LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL

SENIOR CERTIFICATE

GRADE 10

LIFE SCIENCES MID-YEAR EXAMINATIONS

20 MAY 2024

MARKS: 150

TIME: 2H30

This question paper consists of 16 pages including the cover page.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your ANSWER BOOK.
3. Start the answers to each question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. ALL drawings should be done in pencil and labelled in blue or black ink.
7. Draw diagrams or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and a compass.
11. Write neatly and legibly.

SECTION A

QUESTION 1

1.1. Various options are provided as possible answers to the following. Choose the correct answer and write only the letter (A-D) next to the question number (1.1.1 to 1.1.4) in the ANSWER BOOK, for example, 1.1.6.D

1.1.1. The most abundant organic compound found in cell walls of plant cells is: (2)

A Lipid
B Starch
C Cellulose
D Protein

1.1.2. The building blocks of nucleic acids is … (2)

A disaccharides.
B monosaccharides.
C amino acids.
D nucleotide

1.1.3. The chloroplast is the site of … (2)

A photosynthesis
B cellular respiration.
C cellular division
D cytokinesis

1.1.4. Which one of the following statements about enzymes is not true? (2)

A Enzymes are denatured at extreme temperatures
B Enzymes denatures below 37˚c
C Enzymes are used up in a chemical reaction
D Enzymes control and regulates all chemical reactions that takes place in a cell.

1.1.5. Which of the following describes one function of the nucleus in cells: (2)

A Gives the cell its shape
B Allows certain substances through selectively
C Prevents loss of water
D Carries the hereditary characteristics

1.1.6. Which of the following sets of features is common to both plant and animal cells? (2)

A Chloroplasts, cell membrane, nucleus
B Cytoplasm, nucleus, cell membrane
C Cell membrane, cell wall, nucleus
D Cell membrane, cell wall, chloroplasts

1.1.7. The process of water movement through a plant and its evaporation from aerial parts. (2)

A capillarity action
B transpiration
C root pressure
D transpiration pull

1.1.8. A cell is studied under a microscope. Which of the following features will indicate that it is an animal cell? (2)

A A large vacuole is observed
B A large nucleus is observed
C The cytoplasm has many chloroplasts
D The cell is surrounded by thin cell membrane only

1.1.9. Tracheids form part of: (2)

A Xylem tissue
B Chlorenchyma
C Stone cells
D Sieve tubes

1.1.10. The process of cell division that produces two genetically identical daughter cells. (2)

A Mitosis
B Karyokinesis
C Differentiation
D Cell cycle

(10x2) **(20)**

1.2 Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1 to 1.2.10) in your ANSWER BOOK.

1.2.1. The pressure that forces water to move through the roots and up the stem of a plant (1)

1.2.2. Gene-containing thread-like structure in the nucleus that is conspicuous during mitosis. (1)

1.2.3. Specialized cell in ciliated columnar epithelial tissue which produce mucus (1)

1.2.4. Nerve fibers that conduct nerve impulses to the cell body (1)

1.2.5. Part of the human skull that encloses and protects the brain (1)

1.2.6. A structure that attaches bone to bone (1)

1.2.7. Structural unit of the nervous system (1)

1.2.8. The membrane system in a cell on which ribosomes sometimes occur (1)

1.2.9. Apparatus used to measure the rate of transpiration. (1)

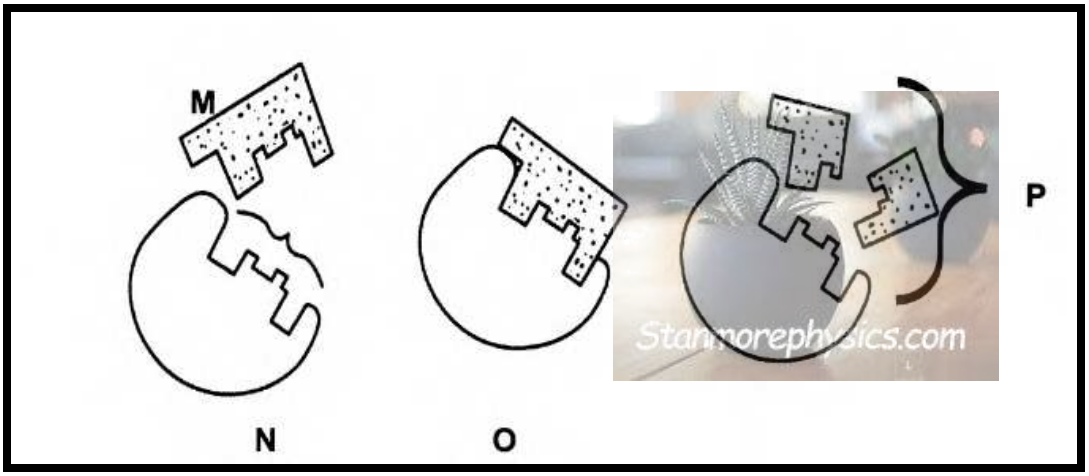
(9 x 1) **(9)**

1.3. Indicate whether each of the statements in COLUMN I applies to A ONLY, B ONLY, BOTH A AND B or NONE of the items in COLUMN II. Write **A only**, **B only**, **Both A and B**, or **None** next to the question number (1.3.1 to 1.3.3) in the ANSWER BOOK

