using a diagram

Unit 2: binocular vision and its importance

Unit 3: changes that occur in the human eye during accommodation and pupillary reflex, using diagrams

Unit 4: the nature and treatment of visual defects, using diagrams

OUTCOMES OF THIS MODULE

Statement of the learning outcomes/objectives

When you complete this module you will be able to:

- Draw and label the parts of the eye.
- Describe the functions of the different parts.
- Briefly explain the changes occurring in the eye during accommodation and pupillary reflex
- Identify and describe the various defects of the eye
- Conduct a dissection of the eye

Unit 1 - The human eye (structure and function)

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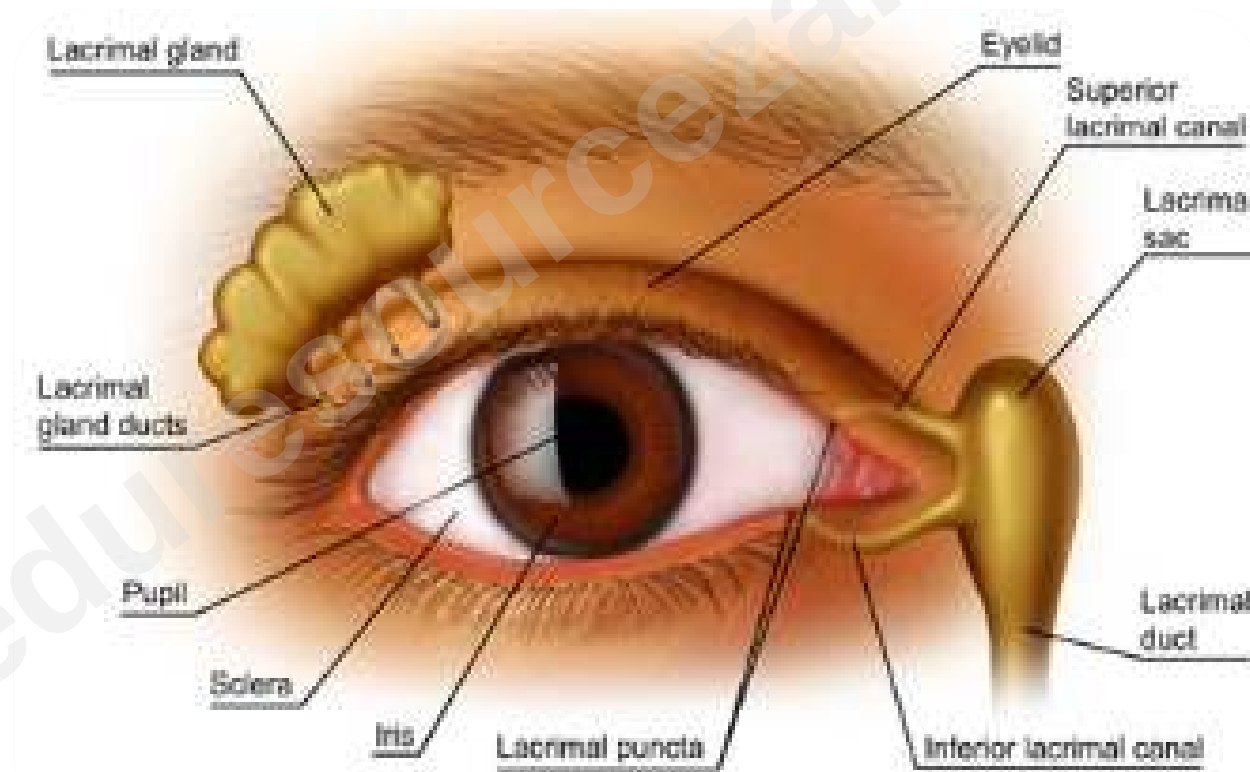
Activity 3.1

Practical activity

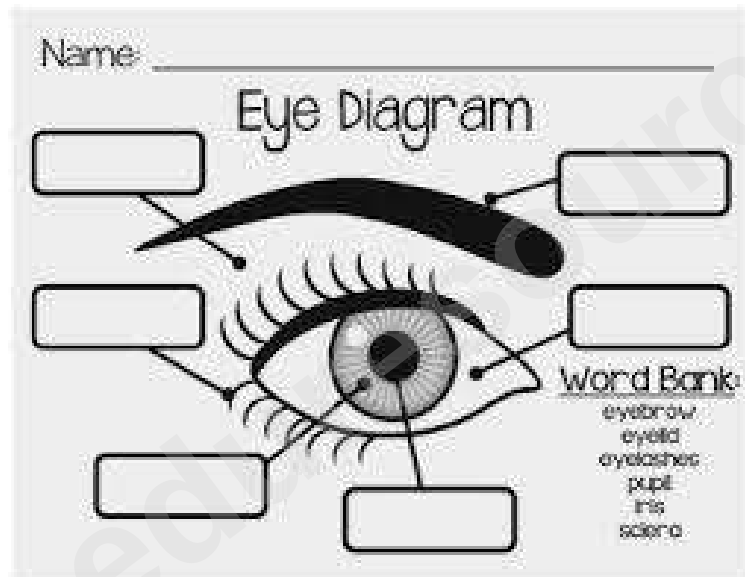
Dissection of sheep's eye (worksheet 7)

