



THE EYE

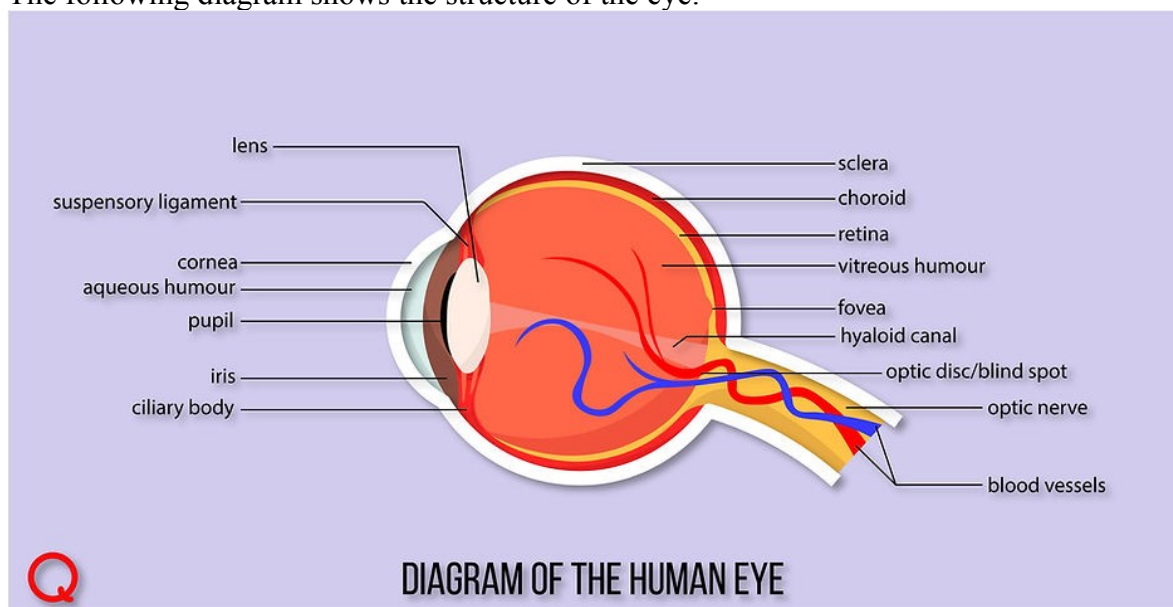
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The Eye

Your eyes are probably your most important sense organs. I mean, think about it: which of your 5 senses do you use the most? Definitely sight! Looking at something is one of the first ways we as humans try to perceive new things. After all, you have to *see it to believe it*.

As you might have guessed, your eyes are very complex organs with a lot more going on inside of them than you might think. You could say that they're *more than meets the eye*. Puns aside, Through these worksheet you should be able to understand the **structure of the eye** and the **functions of each part**, as well as a few of the many **defects of the eye**.

The following diagram shows the structure of the eye:



You've likely seen a diagram like this several times before, but there might be a few structures you're unfamiliar with.

Sclera- tough, white outer coating of the eyeball meant to protect the eye from damage

Choroid- Layer containing blood vessels which keep the retina supplied with a source of oxygen and food materials as well as melanin (to prevent reflection within the eye)

Retina- Layer containing light-sensitive rod and cone cells on which the image is formed

Vitreous humour- Mostly water-based jelly-like fluid which maintains the round shape of the eyeball

Fovea- Most light-sensitive area on the retina containing only cone cells. Point at which most light rays are focused. This point in the eye is responsible for detailed colour vision.

Hyaloid canal (also called Cloquet's canal)- contains lymph, and decreases and increases in volume alternate to the accommodation of the lens to maintain a constant volume in the eye. That is, when the lens increases in volume, the hyaloid canal decreases in volume, and when the lens decreases in volume, the hyaloid canal increases in volume.

Optic Disc/Blind Spot- Point on the retina where the optic nerve leaves the eye. No rods or cones are present, so it is a 'blinds pot' in the vision of each eye. However, each eye compensates for the blind spot of the other, so the blind spot is not noticeable in normal binocular vision (vision with both eyes).

Optic nerve- carries impulses from the cells of the retina to the visual cortex in the rear of the brain for processing.