	COLUMN I	COLUMN II	
1.3.1.	Nerve fibres that conduct nerve impulses to the cell body	A: Neuron B: Axon	(2)
1.3.2.	Tissue that joins muscle to bone	A: Muscle Tissue B: Tendons	(2)
1.3.3.	A pore in the epidermis of the leaf between two guard cells	A: Stoma B: Stroma	(2)

(3x2) **(6)**

1.4 The diagram below shows a certain organic compound



1.4.1 Give labels for the following

(a) M (1)

(b) O (1)

(c) P (1)

1.4.2 Name the mechanism shown in the diagram above (1)

1.4.3 State the properties of enzyme illustrated the diagram above (1)

1.4.4 List TWO properties of enzymes other than the one mentioned in QUESTION 1.4.3 (2)

1.4.5 Explain why part **P** has broken (1)

(8)

1.5. The table below shows the composition of four kinds of food (A, B, C and D):

Food	Kilojoules per 100g	Composition per 100g					
		Protein	Fats	Carbohydrates	Vitamins C	Vitamin D	Iron
A	3800	0,4g	86g	0	0	40mg	0
B	130	1,2g	0	8g	220mg	0	0
C	1150	8,8g	1,5g	60g	0	0	0
D	400	2,0g	0,1g	25g	10mg	0	6mg

1.5.1 Which food (A, B, C or D) would….

(a) Help to prevent anemia? (1)

(b) suitable for a child with Kwashiorkor? (1)

(c) Be highly recommended for a person who has bleeding gums? (1)

(d) The daily vitamin C intake for a 16 year old should be 30mg. (3)

What mass of food D will supply this amount? Show calculations

1.5.2 Rice contains starch and proteins but no glucose. (1)

Which food (A, B, C, or D) is probably rice?

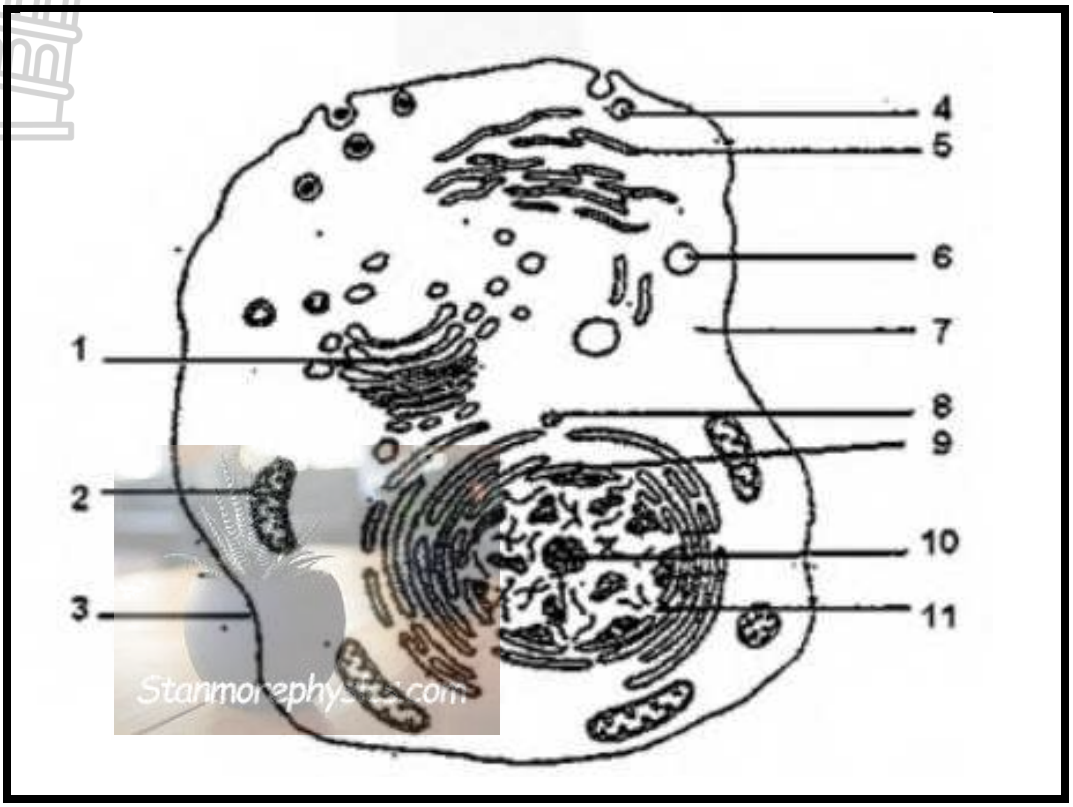
(7)

TOTAL SECTION A: (50)

