



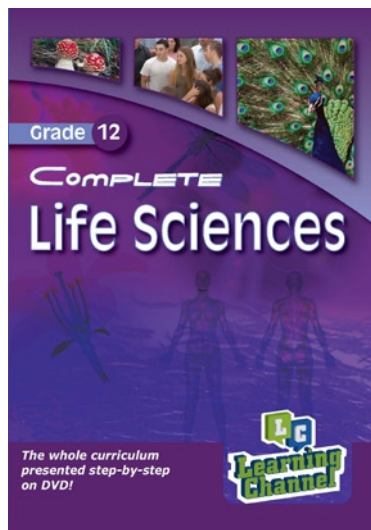
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# **National Senior Certificate Grade 12 Life Sciences Paper 2**

## **MEMORANDUM**

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**MARKS: 150****TIME 2 ½ hours**

This memorandum consists of 8 pages.

**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 × 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  $70^\circ \div 360 \checkmark \times 100 \checkmark = 19,4\checkmark\% \checkmark$  (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  $500 + 500 + 450 + 450 + 400 + 400 + 300 = 3000 \checkmark \div 7 \checkmark = 428,57 \checkmark \text{ cm}^3 \checkmark$  (4)  
 1.5.4 Measure the volume of the space ✓ inside the cranium of the skull. ✓ (2)  
**(9)**
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- 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 ✓ (2)
- (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]**

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**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 the shape of the 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 correctly	No – 0 mark	Yes – 1 mark
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

(6)

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*) (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]**

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**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 × 6 = (12)

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

<b>Marks</b>	<b>Descriptions</b>
<b>3</b>	1 Strategy provided for ALL requested stakeholders. Very little/no irrelevant information
<b>2</b>	1 Strategy provided for ALL requested stakeholders with NOT MUCH irrelevant information/1 Strategy provided for only 3–5 requested stakeholders. Very little/no irrelevant information
<b>1</b>	1 Strategy provided for only 3-5 requested stakeholders with MUCH irrelevant information. 1 Strategy provided for only 1–2 requested stakeholders. Very little/no irrelevant information
<b>0</b>	Not attempted/nothing written other than question number/All information irrelevant

(3)

(15)

**Total Question 4: [40]**

**TOTAL SECTION C: [40]**

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