



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2013

**LIFE SCIENCES P1
MEMORANDUM**

MARKS: 150

This memorandum consists of 7 pages.

SECTION A

QUESTION 1

| | | | | | | |
|-----|-------|------|-----|-------|-----------------------------|--------------|
| 1.1 | 1.1.1 | A ✓✓ | 1.2 | 1.2.1 | Emigration ✓ | |
| | 1.1.2 | B ✓✓ | | 1.2.2 | Interspecific competition ✓ | |
| | 1.1.3 | C ✓✓ | | 1.2.3 | (Dilute) Iodine solution ✓ | |
| | 1.1.4 | B ✓✓ | | 1.2.4 | Photolysis ✓ | |
| | 1.1.5 | A ✓✓ | | 1.2.5 | Glycolysis ✓ | |
| | 1.1.6 | D ✓✓ | | 1.2.6 | Oxidative phosphorylation ✓ | |
| | 1.1.7 | D ✓✓ | | 1.2.7 | Pleural membranes ✓ | |
| | 1.1.8 | A ✓✓ | | 1.2.8 | Egestion/Defecation ✓ | (8 x 1) |
| | 1.1.9 | C ✓✓ | | | | (8) |
| | | | | | | (9 x 2) (18) |

| | | | | | |
|-----|-------|-----------|-------|-----------|---------|
| 1.3 | 1.3.1 | B only ✓✓ | 1.3.6 | None ✓✓ | |
| | 1.3.2 | A only ✓✓ | 1.3.7 | None ✓✓ | |
| | 1.3.3 | A only ✓✓ | 1.3.8 | A only ✓✓ | |
| | 1.3.4 | B only ✓✓ | 1.3.9 | None ✓✓ | |
| | 1.3.5 | A only ✓✓ | | | (9 x 2) |
| | | | | | (18) |

- 1.4 1.4.1 (a) **Graph 1** ✓ (Buffalo City Metropolitan Municipal area)
- The base of the age pyramid is wide but becomes narrow towards the top. ✓ / This indicates that there are a high proportion of individuals in the younger age group. ✓
 - When they grow up and reproduce the population will increase in size. ✓ (Any 2) (2)
- (b) **Graph 2** ✓ (Population in Germany)
- The pre-reproductive age group is smaller than the reproductive or the post-reproductive age group. ✓
 - As the older individuals die, fewer of the younger individuals would replace them and hence the population would decline. ✓ (Any 2) (2)
- 1.4.2
- Age pyramids are useful in predicting whether the population will increase, decrease or remain constant in the future. ✓
 - This information is very useful in planning for schools, housing needs, social welfare, medical services, provision of resources and creating employment. ✓ (2)

