



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2016

**LIFE SCIENCES P1
MEMORANDUM**

MARKS: 150

This memorandum consists of 11 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2016

1. **If more information than marks allocated is given.**
Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.
2. **If, for example, three reasons are required and five are given.**
Mark the first three irrespective of whether all or some are correct/ incorrect.
3. **If whole process is given when only part of it is required.**
Read all and credit relevant part.
4. **If comparisons are asked for and descriptions are given.**
Accept if differences/similarities are clear.
5. **If tabulation is required but paragraphs are given.**
Candidates will lose marks for not tabulating.
6. **If diagrams are given with annotations when descriptions are required.**
Candidates will lose marks.
7. **If flow charts are given instead of descriptions.**
Candidates will lose marks.
8. **If sequence is muddled and links do not make sense.**
Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links becomes correct again, resume credit.
9. **Non-recognised abbreviations.**
Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation but credit the rest of answer if correct.
10. **Wrong numbering.**
If answer fits into the correct sequence of questions but the wrong number is given, it is acceptable.
11. **If language used changes the intended meaning.**
Do not accept.

12. **Spelling errors.**
If recognisable accept provided it does not mean something else in Life Sciences or if it is out of context.
13. **If common names given in terminology.**
Accept provided it was accepted at the provincial memorandum discussion meeting.
14. **If only letter is asked for and only name is given (and vice versa).**
Do not credit.
15. **If units are not given in measurements.**
Candidates will lose marks. Memorandum will allocate marks for units separately.
16. **Be sensitive to the sense of an answer, which may be stated in a different way.**
17. **Caption.**
All illustrations (diagrams, graphs, tables, etc.) must have a caption.
18. **Code-switching of official languages (terms and concepts).**
A single word or two that appears in any official language other than the learners' assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.
19. **Changes to the memorandum**
No changes must be made to the marking memoranda without consulting the provincial internal moderator.

SECTION A**QUESTION 1**

- 1.1 1.1.1 D ✓✓
- 1.1.2 D ✓✓
- 1.1.3 A ✓✓
- 1.1.4 A ✓✓
- 1.1.5 A ✓✓
- 1.1.6 D ✓✓
- 1.1.7 C ✓✓
- 1.1.8 A ✓✓
- 1.1.9 C ✓✓
- 1.1.10 C ✓✓ (10 x 2) (20)
- 1.2 1.2.1 Carrying capacity ✓
- 1.2.2 Chloroplasts ✓
- 1.2.3 Culling ✓
- 1.2.4 Intraspecific ✓ competition
- 1.2.5 Nephron ✓
- 1.2.6 Egestion/Defaecation ✓ (6 x 1) (6)
- 1.3 1.3.1 B only ✓✓
- 1.3.2 B only ✓✓
- 1.3.3 A only ✓✓
- 1.3.4 Both A and B ✓✓
- 1.3.5 A only ✓✓
- 1.3.6 A only ✓✓
- 1.3.7 A only ✓✓ (7 x 2) (14)

- 1.4 1.4.1 To demonstrate that light energy ✓ is necessary for photosynthesis. ✓ (2)
- 1.4.2 The presence/absence of starch ✓ (1)
- 1.4.3 (Dilute) iodine solution ✓ (1)
- 1.4.4 (a) No colour change / remain reddish brown ✓ (1)
- (b) Turns blue-black ✓ (1)
- 1.4.5 (a) Carbohydrases ✓ (1)
- (b) Salivary glands ✓ (1)
- 1.4.6 (a) Oxygen ✓ / O₂ (1)
- (b) Oxygen ✓ / O₂ (1)

