Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2022

LIFE SCIENCES P1 MARKING GUIDELINE

MARKS: **150**

This marking guideline consists of 11 pages.

PRINCIPLES RELATED TO THE MARKING OF LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when maximum marks are 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 a part of it is required**
   Read all and credit the relevant parts.

4. **If comparisons are asked for, but descriptions are given**
   Accept if the 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 become 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 the 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 the answer, provided it does not mean something else in Life Sciences or if it is out of context.

13. **If common names are given in terminology**
    Accept, provided it was accepted at the national memo discussion meeting.

14. **If only the letter is asked for, but only the 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 different ways**

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 appear(s) in any official language other than the learner's 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.

SECTION A

QUESTION 1

1.1	1.1.1	B ✓✓		
	1.1.2	C ✓✓		
	1.1.3	A ✓✓		
	1.1.4	D ✓✓		
	1.1.5	C ✓✓		
	1.1.6	C ✓✓		
	1.1.7	C ✓✓		
	1.1.8	A ✓✓		
	1.1.9	A ✓✓		
	1.1.10	A ✓✓	(10 x 2)	(20)
1.2	1.2.1	Stroma ✓		
	1.2.2	Mitochondrion ✓/ Mitochondria		
	1.2.3	Glycolysis ✓		
	1.2.4	Yeast ✓		
	1.2.5	Bronchi ✓		
	1.2.6	Medulla ✓		
	1.2.7	Excretion ✓		
	1.2.8	Nephron ✓	(8 x 1)	(8)
1.3	1.3.1	Both A and B ✓✓		
	1.3.2	B only ✓✓		
	1.3.3	B only ✓✓	(3 x 2)	(6)
1.4	1.4.1	(a) Oxygen ✓		(1)
		(b) Diffusion ✓		(1)
	1.4.2	(a) A ✓ – (Pulmonary) arteriole ✓		(2)
		(b) D ✓ – Erythrocyte ✓ / Red blood cell		(2)
		(c) B ✓ – (Pulmonary) venule ✓		(2)
	1.4.3	(a) Squamous ✓ epithelium		(1)
		(b) Endothelium ✓		(1)

1.5 1.5.1 (a) Oesophagus ✓ (1)

(b) Stomach ✓ (1)

(c) Pylorus ✓ / Pyloric sphincter (1)

1.5.2 Controls the movement of chyme from the stomach to the small intestine ✓ (1)

1.5.3 (a) Gastric glands ✓ (1)

(b) Hydrochloric acid ✓ (1)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 (a) A – Malpighian body ✓/renal corpuscle (1)

(b) B – (Ultra) filtration ✓ (1)

2.1.2 (a) Afferent arteriole ✓ (1)

(b) Glomerulus ✓ (1)

(c) Glomerular filtration ✓ (1)

2.1.3
- Protein molecules are large molecules ✓
- which generally cannot pass through ✓ the tiny pores of the thin glomerular endothelium into the capsular space
- Therefore, very high amounts of protein in the urine indicates malfunctioning of filtration process ✓/ greater pressure facilitates filtration
- as well as tubular reabsorption ✓
- a tear in the glomerular membrane can also lead to proteins appearing in the urine ✓ (Any 3 x 1) (3)

2.1.4 Glucose ✓ (1)

2.1.5
- Afferent arteriole is wider than efferent arteriole ✓/the narrow diameter of efferent arteriole resists the flow of blood from the wider afferent arteriole
  causing high blood pressure in the glomerulus ✓
- The glomerulus provides large surface area ✓
  so that more plasma(liquid) is able filter through the endothelium within a short period of time ✓
- Walls of glomerular capillaries consist of a single endothelial layer ✓ which is in close contact with inner wall of Bowman's capsule and therefore, which facilitates efficient filtration ✓
- The endothelial wall of glomerular capillaries has many pores ✓
  so that the liquid part of the blood / plasma is able filter out in to the capsular space ✓
- Bowman's capsule is cup-shaped to provide a large filtration surface✓
  so that more filtration occurs ✓
- The inner wall of Bowman's capsule consists of a single epithelial layer consisting of irregular shaped podocytes with intercellular spaces ✓ for easy glomerular filtration ✓