STRUCTURE OF THE EYE

EXTERNAL STRUCTURE

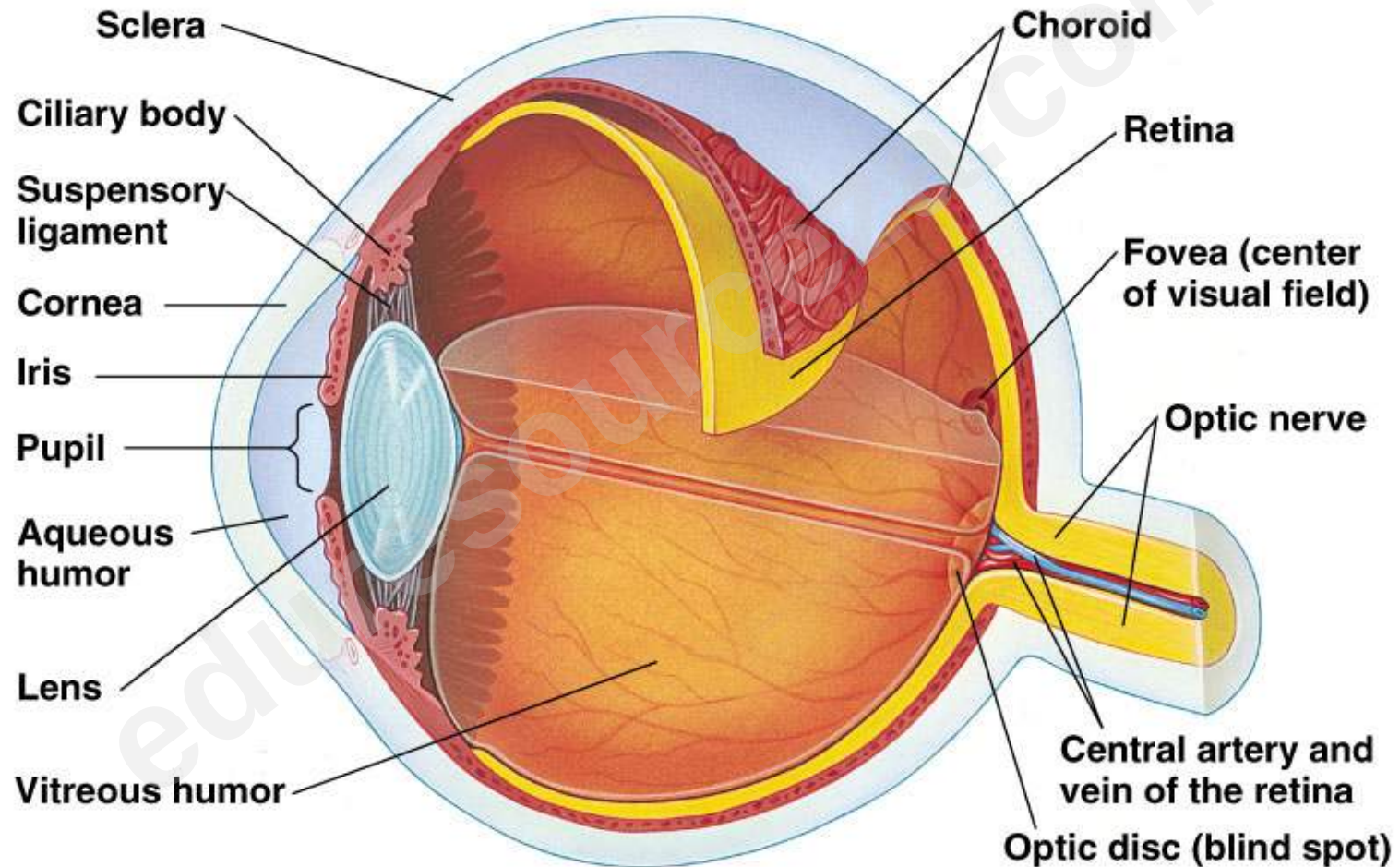


Protection of the eye



- Orbit
- Adipose tissue
- Eyebrows
- Eye lashes
- Eyelid
- Lacrimal fluid
- Glands of Meibum
- Sclera
- Conjunctiva

INTERNAL STRUCTURE OF THE EYE



PARTS OF THE EYE

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SCLERA

- white of the eye
- supports eyeball
- provides attachment for muscles

CORNEA

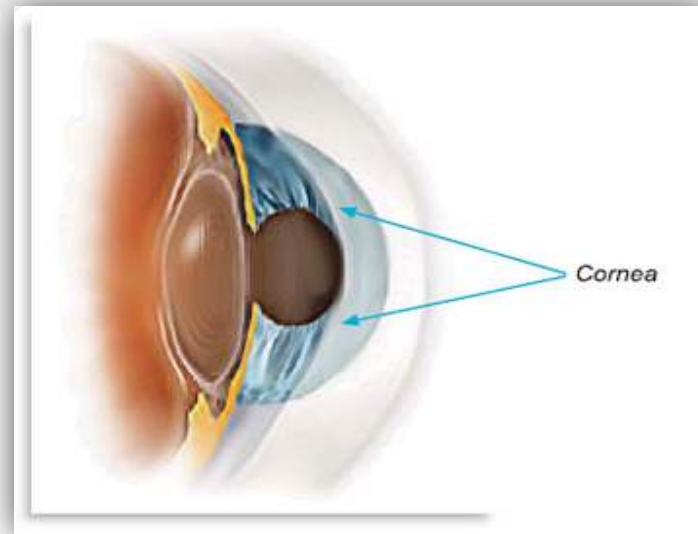
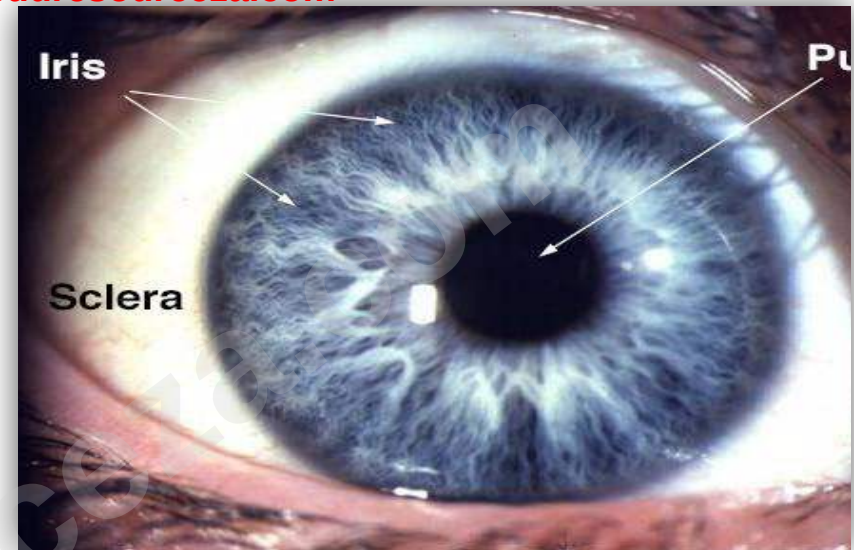
- transparent bulge over pupil
- focuses light (refracts) onto retina

IRIS

- coloured part of eye
- controls light entering

PUPIL

- black hole in iris
- where light enters

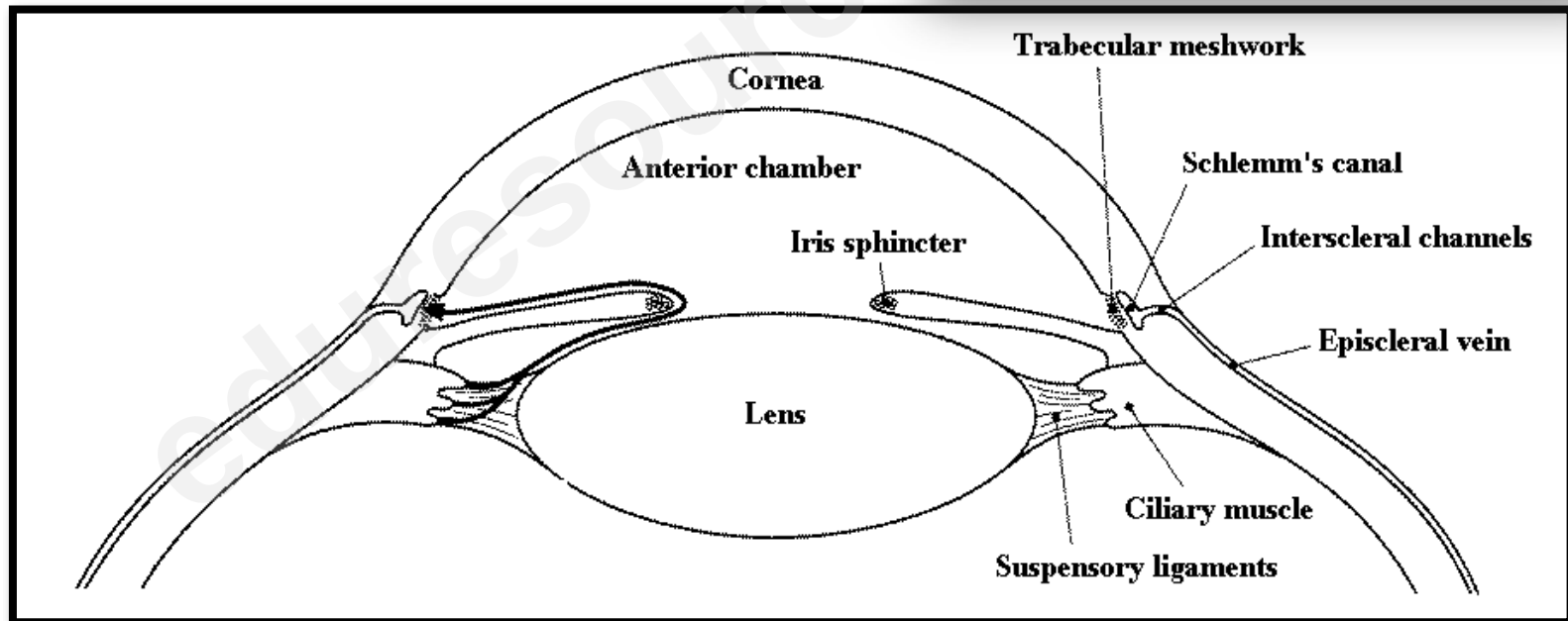
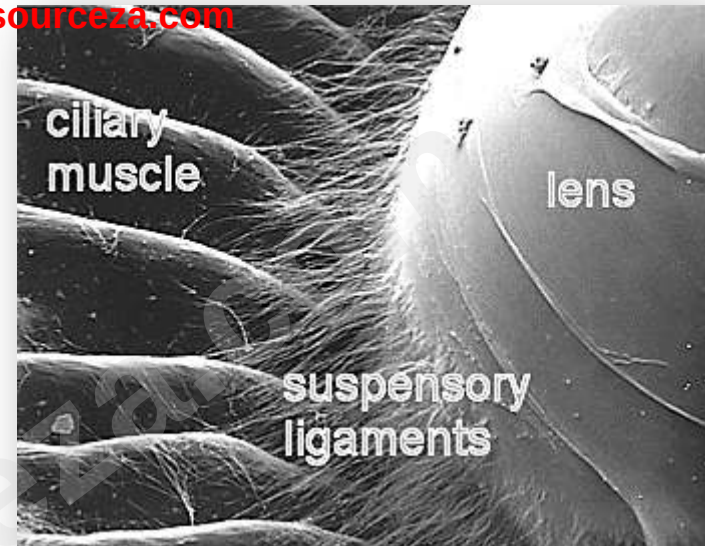


