



**LIFE SCIENCES PAPER 2 MEMORANDUM**

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**SECTION A**

**Question 1**

**1.1**

- 1.1.1 C ✓✓
- 1.1.2 C ✓✓
- 1.1.3 D ✓✓
- 1.1.4 B ✓✓
- 1.1.5 B ✓✓

5 x 2 = (10)

**1.2**

- 1.2.1 Population ✓
- 1.2.2 Sedimentary rock ✓
- 1.2.3 Red data book ✓
- 1.2.4 Sustainable ✓
- 1.2.5 Inter-specific competition ✓
- 1.2.6 Non-biodegradable pollutants ✓

(6)

**1.3**

- 1.3.1 E ✓
- 1.3.2 H ✓
- 1.3.3 A ✓
- 1.3.4 G ✓

1.3.5 B ✓ (5)

**1.4**

1.4.1  $70^\circ \div 360 \times 100 = 19,4\%$  ✓ (4)

1.4.2 Carbon dioxide, carbon monoxide, nitrogen oxides and hydrocarbons  
(First TWO only) (2)

1.4.3 By combustion of the fuel/in the exhaust fumes (Any ONE) (1)

1.4.4 They can cause asthma, allergies and cancer. ✓ (3)[10]

**1.5**

1.5.1 3,1 to 2,7 mya/million years ago / 2.7 to 3.1 mya (2)

1.5.2 The brain size got larger. ✓ (1)

1.5.3  $500 + 500 + 450 + 450 + 400 + 400 + 300 = 3000 \div 7 = 428,57 \text{ cm}^3$  ✓ (4)

1.5.4 Measure the volume of the space inside the cranium of the skull. ✓ (2)[9]

**1.6**

1.6.1 The common chimp and the human, because they have a more recent common ancestor. ✓ (2)

1.6.2 The Old World monkeys, because they have remained the same/have not changed much over time. ✓ (2)

1.6.3 (a) 10/11 million years ago ✓  
(b) 20/21 million years ago ✓ (2)[6]

**1.7**

1.7.1 Artificial selection is the process by which humans deliberately choose to interbreed only those organisms that have desirable characteristics or traits. ✓ (1)

1.7.2 – Wrinkly skin for A/the Sharpei ✓  
– Large size or height for B/the Great Dane ✓  
– Short legs for C/the Dachshund ✓ (3)[4]

**TOTAL QUESTION 1: [50]**

**TOTAL SECTION A: [50]**

**SECTION B**

**Question 2**

**2.1**

2.1.1 The mopane worm is eaten/is a source of food. ✓ (1)

2.1.2 Too many mopane worms have been collected from these populations/the populations have been overexploited/greed. ✓ (1)

2.1.3 Moths of the mopane worm only live for a few days and so cannot travel very far and the mopane worm larvae move very slowly. ✓ (2)

2.1.4 They do not understand how to harvest mopane worms in a sustainable way to ensure that there will be mopane worms that they can harvest in the future. ✓ (2)

2.1.5 Taking only some of the mopane worms so that others are left to reproduce and lay eggs, resulting in more mopane worms in the future. (2)

2.1.6 They could be overexploited/damaged or their numbers could decrease. ✓  
(Any ONE) (1)

2.1.7 Grow more mopane trees to supply the food needed for the mopane worms to flourish. ✓ (1)[10]

**2.2**

2.2.1 The different species have differently shaped beaks. ✓ (1)

2.2.2 The different species eat different food. ✓  
Mutations ✓ may cause differences in shape of beaks. ✓ (1)

2.2.3 The finch ancestors must have arrived before the other types of birds ✓  
and so they had more unoccupied niches available ✓ and more time to evolve  
into new species ✓ that were adapted to these niches.  
They were better adapted than any of the other birds. ✓ (Any TWO) (2)

2.2.4 The finches on the mainland would have had more competition ✓ for available  
niches from better adapted animals/birds. ✓ OR  
Less variety ✓ of food ✓ on mainland. (2)[6]