TOTAL SECTION A: 50

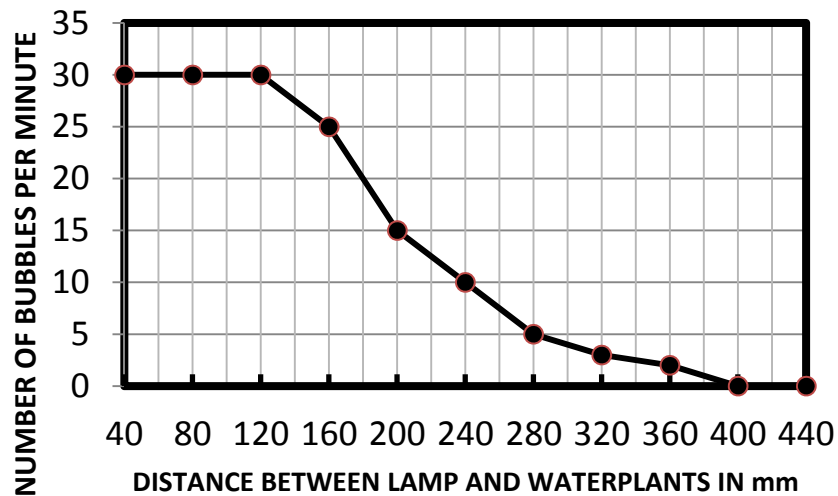
SECTION B

QUESTION 2

- 2.1 2.1.1 The graph showing the size of an impala population between 1952 and 1985. ✓ (1)
- 2.1.2 A – Establishment phase/Lag phase ✓
B – Accelerating growth phase/Log phase/Exponential growth phase. ✓ (2)
- 2.1.3 (a) **Growth phase A**
- Population size is small. ✓
 - Population is adapting to its environment. ✓
 - Young population with few reproducing animals. (Not sexually matured to reproduce) ✓
 - Some cannot find a mating partner when the population density is low. ✓ (Any 2) (2)
- (b) **Growth phase B**
- Birth rate is higher than the death rate. ✓
 - Little or no limiting factors. ✓
 - Conditions for growth are highly favourable. (Sufficient food and water supply, limited competition for resources) ✓
 - High number of reproductive population. ✓ (Any 2) (2)
- 2.1.4 The carrying capacity of the habitat ✓ (1)
- 2.1.5
- Aerial photography ✓
 - Counting ✓ (Any 1) (1)
- 2.1.6
- Competition ✓
 - Food shortage ✓
 - Territoriality ✓
 - Diseases ✓ (Any 2) (2)
- 2.1.7
- The size of the impala population fluctuates around the carrying capacity of the habitat. ✓
 - Whenever the population size grows beyond the carrying capacity of the habitat, it is dropped below the carrying capacity by the environmental resistance. ✓
 - When conditions improve the population increases. ✓ (Any 2) (2)
- 2.2 2.2.1 To investigate the effect of light intensity on the rate of photosynthesis. ✓ (1)
- 2.2.2 To increase the concentration of CO₂ in the water. ✓ (1)
- 2.2.3 Oxygen ✓ (1)
- 2.2.4 A glowing splint glows brighter ✓ (re-kindles) when inserted in to a test tube containing oxygen. ✓ (2)
- 2.2.5
- Amount of CO₂ ✓
 - Temperature of the water ✓ (2)

2.2.6

Number of air bubbles formed at various distances



| Mark allocation for the graph | | |
|------------------------------------|---------------------------------|-----|
| Correct type of graph | | 1 |
| Title of graph | | 1 |
| Correct label and units for X-axis | | 1 |
| Correct label and units for Y-axis | | 1 |
| Appropriate scale for Y-axis | | 1 |
| Drawing of the graph | 1 – 4 points plotted correctly | 1 |
| | 5 – 8 points plotted correctly | 2 |
| | 9 – 11 points plotted correctly | 3 |
| | | (8) |

- 2.2.7
- Temperature ✓
 - Amount of available CO₂ ✓ (Any 1) (1)
- 2.2.8
- The light intensity is directly proportional to the rate of photosynthesis ✓✓ OR
 - When the light intensity increases or decreases ✓ the rate of photosynthesis increases or decreases. ✓ (2)
- 2.3
- 2.3.1
- 1 – Endothelium ✓ (2)
 - 2 – Squamous epithelium ✓ (1)
- 2.3.2
- 3 – Erythrocyte/Red blood cell ✓ (1)
- 2.3.3
- Haemoglobin ✓ (1)
- 2.3.4
- (a) Deoxygenated blood ✓ (1)
 - (b) Oxygenated blood ✓ (1)
- 2.3.5
- Many alveoli provides large gaseous exchange surface. ✓
 - The inner surface is kept moist by film of moisture, to facilitate diffusion of oxygen and carbon dioxide in dissolved state. ✓
 - The lining of alveolus is thin; only one cell layer thick for rapid diffusion of gases. ✓
 - Are in close contact with blood capillaries; blood contains haemoglobin which acts as an oxygen carrier. ✓ (Any 3) (3)

QUESTION 3

| No | AEROBIC RESPIRATION | ANAEROBIC RESPIRATION |
|----|---|--|
| 1 | Breaks down glucose in presence of oxygen. ✓ | Breaks down glucose in absence of oxygen. ✓ |
| 2 | Glucose is completely broken down to CO ₂ and H ₂ O. ✓ | Glucose is broken down into alcohol or lactic acid and CO ₂ . ✓ |
| 3 | Takes place in mitochondria. ✓ | Takes place in the cytosol only. ✓ |
| 4 | The CO ₂ and H ₂ O formed during the process can be excreted. ✓ | The alcohol/lactic acid formed during the process accumulate and become poisonous. ✓ |
| 5 | Releases more energy due to complete breakdown of glucose. ✓ | Releases less energy because the glucose is not completely broken down. ✓ |

1 mark for the table (Any 3 x 2) (7)