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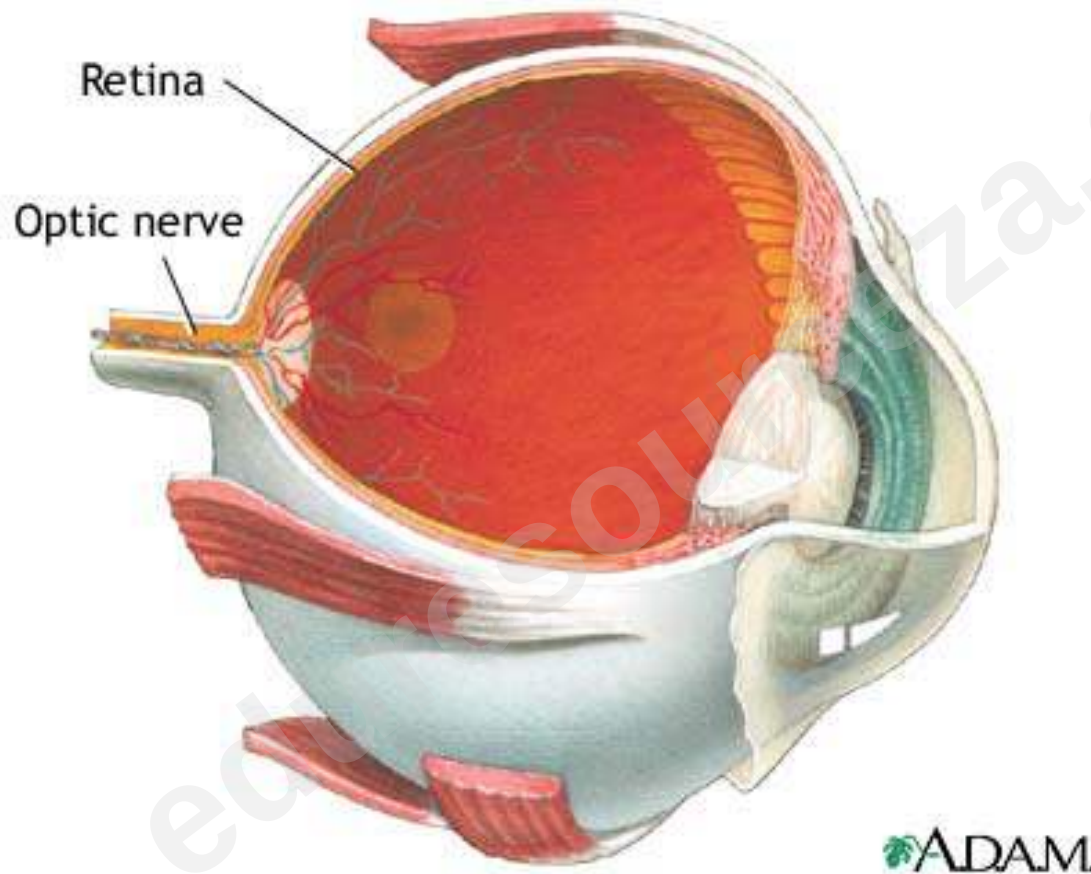
LENS

Flexible disc of
transparent cells
converging lens
allows us to see
objects near and
far

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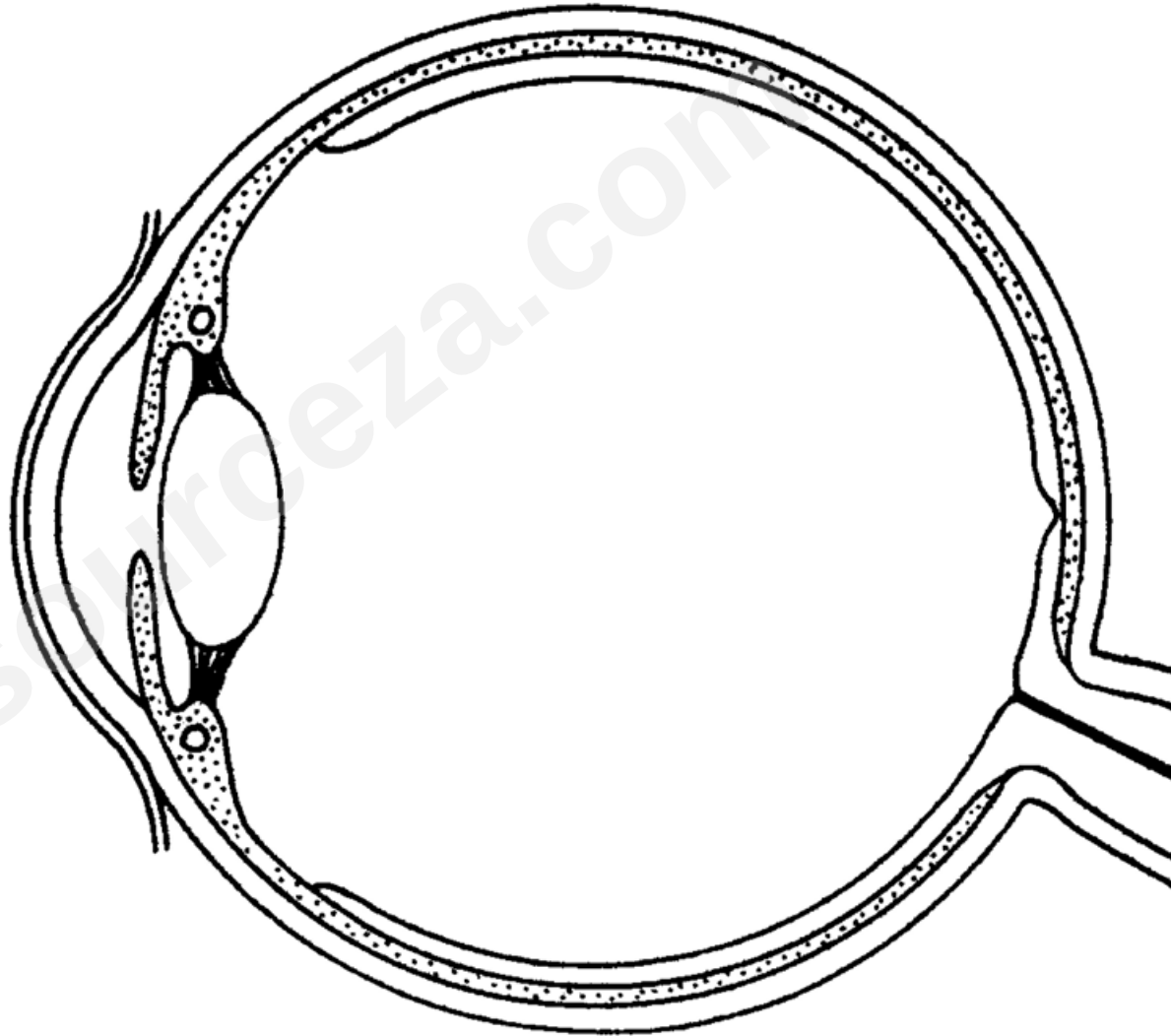