**2.3**

2.3.1

	<i>Australopithecus africanus</i>	<i>Gorilla gorilla</i>	<i>Homo sapiens</i>
Shape of canines – large or small?	Small ✓	Large ✓	Small ✓
Forehead – straight up or sloping?	Straight ✓	Sloping ✓	Straight ✓
Position of ridges above the eye socket – high or low?	Low ✓	High ✓	Low ✓
Vertebral column – horizontal or vertical?	Vertical ✓	Horizontal ✓	Vertical ✓

(12)

2.3.2 Upright ✓ – it has a vertical vertebral column like modern humans. ✓ (2)[14]

**Total Question 2: [30]**

**Question 3**

**3.1**

3.1.1 The diversity/number and variety of species of plant and animal life within a specific area or country. ✓ (1)

3.1.2

Table showing the number of species of plants and animals found in South Africa:

Type of plant or animal	Number of species
Flowering plants	20 300
Mammals	243
Birds	800
Amphibians and reptiles	370
Fish	2 220
Insects	80 000

Assessment tool for assessing the table	
Table is drawn	No – 0 mark Yes – 1 mark

correctly	
First column is labelled correctly	No – 0 mark    Yes – 1 mark
Second column is labelled correctly	No – 0 mark    Yes – 1 mark
Information in first column all present and correct	No – 0 mark    Yes – 1 mark
Data in second column all present and correct	No – 0 mark    Yes – 1 mark
Correct heading/title	No – 0 mark    Yes – 1 mark

- 3.1.3 Habitat loss or degradation; ✓ overexploitation of resources (including hunting and poaching); ✓ invasion of alien species; ✓ pollution, climate change. ✓ (Mark first THREE only) (6)

(3)  
(10)

**3.2**

- 3.2.1 The evidence is provided in the fossil record. (1)

- 3.2.2 Mass extinctions ✓ (1)

- 3.2.3 Biodiversity decreases ✓ (1)

- 3.2.4 – Global cooling of the planet during ice ages  
– Global warming  
– Land masses joining up/separating due to continental drift/plate tectonics  
– Large-scale volcanic eruptions  
– Decrease in oxygen in the oceans  
– Diseases.  
(Mark first THREE only) (3)

- 3.2.5 There are many vacant ecological niches available ✓ and organisms with adaptations that help them exploit these niches ✓ evolve through the process of natural selection. ✓ (3)[9]

**3.3**

- 3.3.1 Homologous structures are anatomical structures in different organisms that have basically the same structure, ✓ inherited from common ancestor, ✓ but performing different functions ✓. Examples of homologous structures in the diagrams are the forelimb of the human ✓ and the flipper of a whale ✓ (or wing of a bat). (any THREE [explanation] +1 mark for example) (4)

- 3.3.2 Analogous structures are anatomical structures in different animals that have evolved independently/have a different origin ✓ but may appear to be physically similar, as they are used for the same purpose/function. ✓ Examples of analogous structures in the diagrams are the wing of the insect ✓ and the bat. ✓ (4)

- 3.3.3 Vestigial structures are anatomical structures that have no apparent function ✓ but that resemble structures their ancestors once had ✓. An example of a vestigial structure in the diagram is the pelvic girdle of a whale. ✓ (3)[11]