(Mark first THREE only) (Any 3 x 2) (6)

2.2 2.2.1 The rate of photosynthesis increases with increasing light intensity ✓✓

OR

The rate of photosynthesis decreases with increasing light intensity ✓✓

OR

The light intensity has no effect on rate of photosynthesis ✓✓ (2)

2.2.2 The light intensity ✓ (1)

2.2.3 By counting the number of bubbles released per minute ✓✓ (2)

2.2.4 Oxygen ✓ (1)

2.2.5
- Temperature ✓
- The voltage of the bulb ✓/ current
- The amount of carbon dioxide ✓
- Person counting the bubbles ✓
- Plant species ✓
- The surface tension of water ✓
- The purity of water used ✓

(Mark first TWO only) (Any 2 x 1) (2)

2.2.6 To increase the concentration of carbon dioxide in the water ✓ (1)

2.2.7
- The glowing splint ✓ burst into flame / glows brighter
- which indicates that oxygen has been given off ✓ by the plant. (2)

2.2.8 (a) $28 - 8 = 20$ ✓

$\frac{20}{8} \times 100$ ✓$= 250$ ✓% (3)

(b)
- It enables farmer to adjust the light to its optimal level ✓
- in order to increase the rate of photosynthesis ✓
- By increasing the rate of photosynthesis, the farmer is able to increase agricultural yield to its maximum ✓ (3)

2.3 2.3.1 (Structure of) a villus. ✓ (1)

2.3.2 Found in the small intestine ✓/duodenum/jejunum/ileum (1)

2.3.3 Absorption of digested nutrients ✓ (1)

2.3.4 Diffusion: ✓ is the movement of molecules from a region of its higher concentration to a region of its lower concentration. ✓

OR

Active transport: ✓ is the movement of molecules with the assistance of carrier molecules against the concentration gradient/ from high concentration to low concentration using energy. ✓

(Mark first ONE only) (2)

2.3.5
- The thin columnar epithelium ✓ facilitates easy diffusion of nutrients ✓
- Provides large surface area ✓ (large area of absorption) so that more nutrients are absorbed in a faster pace. ✓
- Consists of many blood capillaries (a network of blood capillaries) and lacteal ✓ for faster transport of nutrients away from the site of absorption. ✓ (6)

2.4 2.4.1 To prevent air from entering the test tubes ✓as it would alter the experimental results / to stop gases from entering or leaving. (1)

2.4.2
- Test tube **B** contains a bag of live worms ✓
- They produce large amounts of carbon dioxide over time. ✓ / during
- cellular respiration which causes the indicator in test tube **B** to become yellow (2)

2.4.3 Test tube **C** was set up as a control ✓/ to compare results / to determine whether the factor under investigation was actually the one that caused the change. (1)

2.4.4
- No photosynthesis will take place ✓ due to lack of light.
- the green leaves continue to respire ✓ at a rate slower than animals
- hence releases small amounts of carbon dioxide ✓ and later
- the amount of carbon dioxide increases ✓ due to gradual accumulation. (Any 3 x 1) (3)

[50]

QUESTION 3

3.1 3.1.1 (a) Diaphragm ✓ (1)

(b) Intercostal muscles ✓/ external and internal intercostal muscles (1)

3.1.2 Diagram 2 ✓ (1)

3.1.3
- The diaphragm is relaxed and therefore restores its original dome shape ✓
- Size of thoracic/chest cavity is substantially reduced ✓
- Size of the lungs became smaller ✓

(Mark first TWO only) (Any 2 x 1) (2)

3.1.4 A → B ✓✓ (2)

3.1.5 (a)
- The accumulation of fluids and mucus in the alveoli drastically reduces the rate of gaseous exchange ✓
- This causes an increase in the carbon dioxide level and drop in the oxygen level in the blood ✓
- The high level of carbon dioxide stimulates medulla oblongata ✓
- to send impulses to breathing muscles ✓ and
- heart muscles ✓
- causing an increase in the rate and depth of breathing ✓ and
- rate of heart beat ✓
- in an attempt to restore carbon dioxide/oxygen balance in the
- blood ✓ (Any 4 x 1) (4)