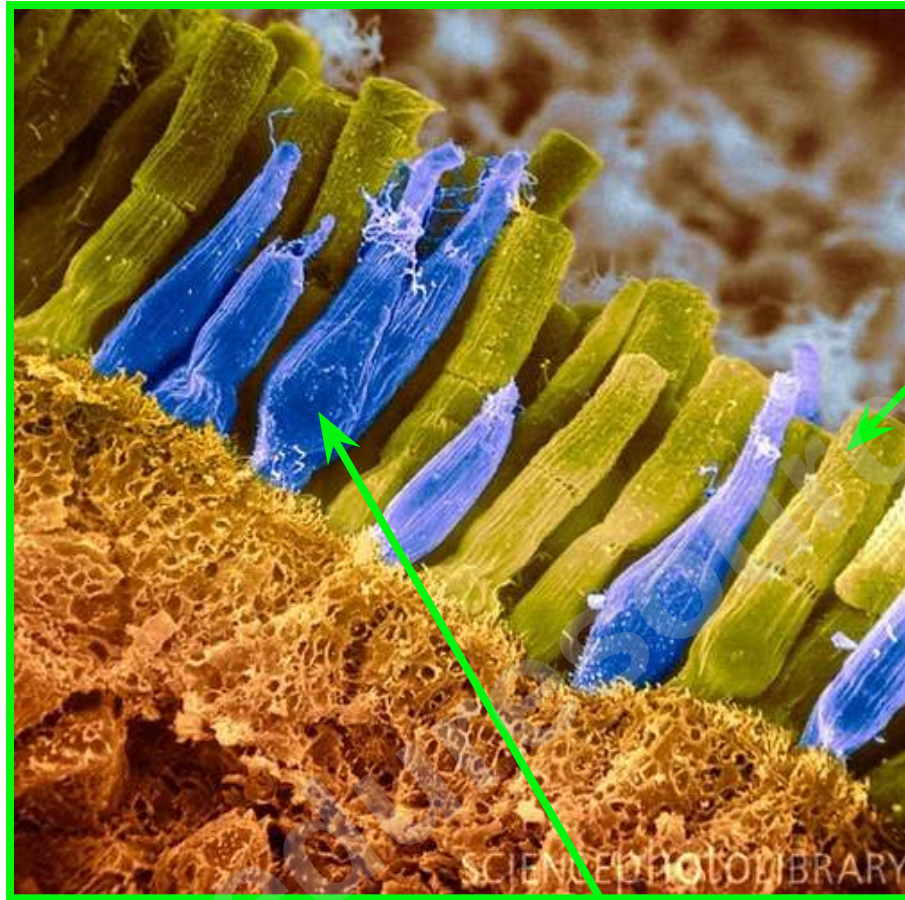
- **RETINA**

- internal membrane
- contain light-receptive cells (rods & cones)
- converts light to electrical signal

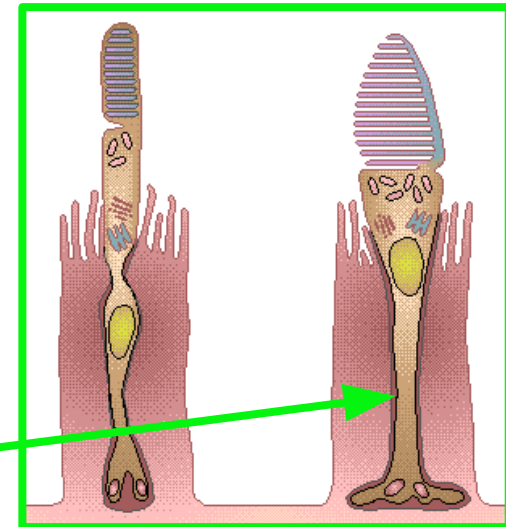
Activity 3.2

- Label the parts of the eye in **blue** and add the functions of each part in **red**





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Dark Adaptation

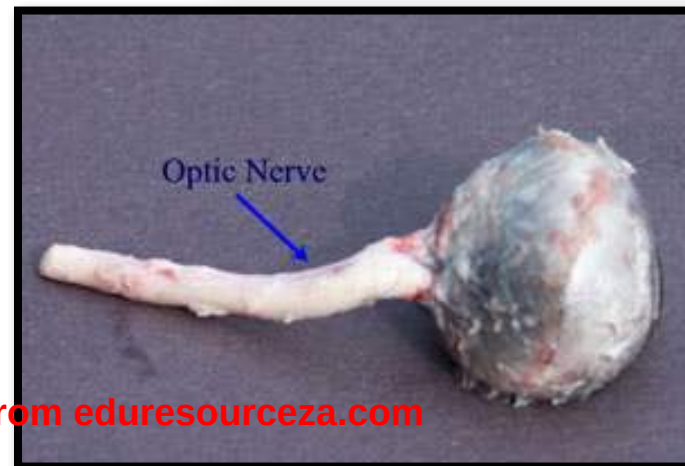
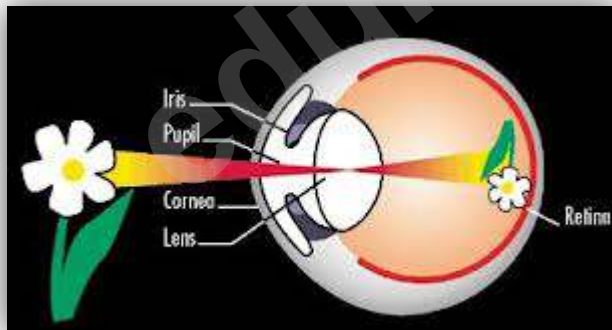
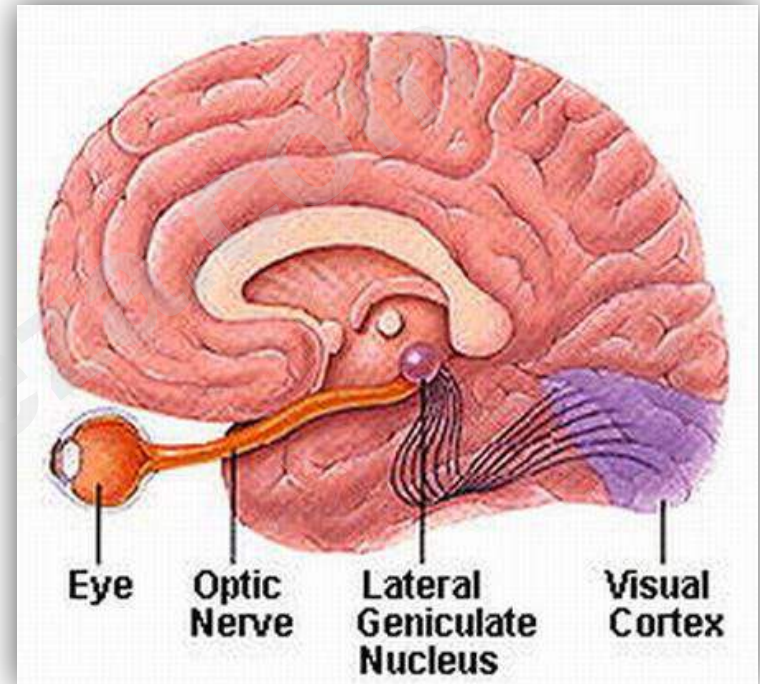
- After about thirty minutes, your eyes are completely dark adapted and can see an amount of light equivalent to a candle 16 km away.



