Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE

GRADE 10

JUNE 2025

LIFE SCIENCES

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 pages.

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 answer 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. Do ALL drawings in pencil and label them in blue or black 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 may use a non-programmable calculator, protractor and a compass where necessary.
11. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.9) in the ANSWER BOOK, for example 1.1.10 D.

1.1.1 The organelle where proteins are synthesised.

A Nucleus
B Ribosomes
C Cytosol
D Mitochondria

1.1.2 The tissue that forms a protective outer covering in plant organs is the …

A xylem.
B epidermis.
C phloem.
D root hair.

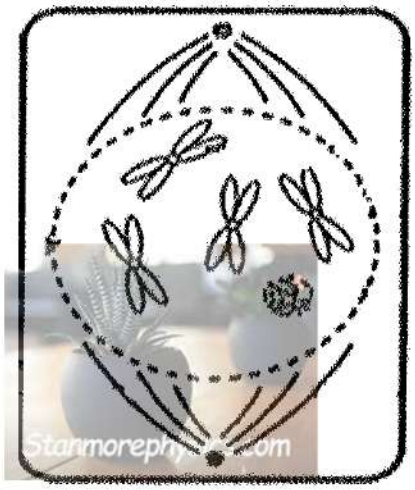
1.1.3 What is the main function of the nucleus?

A Stores sugars
B Packages proteins
C Provides energy to the cell
D Stores the genetic material

1.1.4 Which of the following chemical tests is used to show the presence of glucose in food?

A Iodine test
B Millon's reagent
C Ethanol
D Benedict's solution

QUESTIONS 1.1.5 TO 1.1.6 ARE BASED ON THE DIAGRAM BELOW



1.1.5 After completion of this cell division, the nucleus of each new cell will have……

A Two chromosomes

B Eight chromatids

C Four chromosomes

D Eight chromosomes

1.1.6 Which ONE of the following events occurs in the phase represented in the diagram above?

A DNA replication

B Chromatin network condenses to form visible chromosomes

C Chromosomes separate to chromatids

D Division of the cytoplasm

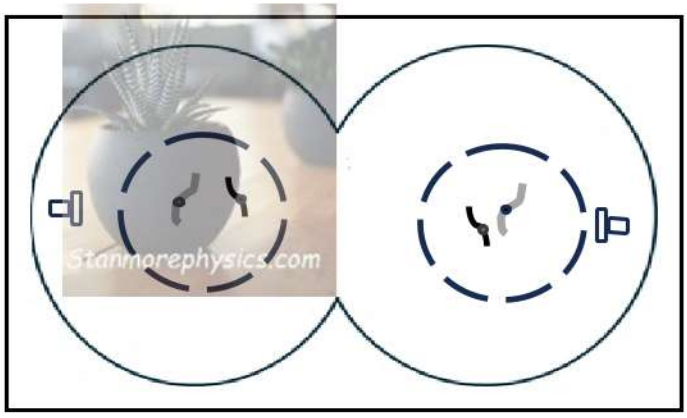
1.1.7 The following elements are found in some organic compounds:

(i) Hydrogen
(ii) Nitrogen
(iii) Oxygen
(iv) Carbon

Which of the elements listed above are found in proteins but not in carbohydrates and lipids?

A (i), (ii), (iii) only
B (i) only
C (i) and (iii) only
D (ii) only

QUESTION 1.1.8 IS BASED ON THE DIAGRAM BELOW, WHICH SHOWS A DIVIDING CELL.



1.1.8 Which phase of cell division is shown in the diagram above?

A Prophase

B Metaphase

C Interphase

D Telophase

1.1.9 Which of the following elements leads to goitre when it is not received in the required amounts in the body?

A Sodium

B Calcium

C Iodine

D Magnesium (9 x 2) **(18)**

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 1.2.9) in your ANSWER SHEET.

1.2.1 The loss of water in the form of vapour through the aerial parts of the plant.

1.2.2 An opening through which the spinal cord leaves the skull

1.2.3 Transparent covering of the epidermis of the leaf

1.2.4 The building blocks of proteins

1.2.5 Red pigment found in the blood

1.2.6 A membrane around vacuole

1.2.7 A pore in the epidermis of the leaf surrounded by two guard cells

1.2.8 A movement of gas molecules from a region of a higher concentration to a region of lower concentration

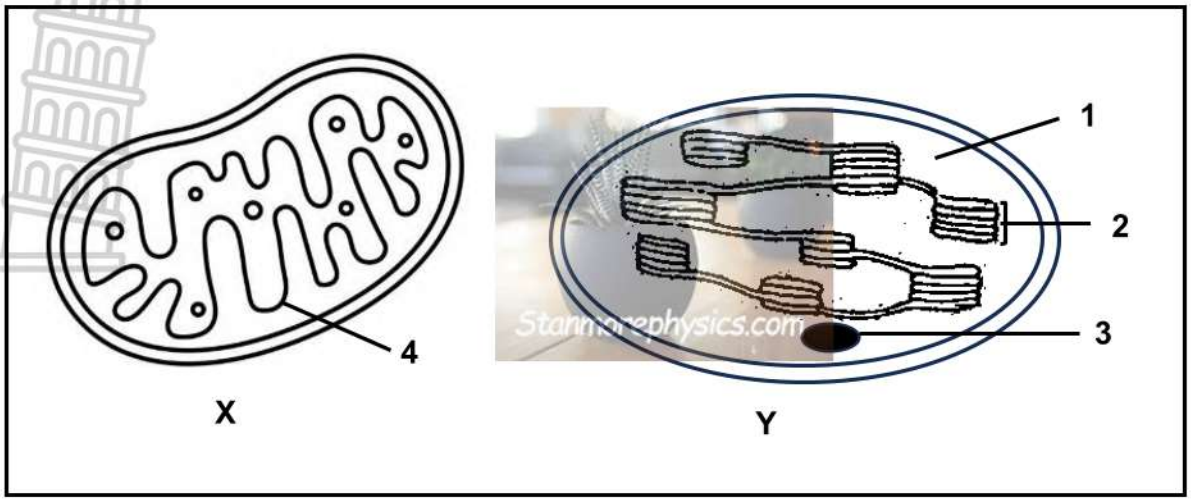
1.2.9 The part of the human skeleton made up of the arms, legs, shoulder girdle, and pelvic girdle (9 x 1) **(9)**

