LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL

SENIOR CERTIFICATE

GRADE 10

LIFE SCIENCES

JUNE EXAMINATION 2023

MARKS: 150

TIME: 2 ½ hours

This question paper consists of 12 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the 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 the question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and labels should be in black and blue ink.
7. Draw diagrams, tables 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 where necessary.
11. Write neatly and eligibly

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

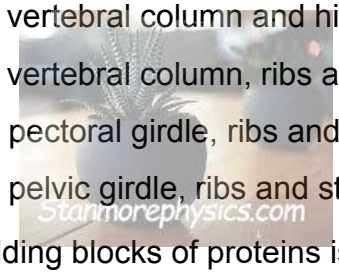
1.1.1 The axial skeleton is made up of the following regions

A Skull, vertebral column and hip bones

B Skull, vertebral column, ribs and sternum

C Skull, pectoral girdle, ribs and sternum

D Skull, pelvic girdle, ribs and sternum



1.1.2 The building blocks of proteins is …

A disaccharides.

B monosaccharides.

C amino acids.

D glycerol.

1.1.3 The mitochondria are the site of …

A photosynthesis.

B cellular respiration.

C cellular division

D cytokinesis

1.1.4 The following is true about enzymes except for one of the following options

A Enzymes are denatured at extreme temperatures

B Enzymes are denatured at extreme pH

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 Protein substance produced by the body to fight against disease

A Enzyme

B Microbes

C Bacterium

D Antibody

1.1.6 Connective tissue that reduces friction between bones:

A Cartilage

B Tendon

C Ligament

D Blood

1.1.7 The tendency of liquids to move up narrow tubes is called …

A capillarity action.

B transpiration.

C root pressure.

D transpiration pull.

1.1.8 Epithelial tissues lining the mouth and lungs is known as. . . . . tissues

A Cuboidal

B Columnar

C Ciliated columnar

D Squamous

1.1.9 The type of root system in dicotyledonous plants

A Adventitious roots

B Tap roots

C Lateral roots

D Immature root

1.1.10 The series of events that take place in a cell that cause it to divide into 4 daughter cells

A Differentiation

B Karyokinesis

C Meiosis

D Cell cycle

(10 x 2) **(20)**

1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question numbers (1.2.1 to 1.2.9) in the ANSWER BOOK.

1.2.1 The organic compound made up of the elements C, H and O where the ratio of H:O is greater than 2:1

1.2.2 A change in the structure of a protein as a result of high temperatures

1.2.3 Living material found in plant and animal cells

1.2.4 Plastids that store food in plant cells

1.2.5 Permanent tissue that lines the surfaces of roots, stems and leaves

1.2.6 Yellowing of leaves due to the shortage of Nitrogen

1.2.7 Loss of water from the margins of leaves

1.2.8 The division of the cytoplasm

1.2.9 Dark-stained body in the nucleoplasm of a cell

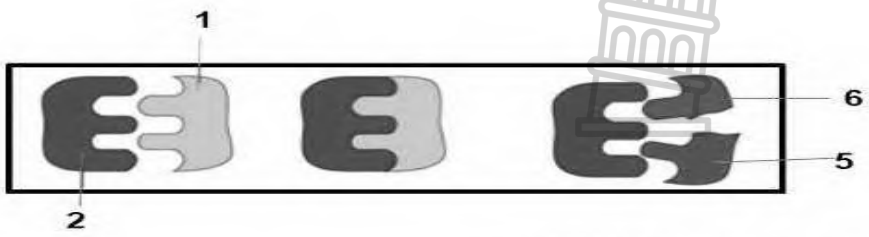
(9 x 1) **(9)**

1.3 Indicate whether each of the descriptions in COLUMN I apply 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 numbers (1.3.1 to 1.3.3) in the ANSWER BOOK

	Column I	**Column II**
1.3.1	Make up the walls of capillaries	A: Cuboidal epithelium B: Squamous epithelium
1.3.2	Leucocytes help to protect the body against diseases because they produce	A: Antibodies B: Antibiotics
1.3.3	Force responsible for upward movement of water in plants	A: Capillarity B: Transpiration pull

(3 x 2) **(6)**

1.4 Study the diagram below of the Lock and Key Theory of enzymes. Answer the questions that follows.



[Source: https://www.quora.com]

1.4.1 Name the mechanism shown in the diagram above. (1)

1.4.2 Explain the function of an organic catalyst? (2)

1.4.3 Explain the function of the enzyme protease, in washing powders and give two examples it will work on? (3)

1.4.4 If structure **1** represents maltose and structure **2** maltase, identify products numbered **5** and **6.** (2)

(8)