SECTION B

QUESTION 2

2.1 Study the diagram of a cell and answer the questions that follow:



2.1.1. Is the diagram above, of a plant or animal cell? (1)

2.1.2 Give TWO visible reasons from the diagram to support your answer to question 3.2.1 above. (2)

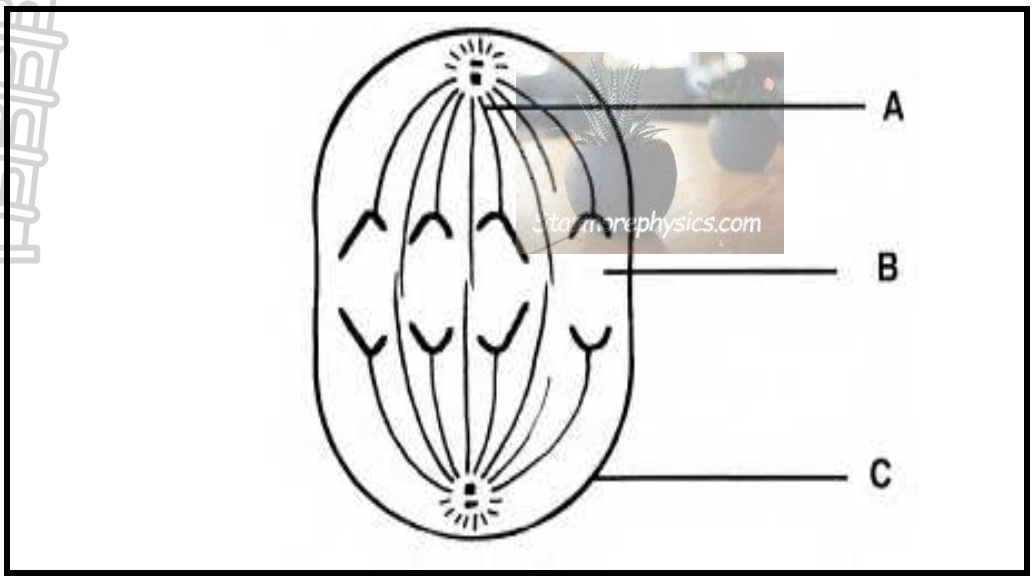
2.1.3 Give the number only of the part that is said to be differentially or semi-permeable. (1)

2.1.4. Label 1, 2 and 3. (3)

2.1.5. Tabulate **TWO** differences between a plant and an animal cell. (5)

(12)

2.2 The diagram below shows a cell during a phase in mitosis.



2.2.1 Label part A, B, C on the diagram above (3)

2.2.2 Discuss the main events that occur before the phase represented in the diagram. (3)

2.2.3 Mention TWO ways in which process of mitosis is biologically importance (2)

2.2.4 Explain why the phase above is anaphase (2)

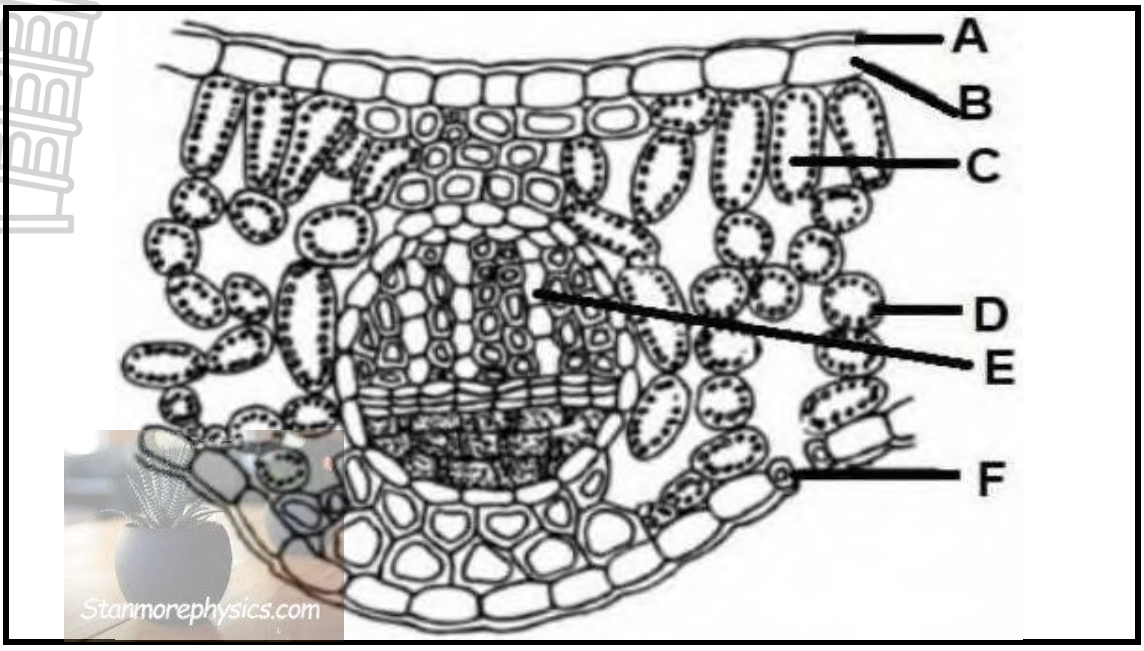
2.2.5 At a time cells may continue to divide by mitosis uncontrollably. Such cells are referred to as being cancerous

(a) Name THREE causes of cancer. (3)

(b) In what TWO ways cancer may be treated. (3)

(16)

2.3 The diagram shows the cross section of the dicotyledonous leaf.



2.3.1 Give the LETTER of the part that:

(a) transparent and impermeable to water (1)

(b) transports water and mineral salts (1)

2.3.2 Give collective term for part **C** and **D** (1)

2.3.3 Describe the influence sunken stomata of this diagram on transpiration rate. (3)

2.3.4 Explain TWO ways in which part **C** is structurally adapted for its function of photosynthesis (4)

(10)

2.4. The following nutritional information is printed on a box of breakfast cereal. Study the table and answer the questions that follow.