1.3 Indicate whether each of the descriptions 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	Source of reserve energy	A: B:	Vitamins Fats
1.3.2	Mammalian tissue	A: B:	Blood Muscle
1.3.3	Join the ribs to the sternum	A: B:	Cartilage Bone

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

1.4 The diagrams below show two organelles found in cells.



1.4.1 Name organelle:

(a) **X** (1)

(b) **Y** (1)

1.4.2 Which organelle (**X** or **Y**) is …

(a) found in plant cells only? (1)

(b) a plastid? (1)

(c) known as the powerhouse of the cell? (1)

1.4.3 Identify parts numbered:

(a) **1** (1)

(b) **2** (1)

(c) **3** (1)

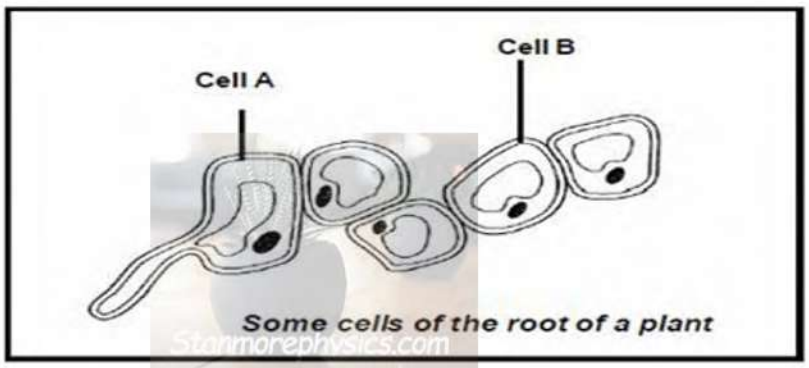
(d) **4** (1)

1.4.4 Name the metabolic process is associated with:

(a) **X** (1)

(b) **Y** (1)
(11)

1.5 Study the diagram below and answer the questions that follow



1.5.1 Identify cell **A** and **B** (2)

1.5.2 State TWO adaptations of cell A that will enable it to absorb water (2)

1.5.3 In which plant organ is the above diagram found? (1)

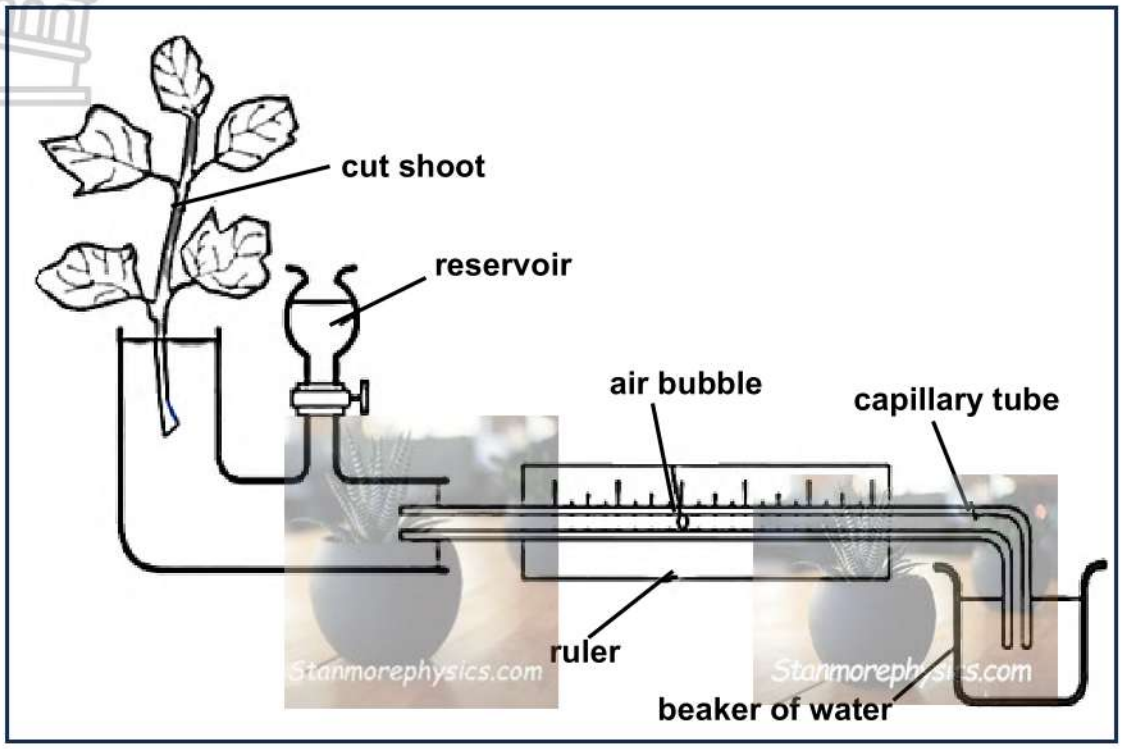
1.5.4 What is the pathway along which water moves from cell **A** to cell **B**? (1)
(6)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 A learner set up the following apparatus to investigate how temperature affects transpiration rate.



