

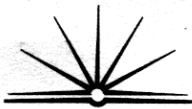
Question 28 - Communication.

a) i) The Organ of Corti contains hair cells which vibrate as changing energy caused by ~~the~~ pressure waves in the cochlea to turn into electrochemical energy which the brain can interpret.

ii) Pitch and Frequency are ~~directionally~~ proportional. An increase in pitch causes an increase in Frequency.
high pitch = High frequency.

On the other hand High frequencies^(or pitch) has a small wavelength and ~~short~~ ^{low} frequencies or pitch have a large wavelength.

iii)	Humans	Birds.
main Structure	Vocal chords	Syrinx
Location.	within larynx - front of throat	In trachea ^{near} where it branches into two tubes going to each lung.
How is sound ^{sound} produced.	Air from lungs passes through the vocal chords causing them to vibrate and sound to be produced. Controlled by muscles within the larynx	Air from lungs passes through syrx where membranes vibrate causing sound. Sound production controlled by tightening of muscle of the sy-rinx.
Use of breathing ^{respiratory} system	✓	✓
Sound produced...	very complex → is modified by mouth, tongue, lips and nasal cavity.	has varying pitch and loudness. as well as



b) i) cerebrum - forms large portion of the brain, & folding of surface allows it to have a rugged texture.

Bulk of the brain - Grey coloured

cerebellum - located to the bottom right hand corner

if the right hemisphere is being observed. It has

more folding than the cerebrum and ~~the~~ is smaller and slightly lighter in colour.

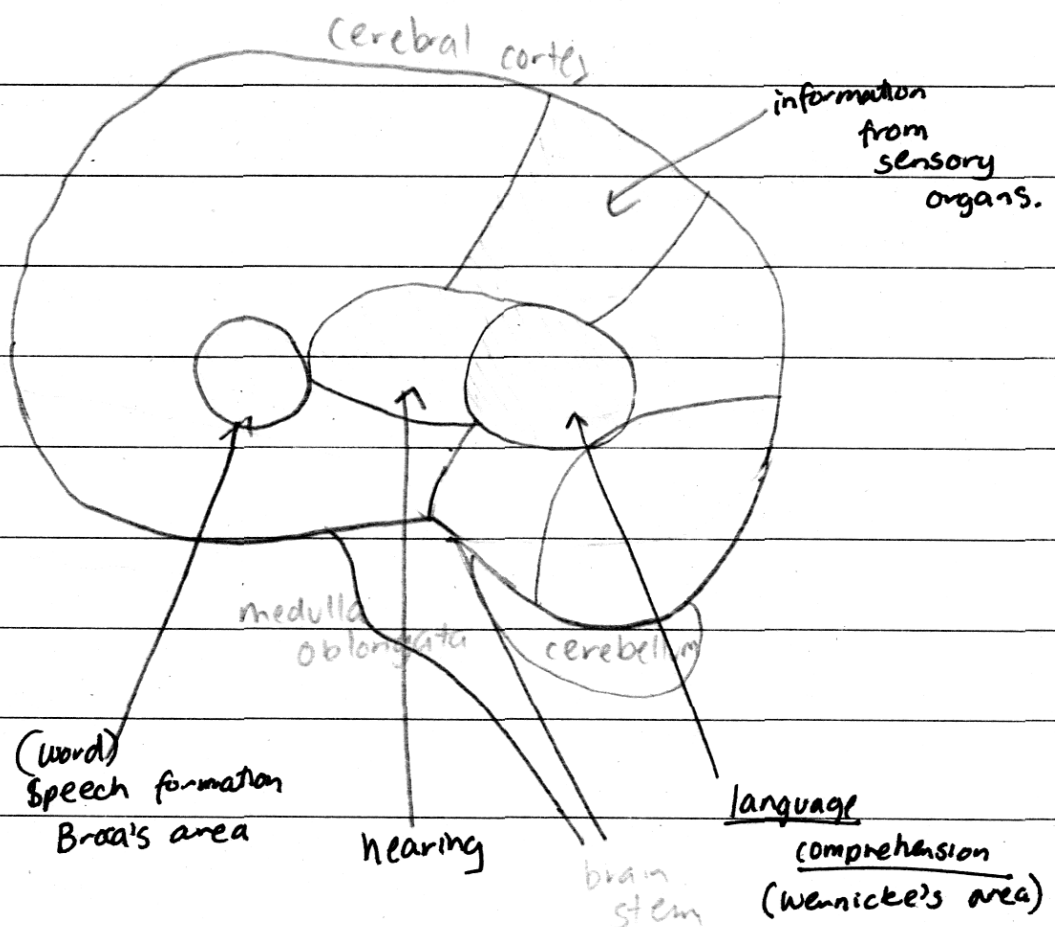
medulla oblongata - ~~the~~ very light in colour -

creamy. located on brain stem, smooth

appearance, : ~~the~~ below the cerebrum where

bump occurs in brain stem.

ii)



c) i)

ii) As lens thickness increases the focal length ~~is~~ decreases

iii) The lens of an eye can change its thickness in a process called accommodation. It involves the ciliary muscles and suspensory ligaments. ~~The lens is relaxed~~

~~when it has a thickness of~~ When the lens is relaxed, it ~~has a~~ is relatively thin. From

above we can see that this means that its

focal length is relatively high. Because of

this, it can focus on objects which are ~~at~~ far away or distant, allowing a clear image to be formed.

When the ciliary muscles contract, the thickness of the

lens increases. From above, this means it has

a short ^(shorter) focal length. This shorter focal length

allows objects which are close to the eye

to be focused or seen with clarity.



d) The retina is made up of photoreceptor cells these cells contain pigments (photopigments) which absorb light ~~and changes~~. There are two types of photoreceptors in the human eye: Rods & Cones.

Rods - contain a pigment called Rhodopsin. ^{which is most sensitive to blue/green light (505nm)} This pigment absorbs light which falls onto the retina.

When this occurs the pigment changes its structure.

(The retinol molecule changes shape and no longer binds to the opsin) This causes a series of

chemical reactions which leads to the production of an action potential. Rods are stimulated by low

light intensity. They are used to distinguish light/dark shades and can detect movement and shape. Rods

occur in greater numbers + proportion in the peripheries of the retina.

Cones - contain a pigment which is ^{most} sensitive to either red, blue or green light. Therefore there are

3 different types of cones. (contain a retinol molecule similar to rods and an opsin molecule which corresponds to the colour to which they are most sensitive.)

Cones work in the same way that rods work

(pigment changes structure \rightarrow chemical reaction \rightarrow nervous impulse produced)

They need higher light intensities to work so are therefore best with day vision. They allow for colour vision (and when the brain interprets the signals from all 3 types of cones, it can distinguish the colour of the object based on the amount of stimulation ^{of each cone} ~~the colour caused~~). They also allow for acuity due to the fact the fovea (area of greatest visual acuity on the retina) contains only cones, each connected to their own separate nerve.

Finally nerves connect each photoreceptor cell to the optic nerve \rightarrow to the brain. These allows messages to pass them through electrochemical changes in their membrane.

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Biology

This page is to be detached, completed and attached to the inside front cover of your writing booklet for the option question you have attempted.