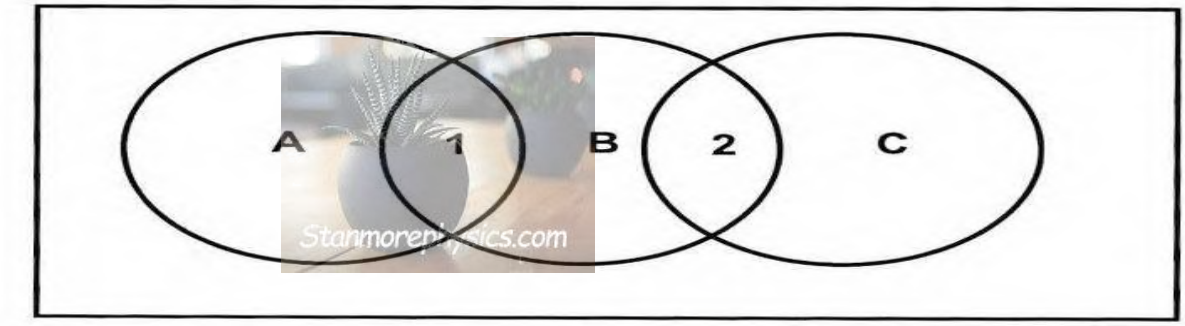
1.5 In the diagram below, the letters **A, B** and **C** represent THREE groups of organic compounds that you have studied.

Number **1** represents characteristics common to **A** and **B** only,

Number **2** represents characteristics common to **B** and **C** only,

B and **C** make up cell membranes.

C is made up of amino acids.



1.5.1 What is meant by organic compound? (1)

1.5.2 Name the organic compound represented by

(a) **A** (1)

(b) **B** (1)

(c) **C** (1)

1.5.3 What feature, in terms of their composition, distinguishes compound **B** from compound **C**? (2)

1.5.4 Which organic compound (**A**, **B** or **C**) is stored as glycogen in the liver of humans? (1)

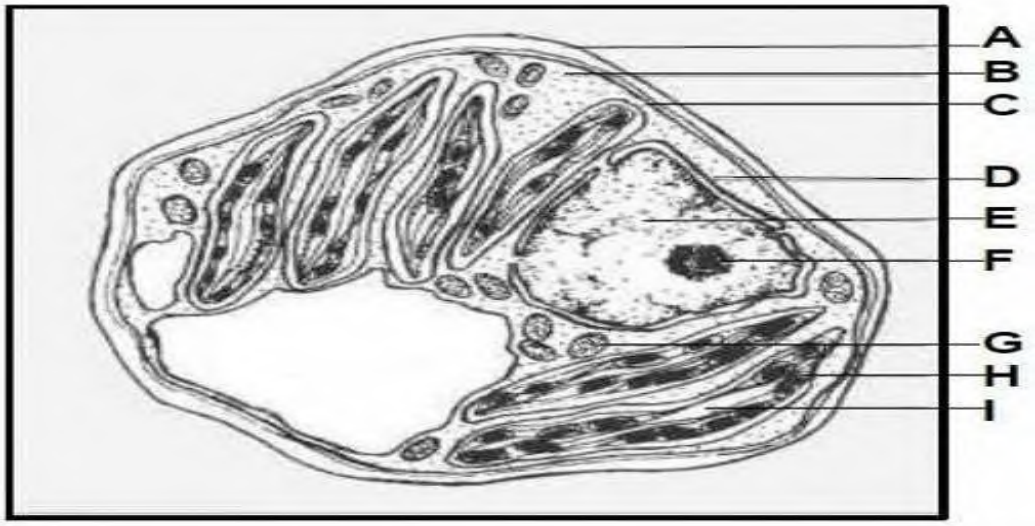
(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Study the electron micrograph of a typical cell below and answer the questions that follow.



2.1.1 Provide labels for **B** and **E**. (2)

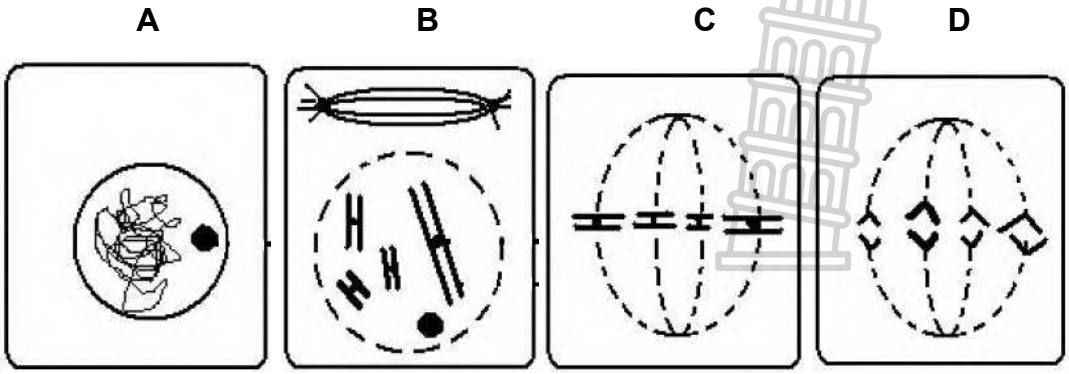
2.1.2 Give the LETTER of the organelle that:

(a) controls the activities of the cell. (1)
(b) protects the inner contents of the cell. (1)
(c) is the site of photosynthesis. (1)

2.1.3 Describe the main structural features of organelle **G.** (2)

2.1.4 Tabulate TWO differences between plant and animal cell. (5)
(12)

2.2 The diagram below represents an organelle found in a plant cell.



2.2.1 Identify phases **A, B, C** and **D**. (4)

2.2.2 Discuss the main events that occur during phase **D**. (3)

2.2.3 Suggest two biological importance of mitosis. (2)

2.2.4 Give ONE difference in telophase between plant and animal. (2)

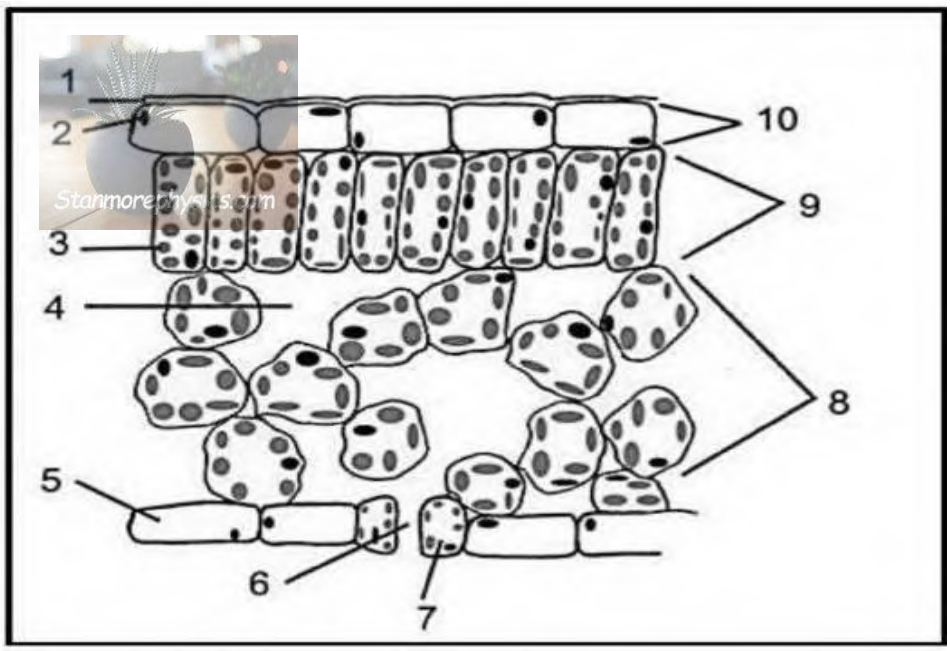
2.2.5 Cancer is described as the uncontrollable division of cells.

(a) State THREE causes of cancer. (2)

(b) State TWO types of treatment used for cancer. (3)

(16)

2.3



2.3.1 Provide labels for **4, 8** and **9**. (3)

2.3.2 Give ONE function of structure **1.** (1)

2.3.3 Give the number and the name of the organelle in which photosynthesis (1)

2.3.4 Give ONE visible difference between cells **5** and **7.** (2)

2.3.5 Xylem is a conducting tissue found in leaves. List THREE structural features of xylem that allows it to perform its function. (3)

(10)

2.4 Study the food label below and answer the questions that follow.

Nutritional information

Servings per package: 8

Serving size: 47,5 g (1 sausage)

Average values	Per 100g	Per sausage
Energy	**580 kJ (138 kcal)**	**276 kJ (65 kcal)**
Fat, Total	7 g	3,3 g
- Saturated	0,9 g	0,4 g
- Monosaturated	1,7 9	0,8 g
- Polyunsaturated	4,4 g	2,1 g
Carbohydrate	10,0 g	4,8 g
Of which sugar	1,3 g	0,6 g
Fibre	4 g	1,9 g
Protein	16,5 g	7,8 g
Sodium	800 mg (0,8 g)	380 mg (0,38 g)

2.4.1 Analyse the table above and provide the protein content of ONE sausage? (1)

2.4.2 List TWO functions of proteins in a diet. (2)

2.4.3 What is meant by saturated fatty acids? And suggest a reason why eating too many saturated fatty acids are unhealthy. (3)