Blood vessels- supply tissue in the eye with blood

Ciliary body- Contains ciliary muscle, a circular muscle which adjusts the size of the lens during accommodation

Iris- Circular, coloured, muscular disc which controls how much light enters the eye through the pupil

Pupil- Hole in the center of the iris which allows light to enter the eyeball

Aqueous Humour- Colourless, water-based fluid which maintains the dome shape of the cornea

Cornea- Transparent anterior section of the sclera which refracts light rays onto the retina

Suspensory Ligament- Ligament attaching the ciliary body to the lens

Lens- Elastic biconvex structure which changes shape during accommodation to fine tune the focusing of the image on the retina

Rods and Cones

The retina comprises two types of light-sensitive cells known as photoreceptors, the **rods** and the **cones**.

Rods are responsible for vision in **low light (scotopic vision)**.

They only detect images in black and white.

They are the more numerous cells in the retina- about 120 million of the total 125 million photoreceptors in the retina are rods.

They are more sensitive to the **brightness of light and have low visual acuity**.

They have only one pigment, **rhodopsin**.

They are **cylindrical** in shape (like rods).

Cones only become active at **higher light intensities (photopic vision)**.

They are capable of detecting colours and fine details.

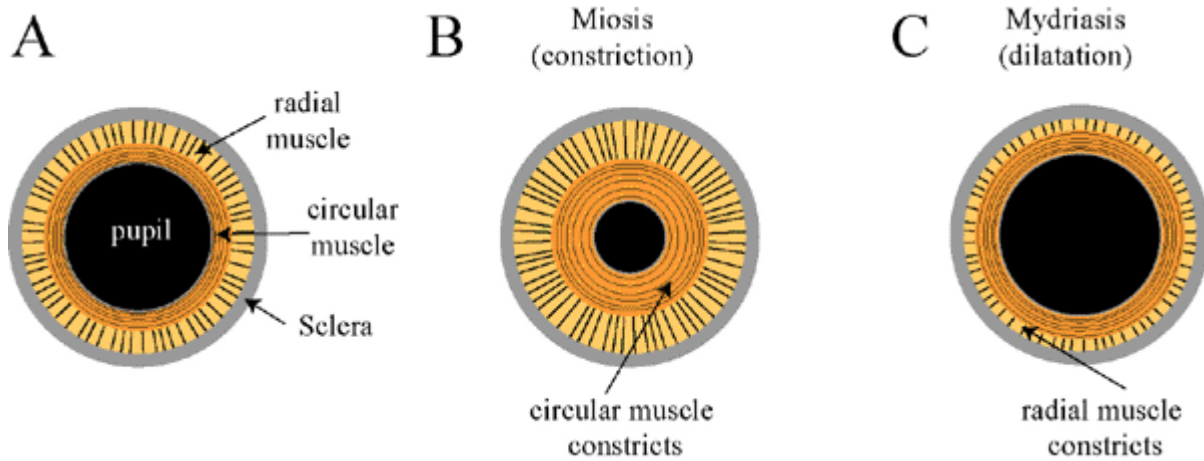
This fine detail detection is due to a **higher visual acuity**.

As the name suggests, cones are **conical** in shape.

For **distant** objects, the ciliary muscle **relaxes**, the suspensory ligaments are **pulled tight**, and the lens are pulled **thin**. This bends the light only **slightly**. For **nearby** objects, the ciliary muscle **contracts**, the suspensory ligaments become **loose**, and the lens is allowed to **bulge**. This causes the light rays to be bent **a lot**.