2.1.1 What is the name of the apparatus shown above? (1)

2.1.2 State the aim of the above experiment. (1)

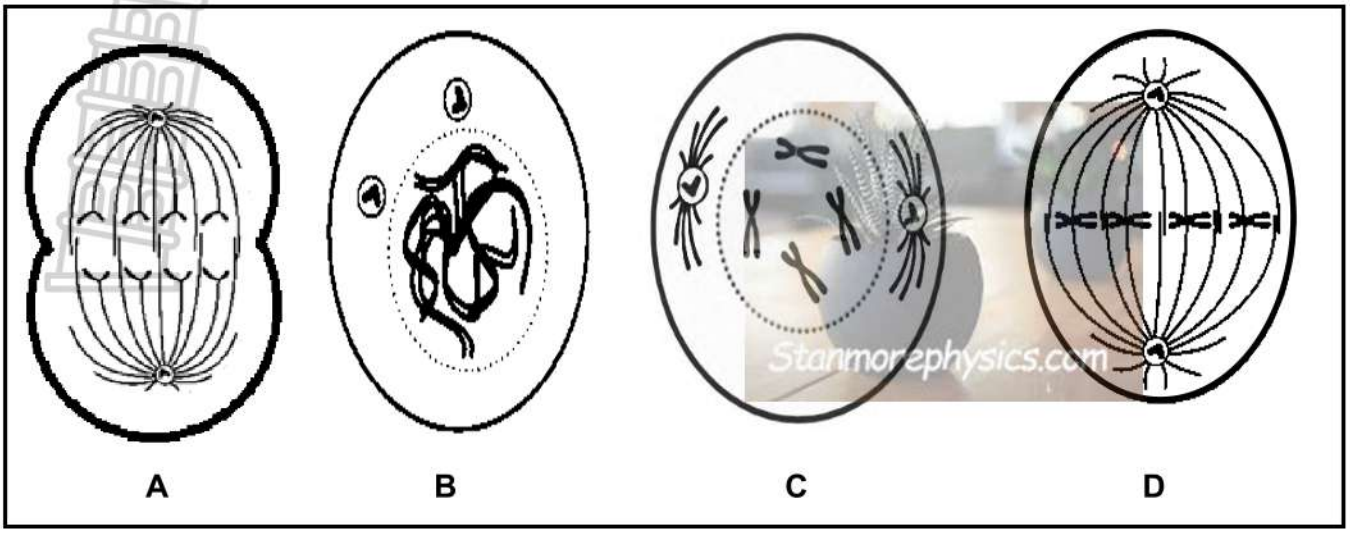
2.1.3 Predict what would happen to the speed of movement of the air bubble if Vaseline was applied to the ventral surfaces of all the leaves. (1)

2.1.4 Explain your answer to QUESTION 2.1.3. (2)

2.1.5 Why should this apparatus be allowed to stand before starting the experiment? (1)

2.1.6 Explain TWO precautionary measures that should be taken to make the results of the experiment to be more reliable. (4)
(10)

2.2 The diagrams below represent different phases of a particular process



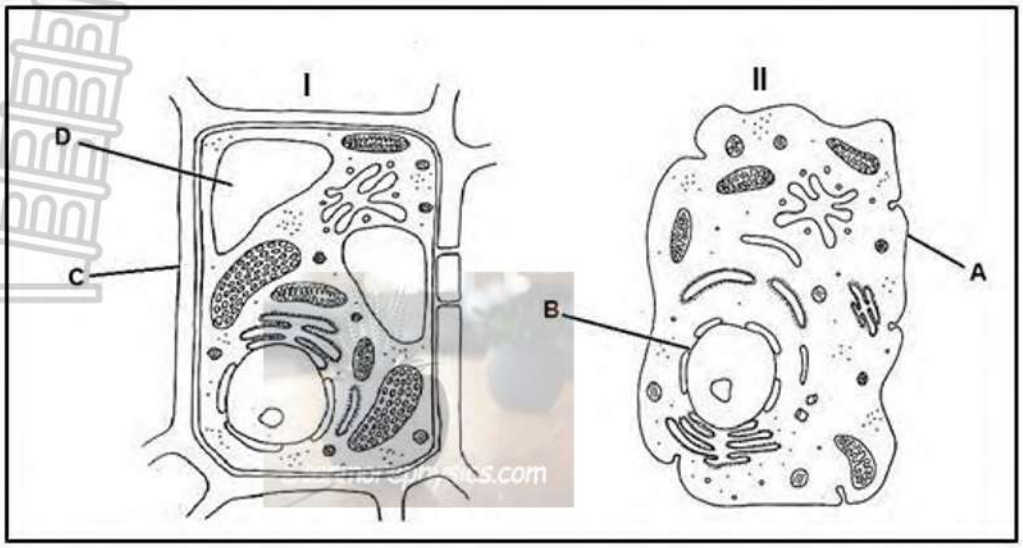
2.2.1 Name the process represented by the diagrams above. (1)