Nutrients present in cereal	**30 g of cereal contain:**
Proteins	4.2 g
Carbohydrates	22.4 g
Fat	0.5 mg
Iron	18 mg
Vitamin B_1	1.5 mg
Fibre (roughage)	5.7 g

2.4.1. Which type of nutrient makes up the largest part of 30g of above cereal? (1)

2.4.2 Name the building blocks of the type of nutrient named in question (2)

2.4.3 Name FOUR functions of protein in the human body. (4)

2.4.4. Draw a simple diagram to show the structure of a lipid, label the parts clearly. (4)

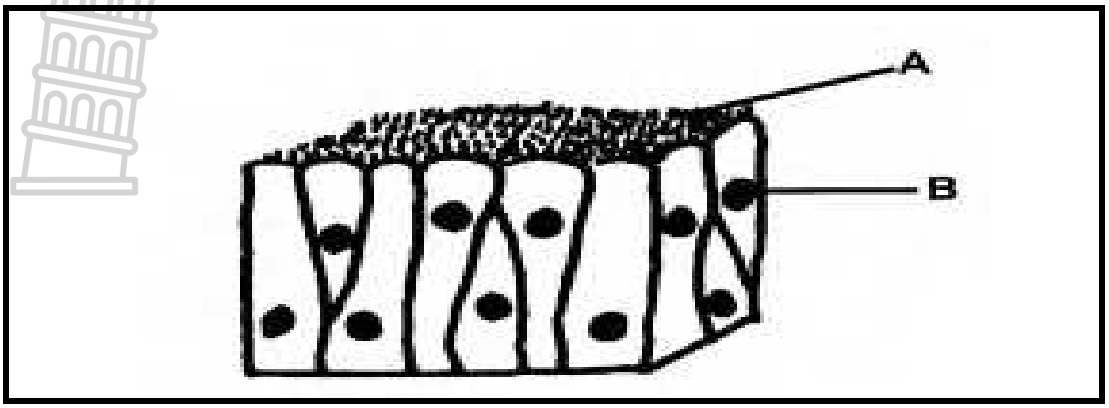
2.4.5. Name an inorganic nutrient in this cereal. (1)

(12)

[50]

QUESTION 3

3.1. The diagram below shows the animal tissue



3.1.1 Identify tissue above (1)

3.1.2. Label part A and B (2)

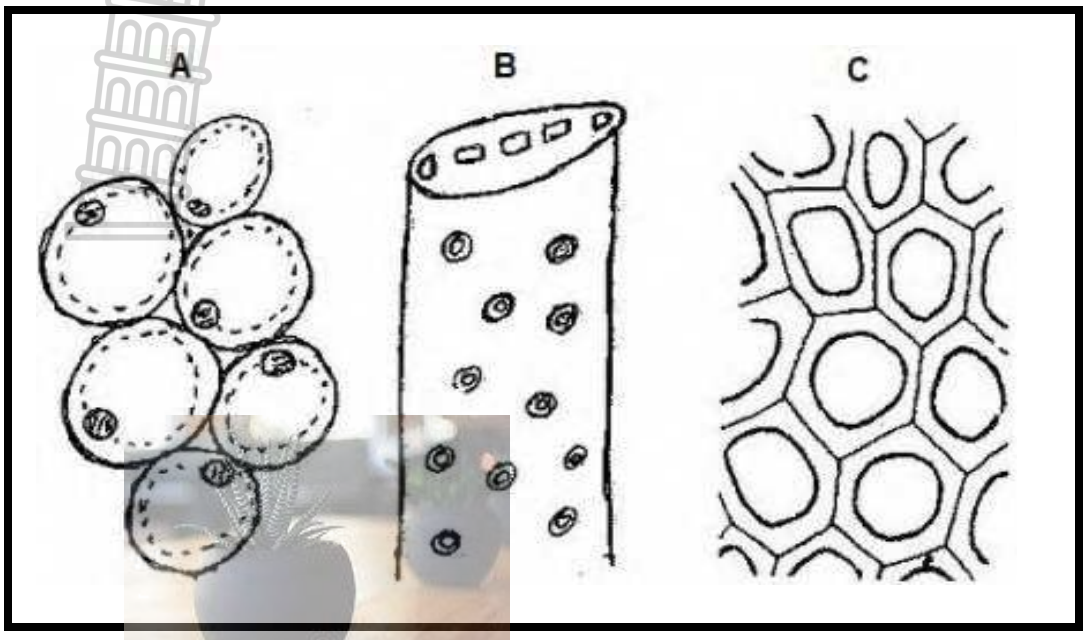
3.1.3. Name TWO areas in the human body where the tissue is found (2)

3.1.4. Give TWO functions of the tissue identified in QUESTION 3.1.1. (2)

3.1.5. Describe ONE way in which the tissue is structurally suited for its function (2)

(9)