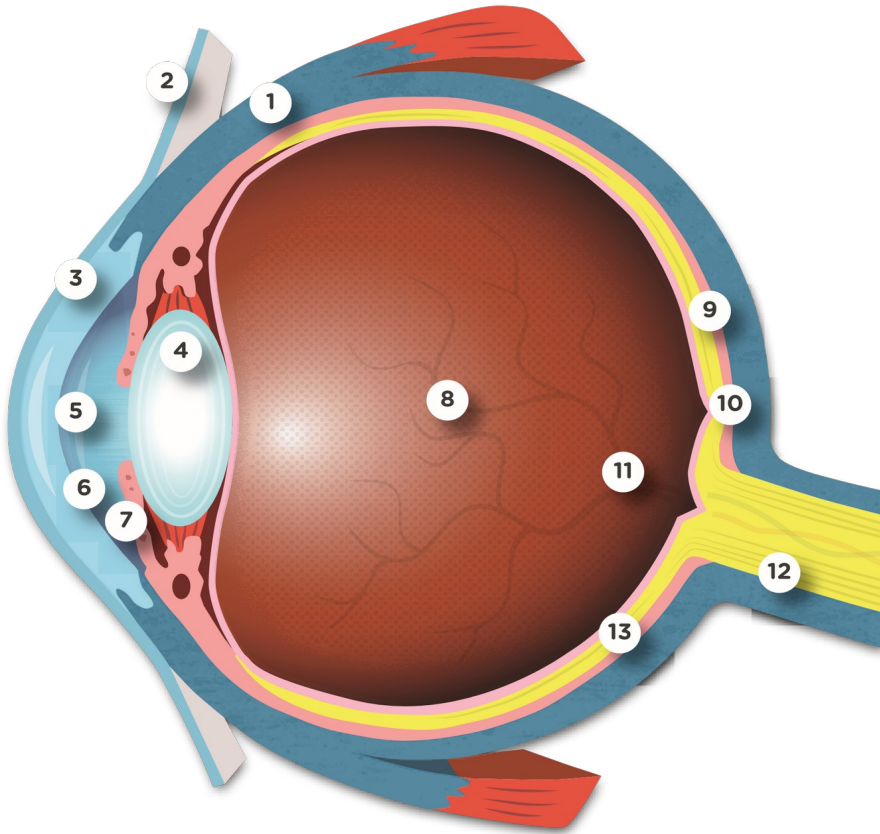
Light Entering the Eye

You've probably been spending the better part of a year indoors due to our current pandemic, so your eyes are usually accustomed to lower light intensities. When you occasionally step outdoors to remind yourself what the sun looks like, you'll go through a couple seconds of agony before your eyes adjust. This is the time taken by your iris to adjust the size of the pupil so that less sunlight enters your sensitive little eyes. Your iris comprises two sets of muscles, the (inner) **circular muscles** and the (outer) **radial muscles**. Each set of muscles does the opposite of what the other set does to either increase or decrease the size of the pupil:



In B, the eye is exposed to bright light, so the circular muscle contracts and the radial muscle relaxes. The result is a smaller pupil to restrict the amount of light passing into the eye. This is called **miosis**. In C, the eye is exposed to dim light, so the circular muscle relaxes and the radial muscle contracts. The result is a larger pupil to allow more light in. This is called **mydriasis**.

ACTIVITY 1



Provide the name of the different parts of the eye

- | | |
|---------|----------|
| 1 | 8 |
| 2 | 9 |
| 3 | 10 |
| 4 | 11 |
| 5 | 12 |
| 6 | 13 |
| 7 | |

ACTIVITY 2
Choose the correct word to complete the

sentences:

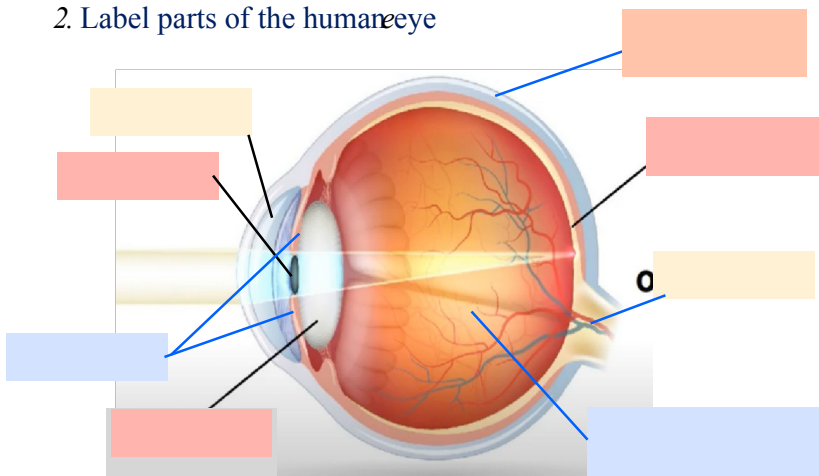
Receptors
organ

light
receptors

eye

_____ stimuli is picked up by visual _____ located in the _____. Eye is the _____ of the sight. Visual _____ are stimulated by _____ colour and movement.