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

2.2.3 State THREE reasons why is the process of mitosis biological important. (3)

2.2.4 List the main events that occur during phase **A** (3)
(11)

2.3 The diagrams below represent different types of cells.



2.3.1 Identify the type of cells represented by diagrams **I** and **II**. (2)

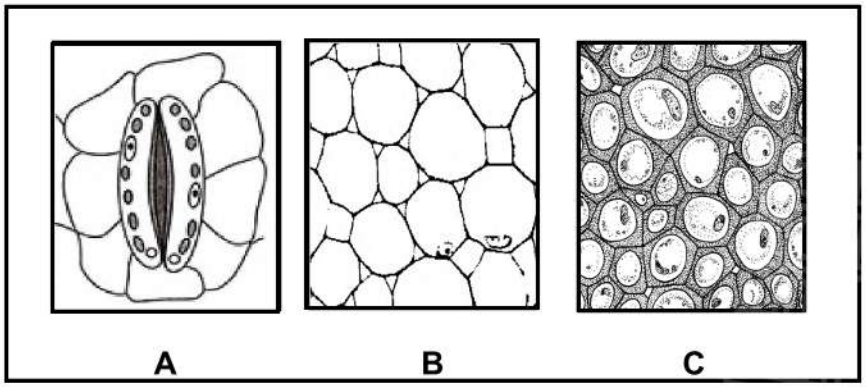
2.3.2 Give the NUMBER and the NAME of the organelle which serves as a storage site for water and mineral salts. (2)

2.3.3 Provide labels for parts **A**, **B** and **C.** (3)

2.3.4 State whether part **D** has a permeable, impermeable or selectively permeable membrane. Give TWO reasons for your answer (3)

2.3.5 A plant cell in a photograph measures 15 mm across. If the actual size of the cell is 0,015 mm, what is the magnification in the photograph? (3)
(13)

2.4 The diagrams below show different types of plant tissues.



2.4.1 Identify tissues **B** and **C.** (2)

2.4.2 Draw a fully labelled diagram of an epidermal cell with root hair. . (4)

2.4.3 Tabulate TWO differences between xylem vessels and phloem sieve tubes. (5)
(11)

2.5 The table below shows nutritional information on three cereal packets **A, B** and **C**. Each packet has a mass of 500g.

NUTRIENT (g)	CEREAL A	CEREAL B	CEREAL C
Protein	2	9	1
Vitamin C	35	30	60
Sodium	200	270	135
Fats (lipids)	7	36	18
Carbohydrates	50	65	55

A 15-year-old girl showed the following symptoms after eating one serving of cereal B:

- Bleeding gums
- Nosebleed
- Sores on the skin

2.5.1 Name the monomers of fats. (2)

2.5.2 Using the list of symptoms mentioned above, name a deficiency disease that the girl is suffering from (1)

2.5.3 Which cereal (**A**, **B** or **C**) will be LEAST suitable to the girl? (1)

2.5.4 Give ONE reason for your answer to QUESTION 2.5.3 (1)
(5)
[50]

QUESTION 3

3.1 Read the passage below.

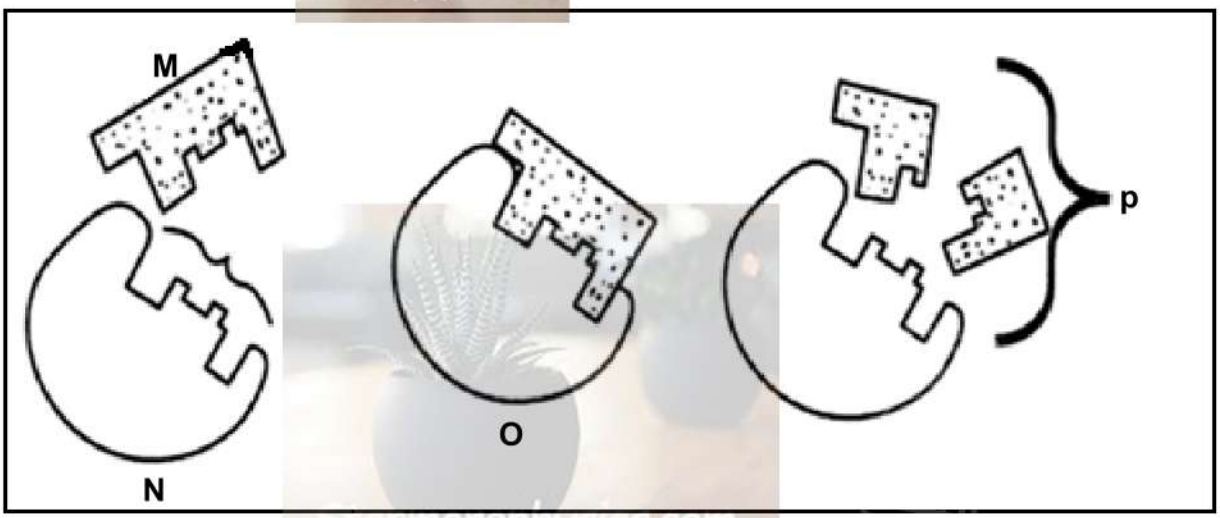
> Cells may begin to malfunction in the body. This results in cancer. This condition may be caused by cells dividing by mitosis in an uncontrolled manner. Abnormal number of cells may cause appearance of tumours (swellings of body parts). Tumours may be benign or malignant.
>
> Radiation from the sun may cause skin cancer. Tar in cigarette is carcinogenic and can cause lung cancer. Viruses are considered as major cause of human cancer like cervical cancer and liver cancer. At present time, certain diet and lifestyle increase risk of cancer. Cancer can be treated in different ways.