- Dark adaptation is a slow process, but allows us to see in a huge range of light levels

OPTIC NERVE

- Transmits electrical impulses from retina to the brain
- Creates blind spot
- Brain takes inverted image and flips it so we can see

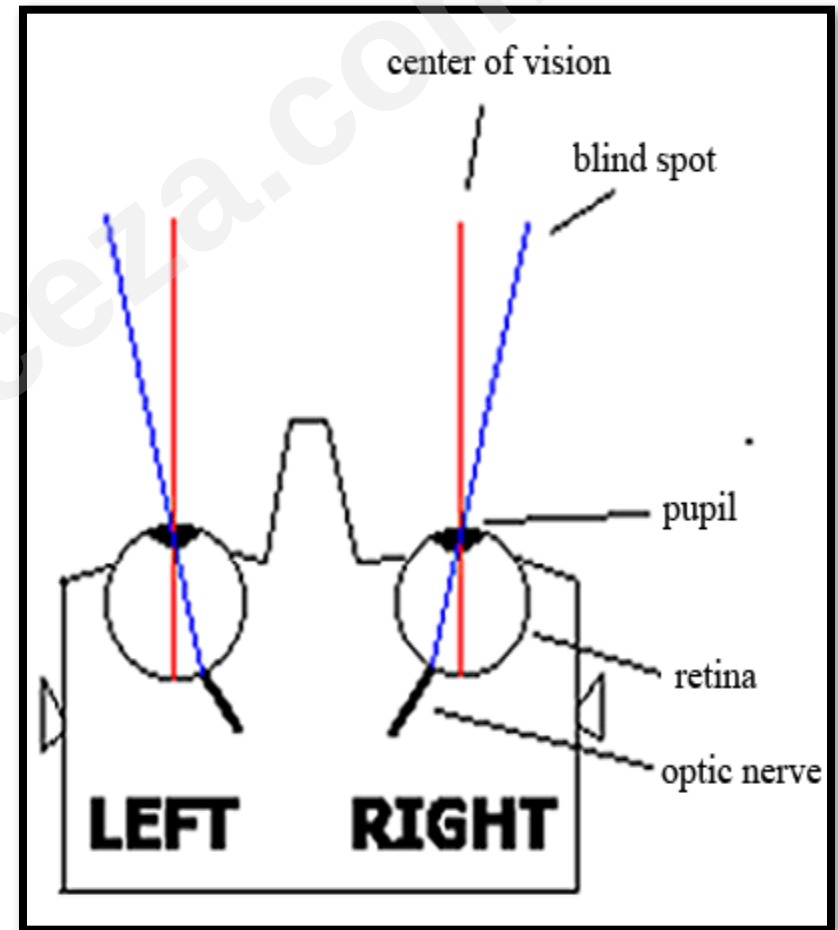


Refraction by concave & convex lenses



Blind Spot

- On retina where the optic nerve leads back into the brain
- No rod or cone cells occur
- Other eye compensates for this area
- Try this test to prove you have a blind spot...



ACTIVITY 3.3



Unit 2: Downloaded from eduresourceza.com

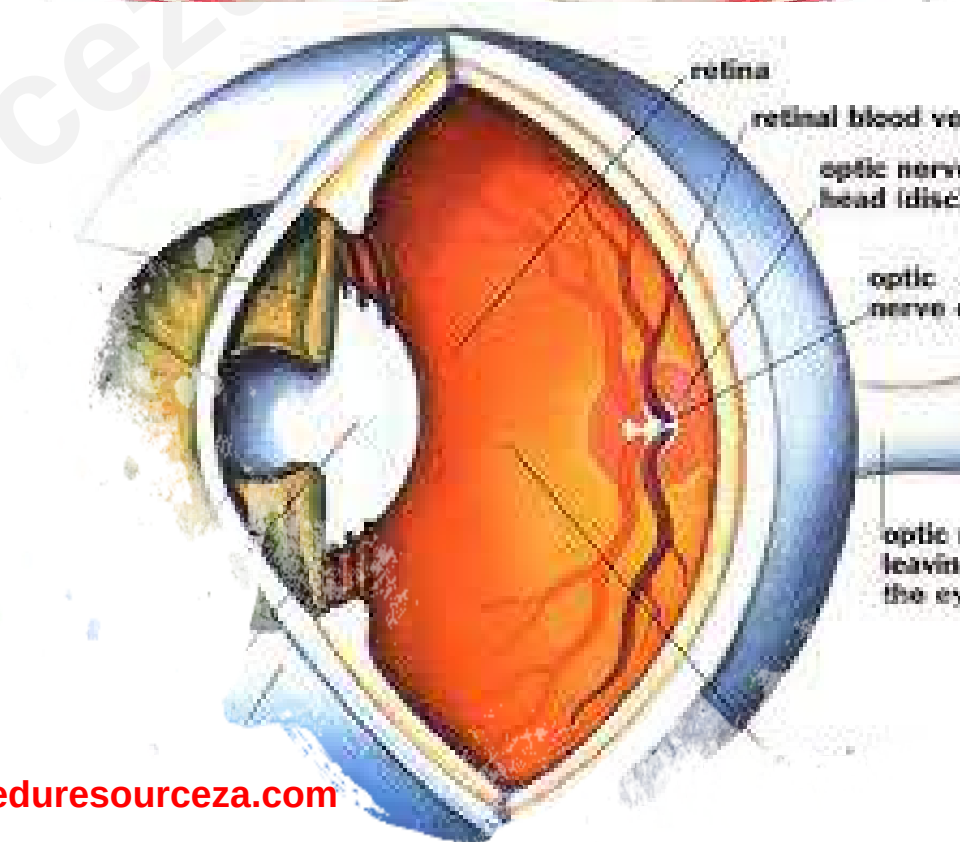
Binocular vision

What it is

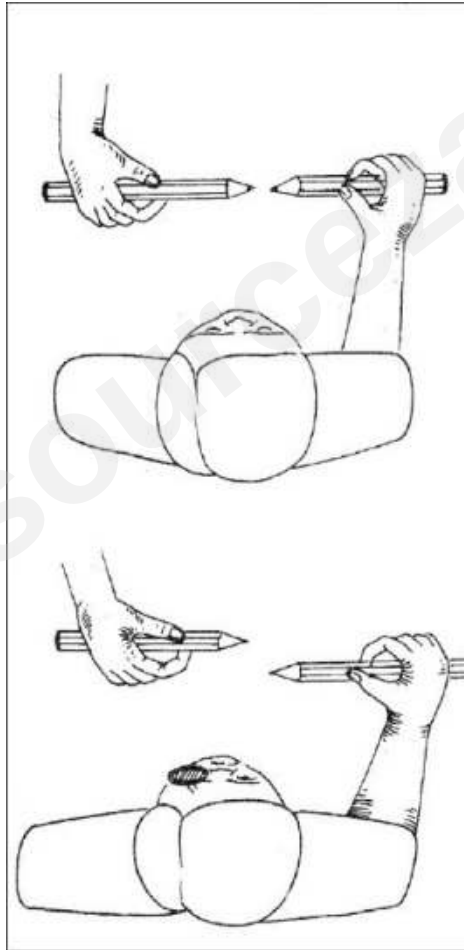
- Refers to the ability to focus on an object with both eyes, creating a single image
- During binocular vision the three pairs of muscles on the outside of each eye enable the eye to see three dimensionally.
- The ability to perceive depth is known as stereoscopy or stereoscopic vision

Significance

- Depth of perception enables us to walk up/ down stairs.
 - It gives a wider field of view
 - gives precise depth perception
 - Binocular vision helps with performance skills such as catching, grasping, and locomotion.
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Activity 3.4