2. Label parts of the human eye



WORD BANK

CORNEA RETINA LENS
OPTIC IRIS PUPIL
NERVE VITREUS SCLERA
HUMOUR

3

ACTIVITY 3

Using the words from the word bank above complete the following sentences.

1. The part of the eye through which light enters is called the _____ .
2. The _____ has six tiny muscles, which control the eye's movements. It's white.
3. The _____ covers the iris and the pupil and helps the eye to focus.
4. The part of the eye which sends signals to the brain is the _____ .
5. Light is focused onto the retina by the _____ .
6. The _____ is the part of the eye which changes light into the electric signals.
7. The _____ is the coloured part of the eye.
8. The _____ is a jelly-like substance that makes the eye round in shape

ACTIVITY 4

Complete the sentences:

- a) The is the front part of the sclera and it is transparent.
- b) The nerve transports visual stimuli to the brain.

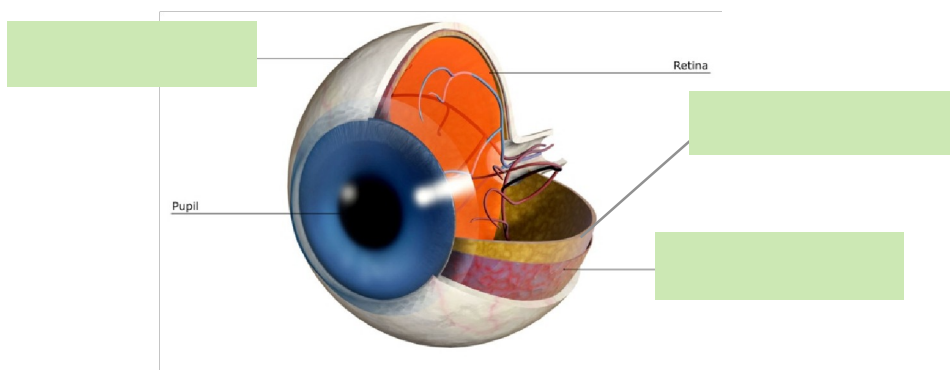
- c) The is the coloured part of the eye.
- d) The part of the eye that is sensitive to light is the
- e) The part that regulates how much light gets into the eye is called

ACTIVITY 5

The eye is made of 3 layers label each on the diagram below. Describe each layer in a small paragraph below the diagram.

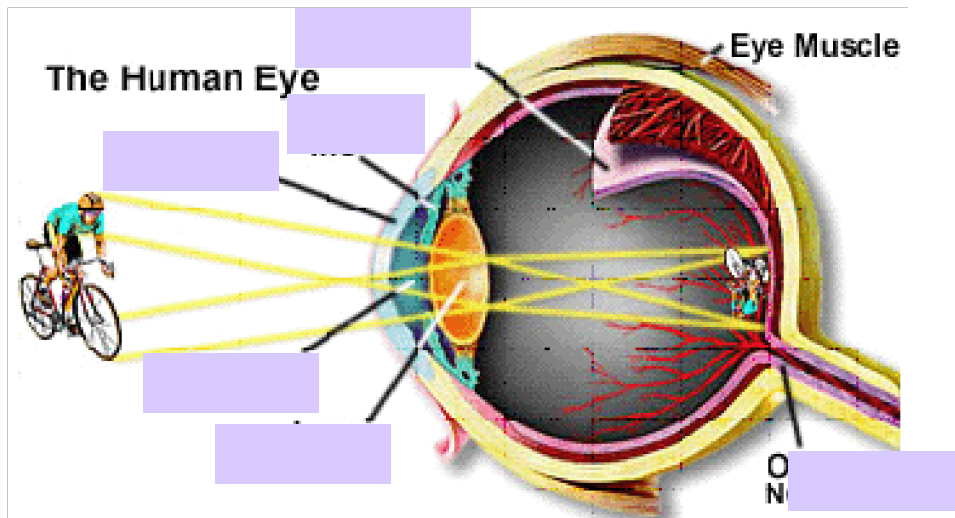
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ACTIVITY 6

Using the diagram as a clue complete the sentences



The image reflected on the retina is _____ and _____ .