3.1.1 What do we call factors that cause cancer? (1)

3.1.2 Give the name of the disease caused by an uncontrolled cell division. (1)

3.1.3 From the passage list three factors that cause cancer. (3)
(5)

3.2 The diagram below shows a mechanism through which enzymes function.



3,2.1 Identify:

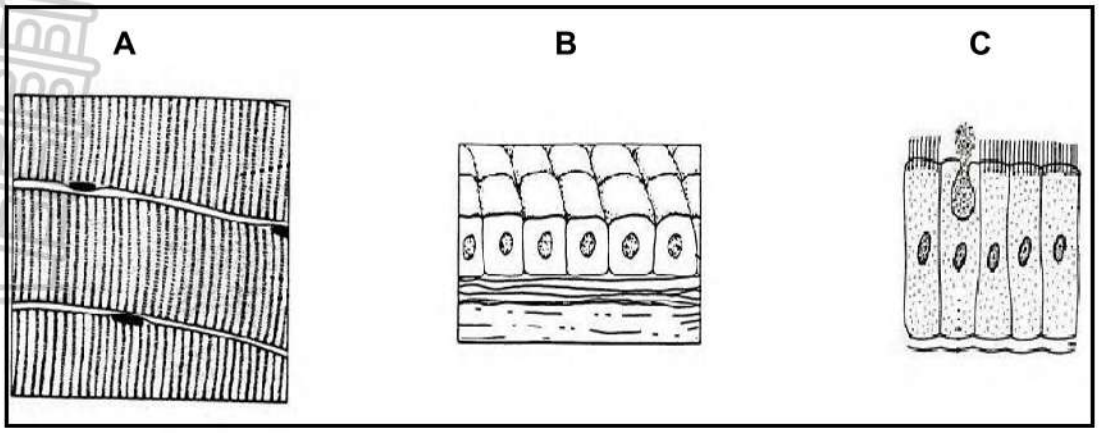
(a) **M** (1)

(b) **O** (1)

(c) **P** (1)

3.2.2 State the property of enzyme that illustrated above (1)
(4)

3.3 The diagram below shows different types of animal tissues,



3.3.1 What is a tissue? (2)

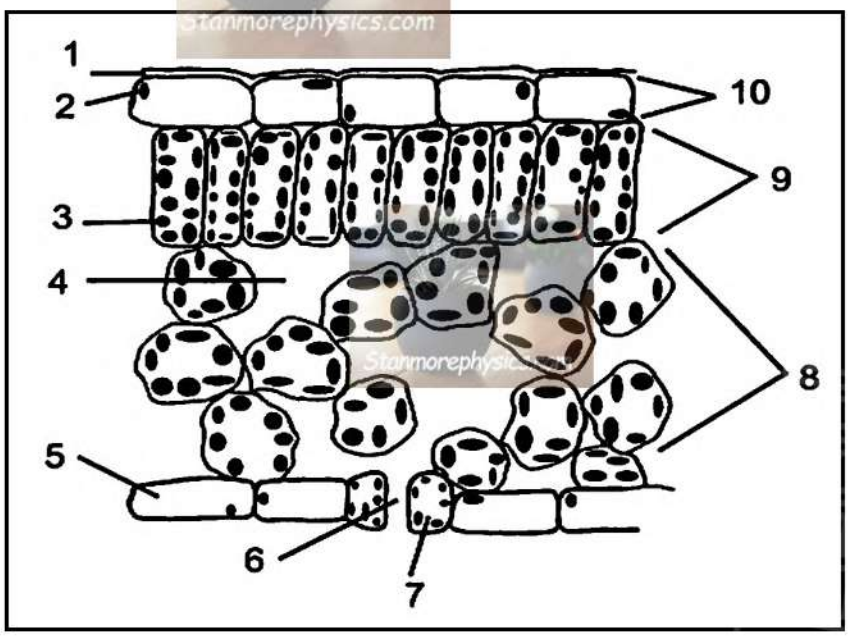
3.3.2 Identify tissues **B** and **C**. (2)

