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# Question 32.

a) i mammary glands.

ii 1. larger skull (brain size) relative to body size.

2. flatter face. (less protruding eyebrow ridges).

b) i) Text books and specialist scientists in the area would be the most effective ways to gather data. Scientific journals, magazines, the internet and television documentaries would all be useful sources of information. Performing a first hand investigation with the help of a qualified scientist would also be useful.

ii) The credibility of the sources is essential. Are the text books recent and written by experienced & qualified scientists? Has the work of the scientist you interviewed been validated, published or backed up? Internet sites, magazines and documentaries should be from well known sources who provide personal details for accountability, such as the name and research position of the author. Articles with differing views should also be considered before you decide if a source is accurate.

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c) An example of polymorphism is skin colour in humans. Skin colour is determined by the amount of melanin in the skin.

People who live in hot climates, such as Africa, have an increased amount of melanin in the skin and therefore a darker skin colour. This provides protection from the harmful effects of ultra-violet radiation from the sun (eg: skin cancer) which is very intense in such regions.

People who live in cooler climates such as Greenland, have a lesser amount of melanin in the skin and therefore a lighter skin colour. This enables them to absorb sufficient U.V radiation to facilitate the production of vitamin D. If such light-skinned people go to Africa, they are not protected from the intense radiation and must therefore be careful when outdoors, covering up and wearing sunscreen, to prevent burning.

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d)

| Primate | FEATURES: Hand and foot structure | Skull shape |
|---|---|---|
| Prosimians | Some prosimians still have claws on their hands. They have an opposable thumb, but not as flexible as other primates. | Small shaped skull with large snout - still uses extensive use of smell. |
| Monkeys | Opposable thumb - mainly for power grip, hold food, climb trees. They have an opposable big toe, aid in climbing. | Larger than prosimians, still primitive though. Have a snout and enlarged jaw + eyebrow ridge. |
| Apes | Opposable thumb used in power grip. They have opposable toe to aid in knuckle walking and grasping food. | Cranial capacity relative to body size / larger than monkeys, but they still have a snout + enlarged jaw line and prominent eyebrow |
| Humans | Opposable thumb uses power + precision grip, able to manipulate and make tools no opposable toes. Arched foot aids in bipedal movements. | Largest cranial capacity to body size of all groups - needed for thought, memory and speech. Flattened face with little jaw and no prominent eye ridge. |

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The information outlined in the table was gathered from textbook, internet and the Australian Museum. Some information conclusions include that was common across all groups was an opposable thumb. This is because it is a feature of all primates, but going down the table the use of this feature became more extensive. Humans being the most ~~evolved~~ advanced were able to manipulate this feature for precision grip, whereas the others used on for power grip. This allow for tool-making and growth in a society. Another conclusion drawn, was that cranial capacity relative to body size increased down the groups. That showed that from the most primitive (prosimians) to most advanced (humans) that brain capacity had attributed to this evolutionary change. Primates collectively have the largest cranial capacity to body ratio of any animal groups, thus it was included as a similarity between all 4 groups.

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e) Biological evolution ~~is a gradual~~ of humans is a gradual process that takes millions of years. and involves ~~the~~ natural selection and the passing on of genes through family blood lines. Cultural evolution/development on the other hand, is rapid and can be observed from one generation to the next, being passed on by complex forms of communication and technology and not "through direct family blood lines. only

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The evolution of humans from the early *Australopithecus ramidus* which lived approximately 4 million years ago, to the modern *Homo sapiens* reveals biological development, such as increased brain size and the ability to walk upright and ~~stand~~ on two legs, which have in turn influenced cultural development, ie, the development of complex social structures, communication abilities, relationships and the use of increasingly more complex tools, from stone, to ivory and bone and now the metals and sophisticated machinery we use today.

In the same way that biological evolution has influenced cultural development, cultural

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development ~~of humans~~ of humans ~~has~~ now has the capacity to influence the biological evolution of humans. The main factors which will effect biological evolution in the next one hundred years include:

- increased population mobility
- advancements in medicine
- genetic engineering.

1. Increased population mobility

As the ability of humans to travel becomes more efficient and widely available, clinal gradation and polymorphism will decline as different races are able to interbreed. This could potentially break down the current ~~"~~imaginery~~"~~ barriers between cultural groups, ideologically as people become more similar ~~they~~ and experience other cultures they should become more tolerant and accepting

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## 2. Advancements in medicine.

Over the last ~~ge~~ century advancements and improvements in medicine have been rapid and numerous. These have the ability to increase survival rates as people live a healthier lifestyle for a longer time, thereby ageing the population and possibly increasing the number of inherited-disease genes in a population, as people who have these diseases can be treated and survive passing their genes onto their offspring. However, projects such as the Human Genome Project open up incredible possibilities such as being able to cure even inheritable diseases.

## 3. Genetic engineering

This term 'genetic engineering' is becoming increasing well-known in today's society as the possibilities the technology proposes continue to expand. Genetic engineering techniques

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such as producing transgenic organisms ~~that artificial insemination~~ may provide benefits such as improved and more efficient food sources and medical possibilities, such as injecting the insulin producing gene into salmon creating a reliable source of insulin for diabetics. These have the potential to increase survival rates and the health of the human population, and also give humans the ability to manipulate the gene pool, choosing desired genes and eliminating others forever.
Genetic engineering could have negative impacts of human biological evolution if used for purposes such as biological warfare, for example the current anthrax scare sweeping through America, which could have devastating consequences.

Advancements in technology have given humans the power to influence their own destiny, with
^ Increasing population mobility, medical advancements and genetic engineering being the three main factors predicted to affect human biological evolution in the next one hundred years.