The most common vision disorder are **myopia**, hyperopia, **astigmatism** and presbyopia.

The tactile reading and writing system for blind people is called _____.

the near-sighted disorder is called _____

the far-sighted disorder is called _____

ACTIVITY 7

Find the words in the wordsearch listed below it.

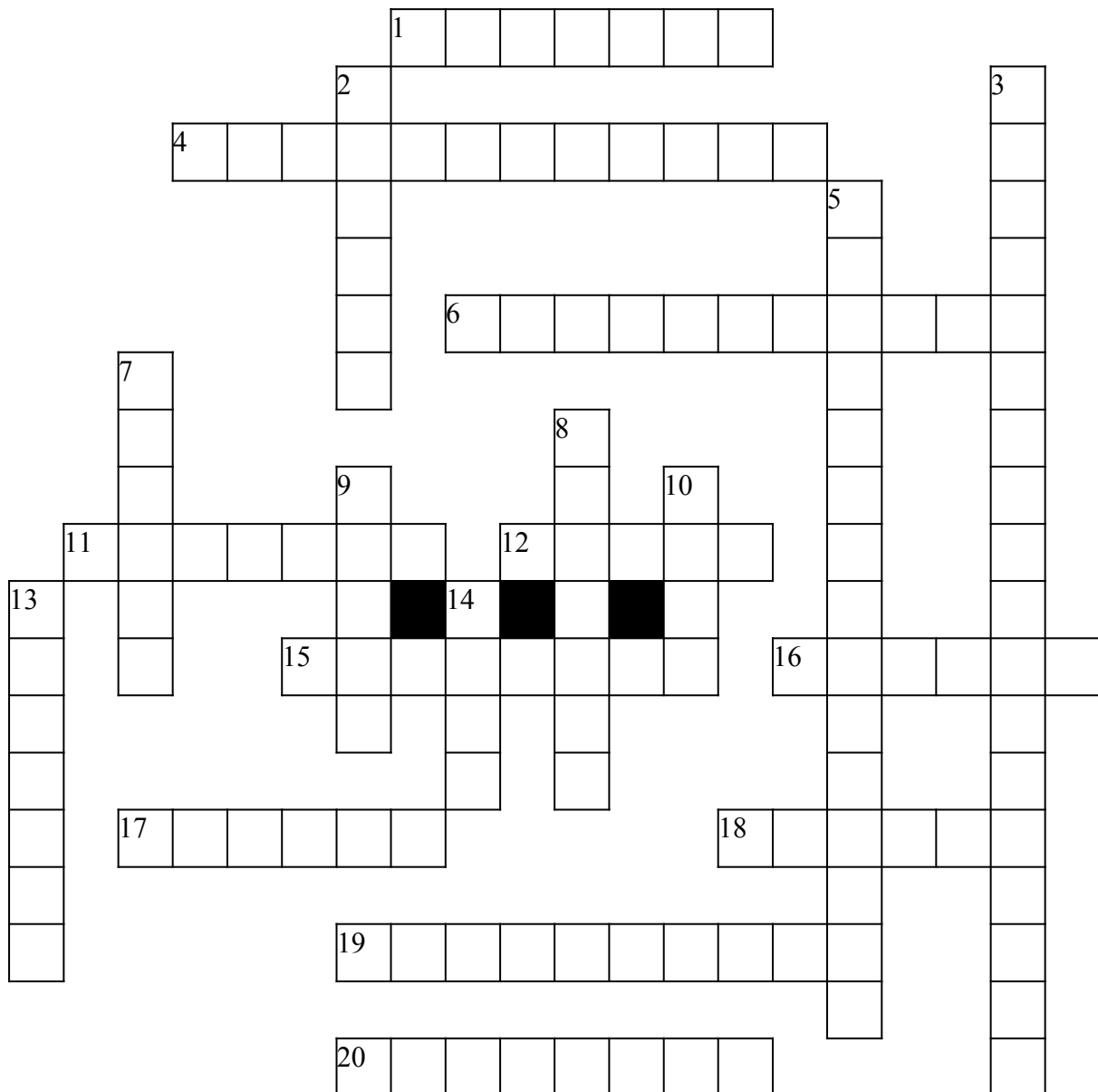
P P F X Y R D V N N U U V C V M A C U L A Y J Y
S J C U L A T E R A L R E C T U S M U S C L E U

