Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2015

LIFE SCIENCES P1 MEMORANDUM

MARKS: 150

This memorandum consists of 7 pages.

SECTION A

QUESTION 1

1.1	1.1.1	D ✓✓		
	1.1.2	A ✓✓		
	1.1.3	C ✓✓		
	1.1.4	C ✓✓		
	1.1.5	C ✓✓		
	1.1.6	D ✓✓		
	1.1.7	D ✓✓		
	1.1.8	A ✓✓		
	1.1.9	B ✓✓		
	1.1.10	B ✓✓	(10 x 2)	(20)
1.2	1.2.1	Chlorophyll ✓		
	1.2.2	Blue-black ✓		
	1.2.3	Deoxyribonucleic acid/DNA ✓		
	1.2.4	Oxygen ✓		
	1.2.5	Cristae ✓		
	1.2.6	Kreb's cycle ✓	(6 x 1)	(6)
1.3	1.3.1	A only ✓✓		
	1.3.2	None ✓✓		
	1.3.3	Both A and B ✓✓		
	1.3.4	B only ✓✓		
	1.3.5	Both A and B ✓✓		
	1.3.6	A only ✓✓	(6 x 2)	(12)
1.4	1.4.1	A - Renal capsule ✓ B - Collecting tubules ✓ C - Ureter ✓		(3)
	1.4.2	Ureter/C ✓		(1)
	1.4.3	Renal artery ✓ - D✓		(2)
	1.4.4	E or Renal vein ✓		(1)
1.5	1.5.1	Obesity is an imbalance between energy intake and expenditure ✓ such that excess energy is stored in fat cells which enlarge/ increase in number ✓		(2)
	1.5.2	13 127 ✓		(1)
	1.5.3	Men are physically more active than women ✓		(1)
	1.5.4	Hypertension ✓		(1)
			TOTAL SECTION A:	**50**

SECTION B

QUESTION 2

2.1 2.1.1 Census ✓ (1)

2.1.2 B ✓ (1)

2.1.3 The base of the age pyramid is wide but it narrows towards the top. ✓
This indicates a high proportion of individuals in the younger age group. ✓ When they grow up and reproduce the population will increase in size. ✓ The narrowing of the pyramid towards the top also indicates a high death rate with increasing age. ✓ (4)

2.1.4 The population size at each of the age groups remains almost equal. ✓ This indicates that the birth and death rates are almost the same. ✓ Therefore, the population will remain more or less the same. ✓ (3)

2.1.5 Stable population ✓ (1)

2.2 2.2.1 (a) **Community**
A community consists of populations of different species ✓ that live and interact in the same place ✓ at the same time. ✓ (2)

(b) **Ecological niche**
The ecological role of a species✓ within the structure and function of a community. ✓ (2)

2.2.2 *Tribolium confusum* ✓
100 survived in bottle 6 when the temperature was 24 °C and the relative humidity was 30%. ✓ (2)

2.2.3 Density independent factors ✓ (1)

2.2.4 Since there are two different species involved it can be regarded as an interspecific competition. ✓ (1)

2.3 2.3.1 Exponential/Geometric/J-shape growth form ✓ (1)

2.3.2 Accelerated/ exponential growth phase ✓ (1)

2.3.3
- Increases in food production and distribution✓
- Improvement in public health (water and sanitation)✓
- Advancement in medical technology (antibiotics and vaccines)✓
- Education and awareness leading to more health conscious population✓ (4)

2.3.4 The human population has almost reached the carrying capacity of the planet earth and therefore begin to experience environmental resistance such as:

- Competition for food, water and living space leading to war and crime rate escalate.✓
- New diseases✓ (e.g. HIV and Aids; Ebola, etc.)
- Greater awareness and education ✓ (Any 2 x 1) (2)

2.3.5 (a) Might lead to extinction of human species (1)

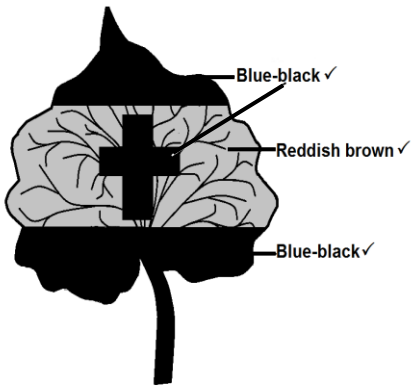
(b)
- Educate and organise awareness programmes to highlight the consequences of unchecked population growth✓
- Tax incentives for smaller families✓
- Introduction of family planning programmes✓(Any 1 x 1) (1)

2.4 2.4.1 The plant was placed in a dark box/darkroom for at least 48 hours. ✓ (1)

2.4.2
- In the dark box, the potted plant was not exposed to sun light ✓
- and therefore, no photosynthesis takes place. ✓
- In the absence of photosynthesis, no glucose will become available as a source of energy. ✓
- Therefore, the plant starts converting stored starch in to glucose continuously until it is no longer present. ✓ (4)

2.4.3
- Boil the leaf in water for 3–4 minutes. ✓
- Boil the leaf in alcohol for about 2 minutes. ✓
- Rinse the leaf in cold water. ✓
- Spread the leaf on a tile and add few drops of diluted iodine solution. ✓

2.4.4



(3)
[40]

QUESTION 3

3.1 3.1.1 The rate of photosynthesis increases ✓ as the light intensity increases ✓ therefore, the mean mass of lettuce plants increase. ✓ (Any 2 x 1) (2)