3.2 Study the following plant tissues and answer questions that follow:



3.2.1 Give the LETTER and the NAME of the tissue which:

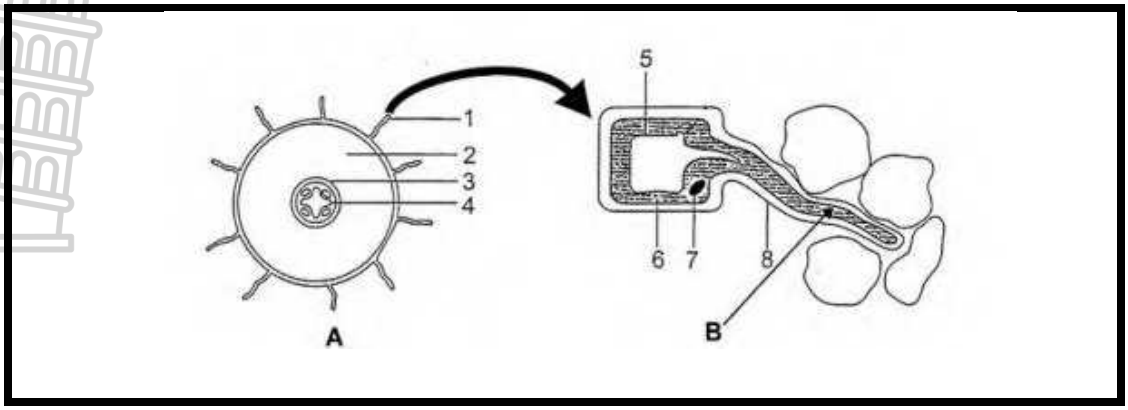
(a) Transports water and minerals up the plant. (2)

(b) Provides mechanical support to the plant. (2)

3.2.2 Explain TWO ways in which tissue **B** is structurally suited for its function. (4)

(8)

3.3 The diagram below represents the plant organ



3.3.1 Identify organ represented by diagram A. (1)

3.3.2 Explain TWO structural adaptations which enable effective functioning of part labeled 4 (4)

(5)

3.4. Grade 10 learners conducted the investigation to determine the effect of different light intensities on the rate of transpiration in leaves.

The following procedure was followed:

- 2 leafy shoots of the same plants were used.
- The leafy shoots were of the same age.
- The leafy shoots were than labelled leafy shoot A and leafy shoot B.
- Leafy shoot A was exposed to different light intensities.
- Leafy shoot B was placed in a dark area.
- All other factors affecting transpiration rate were kept constant.
- Potometer was used to measure the rate of transpiration in both leafy shoots.
- The results of the investigation were recorded hourly for shoot A and B

The results for leafy shoot A are shown in the table below:

Light intensities (Lux)	5	10	15	20	25
Rate of transpiration (ml)	2	4,8	4,9	5	5

3.4.1 Identify:

(a) dependent variable (1)

(b) independent variable (1)

3.4.2 State the effect of increasing the light intensity on transpiration rate from 5 to 10 (1)

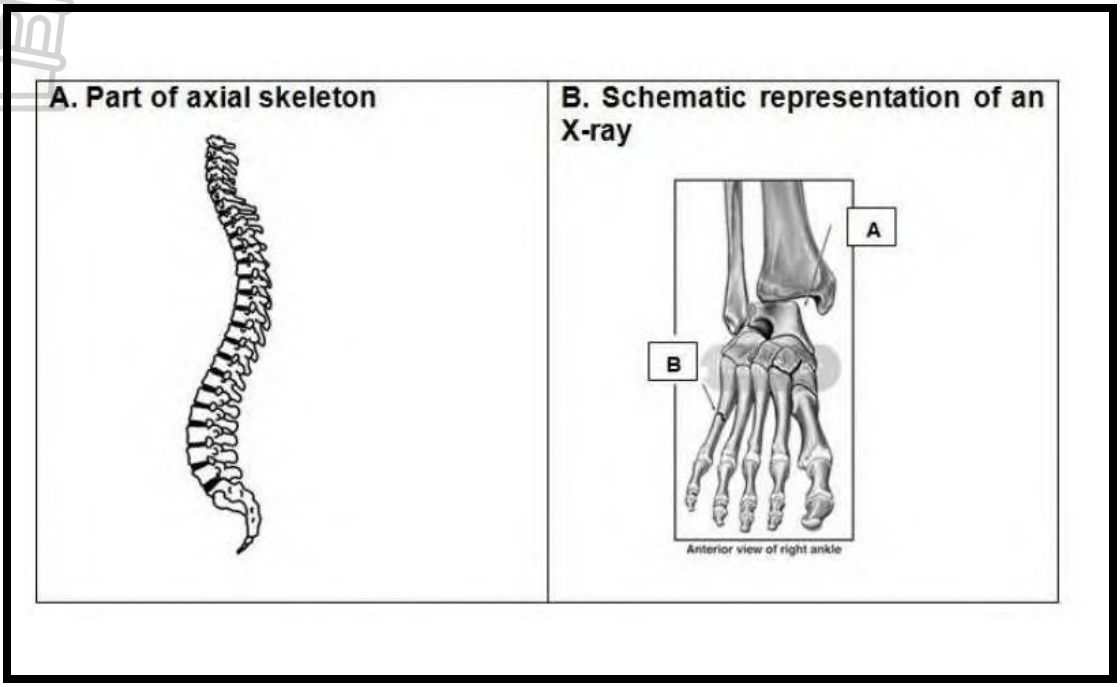
3.4.3 List TWO ways in which learners could increase the reliability of the investigation (2)

