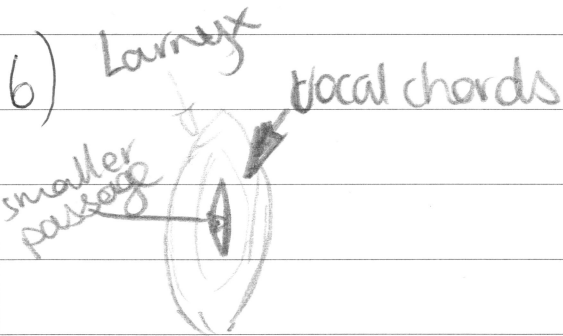


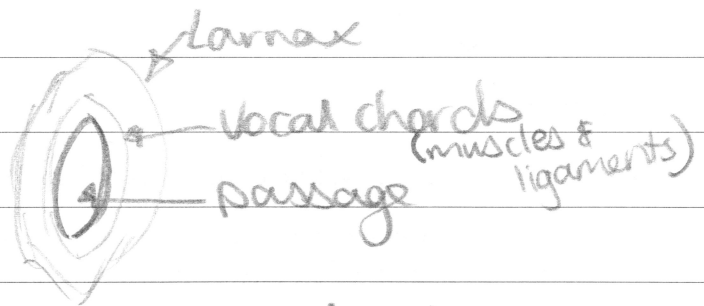
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a)

Organism	Description of structure
Insect - Grasshopper	The tympanum detects vibrations which is a hollow area, located at there hind legs, covered by a thin membrane.
Fish - Fish	The lateral lining that lines the fish detects the vibrations.
Mammal - Human	<u>The Organ of corti</u> The ear detects the sound and the brain perceives it. Sound travels through pinna, through the middle ear through the cochlear which moves the organ of corti which transforms the energy to an implhse that goes to the brain



High pitched note -
 The ^{vocal chords} passage ^{as} vibrate/
 open & close more frequently
 causing a smaller passage to
 form which makes a
 higher pitch



Low pitched note -
 The vocal chords ~~don't~~
 open & close as frequently
 when it is a low pitched note
 which makes the passage
 larger.

e) i) label γ , the photoreceptor : cones distribution.
ii) The structure of cones varies as they are used for different purposes. There are three types of cones ~~that are~~ with each used to detect one of the three colours Red, blue or green. Structure varies for each. There are less located on the periphery and these ones are structured to produce greater visual acuity as the rod cones don't do this. The cones located in the Fovea (with the greatest number in the macula) are structured for colour and visual acuity.

iii) Rhodopsin is made up of opsin and a free retinal. When light hits the rhodopsin, the opsin is bleached and the free retinal is activated and detaches. The free retinal then changes the charge of the membrane causing an ~~electrical impulse~~ ^{electrochemical response} to be created that is sent to the brain. The opsin is then re-used/activated so that continual light recognition ~~is~~ occurs. Rhodopsin has the role of detecting and responding to light.

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di) Action potential is the ~~Brain's reaction~~ positive charge within a membrane that causes a reaction to a stimulus by neurons.

Hard falls damage the brain's functioning as the neurons are damaged. Stuns the neurons

Concussion causes damage to the neurons.

↳ Could cause lack of oxygen which effects the brain's responses and ability to transfer signals across the neurons.

Region X is where vision is perceived, therefore maybe the ~~dog's~~ mammal's vision/eye sight has been damaged causing no signals to be presented to the visual perception which means no action potential.

Severe movement causes neurons to shift.

ii) The lack of action potentials means that the neurons can not interpret signals and therefore can not respond to stimulus. This can result in slow reactions, poor co-ordination, weak/-stumbling movement. In the case of region X which is where vision is perceived, the mammal could become blind as the lack of action potentials means that the brain will not perceive ~~info~~ information about images correctly that is delivered from the optic nerve.

e) DP → two eyes are used, two images presented.
transferred to the brain.

• Rods detect light, cones acuity + colour → optic nerve.

Ears → sonic shadow, something obstructs the way of
the sound i.e our head.

how is it transferred.

~~Biological~~ Biological understanding of our vital senses
gives scientists ^{the opportunity to develop} ~~to develop new technologies~~ new
technologies that can be used for entertainment
functions.

3D movies are able to make movies appear 3D by
using glasses that make each eye perceive ^{its} ~~an~~ own
independent image. These were able to be created by
understanding depth perception in the human eye. Depth
perception is where each eye produces an image. These
two images overlap and when sent to the brain, the
brain is able to perceive depth and create a 3D image.
^{In understanding} The process involved in this helps to create the 3D
films. Light enters each eye through the cornea. Light is
~~reflected~~ ^{refracted} in the cornea and the lens. This lens then
refracts the light onto the retina. The photoreceptor cells
then detect the different colours, image and light intensity.
The rods contain rhodopsin which is used to detect shadows,
light, movement and shapes. The cones contain Iodopsin and
function in creating colour and also in

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visual acuity. When the photoreceptors detect light it goes through the bipolar layer ^{then the} ganglion layer and then form into the optic nerve. The optic nerve takes the two images created by the photoreceptors to the visual perception area which is located at the posterior of the brain above the cerebellum. This region then takes the two overlapping images and forms them into one 3D image. Through understanding this process, scientists were able to make 2D film appear 3D by ensuring each eye perceives an individual image ~~to~~ through using glasses.

Surround sound systems rely on sonic shadows to create ~~a~~ life-like sounds in films. A sound shadow is where the ~~sound~~ vibrations travelling are obstructed or blocked by an object causing the sound to not be heard by one side. By having two ears on the side of our head we have a sound shadow. Through the knowledge of the process of transmitting and receiving sound technologies such as the sound system are able to be created. Sound travels as vibrations down through the pinna to the tympanic membrane or eardrum. The tympanic membrane moves in response to the vibrations causing the ear ossicles, malleus, incus & stapes, to vibrate in response and amplify the sound. This mechanical energy is then transmitted through the oval window into the cochlear. The cochlear contains a fluid called perilymph which ~~is~~

You may ask for an extra Writing Booklet if you need more space.

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moves the mechanical energy through. The ~~energy~~ ^{sound} energy travels through the reissner's membran through the middle canal and moves the basilar membrane. By moving the basilar membrane, the organ of corti (fine cilia) move causing them to ~~produce an ele~~ ^{transform} the mechanical energy into electrochemical energy. This energy is transported through the auditory nerves by neurons to the region that ~~is~~ is involved in the perception of sounds. Since each ear is independent ~~and travels to the~~ it allows for different sounds from each side to be heard. It also allows for sound shadow to be produced as each ~~ear~~ ^{an} ear may receive a sound first. Through the understanding of how sound is perceived and transmitted, scientists were able to apply this to film in order to create life-like sounds.

It is also through understanding the eye and the ear that technologies are created which assist human health. This involves using lasers to correct the cornea of the eye in order to improve visual acuity. Also, the uses of lenses to correct eye sight by either lengthening the focal length by a concave lens or by shortening the focal lengths by a convex lens. In understanding the blind spot, optical illusions can be created as images disappear on paper. Cochlear implants and hearing aids have been created to

help those with ~~improve~~ hearing ~~standards~~ problems.

It is through understanding the processes of the eye and the ear that scientists are able to ~~creat~~ develop revolutionary technologies.

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