



LIFE SCIENCES PAPER 2 MEMORANDUM

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

4.2

Possible answers:

What could the residents do?

The residents of a community could form a committee✓ that could act as a watchdog organisation✓ – 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✓ if the water quality issue is not dealt with by the local municipality/government.✓

They could take legal action✓ against the local municipality✓ 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✓ exactly what is happening to explain the water quality problem and report✓ 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]