TOTAL SECTION A: 50

SECTION B**QUESTION 2**

- 2.1 2.1.1 Graph C ✓ (1)
- 2.1.2 Due to a lower carbon dioxide concentration. ✓ (1)
- 2.1.3 Temperature ✓ (1)
- 2.1.4 The graph will show a steady increase in the rate up to 40 °C ✓ and a further increase in temperature will let it fall dramatically. ✓ (2)
- 2.1.5 - At higher temperatures, the enzymes become completely denatured ✓/ functionless.
- When the temperature is increased to 40 °C, the temperature is optimum for maximum photosynthesis. ✓ (Max. 1) (1)
- 2.2 2.2.1 (a) Waterplants are structurally adapted to perform photosynthesis under water. ✓ (1)
- (b) Addition of small amounts of sodium bicarbonate increases the concentration CO₂ ✓ to bring about a steady rate of photosynthesis. (1)
- 2.2.2 By counting the number of bubbles released in a minute (unit time) ✓ (1)
- 2.2.3 - As the intensity of light increases ✓
- the rate of photosynthesis increases proportionately up to a certain point. ✓
- A further increase in light intensity ✓
- will cause no further increase in the rate of photosynthesis. ✓ (Any 3 x 1) (3)
- 2.2.4 - When the light intensity increases ✓
- the temperature increases proportionately ✓ which
- limits the performance of various enzymes ✓ and
- hence limit the rate of photosynthesis. ✓ (4)
- 2.3 2.3.1 3 – Lacteal/ Lymph fluid ✓
Absorption and transport of fatty acids and glycerol. ✓ (2)
- 2.3.2 Part Labelled 1 ✓ (1)
- 2.3.3 Diffusion/Active transport ✓ (1)

- 2.3.4 - It is only one cell thick / thin ✓ so the nutrients can pass through quickly and easily. ✓
- It is richly supplied with mitochondria ✓
- to supply energy for the active transport of many nutrients. ✓
- It also secretes mucus ✓
- that serves as a carrier-fluid for nutrients ✓
- Moist membrane ✓
- to enhance the diffusion of nutrients. ✓
- It has microvilli ✓
- that further increases the surface area for absorption. ✓
(Any 3 x 2) (6)

2.4 2.4.1 It is the cellular imbalance between the supply of nutrients and energy ✓ and the body's demand for them to ensure growth, maintenance, and specific functions. ✓ (2)

2.4.2 Kwashiorkor ✓ (1)

- 2.4.3 - Gastric glands in the stomach ✓
- secretes gastric juices which ✓
- contains the enzyme proteases. ✓
- The enzyme proteases hydrolyse/digest ✓
- proteins into polypeptides/peptones ✓
- and eventually into amino acids. ✓
- Protease only function best in an acidic medium. ✓ (5)

- 2.5 - A large surface area ✓ for maximum exchange of gases ✓
- Thin and permeable ✓ for a rapid and easy diffusion process ✓
- Moist surface ✓ so that gases can dissolve to form a solution ✓
- Must be well-ventilated ✓ to bring fresh air to the exchange surface ✓
- Well-protected ✓ against mechanical damage and drying out. ✓
(Any 3 x 2) (6)

[40]

QUESTION 3

- 3.1 3.1.1 A – trachea ✓
B – bronchi ✓ (2)
- 3.1.2 - The volume in the bell jar increases ✓ which will cause the
- pressure in the bell jar to decrease ✓ and the elastic balloons
- will expand ✓ increasing their volume and reducing the
- pressure within them. ✓ The pressure in the balloons are less
- than the atmospheric pressure ✓ therefore air will flow in
- through the Y-tube ✓ which will equalise the pressure. ✓
(Any 3 x 1) (3)
- 3.1.3 The sides of the model are immovable ✓ but in the human chest the
rib cage can move upwards and outwards. ✓ (2)
- 3.2 3.2.1 A – renal vein ✓
B – ureter ✓
C – Inferior vena cava ✓ (3)
- 3.2.2 The kidney has the important function in the removal of nitrogenous
wastes/excess salts from the blood. ✓ (1)
- 3.2.3 No*✓ (compulsory mark)
- If the person suffers from diabetes, there would be a certain
- percentage of glucose in the content of structure **B**. ✓
- A diabetes sufferer will have an abnormal glucose content in the
blood ✓
- because his insulin secretion is abnormal. ✓
- Therefore glucose is not converted to glycogen ✓
- hence the glucose is excreted through urine. ✓
(1 compulsory mark + Any 3 x 1) (4)
- 3.2.4 Glucose, ✓ amino acids ✓ and proteins ✓ as they get reabsorbed into
the blood and do not end up in **B** to be excreted. ✓ (4)
- 3.3 3.3.1 - Must all be of the same species ✓
- live in a define area ✓
- and be able to interbreed easily. ✓ (3)
- 3.3.2 Predator – prey ✓ / predation (1)
- 3.3.3 64 000 – 66 000 (1)
- 3.3.4 The lynx population increased* ✓✓
- on the graph the rabbit population increased.
- this result in more food for the lynx ✓
- allowing them to survive and their birth rate to rise. ✓
(1 Compulsory mark + Any 1 x 1) (2)