(b)
- Reduced rate of gaseous exchange ✓ due to pneumonia
- leads to a steady drop in oxygen in the blood ✓
- hence active pumping of oxygen is required to raise the level of oxygen in the blood ✓
- to maintain the optimal rate of cellular metabolism ✓ (e.g., cellular respiration)
- to generate energy for the proper functioning of vital organs to maintain life ✓ (Any 4 x 1) (4)

3.2 3.2.1 (a) Anaerobic respiration ✓/ lactic acid fermentation (1)

(b) In the skeletal muscles ✓ (1)

3.2.2 18/19 ✓arbitrary units (1)

3.2.3 10 ✓ minutes (1)

3.2.4
- The intense physical activity leads to an increased rate of cellular respiration ✓
- causing an accumulation of carbon dioxide ✓ and
- decrease in the level of available oxygen ✓ due to insufficient ventilation
- therefore, only glycolysis takes place ✓
- In the absence of sufficient oxygen, the pyruvic acid molecules are converted to lactic acid ✓ which is stored in the muscle tissues.

(Any 4 x 1) (4)

3.2.5
- No physical activity occurs during resting ✓
- less glucose is required to be oxidised ✓
- therefore, the demand for oxygen is decreased ✓/ excess carbon dioxide is expelled from the body gradually / carbon dioxide-oxygen balance will be restored.
- the lactic acid stored in the muscles will be converted back to pyruvic acid ✓
- enabling the cell to complete the process ✓/ Krebs cycle and oxidative phosphorylation (Any 4 x 1) (4)

3.3 3.3.1 A condition characterised by excess sodium in the blood ✓ (1)

3.3.2
- Too much water loss ✓
- High intake of salt ✓/ sodium (2)

3.3.3
- The high concentration of sodium ✓ creates
- a steeper concentration gradient ✓
- which leads to the passive absorption of water ✓
- from the collecting tubule into the surrounding tissue fluid ✓
- surrounding the cells at the medulla region (Any 3 x 1) (3)

3.3.4
- The lower level of sodium in the blood stimulates
- the adrenal gland ✓ to secrete and release
- more aldosterone into the blood ✓
- which causes the reabsorption of more sodium by the capillaries ✓
- at the distal and collecting tubules ✓/less sodium ions are excreted
- from the kidneys ✓
- Sodium ions are reabsorbed until its level in the blood returns to normal ✓

(Any 4 x 1) (4)

3.3.5
- The diarrhoea and vomiting leads to excessive loss of water and salts ✓
- drops the level of water in the blood ✓/ causes dehydration that
- stimulates the hypothalamus ✓/ pituitary gland to release more ADH into the blood.

(Any 2 x 1) (2)

3.4 3.4.1 (a) 0,7 ✓mg/cm^3 (1)

(b) 0,5 ✓mg/cm^3 (1)

3.4.2
- A healthy person maintains optimum levels of insulin ✓ and
- hence maintains normal blood glucose level ✓
- the additional amount of insulin injected converts more glucose in the blood to glycogen ✓
- which is stored in the muscles and liver ✓ dropping the blood glucose level drastically (Any 3 x 1) (3)

3.4.3
- When the level of glucose drops below the normal ✓
- pancreas/cells of islets of Langerhans are stimulated ✓ to
- secrete more glucagon ✓ into the blood which
- causes the muscles and liver ✓
- to convert stored glycogen into glucose ✓
- this raises the level of glucose back to normal ✓ (Any 4 x 1) (4)

3.4.4
- Concentrated glucose / sugar solution will be absorbed directly in to the blood ✓
- because glucose is the monomer unit of carbohydrates which requires no digestion ✓

OR

- Starch containing food has to be digested into glucose before it can be absorbed into the blood ✓
- The digestion process takes time to complete and it may delay the treatment of the patient ✓ (2)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150