2.4.4 Would you consider this product a healthy choice in terms of fat content? (3)
Give ONE reason for your answer.

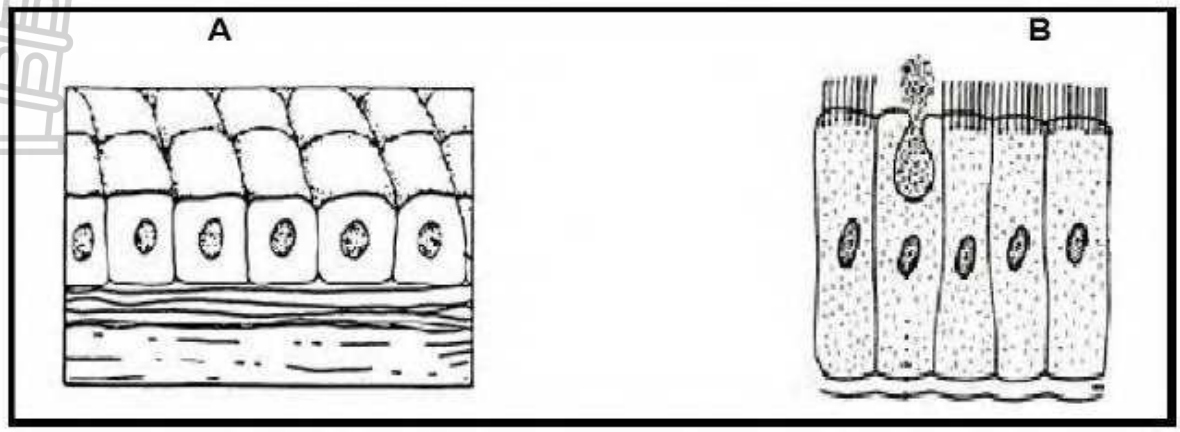
2.4.5 Calculate the total amount of sodium if three sausages were eaten. (3)

(12)

[50]

QUESTION 3

3.1 A student examined sections of animal tissue and observed the following:



3.1.1 Identify tissue:

(a) **A** (1)

(b) **B** (1)

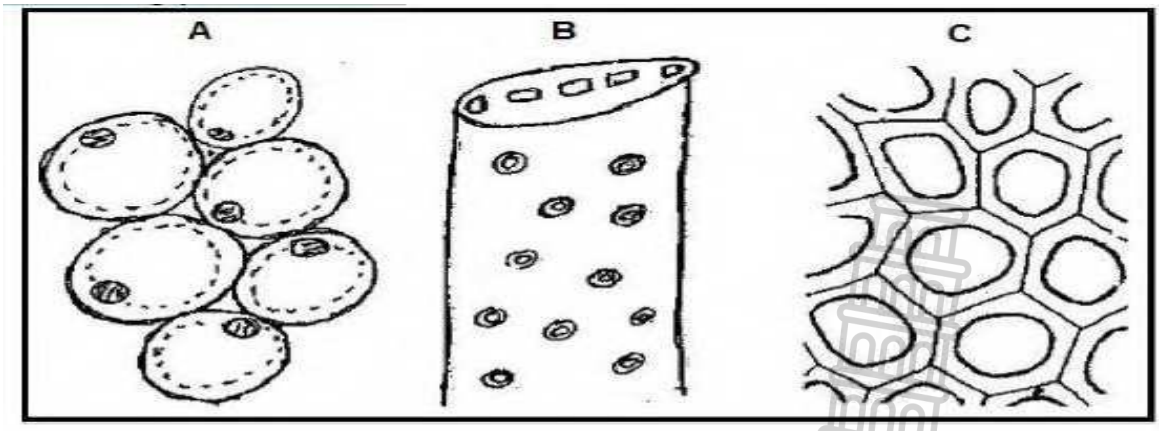
3.1.2 Mention TWO areas in the human body where tissue **B** is found. (2)

3.1.3 Tabulate ONE visible difference between tissue **A** and tissue **B** . (3)

3.1.4 Describe ONE way how tissue B is structurally suited for its function.

(9)