3.3.3 Tabulate ONE visible difference between **B** and **C**. (3)

3.3.4 State the location and the function of tissue **A.** (2)

3.3.5 What is meant the term "CARDIAC" muscle? (1)
(10)

3.4 The diagram below represents the cross-section of a dicotyledonous leaf.



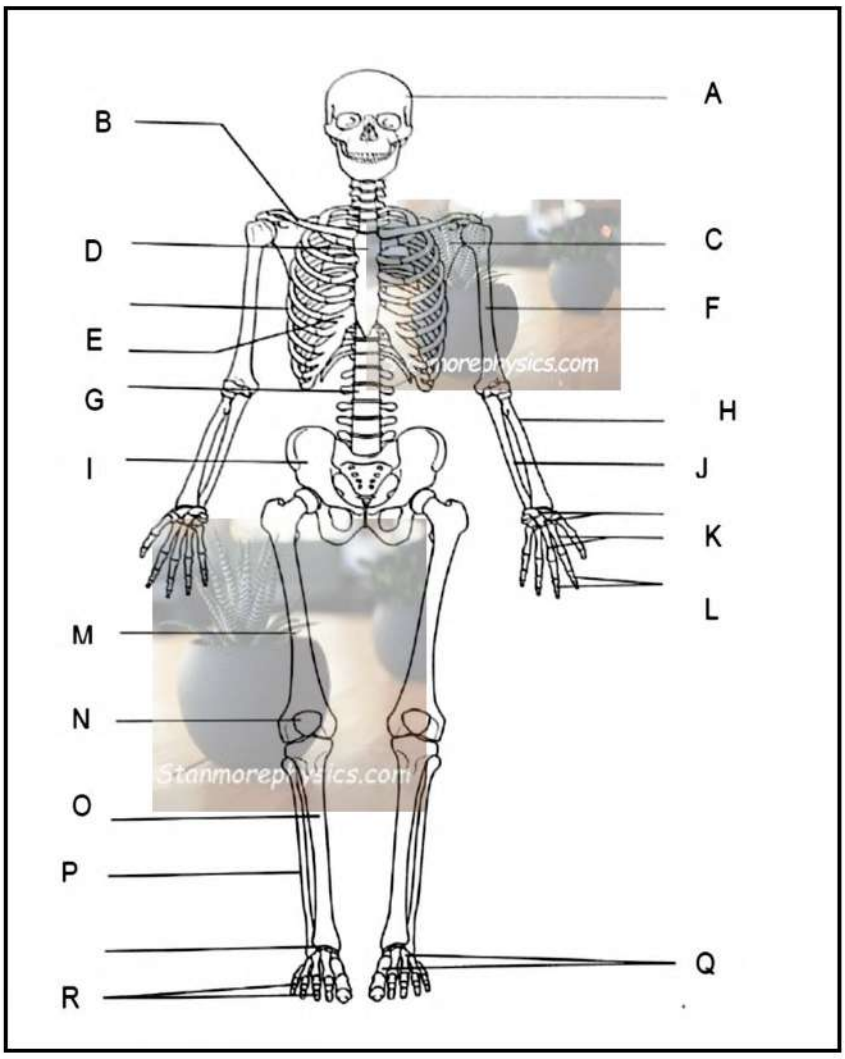
3.4.1 Identify the part numbered **1**. (1)

3.4.2 State TWO functions of the part numbered **1**. (2)

3.4.3 Give the collective name for tissues **8** and **9.** (1)

3.4.4 Explain TWO ways in which tissue **9** is adapted for its functions (4)
(8)

3.5 The diagram below shows a human skeleton.



3.5.1 Identify the part labelled **A**. (1)

3.5.2 To which of the two main sections of the skeleton are the parts labelled A, D, E and G belong? (1)

3.5.3 Name the structure that attaches bone **F** to bone **H** and **J**. (1)

3.5.4 Give the LETTER and NAME of the structure that encloses the brain. (2)

3.5.5 List any THREE functions of the human skeleton. (3)

3.5.6 Give the BIOLOGICAL term for the longest bone of a human skeleton? (1)

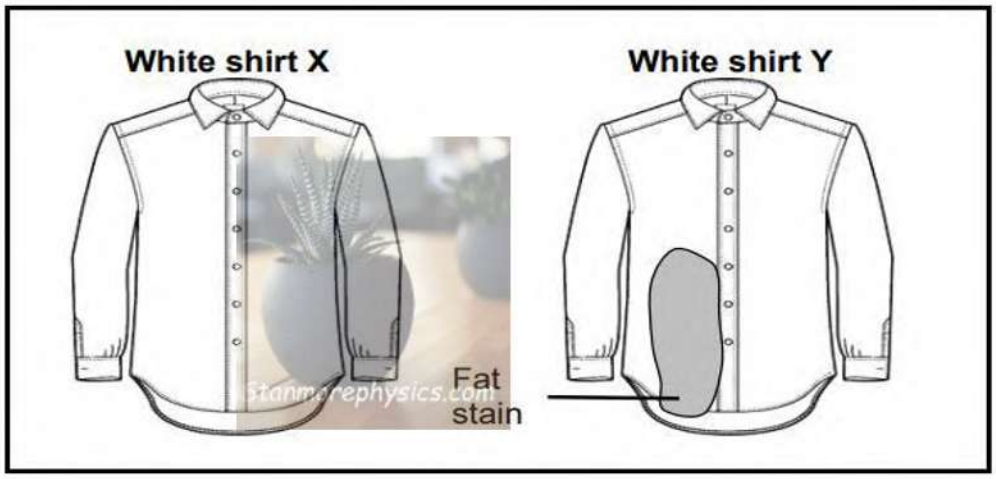
3.5.7 Explain why, in humans, the pelvis of a woman is broader than that of a man. (2)
(11)

3.6 An investigation was carried out to determine the effect of high temperature on a washing powder containing fat-digesting enzymes.

The procedure was as follows

- Two same school white shirts were used.
- White shirts **X** and **Y** had the same fat stains.
- White shirt **X** was washed with detergent containing fat-digesting enzyme for 3 minutes at 37°C.
- White shirt **Y** was washed with detergent containing fat-digesting enzyme for 3 minutes in boiling water.
- The investigation was repeated five times.

The results of an investigation are shown below.



3.6.1 State the aim for this investigation. (2)

3.6.2 List TWO factors that were kept constant during this investigation. (2)

3.6.3 Why was the white shirt **X** included in this investigation? (2)

3.6.4 Give ONE reason why the investigation was repeated five times? (1)

.