3.4.4 Draw a line graph representing the data on the table above. (6)

3.4.5 State the conclusion for the above investigation. (2)

(13)

3.5 Study the diagrams below A (x- ray) and B (part of axial skeleton) and answer the questions that follow.



3.5.1 Refer to diagram B (x- ray). Name the bone that is:

(a) Broken (1)

(b) Dislocated (1)

3.5.2 Differentiate between a sprain, fracture and dislocation. (6)

3.5.3 Identify the part of the axial skeleton shown in diagram A above. (1)

3.5.4 State the main function of the part of the skeleton identified in question 3.5.3 above. (2)

3.5.5 Name FOUR advantages of an exoskeleton. (4)

(15)

: **[50]**

TOTAL SECTION B: [100]

GRAND TOTAL: 150

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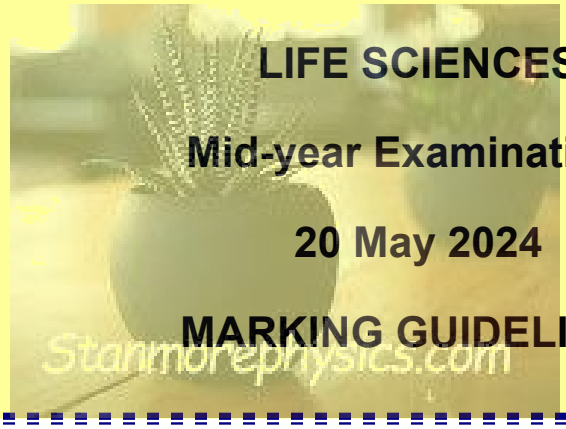
GRADE 10



LIFE SCIENCES

Mid-year Examinations

20 May 2024

MARKING GUIDELINES

MARKS: 150

These marking guidelines consists of 10 pages including the cover page

PRINCIPLES RELATED TO MARKING 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 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 muddles 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-recognized 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 recognizable 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: only accept if provided as an alternative in the marking guideline.
14. If only letter is asked for and only name is given (and vice versa) No 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, drawings, 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 answer should be credited, if it is correct.
19. No changes must be made to the marking guidelines without consulting the Provincial office through your District office.

SECTION A

QUESTION 1

1.1. 1.1.1. C✓✓
1.1.2. D✓✓
1.1.3. A✓✓
1.1.4. B✓✓
1.1.5. D✓✓
1.1.6. B✓✓
1.1.7. B✓✓
1.1.8. D✓✓
1.1.9. A✓✓
1.10. A✓✓

(10x2) **(20)**

1.2. 1.2.1. Root pressure ✓
1.2.2. Chromatin✓
1.2.3 Goblets✓
1.2.4. Sensory✓
1.2.5 Cranium✓
1.2.6. Joint✓
1.2.7. Neuron✓
1.2.8. Endoplasmic reticulum✓
1.2.9. Potometer✓

(9 x 1) **(9)**

1.3. 1.3.1. A only✓✓ (2)
1.3.2. B only✓✓ (2)
1.3.3. A Only✓✓ (2)

(3x2) **(6)**

1.4. 1.4.1. (a) Substrate molecule ✓ (1)

(b) Enzyme-substrate molecule ✓ (1)

(c) Products ✓ (1)

1.4.2 Lock and Key Model ✓ (1)

1.4.3 Enzymes are specific to the reaction they catalyse ✓ (1)

1.4.4
- Enzymes are sensitive to temperature✓
- Enzymes are sensitive to pH✓
- Enzymes can be used repeatedly✓ **(ANY 2)**

(2)

1.4.5 To show that the enzyme has catalyzed /acted on the substrate molecule✓ (1)

(8)

1.5. 1.5.1 (a) B/D ✓ (1)

(b) C✓ (1)

(c) B✓ (1)

(d) Food D has 10 mg Vitamin C/ 100 g (3)

30 mg/ 10 mg = 3✓

So: 3 x 100g✓ of food D provide 30 mg ✓of Vitamin C

1.5.2. D ✓ (1)

(7)

TOTAL SECTION A: [50]

SECTION B

QUESTION 2

2.1 2.1.1 Animal Cell ✓ (1)

2.1.2
- Small vacuole✓
- Irregular shape✓ (2)

2.1.3 3✓ (1)

2.1.4
- 1 - Golgi body✓
- 2 – Mitochondrion✓
- 3 - Cell membrane✓ (3)

2.1.5

Plant cell	Animal cell
• Has a regular shape✓ • Cell wall present✓ • Has a large vacuole✓ • Has no centriole✓ • May have plastids✓	• Has an irregular shape✓ • Cell wall absent✓ • Has small numerous vacuole✓ • Has centriole✓ • Have no plastids✓

(5)

