

(a) (i) They ~~form~~<sup>form</sup> the retina at the back of the eye  
(they are the rods and cones).

(ii) A. protects the eye by providing an outer ~~layer~~ covering  
B. controls the amount of light entering the eye.

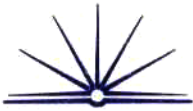
(b) Conducting secondary + primary research would assist with

(i) this discovery. Analysing already existing information  
would be of most assistance. This would include reading  
books such as encyclopedias and ~~at~~ books on animal  
behaviour. The internet would also be a good source.

It would also be useful to analyse the ~~bone~~ structures  
the of animals to determine how they produce sound.

Museums would be a good resource for this as the  
mode of sound production could be seen first hand.

This would be primary research.



(ii)

For information to be reliable it must be also reproducible.

It would need to be determined if the information was accurate and also occurred in many sources.

The validity of the resource of data would also have to be addressed. The For the information to be relevant it

must be related to the ways animals produce sound, not

how they hear sounds, or other factors. Data should be

of a credited source and not be false or inaccurate.

(c) Cataracts occurs when the lens grows cloudy and eventually becomes opaque. Opaque areas of the lens prevent light from reaching the

retina. A person can implement a number of strategies used to overcome the effects of cataracts.

- intraocular lens transplant: This is when the lens that is cloudy and opaque is replaced by a clear lens.

- Topical anesthesia: today long operations don't even have to be performed. This technology

Involves inserting eyedrops into the eye of a person with cataracts.

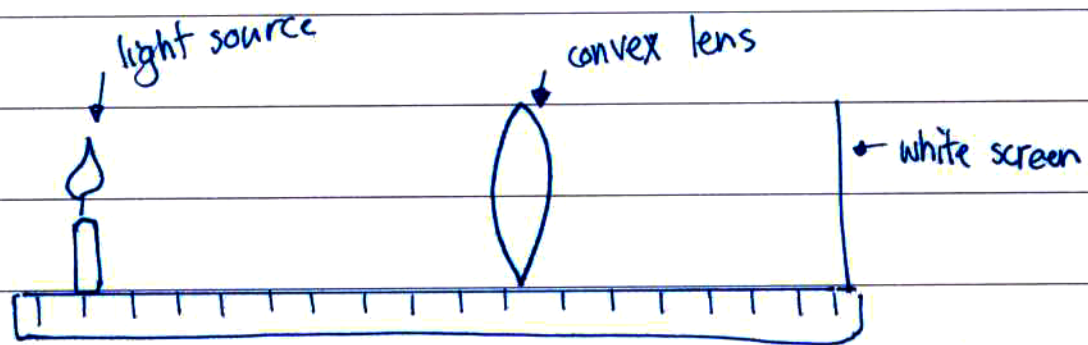
— Phacoemulsification: A small incision is made on the cornea. The doctor then inserts a tiny probe that emits ultrasound waves. The ultrasound causes the cloudy areas to soften and break up. This allows the cloudy parts to be sucked up. 'Phaco' is growing in popularity.

(d) The process of accommodation was modelled using lenses and a light box or ray box. The ray box was connected to a power pack to produce light rays that were then sent through a number of convex lenses with different curvatures and shapes. The first lens used was a long thin one and then a short dense one. We recorded the size of the focal length of each. A convex lens was suitable because the human eye is a convex lens. The light rays represented the light rays



d) Aim: To model the process of accommodation using convex lenses

Method: Set up the following apparatus:



- ① ~~Make~~ Fix the light source <sup>(candle)</sup> and white screen in a fixed position
- ② ~~lights~~ Turn on the light source, ~~move~~ <sup>(candle)</sup> the convex lens. Start with the lens close to the white screen and gradually move the convex lens away until there is a ~~for~~ clearly focussed upside down image of a candle on the screen. ~~Measure~~
- ③ Measure the distance between the middle of the convex lens to the white screen this is the focal length.

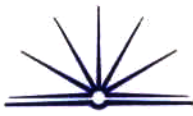
④ Repeat the procedure with ~~lens~~ convex lenses of different thickness.

⑤ Compare the <sup>different</sup> focal lengths

Results: The ~~the~~ thicker the convex lens  $\rightarrow$  the shorter the focal length

Conclusion: The more convex ~~structure~~ <sup>the lens</sup> is the ~~more~~ shorter the focal length as in the eye, when we are focussing on near objects our lens bulges to accommodate (suspensory ligaments relaxed). The ~~the~~ less convex a lens is i.e.  $\rightarrow$  the longer the focal length. This relates to the eye when viewing distant objects the lens flattens (stretched by suspensory ligaments)!

\* In the experiment it is important to keep the ~~Repeating the experiment would increase~~ amount of light in room constant, as this may interfere with judgment. If precise measurements



were needed then the experiment should be repeated, this isn't necessary in this experiment  
~~accuracy~~ ~~though~~ ~~in~~ ~~this~~ ~~experiment~~

e) Two devices used to assist people with hearing impairments

are the hearing aid and the cochlear implant.

The hearing aid is a device which amplifies sound waves, <sup>eg. older elderly ppl more likely to lose hearing</sup>

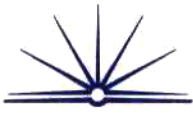
however it ~~is~~ can only be used for people with conductive hearing impairment (outer + middle ear) and will not work for people with nerve damage to the cochlea,

auditory nerve or auditory nerves in the brain. ~~The~~

The hearing aid ~~works~~ ~~but~~ 'does not distinguish between frequencies and therefore all sounds are amplified.

This can provide discomfort as well as making it difficult to distinguish a person's voice from background noise.

The cochlea implant is designed for those who are completely deaf, usually because of damage to the hair cells in the organ of corti<sup>1</sup> or nerve damage. The implant converts sound energy into electrical impulses by directly stimulating the auditory nerve. Cochlea implants are best suited to those who have already learnt



how to speak. ~~While it is~~ It is a fairly expensive device and therefore may be appropriate for those who really need it. Disadvantages include physical side-effects such as a droopy face, and the large bulky size of the device may ~~per~~ look ungainly or provide discomfort.

Both the hearing aid and cochlea implant ~~are~~ can only be used if the basic structures of the ear exists, eg. if the ear ossicles have fused together then <sup>the</sup> vibrative mediums ~~to~~ are affected and neither the hearing aid or the Cochlea Implant would be able to assist in hearing.