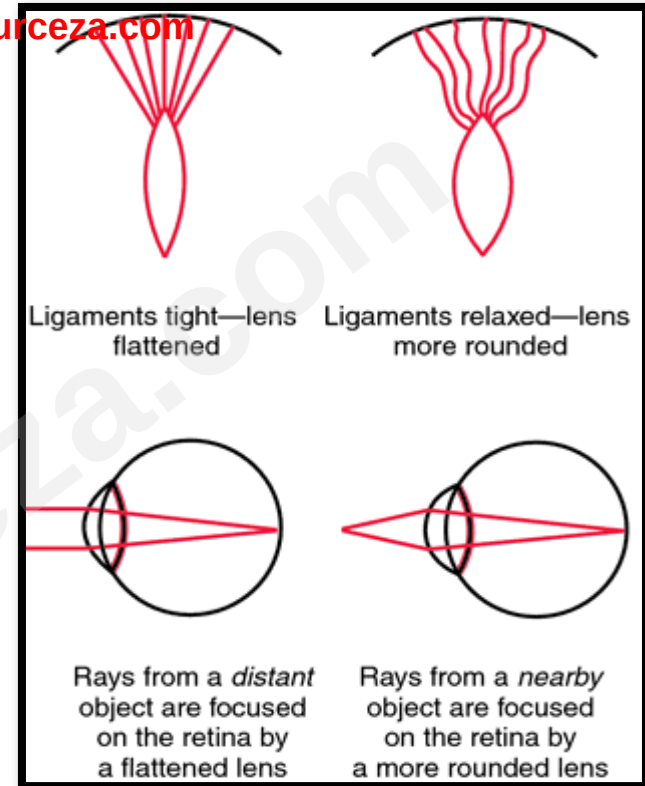


Unit 3:

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Accommodation

- **Accommodation** is the focusing of light in the retina.
- Mammals focus by changing the shape of the lens.
- The lens is flattened for distant objects.
- The lens is rounded for near objects.



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Accommodation

- Near vision

- When an object is less than 6 m away.

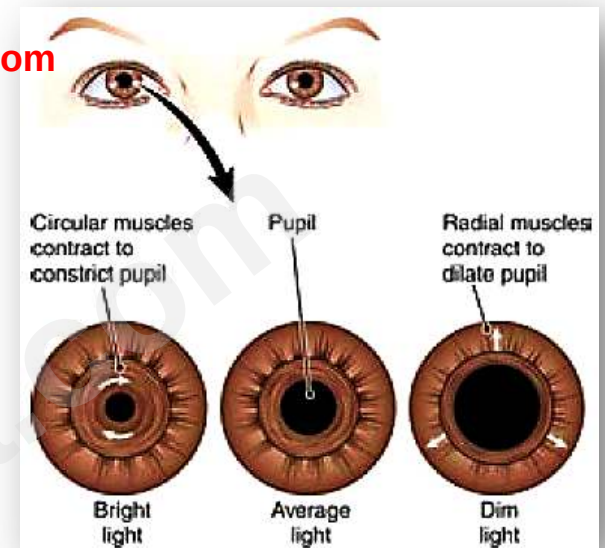
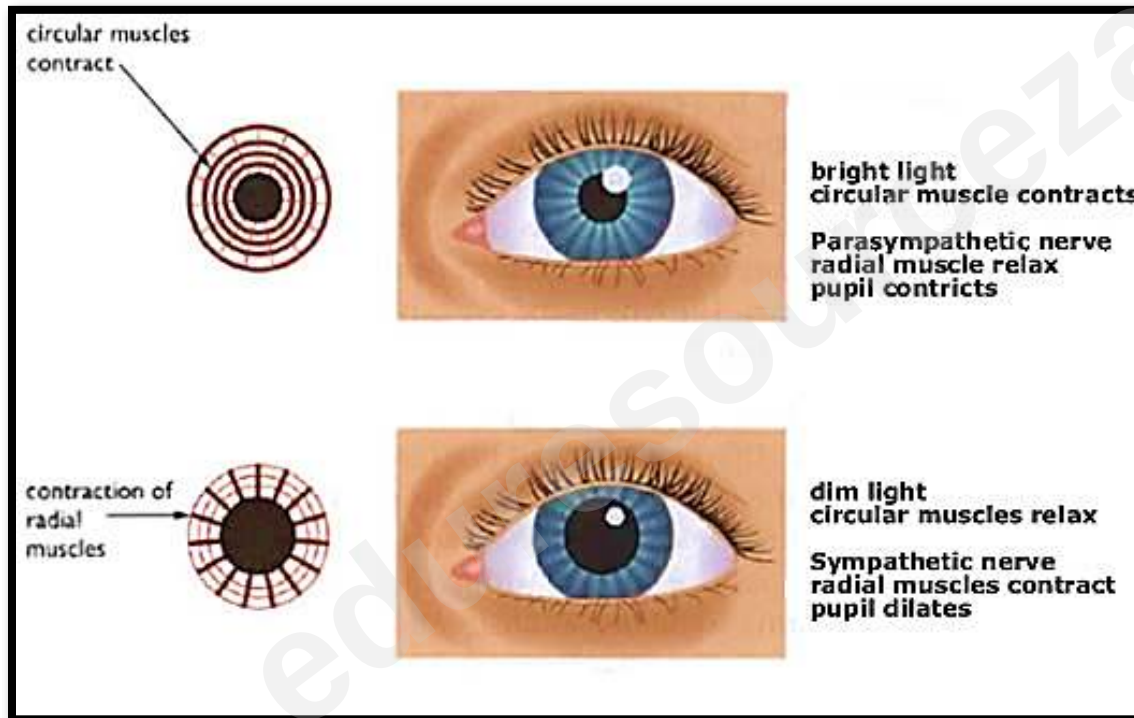
- the ciliary muscles **contract**
- the sclera is pulled forward
- the suspensory ligaments **slacken (loosen)**
- the tension on the lens **decreases**
- the lens becomes **more convex**
- the refractive power of the lens **increases**
- a clear image is formed on the retina

- Far vision

- When an object is 6m away and more

- Ciliary muscles **relax**
- Sclera goes back to normal position
- Suspensory ligaments become **taut (tight)**
- Tension on the lens **increases**
- The lens becomes **less convex**
- The refractive power of the lens **decreases**
- The clear image is formed on the retina

CC-SS-TD



Pupillary reflex

PUPILLARY MECHANISM

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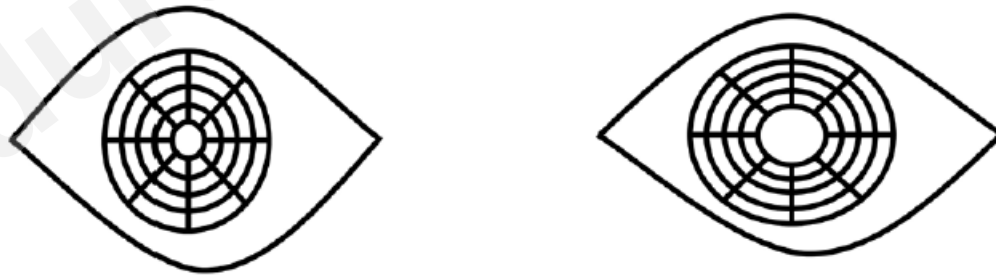
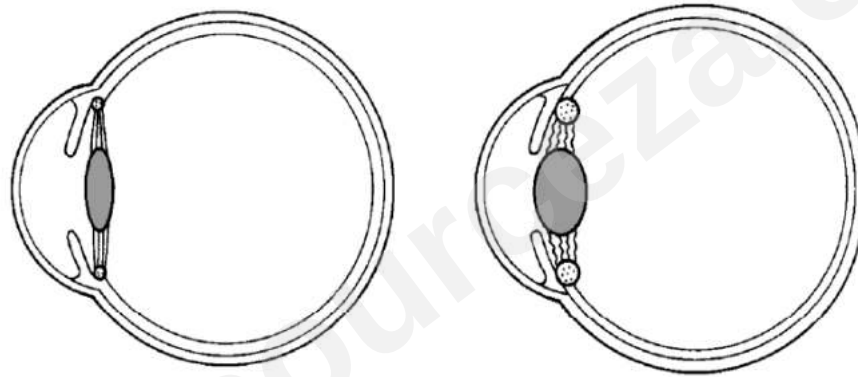
- **In bright light**
- The circular muscles of the iris contract
- The radial muscles relax
- The pupil constricts
- The amount of light entering the eye is reduced



- **In dim light**
- The radial muscles of the iris contracts
- The circular muscles relax
- The pupil dilates
- The amount of light entering the eye is increased.