3.2 Study the diagram below and answer the questions that follow.



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

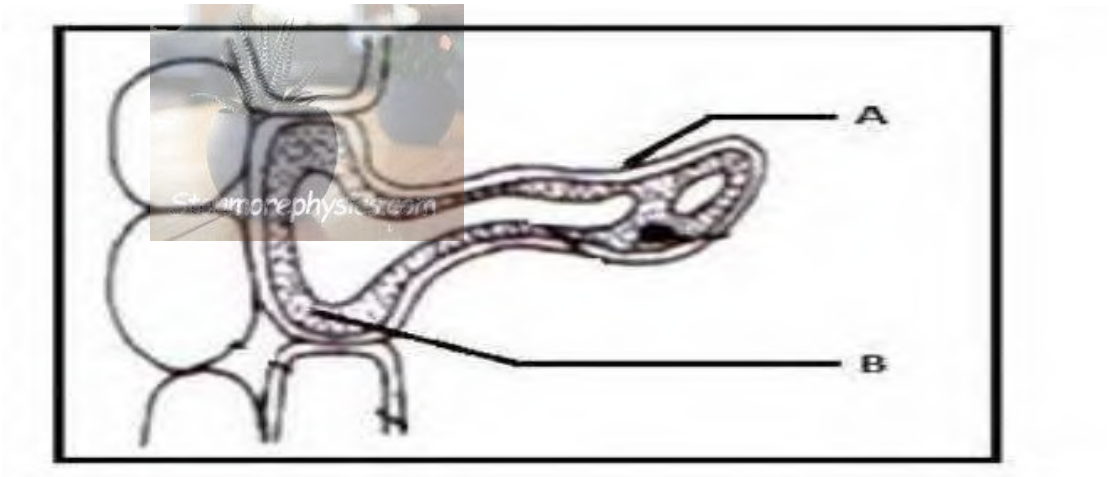
(a) Transports water and minerals up the plant (2)

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

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

(8)

3.3 Study the diagram below of a root hair cell.



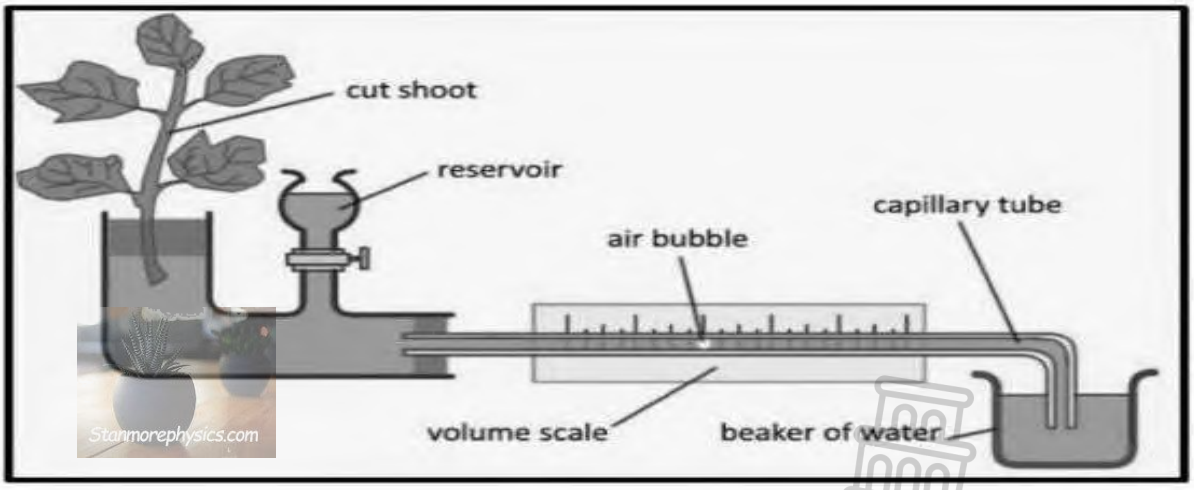
(6)

3.3.1 Identify parts B. (1)

3.3.2 Explain TWO ways in which root hair is adapted for the absorption (4)

(5)

3.4 The Grade 10 learners set up the following apparatus to investigate how temperature affects transpiration rate, and recorded the results in the table below.



Temperature ^{0} C	22	25	27	28	30
Transpiration rate (m mol/m^2 sec)	1,5	3,5	5	4,5	4

3.4.1 Give a hypothesis for this experimental investigation. (2)

3.4.2 Identify the:

(a) Dependent variable (1)