- 3.2 3.2.1 (a) D ✓ Contains proteins/highest flow rate ✓ (2)
 (b) B ✓ High concentration of glucose, but no proteins ✓ (2)
 (c) C ✓ No glucose and sodium ions and the urea is lower in concentration than in D ✓ (2)
 (d) A ✓ Has the highest concentration of urea ✓ (2)
- 3.2.2
- High flow rate in D because of the heart beat/arterial blood. ✓
 - Flow rate decreased in glomerulus ✓ because of smaller diameter of capillaries/flow divided into many capillaries. ✓
 - Flow rate is decreased as the fluid passes through membranes ✓ hence low flow rate when fluid enters capsule where pressure of heartbeat is absent. ✓
 - Large volume comes in and has to squash out through smaller volume allowed by efferent arteriole ✓ therefore slows the flow rate down. (Any 4) (4)
- 3.2.3
- Excretion of urea, sodium ions and ammonium ions ✓
 - Re-absorption/regulation of glucose ✓
 - Osmoregulation ✓ (Any 2) (2)
- 3.3 3.3.1
- Number of rabbits = $\frac{\text{No. in 2}^{\text{nd}} \text{ sample}}{\text{No. marked in 2}^{\text{nd}} \text{ sample}} \checkmark \times \text{No. originally marked } \checkmark$
 $\frac{25}{5} \checkmark \times 15 \checkmark = 75 \checkmark$ (5)
- 3.3.2
- The area sampled might be one that rabbits preferred/did not prefer. ✓
 - Some rabbits may have emigrated/immigrated. ✓
 - Some rabbits may have died. ✓ (Any 2) (2)
- 3.3.3
- Sample area must be taken randomly. ✓
 - Repeating the process many times and finding the average estimate. ✓ (2)
- 3.4 3.4.1 **Carrying capacity of a habitat**
 The maximum number of individuals ✓ that can be supported by the environment ✓ under conditions prevailing at any given time. (2)
- 3.4.2 **Ecological succession**
 The development of a community over time ✓ which involves species in one stage being replaced by different species. ✓ (2)

- 3.5
- The double membrane is highly permeable ✓ and allows water and carbon dioxide to enter easily. ✓
 - The grana contain chlorophyll ✓ to trap sunlight. ✓
 - The grana are made up of thin flat discs called lamellae ✓ that present a large surface area for the absorption of sunlight. ✓
 - The stroma contains enzymes ✓ for the reactions of the dark phase. ✓
 - Ribosomes in the stroma ✓ synthesise enzymes for photosynthesis. ✓
 - Starch granules ✓ are present to temporarily store the starch that is produced. ✓

(Any 3 x 2) (6)
[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

4.1 Homeostasis is the ability of a living organism to maintain a constant ✓ internal environment ✓ irrespective of changes in the external environment ✓ e.g. ability to maintain constant (correct level) glucose concentration level of the blood. ✓ Two hormones, insulin ✓ and glucagon, ✓ secreted by the islets of Langerhans ✓ in the pancreas ✓ control the concentration of glucose level of the blood.

When the blood sugar level is higher ✓ than normal ✓, the hormone insulin is secreted. ✓ The release of hormone insulin reduces the level of glucose ✓ in two ways. Firstly, it increases the rate at which glucose is absorbed ✓ by the cells of the liver and muscles. ✓ Secondly, it stimulates the conversion of glucose into glycogen ✓ and fat in the liver and muscles. ✓

When the blood sugar level is lower than normal, ✓ the hormone glucagon ✓ is secreted. The hormone glucagon stimulates the conversion of stored glycogen ✓ in the liver, ✓ into glucose. ✓ This glucose is released into the blood in order to raise the level of glucose back to normal level. ✓

When insulin is not secreted in the body the glucose level of the blood rises. ✓ This condition is known as *diabetes mellitus*. ✓ The kidney excretes some of the glucose in the urine. ✓

There are two types of *diabetes mellitus*. Type 1 diabetes occurs when the pancreas stops producing insulin. ✓ People who have Type 1 diabetes must inject insulin to survive. ✓ Type 2 diabetes is caused by the secretion of insufficient quantity of insulin. ✓ This condition can be treated successfully without medication ✓ by making certain adjustments in the diet.

The symptoms of *diabetes mellitus* are presence of glucose in the urine, ✓ extreme thirst, ✓ nausea/vomiting, ✓ weight loss, ✓ fatigue, ✓ non-healing wounds ✓ and frequent urination. ✓

The treatment and management of this condition include regular exercise, ✓ following a prescribed diet ✓ and using prescribed medication. ✓

(17)
Synthesis (3)

| Marks | Descriptions |
|-------|---|
| 3 | Well structured – demonstrates insight and understanding of question. |
| 2 | Minor gaps in the answer. |
| 1 | Attempted but with significant gaps in the answer. |
| 0 | Not attempted/nothing written other than question number. |

TOTAL SECTION C: 20
GRAND TOTAL: 150