3.1.2 Carbon dioxide ✓
Temperature ✓ (2)

3.1.3 They raised the level of CO_2 to an optimum level of 4% ✓ and temperature to 25 °C ✓ as they increased the light intensity to 8 arbitrary units. ✓ (3)

3.1.4
- The rate of photosynthesis will drop ✓ drastically
- because at higher temperature the protein molecules of the enzymes become denatured ✓
- and therefore, become functionless. ✓ (2)

3.2 3.2.1 A Stomach✓
B Pancreas ✓
D Gall bladder ✓ (3)

3.2.2 Name: Liver ✓
Letter: C ✓ (2)

3.2.3
- Neutralises the acidic chyme from the stomach ✓
- Emulsifies fat ✓
- Provides an alkaline pH for the functioning of enzymes found in the pancreatic juice ✓
- Acts an antiseptic and prevents decomposition of food ✓ (4)

3.2.4 Diabetes mellitus ✓ (1)

3.2.5 **When the blood sugar level rises**:
- (Beta cells) of the islets of Langerhans ✓ in the pancreas ✓ secrete insulin ✓ which regulates blood sugar level.
- It facilitates absorption of glucose from blood into the cells and glucose level of blood is lowered. ✓
- It increases the rate of glucose utilisation in cells. ✓
- It stimulates the conversion of excess glucose into glycogen in the liver and muscles. ✓ (max 4)

When the blood sugar level drops:
- (Alpha cells) of the islets of Langerhans in the pancreas secrete glucagon ✓ which regulates blood sugar level.
- It stimulates the conversion of stored glycogen into glucose. ✓
- and increases the level of glucose in the blood. ✓

High concentration of glucose inhibits the secretion of glucagon✓ but stimulates the secretion of insulin.✓ Similarly, low concentration of glucose inhibits the secretion of insulin✓ but stimulates the secretion of glucagon.✓ This is known as negative feedback mechanism.✓ (max 4) (8)

3.3 3.3.1 A Afferent arteriole ✓
B Efferent arteriole ✓
C Glomerulus ✓ (3)

3.3.2 Ultra-filtration ✓ (1)

3.3.3 Part labelled B is narrower than part labelled A. ✓ Narrow diameter of part labelled B therefore, resist the flow of blood by slowing down the rate of blood flow. ✓ This creates higher blood pressure ✓ in part labelled C. High blood pressure thus generated leads to leakage of blood plasma ✓ with smaller substances such as glucose, amino acids, water, urea and other nitrogenous waste products through the micro pores ✓ on the capillary network at C. Blood cells, plasma proteins and other large solutes are left behind in blood. ✓ (6)

3.3.4 Podocytes ✓ (1)

3.3.5 Presence of slit pores ✓ between the podocytes act as selective filters ✓ allowing only fairly small particles to pass through into the capsular space. ✓ (Any 2 x 1) (2)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Mechanism of breathing process
Inhalation (Inspiration)

- Diaphragm contracts and becomes less convex ✓
- Abdominal muscles relax ✓
- External intercostals muscle contract✓internal intercostal muscle relax ✓
- Ribs are raised upwards and outwards ✓
- Thoracic cavity enlarges in volume ✓
- and pressure in lungs decreases ✓
- Air flows through the air passages into lungs ✓
- Lungs expand ✓ (max 5) (5)

Exhalation (Expiration)

- Diaphragm relaxes✓ and return to its convex dome-shaped position✓
- External intercostals muscles relax✓ and internal intercostals contract✓
- Ribs and sternum move inwards and downwards✓
- Volume of thoracic cavity decreases✓
- Pressure inside thoracic cavity increases✓
- Pressure on lungs increases✓ and
- air rich in carbon dioxide is forced out of lungs ✓ through the air passages into atmosphere ✓ (max 5) (5)

Homeostatic control of carbon dioxide and oxygen

- When the carbon dioxide concentration in the blood increases ✓
- it is detected by the sensory cells (pH receptors) in the walls of the aorta near the heart and brain ✓
- and at the base of the carotid arteries ✓ and
- afferent sensory impulses are transmitted ✓
- to the respiratory control centre in the medulla oblongata ✓
- and the cardio-vascular centre ✓
- from where efferent impulses are transmitted to the diaphragm ✓
- and external inter-costal muscles ✓
- which contract more actively to increase the rate and depth of breathing ✓
- as a result, more oxygen is inhaled ✓ and
- more carbon dioxide is exhaled ✓
- the cardiac muscles contract faster ✓ (heart beat rate increases)
- and the carbon dioxide containing blood is pumped faster to lungs ✓
- and oxygen containing blood faster to the tissue cells ✓
- the peripheral arterioles contract ✓
- so that the blood flows faster through the tissues ✓
- when the carbon dioxide concentration decreases the process slows down ✓ (max 7) (7)

Assessing the presentation of the essay			
Criterion	**Relevance (R)**	**Logical sequence (L)**	**Comprehensive (C)**
Generally	All information provided is relevant to the topic.	Ideas are arranged in a logical/cause-effect sequence.	All aspects required by the essay have been sufficiently addressed.
In this essay	Only information relevant to the Mechanism of breathing process and the homeostatic control of carbon dioxide and oxygen.	The mechanism of breathing process is described in the correct sequence and the homeostatic control of respiratory gases are described in the correct logical sequence.	Mechanism of breathing process thoroughly discussed with homeostatic control of respiratory gases.
Marks	**1**	**1**	**1**

Content: 17
Synthesis: 3

TOTAL SECTION C: 20
GRAND TOTAL: 150