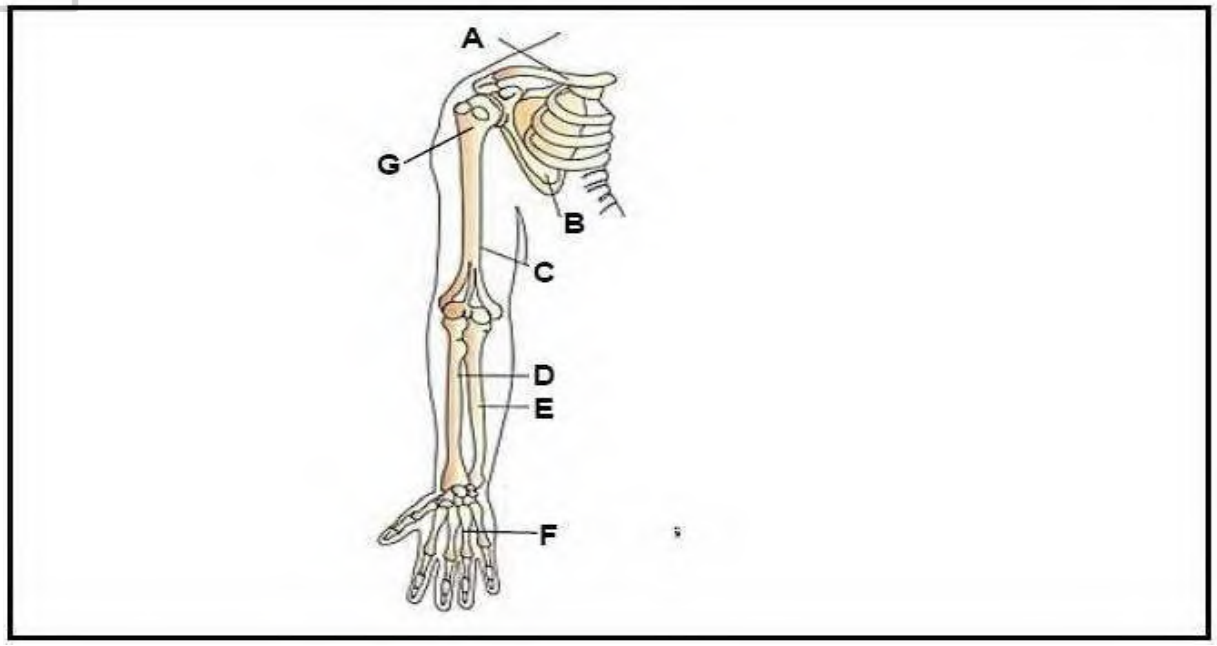
(b) Independent variable (1)

3.4.3 Draw a line graph to illustrate the results in the table above. (6)

3.4.4 What can you conclude about the relationship between temperature and transpiration rate? (1)

(11)

3.5 Study the diagram of a region of the human skeleton. Answer the questions that follows:



3.5.1 Briefly explain TWO functions of the skeleton (4)

3.5.2 Give the LETTERS of the bones that make up the pectoral girdle. (2)

3.5.3 Give the LETTER of a synovial joint in the diagram above. (1)

3.5.4 Two sets of muscles are attached to the front and back of the humerus respectively

(a) Name these TWO muscles. (2)

(b) Name the substance that builds and repairs muscle tissue. (1)

(c) Describe how these muscles function to bring about movement. (3)

(d) Predict what would happen if the muscle attached to the back of the humerus cannot function (2)

3.5.5 List TWO diseases that affect the skeleton (2)

(17)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

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GRADE 10

LIFE SCIENCES

JUNE EXAMINATION 2023

MARKING GUIDELINES

MARKS: 150

This MARKING GUIDELINE consists of 9 pages including the cover page.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES 2023

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 spelling errors. If recognizable accept provided it does not mean something else in Life Sciences or if it is out of context.

12. If common names given in terminology Accept provided it was accepted at the Provincial memo discussion meeting.

13. If only letter is asked for and only name is given (and vice versa) No

credit.

14. If units are not given in measurements Candidates will lose marks. Memorandum will allocate marks for units separately.

15. Be sensitive to the sense of an answer, which may be stated in a different way.

16. Caption All illustrations (diagrams, drawings, graphs, tables, etc.) must have a caption

17. 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. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

18. No changes must be made to the marking memoranda without consulting the Provincial Internal Moderator.

SECTION A
QUESTION 1

1.1.1. B✓✓
1.1.2. C✓✓
1.1.3. B✓✓
1.1.4. C✓✓
1.1.5. D✓✓
1.1.6. A✓✓
1.1.7. A✓✓
1.1.8. D✓✓
1.1.9. B✓✓
1.1.10 D✓✓ (10×2) (**20**)

1.2.1. Lipids ✓
1.2.2. Denaturation / Denature✓
1.2.3. protoplasm✓
1.2.4. Leucoplasts✓
1.2.5. Epidermis / Epidermal cells✓
1.2.6. Chlorosis ✓
1.2.7. Guttation ✓
1.2.8. Cytokinesis✓
1.2.9 Nucleolus ✓ (9×1) **(9)**