1 mark for table plus first 2 in each pair in the table

(12)

2.2. 2.2.1 A: Spindle fibres✓ (1)

B: Equator ✓ (1)

C: Cell membrane ✓ (1)

2.2.2 Metaphase (3)
- Chromosomes arrange themselves along the equator✓
- Chromosome attach to spindle fibres✓
- By centromeres✓

2.2.3 It forms new cells used for: (2)
- Growth in the size of the organism ✓
- Repair and replacement of work out or damaged tissue✓
- Brings about asexual/ vegetative reproduction✓ (Any 2)

2.2.4 (2)
- Spindle fibre contract ✓
- Chromatids are pulled to opposite direction/poles ✓

2.2.5 (a) Causes of cancer (3)

- Radiation ✓
- Genetics ✓
- Infectious agent ✓

(Any other relevant answers)

(b) Treatment of cancer (3)

- Chemotherapy/ radiotherapy ✓
- Surgery ✓
- Traditional medicine ✓

(16)

2.3.

2.3.1. (a) A✓ (1)

. (b) E✓ (1)

2.3.2. Mesophyll✓ (1)

2.3.3.

- They are below surface of the epidermis enable pocket of still, moist air to be in direct contact with the stoma✓
- This pocket of air reduces the water potential gradient between the inside and outside of the leaf. ✓
- Thus decrease the transpiration rate. ✓

(3)

2.3.4 - Contains many chloroplasts✓ for absorption of sunlight✓ (4)

- cells are thin walled✓ and this facilitate gaseous exchange ✓

(10)

2.4. 2.4.1. Carbohydrates✓ (1)

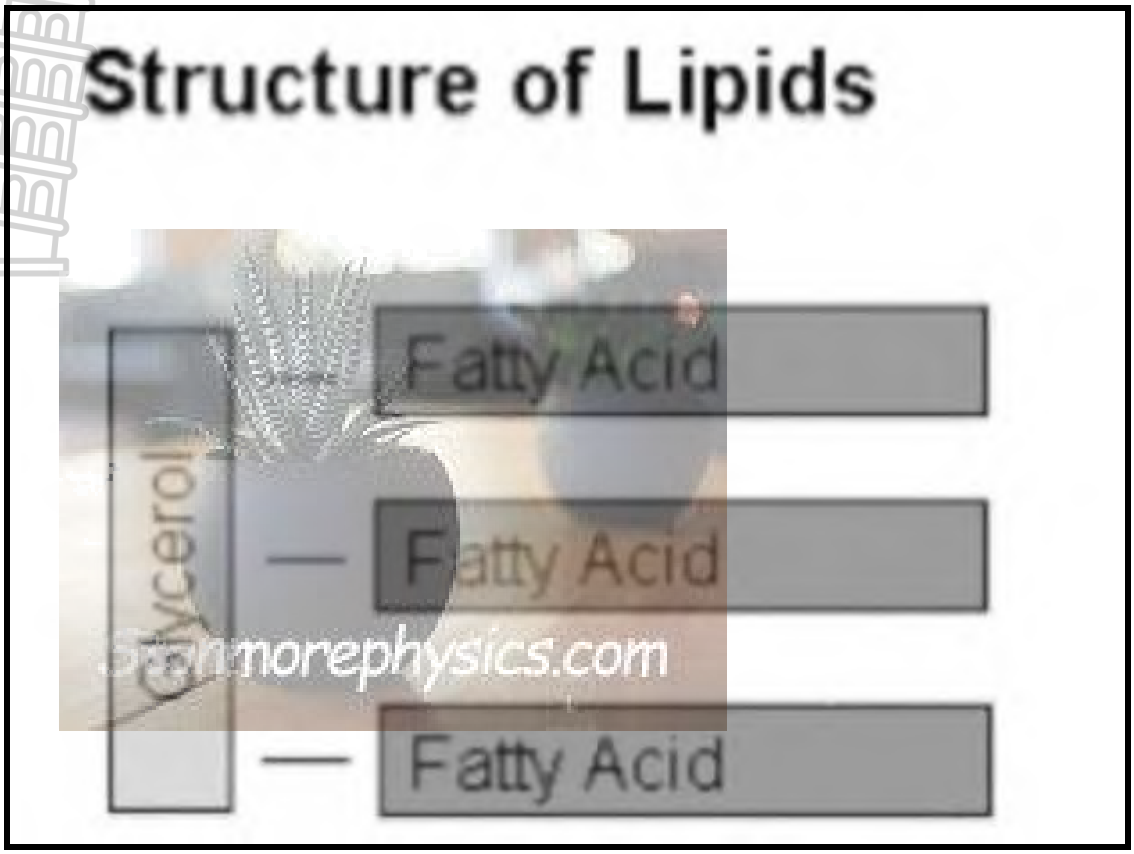
2.4.2. Monosaccharides✓✓ /glucose (2)

2.4.3.