- 3.4 (a) Mutualism is the symbiotic relationship between two organisms of different species ✓ where both the individuals derive mutual (nutritional) benefit. ✓ (2)
- (b) Commensalism is the symbiotic relationship between two organisms in which one organism benefits ✓ while the other neither benefits, nor is it harmed. ✓ (2)
- 3.5 3.5.1 A – Lag/establishment phase ✓
B – Accelerating/exponential growth phase ✓/ geometric growth phase
D – Equilibrium/stationary phase ✓ (3)
- 3.5.2 B ✓ (1)
- 3.5.3 - As the size of the population reaches closer to the carrying capacity ✓
- the competition for scarce resources increases ✓
- as a result of environmental resistance ✓ (e.g. shortage food, oxygen, space etc.)
- causing an unfavourable condition for rapid reproduction. ✓
(Any 2 x 1) (2)
- 3.5.4 - The size of human population has nearly reached the carrying capacity of planet earth
- resulting severe competition for scarce resources ✓ and
- unprecedented exploitation of natural resources ✓
- leading to rapid pollution of air, water and land ✓
- causing further decrease of carrying capacity ✓
- causing increased competition ✓
- and eventually will lead to the *extinction ✓ of mankind.
(*Compulsory point) (1 compulsory point + Any 1 x 1) (2)
- 3.6 - Pioneer species stage ✓
- Intermediate species stage ✓
- Climax community ✓
(Mark only the first two.) (Any 2 x 1) (2)
- [40]**

TOTAL SECTION B: 80

SECTION C**QUESTION 4*****Process of Glycolysis ✓**

- Occurs in the cytoplasm (cytosol) ✓
- it involves phosphorylation ✓ (i.e., addition of energy from ATP)
- of energy-rich glucose molecule ✓
- The activated glucose molecule is then broken down into two molecules pyruvic acid. ✓
- Energised hydrogen atoms ✓ releases energy in the process.
- This energy is used to form ATP. ✓
- Each step in the process is catalysed by a highly specific enzyme. ✓
- No oxygen is required.

(*Compulsory mark 1 + 3) (4)

***Krebs' cycle ✓**

- Occurs only if oxygen is present. ✓
- Pyruvic acid produced during glycolysis
- enters the mitochondria ✓
- where it is used in a cycle series of reactions.
- The energised hydrogen atoms ✓
- and CO₂ ✓ are released during these reactions.
- co-enzymes ✓ transfer the hydrogen atoms.

(*Compulsory mark 1 + 3) (4)

***Oxidative phosphorylation ✓ / Terminal oxidation / hydrogen transfer system**

- Occurs in the mitochondria. ✓
- The energised hydrogen atoms (from glycolysis and Krebs' cycle) are transferred ✓ from one co-enzyme carrier to another.
- At each transfer, little energy is given ✓ off from the energised hydrogen
- until gradually all the energy is drained ✓ from the hydrogen atoms.
- This energy is used to combine with ADP + P to form ATP. ✓
- Finally the hydrogen combines with oxygen ✓
- to form water ✓
- The majority of ATP molecules are produced during this stage.

(*Compulsory mark 1 + 3) (4)

Homeostatic control of CO₂

- Receptor cells in the carotid artery in the neck are stimulated ✓
- to send impulses to the medulla oblongata ✓ in the brain.
- The medulla oblongata stimulates breathing muscles ✓ (intercostal muscles and diaphragm)
- and heart. ✓
- Breathing muscles contract more actively ✓
- increasing the rate and depth of breathing. ✓
- The heart beats faster ✓
- and more CO₂ is taken to and exhaled from the lungs. ✓

(Any 5 x 1) (5)

ASSESSING THE PRESENTATION OF THE ESSAY

Criterion	Relevance (R)	Logical sequence (L)	Comprehensive (C)
Generally	All information provided is relevant to the question.	Facts are arranged in a logical/ sequential order.	All aspects required by the essay have been sufficiently addressed.
In this essay	Only information relevant to the process of respiration and the homeostatic control of CO ₂ is discussed. (There is no irrelevant information.)	Events leading up to the final production of ATP and the reduction of high levels of CO ₂ back to normal level are provided in the correct sequence.	Learner has scored at least: - Glycolysis (3) - Krebs' cycle (3) - Terminal oxidation (3) - Homeostatic control of CO ₂ (3)
MARK	1	1	1

Synthesis (3)

TOTAL SECTION C: 20
GRAND TOTAL: 150