1.3.1. B Only✓✓
1.3.2. A only✓✓
1.3.3. B0th A and B✓✓ (3 x 2) **(6)**

1.4.1. Lock and key mechanism ✓ (1)
1.4.2. Speed up chemical reactions ✓ without being used up in a reaction✓. (2)
1.4.3. – proteases are enzymes that breaks down proteins.✓ (3)
-- helps to work on breaking down, eggs ✓, and gravy✓ (any stains that are protein in nature.✓
1.4.4. 5: glucose ✓
6: glucose ✓ (2)
(8)

1.5.1. - A compound which has carbon with hydrogen and oxygen✓ (1)
1.5.2. (a) Carbohydrate✓
(b) Lipid / Fat✓
(c) Protein✓ (3)
1.5.3. - B does not have N ✓ whereas C has N ✓ (2)
1.5.4. A✓ (1)

TOTAL SECTION A: 50

QUESTION 2

2.1.1 B: cytoplasm ✓
E: nucleoplasm ✓ (2)

2.1.2 (a) D ✓
(b) A ✓
(c) H / I ✓ (3)

2.1.3 - Rod shaped ✓
- Surrounded by a double membrane ✓ (Any 2 x 1) (2)
- Inner membranous projections called cristae ✓

2.1.5 ✓

	Plant cell		Animal Cell
1.	Cell wall present ✓	1.	No cell wall present ✓
2.	Plastids present ✓	2.	No plastids present ✓
3.	Large vacuoles ✓	3.	Small or no vacuoles ✓

Any 2 reasons (2 x 2)
1 mark for table (5)

(12)

2.2 2.2.1 A: Interphase ✓
B: Prophase ✓
C: Metaphase ✓
D: Anaphase ✓ (4 x 1) (4)

2.2.2 - Spindle fibres contract ✓
- Two chromatids pull apart ✓
- to opposite sides of the cell (poles) ✓
- Chromosomes split at the centromere ✓ (Any 3 x 1) (3)

2.2.3 - Growth: Increase in size of the organism ✓
- Replacement of dead cells ✓
- Responsible for asexual reproduction in certain plants and animals ✓
- Repairs damaged tissues ✓ (Any 2 x 1) (2)

2.2.4. In an animal cell Cytokinesis occurs through a constriction / invagination ✓ of the cell membrane, and two cells are formed and, in a plant, cell Cytokinesis occurs through the formation of a cell plate

✓from the centre of a cell and divides the cell into two (2)

2.2.5 (a) - Smoking ✓
- Radiation ✓
- Hormonal imbalances ✓
- Viruses ✓
- Exposure to certain chemicals and pollutants ✓

(Any reasonable answer) (Any 3 x 1) (3)

(b) Chemotherapy / Surgery / Radiotherapy ✓✓ (2)

(16)

2.3.1. **4**- Air space / air chamber. ✓

8- spongy mesophyll✓

9-palisade mesophyll ✓ (3)

2.3.2. it traps moisture and prevent evaporation. ✓ it is a translucent layer that allows sunlight to enter ✓ (Any 1×1) (1)

2.3.3. **3-** chloroplast ✓ (1)

2.3.4. **5**- has brick shaped cells ✓Has no chloroplasts ✓ (any 1×1) (1)

7- has bean like cells ✓ Has chloroplasts ✓ (any 1×1) (1)

2.3.5. consist of dead cells

- They are elongated and hallowed cells.✓
- joined end to end.✓
- has unevenly thickened walls made of lignin.✓
- they may have spiral or round thickened walls. ✓ (any 3×1) (3)

(10)

2.4.1. 7.8g ✓ (1)

2.4.2. – Storage of energy✓

-- makes up the cell membrane ✓

--component of chromosomes ✓

-- Enzymes are proteins, control chemical reactions in organisms ✓

-- Hormones are proteins that controls growth and development✓

(any 2x1) (2)

2.4.3. These fats are derived from animals✓, Excessive intake of this fats leads to high cholesterol level in the blood✓, which causes fat deposits in the arteries therefore narrowing them✓. (3)

2.4.4. Yes✓, low level of saturated fat✓ in relation to total fat content✓ (3)

2.4.5. Amount of sodium in one sausage = 380 mg (0.38g)

Amount of sodium in three sausages= 3×380mg / (3×0.38g)✓ (3)

= 1140✓ mg✓ / (1.14g) **(12)**

[50]

QUESTION 3

3.1.1.

a) Columnar epithelium ✓ (1)

b) B- Ciliated Columnar epithelium (1)

3.1.2. Lines the nose✓ and windpipe✓ (2)

3.1.3.

