



**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]

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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) $0,7 \checkmark \text{mg/cm}^3$ (1)
- (b) $0,5 \checkmark \text{mg/cm}^3$ (1)
- 3.4.2 - A healthy person maintains optimum levels of insulin \checkmark and
- hence maintains normal blood glucose level \checkmark
- the additional amount of insulin injected converts more glucose in
the blood to glycogen \checkmark
- which is stored in the muscles and liver \checkmark dropping the blood
glucose level drastically (Any 3 x 1) (3)
- 3.4.3 - When the level of glucose drops below the normal \checkmark
- pancreas/cells of islets of Langerhans are stimulated \checkmark to
- secrete more glucagon \checkmark into the blood which
- causes the muscles and liver \checkmark
- to convert stored glycogen into glucose \checkmark
- this raises the level of glucose back to normal \checkmark (Any 4 x 1) (4)
- 3.4.4 - Concentrated glucose / sugar solution will be absorbed directly in
to the blood \checkmark
- because glucose is the monomer unit of carbohydrates which
requires no digestion \checkmark

OR

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

[50]**TOTAL SECTION B: 100**
GRAND TOTAL: 150