Activity 3.5

Annotate the diagrams to describe the two processes taking place in the eye



Unit 4: Defects of the eye

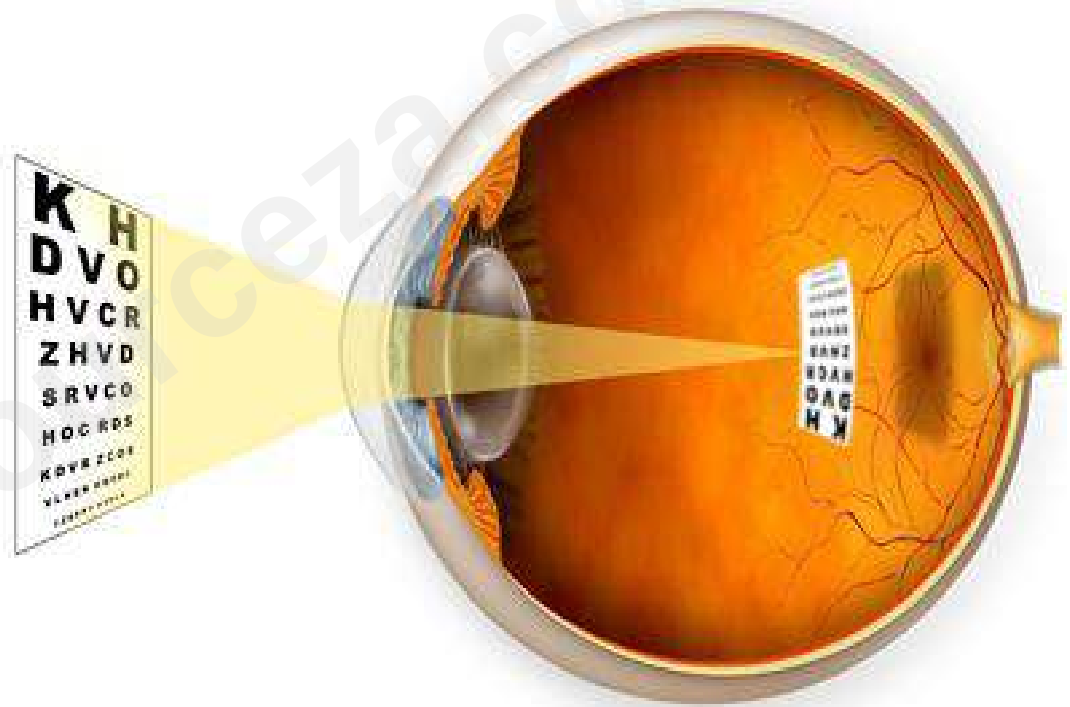
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Focusing Problems

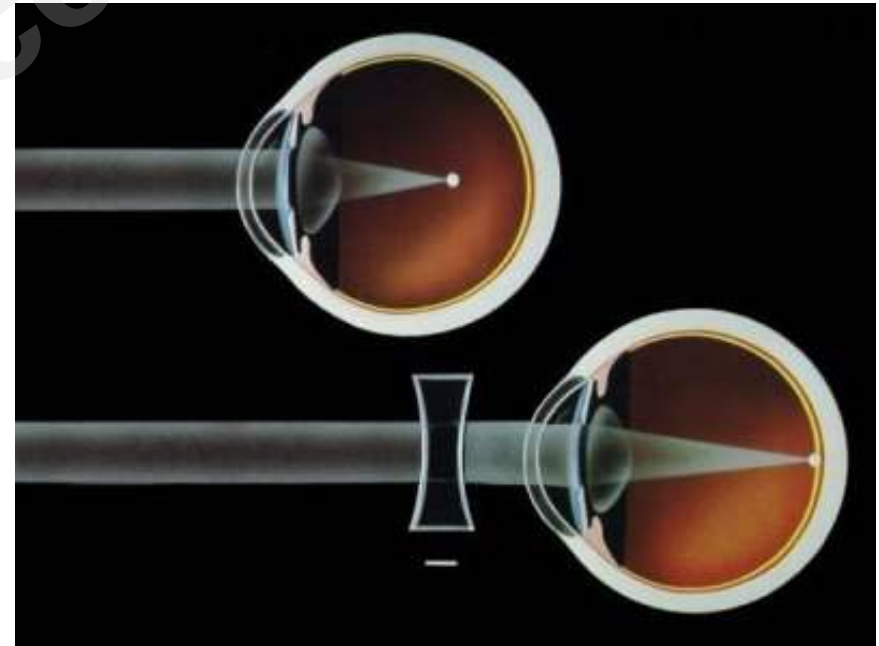
MYOPIA

- Near-sightedness
- Problem seeing objects far away
- Distance between lens and retina too large
- Light focused in front of retina
- Correct with diverging lenses



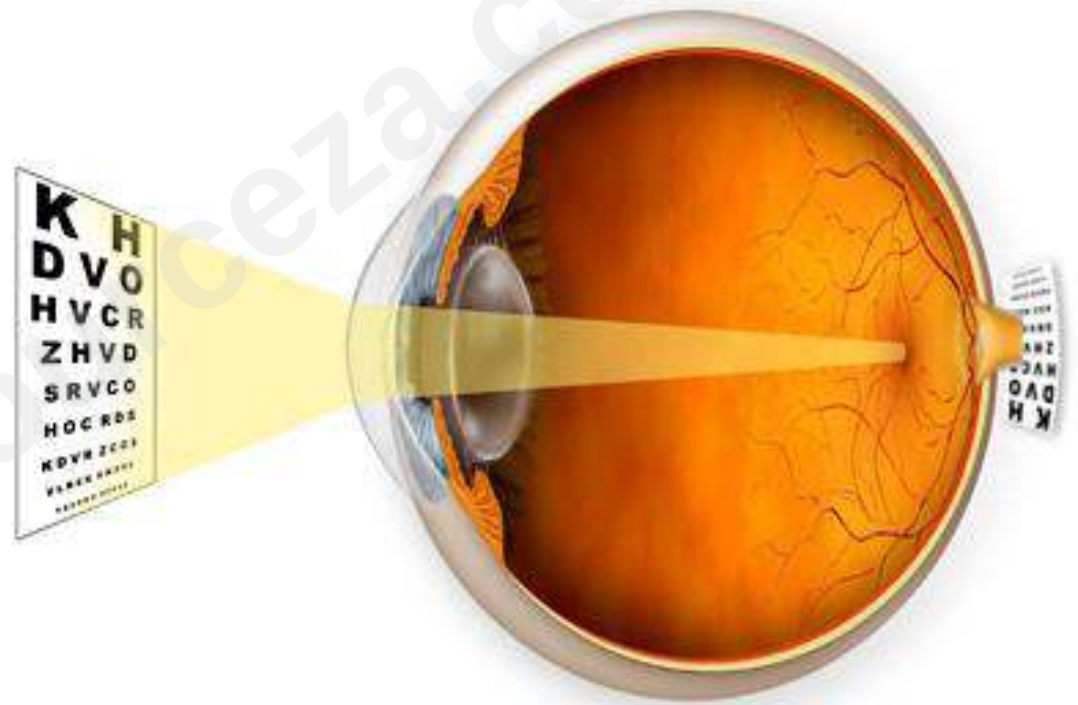
Near-Sighted (Myopia)