W C O K V A O B N E B L H O C B L G P O T U N J
 I I I F Y I Y P C Z P I D K Q F T U A U Z C J Z
 K L G L O Q H E P A Q U E O U S H U M O R Q J G
 V I A O Z M W J H H R E T I N A J G Z X G J L W
 X A X M E D I A L R E C T U S M U S C L E K W W
 Z R W A B F N T I B V Z R Z I W A F B X S N L H
 X Y E P J G R T F G K S X G R L L G L G U P S O
 N B L L X N H L Z V S I C O N J U N C T I V A M
 Q O O K S G K J L L C K F X Q O P Q O R H Y M H
 P D P Z J D B U Q J P M Y P O R C E B T V N G Y
 P Y T B T K K U C T U L J Q S N R M T X X T X P
 T M I S P F V J N T P H E Q R C X N G K I G P N
 H G C M U B U M A U I C H O E H G Y Q W Y U G B
 I H N C H O R O I D L O N U A Y Q W O Z C Q C S
 R Q E X P G K Q O B S R U D K F R G J D H R B B
 I X R D C A O P T I C N E R V E H E A D L L H J
 S S V Z B A U E T R A E X C U F H R N W T C M L
 Q H E P X O B S L N G A X A X E O K L E N S H N
 R V G T N R U W O X E S V I T R E O U S B O D Y
 T P O S T E R I O R C H A M B E R F V C I E A W
 I W Y P R A A N T E R I O R C H A M B E R U I X
 F D B S C L E R A J Q X C P W D S J S F V C X J

anterior chamber aqueous humor choroid ciliary body conjunctiva
 cornea iris lateral rectus muscle lens macula medial rectus muscle
 optic nerve optic nerve head posterior chamber pupil retina sclera
 vitreous body

ACTIVITY 8

Use the hints provided to complete the crossword puzzle.



Across

- 1. Radial fibers that suspend the lens from the ciliary body and hold it in position
- 4. Clear, watery fluid that fills the space between the back surface of the cornea and the front surface of the vitreous, bathing the lens
- 6. Transparent mucous membrane covering the outer surface of the eye except the cornea
- 11. Tiny opening of the lacrimal canaliculus of each upper and lower eyelid
- 12. Central pit in the macula that produces the sharpest vision. Contains a high concentration of cones and no retinal blood vessels.
- 15. Jelly like structure that occupies the posterior cavity of the globe
- 16. Opaque, fibrous protective outer layer of

Down

- 2. Contains sensory receptors for the transmission of light, is really part of the brain
- 3. Responsible for moving the eye and are considered extrinsic
- 5. Fluid filled space inside the eye between the iris and the innermost corneal surface
- 7. The yellow spot in the center of the retina; area of acute central vision
- 8. Vascular layer of the eye lying between the retina and sclera that provides nourishment to outer layers of the retina
- 9. Black circular opening in the center of the iris that regulates the amount of light that enters the eye
- 10. The transparent biconvex structure situated

the eye

17. Most of the eye's refractive power comes from this structure of the eye

18. Transitional zone about 1-2 mm wide, where the cornea joins the sclera and the bulbar conjunctiva attaches to the eye

19. Second cranial nerve. The largest sensory nerve of the eye that carries impulses from sight from the retina to the brain

20. Pink fleshy conjunctival tissue in the nasal corner of each eye over the semilunar fold

between the iris and the vitreous

13. Structures covering the front of the eye, which protects it; distributes tear film over the exposed corneal surface

14. Pigmented tissue lying behind the cornea that gives color to the eye