Simple columnar	**Ciliated columnar**
No cilia ✓	Have cilia ✓

ONE MARK FOR THE TABLE✓ (3)

3.1.4. Produces mucus to trap dust ✓

- Has cilia to move dust away the body✓ (2)

(9)

3.2.1. (a). B✓ Xylem ✓ (2×1) (2)

(b). C ✓Sclerenchyma✓ (2×1) (2)

3.2.2. Cells are elongated and non living✓/joined end forming continuous tubes✓

-Contains thickened✓/lignified walls to withstand pressure of water✓

-Perforated with pits✓for lateral water transport✓ (Any 2×2) (4)

(8)

3.3.1 B- cytoplasm ✓ (1)

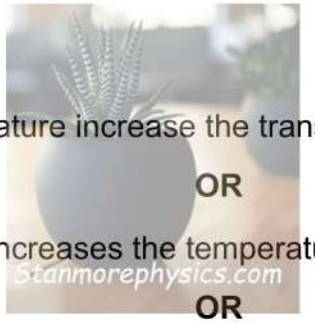
3.3.2. It has no cuticle, so it can absorb water. ✓

It has a vacuole to stop water.✓

Root hair is unicellular with a thin wall.✓ (any 2×2) (4)

(5)

3.4.



3.4.1. As the temperature increase the transpiration rate will increase ✓✓

OR

As the temperature increases the temperature will decrease ✓✓

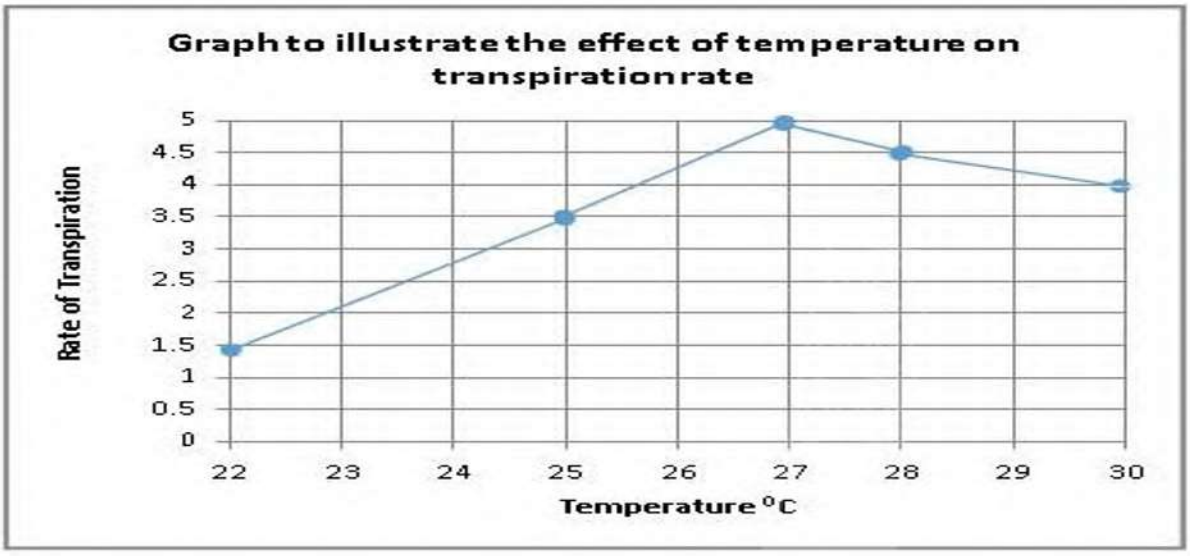
OR

Change of temperature will have No effect on the rate of transpiration. ✓✓ (2)

3.4.2. (a) Transpiration rate ✓ (1)

(b) Temperature ✓ (1)

3.4.3.



Rubric: Graph

Type of graph	1✓
Heading for the graph	1✓

Correct scale X-axis and Y-axis	1✓
Correct label X and Y Axis	1✓
Plotting values	1✓
Joining of points	1✓

(6)

3.4.4. – as the temperature increases the rate of transpiration increases to an optimum temperature, the transpiration rate then starts to decrease✓ (1)

(11)

3.5.1 - Movement: Skeleton with attached muscles allows for movement ✓
- Protection: Protects internal organs of the body ✓
- Storage of minerals: Various minerals such as calcium stored by the bones ✓
- Framework: Gives body shape ✓ (Any 2 x 2) (4)

3.5.2 A ✓ and B ✓ (2)

3.5.4 G ✓ (1)

3.5.5 (a) Biceps ✓ and triceps ✓ (2)

(b) Protein ✓ (1)

(c) - Muscles work in opposition ✓ to each other (antagonistic)
- When one contracts ✓ the other relaxes ✓ **OR**
(biceps contract, triceps relax) ✓ (3)

(d) It will prevent✓ the straightening ✓ of the arm. (2)

3.5.6 Osteoporosis, ✓ Rickets ✓ of Arthritis ✓ (Any 2 x 1) (2)

(17)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150