Nearsighted



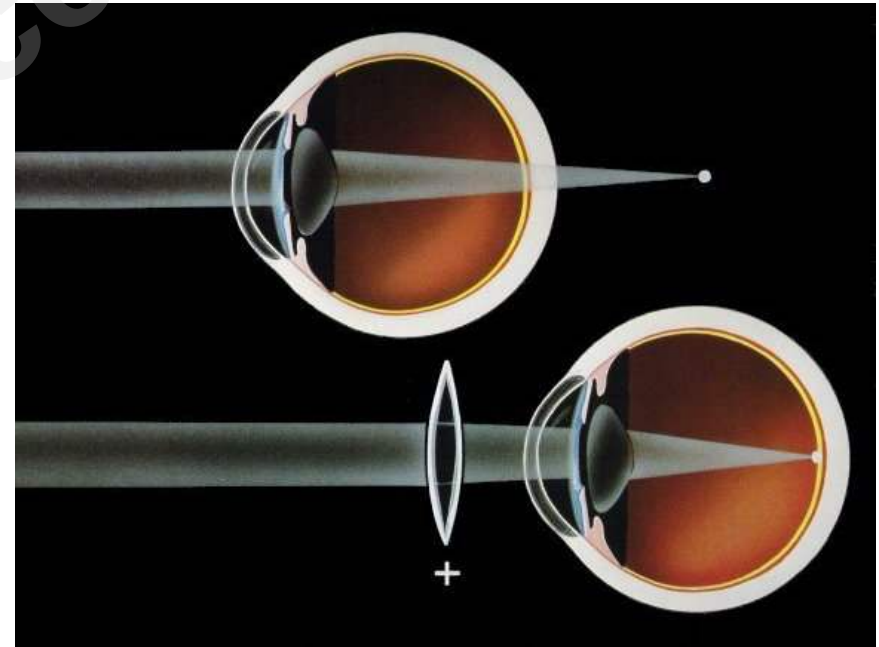
HYPEROPIA

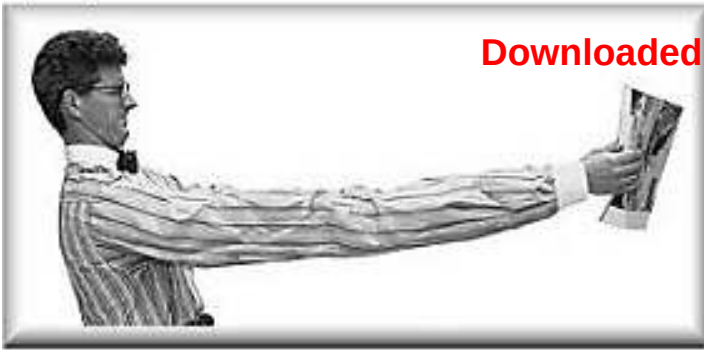
- Far-sightedness
- Problem seeing close objects
- Distance between lens and retina too small
- Light focused behind retina
- Corrected with converging lenses



Far-Sighted (Hyperopia)

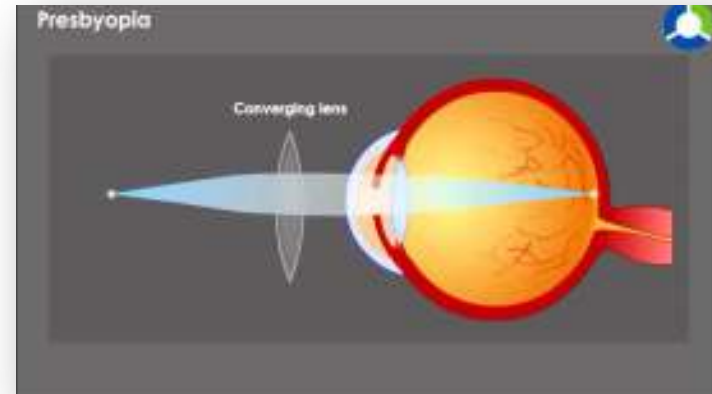
Farsighted





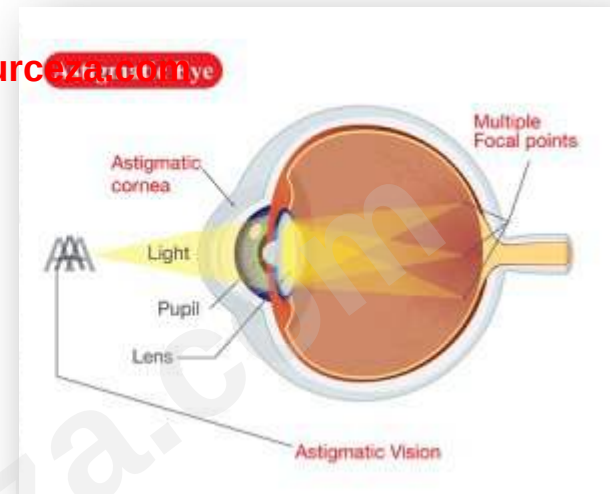
PRESBYOPIA

- Form of far-sightedness
- Harder for people to read as they age
- Lens loses elasticity
- Corrected by glasses with converging lenses



ASTIGMATISM

- Eye cannot focus an object's image on a single point on retina
- Cornea is oval instead of spherical
- Causes blurred vision
- Some types can be corrected with lenses



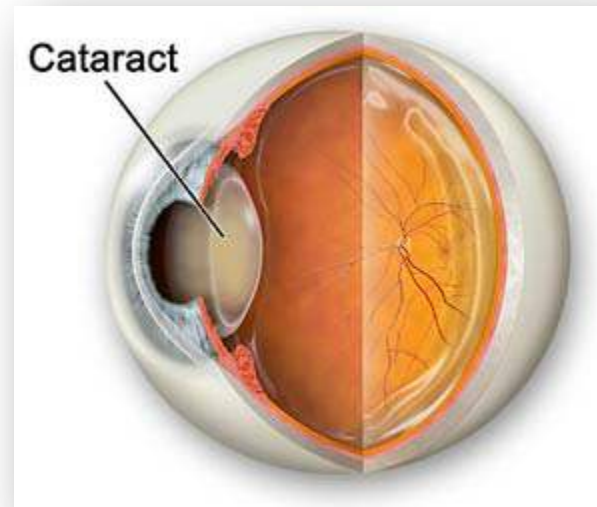
Vision Due To Astigmatism

Normal Vision

Diseases of the Eye

CATARACTS

- Clouding forms in the lens due to denaturing of lens protein
- Obstructs passage of light
- Caused by age, chronic exposure to UV, or due to trauma
- Removed by surgery



GLAUCOMA

- Group of diseases
- Pressure builds up in the eye which affects the optic nerve
- Loss of ganglion cells
- Gradual loss of sight and eventual blindness
- Check eyes regularly
- Can be treated



Activity 3.6

- In an investigation a learner was asked to thread a cotton thread through the 'eye' (hole) of a needle 10 times with both eyes open and then with only the right eye open. This was done under the same light intensity and at a distance of 30 cm from the eyes. The results are recorded in the table below.
- Set 5 questions incorporating all four cognitive levels on the investigation on the eye**

Attempts	TIME TAKEN TO THREAD THE NEEDLE in seconds(s)	
	Two eyes open	Only right eye open
1	12	38
2	12	35
3	10	37
4	11	36
5	9	34
6	9	33
7	10	30
8	8	31
9	7	29
10	7	28

KEY POINTS FOR THE MODULE

- The eye can't be studied without diagrams.
- Structure and function is NB.
- Accommodation and the pupillary mechanism are asked every year.
- Let the weaker learners only learn accommodation for near vision – accommodation for far vision is just the opposite.