3.6.5 Give THREE uses of enzymes apart from the one given in the investigation. (3)

3.6.6 State the conclusion for this investigation. (2)

(12)

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150

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NATIONAL SENIOR CERTIFICATE

GRADE 10

JUNE 2025

AMENDED LIFE SCIENCES MARKING GUIDELINES

MARKS: **150**

These marking guidelines consist of 12 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
   Stop marking when the maximum mark 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 the 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 become correct again, resume credit.

9. **Non-recognized abbreviations**
   Accept if first defined in answer. If not defined, do not credit the unrecognized abbreviation but credit the rest of answer if correct.

10. **Wrong numbering**
    If the answer fits into the correct sequence of questions but the wrong number is given, it is acceptable. Indicate that the candidate's numbering is wrong.

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 are given in terminology**
    Accept, provided it was accepted at the Provincial Marking Guideline Discussion Meeting Constitution.

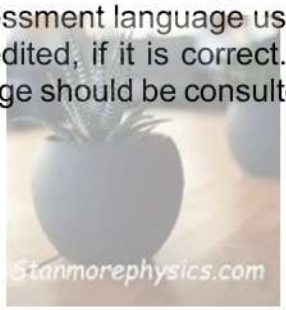
14. **If only a letter is asked for and only name is given (and vice versa)**
No credit.

15. **If units are not given in measurements**
The marking guideline will allocate marks for units separately, except where it is already given in the question.

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

17. **Caption**
Credits will be given for captions to all illustrations (diagrams, graphs, tables, etc.) except where it is already given in the question.

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 language



SECTION A

QUESTION 1

1.1 1.1.1 B ✓✓

1.1.2 B✓✓

1.1.3 D✓✓

1.1.4 D✓✓

1.1.5 C✓✓

1.1.6 B✓✓

1.1.7 D✓✓

1.1.8 D✓✓

1.1.9 C✓✓

1.2 1.2.1 Transpiration✓

1.2.2 Foramen magnum ✓

1.2.3 Cuticle✓

1.2.4 Amino acids ✓

1.2.5 Haemoglobin ✓

1.2.6 Tonoplast✓/ Vacuolar membrane

1.2.7 Stoma✓/stomata

1.2.8 Diffusion✓

1.2.9 Appendicular skeleton✓ (9 x 1) **(9)**

1.3.1 B only✓✓

1.3.2 Both A and B✓✓

1.3.3 A only✓✓ (3 X 2) **(6)**

1.4	1.4.1	(a)	Mitochondrion✓	(1)
		(b)	Chloroplast✓	(1)
	1.4.2	(a)	**Y**✓	(1)
		(b)	**Y**✓	(1)
		(c)	**X**✓	(1)
	1.4.3	(a)	Stroma ✓	(1)
		(b)	Granum✓/grana	(1)
		(c)	Starch granule✓	(1)
		(d)	Cristae✓	(1)
	1.4.4		Cellular respiration✓	(1)
		0		
			Photosynthesis✓.	(1)
				(11)
1.5	1.5.1		A – Root hair✓ /epidermal cell	(1)
			B – Cortex✓/ Parenchyma	(1)
	1.5.2		Finger-like projections/ elongated✓	
			Thin cell wall ✓	
			Cell wallwithout cuticle✓and	
			Permeable cell wall✓	
			Cell sap with a low water concentration/potential ✓	
			Large vacuole ✓ Any 2	(2)
	1.5.3		Root✓	(1)
	1.5.4		cell to cell via cytoplasm✓ / vacuole/plasmodesmata /symplast	
			Cell to cell via cell walls / through intercellular air spaces/apoplast	(1)
			Cell to cell through osmosis	**(6)**
			(any 1)	

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 Potometer✓ (1)

2.1.2 To determine the effect of temperature on the rate of transpiration✓ (1)

2.1.3 - The speed of movement of the air bubble will be reduced/ slower✓ (1)

2.1.4 - Vaseline prevents transpiration✓at the ventral surfaces
- by blocking the stomata✓ (2)

2.1.5 To allow it to acclimatize to the environment✓/ temperature (1)

To allow transpiration to start✓

2.1.6 - Cut the shoot from a plant under water✓ to prevent air from entering the xylem✓

- set up apparatus under water✓ to prevent air bubbles from entering✓
- Make sure the apparatus is airtight using Vaseline to seal any gaps✓
  If air enters the apparatus the readings will be affected✓
- Dry the leaves of the shoot✓
  Any moisture present on the leaves will affect the rate of transpiration✓
  - Cut the shoot at a slant✓ an angle to increase surface area✓/ keeping xylem intact/ preventing damage to the xylem
- Do not cut through the xylem✓ to allow movement of water

Reliability

Repeat the experiment✓, then use average results✓

Set up more than one apparatus✓ to increase the sample size✓

Any (2 x 2) (4)

(Mark first TWO only) **(10)**

2.2 2.2.1 Mitosis✓ (1)

2.2.2 A- Anaphase✓
B- Interphase✓/(prophase)
C- Prophase✓
D- Metaphase✓ (4)

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 (3 x 1) (3)

(Mark first THREE only)

2.2.4
- Spindle fibres contract ✓
- Chromosomes split at the centromere ✓
- sister chromatids pull apart ✓
- to opposite sides of the cell (poles)✓

(Mark first THREE only) (3)
(11)