**Total Question 3: [30]**  
**TOTAL SECTION B: [60]**

**SECTION C**

**Question 4**

**4.1**

- 4.1.1 The number of bacteria would have increased<sup>√</sup> as human sewage contains bacteria.<sup>√</sup> (2)
- 4.1.2 The increase in bacteria<sup>√</sup> led to a decrease<sup>√</sup> in the oxygen concentration. This is because the bacteria remove oxygen from the water.<sup>√</sup> (3)
- 4.1.3 The increase in the number of bacteria caused an increase in the concentration of nitrate ions<sup>√</sup> in the water. This is because the bacteria break down/decompose<sup>√</sup> the organic material<sup>√</sup> in the sewage into inorganic nutrients<sup>√</sup> such as nitrate ions. (4)
- 4.1.4 The number of algae<sup>√</sup> increased<sup>√</sup> in the water and produced more oxygen<sup>√</sup> by photosynthesis.<sup>√</sup> OR Other fresh<sup>√</sup> water containing oxygen<sup>√</sup> was added by tributaries<sup>√</sup> leading into the river.<sup>√</sup> OR The numbers of bacteria<sup>√</sup> decreased<sup>√</sup> and so less<sup>√</sup> oxygen was removed from the water.<sup>√</sup> (Any ONE reason plus correct explanation) (4)
- 4.1.5 Lack of oxygen<sup>√</sup> for (cellular) respiration<sup>√</sup> (2)
- 4.1.6 The effect of a sewage spill should be less severe<sup>√</sup> in winter. At lower temperatures the bacteria will have a lower metabolic rate<sup>√</sup> and so would remove less oxygen from the water. (2)
- 4.1.7 – Drinking the water<sup>√</sup>  
– Bathing in the water<sup>√</sup>  
– Using water for washing clothes, etc. (or any other reasonable answer).<sup>√</sup> (3)
- 4.1.8 Cholera<sup>√</sup>, typhoid<sup>√</sup>, hepatitis A<sup>√</sup>, gastro-enteritis<sup>√</sup>, dysentery<sup>√</sup>, blue baby syndrome<sup>√</sup> any other disease caused by water pollution (Mark first TWO only) (2)
- 4.1.9 They should purify their water by boiling it<sup>√</sup> or by adding chlorine tablets/  
water purifying pills<sup>√</sup> or by using a filter<sup>√</sup> (Any TWO) (2)
- 4.1.10 The local municipality<sup>√</sup> or the people in charge of the sewage treatment plant.<sup>√</sup> (Any ONE) (1)[25]

**4.2**

Possible answers:

What could the residents do?

The residents of a community could form a committee<sup>√</sup> that could act as a watchdog organisation<sup>√</sup> – keeping an eye on the water quality either by checking it themselves or by paying someone to check it periodically.

They could organise demonstrations/other mass action campaigns<sup>√</sup> if the water quality issue is not dealt with by the local municipality/government.<sup>√</sup>

They could take legal action<sup>√</sup> against the local municipality<sup>√</sup> if water quality issues are not addressed and people become sick/suffer loss of income, etc.

(Any ONE with explanation) (2)

What could the reporters do?

They could investigate<sup>√</sup> exactly what is happening to explain the water quality problem and report<sup>√</sup> on their findings.

They could educate√ people in their community on how to deal with contaminated water/what their legal and civil rights are/who to contact if they have a problem with water quality.√

(Any ONE with explanation) (2)

Legal experts/lawyers working in the community

They could offer to represent√ members of their community in any legal action taken against the municipality/government.√

They could become familiar√ with the legal aspects of water quality provided to the public and make contact with the municipality/sewage treatment plant to ask them to liaise with them if any problem arises.√

(Any ONE with explanation) (2)

Local councillors

They should ensure that adequate systems√ are in place to prevent sewage spills.√  
They should ensure that they employ people who are qualified√ and are able to do the job or running a sewage treatment plant. √

They should maintain regular contact√ with their communities and listen to any problems that they would like to raise regarding water quality.√

(Any ONE with explanation) (2)

Members of parliament

They should ensure that laws√ and policies are in place to safeguard the public from sewage spills√.

They should ensure that enough money is allocated√ to maintain good infrastructure of sewage treatment plants to reduce the chances of sewage spills in the future.√

(Any ONE with explanation) (2)

Members of environmental organisations

They could raise public awareness√ about the dangers of contaminated water to human health and to other life.√

They could monitor√ water bodies that could be contaminated with sewage and keep a database of the information that they collect.√

(Any ONE with explanation) (2)

2 x 6 = (12)

Note: No marks for an action that is repeated; marks are only given for the first time it is described.

(3)[15]

**Total Question 4: [40]**

**TOTAL SECTION C: [40]**