- Building blocks of all organic material in cells✓
- Enzymes are proteins which control many reactions ✓
- Hormones are proteins which control metabolic✓activities/processes✓
- Reserve source of energy✓ (Any Four)

(4)

2.4.4. **Rubric to be used to assess the diagram of lipid** (4)



Heading	1
One glycerol	1
Three fatty acids	1
Structure E-shaped	1

2.4.5. Iron ✓ (1)

(12)

[50]

QUESTION 3

3.1

3.1.1 Ciliated columnar epithelium✓ (1)

3.1.2 A - Goblet ✓ (1)

B - nucleus✓ (1)

3.1.3 Stomach ✓ (2)
Small intestines ✓

3.1.4
- Provides support to other cell types. ✓ (3)
- Absorbs food, water and minerals. ✓
- Goblet cells secrete mucus✓

3.1.5
- Has goblet cells ✓ (4)
- That produces mucus to trap the germs/moisten the surface✓
- Has cilia✓
- Remove dust particles ✓

(12)

3.2 3.2.1 (a) B✓ – xylem ✓ (2)

(b) C✓ - Sclerenchyma ✓ (2)

3.2.2 - Cells are elongated and non living ✓/ joined and forming continuous tubes✓ (4)
- Contains thickened / lignified walls to withstand pressure of water ✓
- Perforated with pits for lateral water transport ✓

(8)

3.3 3.3.1 Root✓ (1)

3.3.2
- cross walls are perforated or completely absent ✓ (4)
- xylem of the roots forms continuous tubes with xylem of stem and leaves✓
- xylem vessels have no living contentsΠ allowing water to flow freely inside✓
- walls of vessels tracheids not completely thickened✓
- that allow pits water to move across the roots and stem✓ **(Any 2 x2)**

(5)

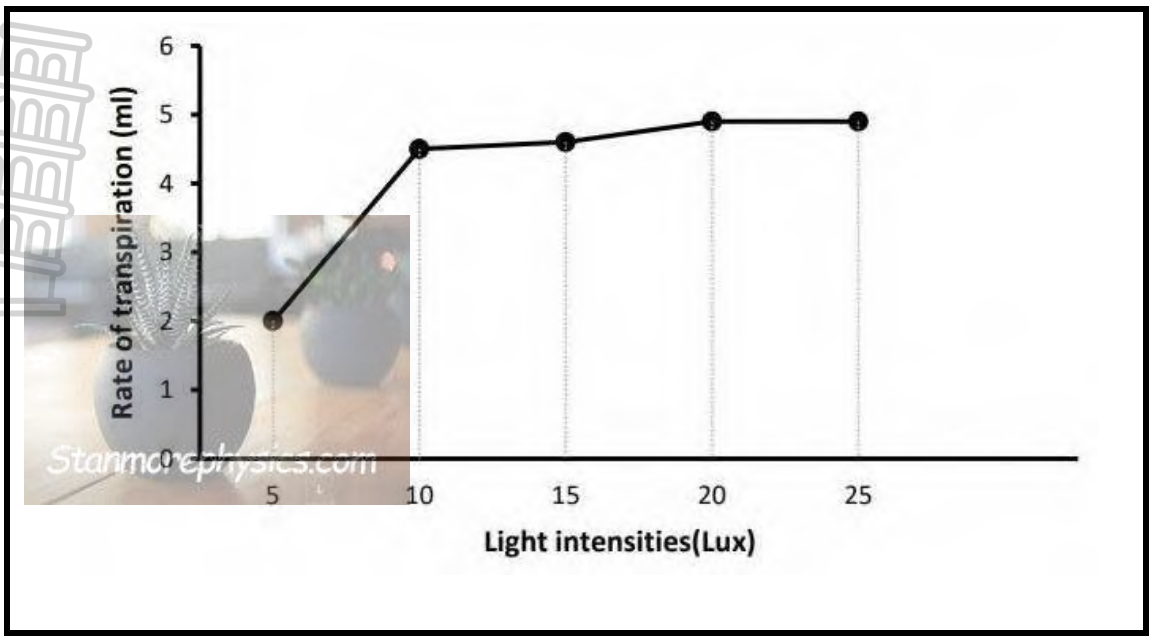
3.4 3.4.1 (a) rate of transpiration in leaves ✓ (1)

(b) different light intensities ✓ (1)

3.4.2 it increased the rate of transpiration. ✓ (1)

3.4.3 – repeat the investigation ✓ (2)
- increase sample size ✓

3.4.2



Marking Criteria:

Correct type of Graph **(T)**		1
Caption (C)		1
X- axis with label and correct units		1
Y-axis with label and correct (units		1
Plotting	1-4 correct points plotted	1
	All correct sectors	2

(6)

3.4.5 The rate of transpiration increases with an increase with the light intensity up to a point where it no longer increases ✓✓ (2)

(13)

3.5 3.5.1 (a) Metatarsal✓ (2)
(b) Tibia✓

3.5.2
- **Sprain** -the ligaments and connective tissue✓ is torn and swells✓ (6)
- **Fracture**- the bone✓ is cracked or completely broken✓
- **Dislocation** – the bone✓ has moved out of position✓

3.5.3 Vertebral column✓ (1)

3.5.4 Protects the spinal cord. ✓✓ (2)

3.5.5
- Good support and attachment for muscles✓
- Reduces water loss✓
- Thin and flexible at joints for quick movement✓
- Protection✓

(4)

(15)

TOTAL SECTION B: [100]

GRAND TOTAL: 150