2.3.1 Diagram I – plant✓cell (1)
Diagram II – animal ✓cell (1)

2.3.2 D✓ – vacuole✓ (2)
Or vacuole✓✓

2.3.3 A – cell membrane ✓ (1)
B – nucleus✓/nuclear membrane/pore (1)
C – cell wall✓ (1)

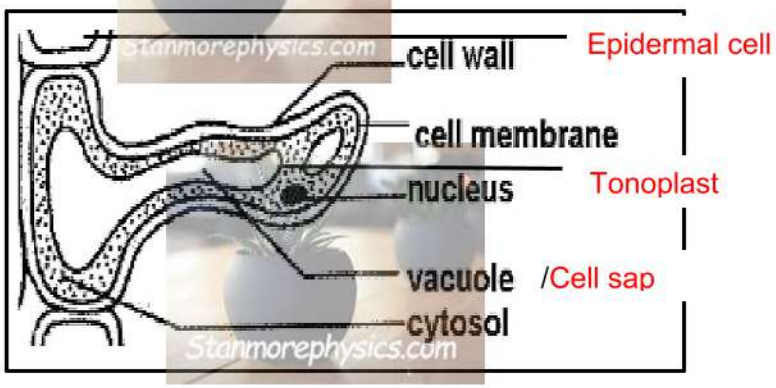
2.3.4
- Selective membrane✓
- allows water and mineral salts to pass through✓ and
- prevent larger molecules from enter✓ (3)

2.3.5 Magnification = Image/ Actual

= 15✓ mm / 0,015✓ mm = (x) 1 000✓ (3)
(13)

2.4 2.4.1 B – Parenchyma✓ (1)
C – Collenchyma✓ (1)

2.4.2 **Epidermal cell with root hair**



Criteria for assessing the drawing
Caption (**C**)✓
Root hair drawn(**D**)✓
Any two correct labels(**L**)✓ ✓ (4)

2.4.3

Xylem vessels	Phloem sieve tubes
Conduct water✓ and dissolved mineral salts	Conduct dissolved food✓
Walls are thickened✓ /lignified	Walls are thin✓ /made up of cellulose
Cross walls perforated /✓absent	Sieve plates present✓
Transport is from root to leaves✓	Transport is from leaves to roots✓
Involved in upward movement✓	Both upward and downward movement✓

1 table + Any(2 x 2) (5)
(11)

2.5.1 Fatty acids✓ and glycerol✓ (2)

2.5.2 Scurvy✓ (1)

2.5.3 B✓ (1)

2.5.4 Cereal B has the least amount of vitamin C✓ (1)

(5)
[50]

QUESTION 3

3.1 3.1.1 Carcinogens✓/carcinogenic (1)

3.1.2 Cancer✓ (1)

3.1.3
- Tar in cigarettes✓
- Viruses✓
- Certain diet✓
- Life style✓
- radiation from the sun✓

Any (3)

(Mark first THREE only)

3.2 3.2.1 (a) Substrate✓ molecule (1)

(b) Enzyme-Substrate✓ complex (1)

(c) Product(s)✓ (1)

3.2.2 Enzyme are substrate-specific ✓/
enzymes are specific to the reaction they catalyse (1)
-Reusable✓/does not change after the reaction **(4)**

3.3 3.3.1 A group of cells that have the same structure✓ and
are specialised to perform a specific function✓. (2)

3.3.2 **B**-Cuboidal epithelium✓
C-Ciliated columnar epithelium✓ (2)

3.3.3 T✓

	Tissue B	Tissue C
	Cube-shaped cells✓	Long narrow cells✓
	No goblet cell✓	Has goblet cells✓
	Have no cilia✓	Have cilia✓

1 table + Any (1 x 2) (3)

3.3.4
- **A** is attached to the bones✓
- It is responsible for voluntary movements✓ (2)

3.3.5 Heart (muscles)✓ (1)

(10)

3.4	3.4.1	**1-**Cuticle✓		(1)
	3.4.2	- Allows light into leaf✓ - Protect leaf cells✓ - Prevents water loss✓/ Is waterproof **(Mark first TWO only)**	Any	(2)
	3.4.3	Mesophyll✓tissues		
	3.4.4	- Elongated✓ deeper penetration of light✓ - thin-walled cells✓ allow for easy diffusion of substances✓ - Have many chloroplasts✓ for maximum absorption of sunlight✓ / photosynthesis - Has closely-packed cells✓ to increase surface area for absorption of sunlight✓ Directly below epidermis✓ for easy access to light✓ Arranged at right angles to the upper epidermis✓ to allow maximum number of cells to fit✓. Any (2 x2) **(Mark first TWO only)**		(4) **(8)**
3.5	3.5.1	Cranium✓/ skull		(1)
	3.5.2	Axial skeleton✓		(1)
	3.5.3	Ligament✓		(1)
	3.5.4	A✓ Cranium✓		(2)
	3.5.5	- Framework✓ /structure for support - Protects✓ delicate organs - Muscle attachment✓ - Bones in the ears for hearing✓ - Store minerals✓ - Manufacture blood cells✓ - allows for movement✓ (Mark first THREE only)	Any	(3)
	3.5.6	Femur✓		(1)
	3.5.7	- To give support during pregnancy✓ - And allows passage of child during birth ✓		(2) **(11)**

3.6 3.6.1 - To determine the effect of high temperature on a washing powder containing fat-digesting enzymes ✓✓ (2)

3.6.2 - Type/ colour of shirt✓
- Type of detergent✓
- Time for washing✓
- Same fat stain✓

(Any 2) (2)

3.6.3 - Serves as a control✓
- to compare the effect of high temperature on fat digesting enzymes✓
- To show that enzyme action is affected by high temperature and not any other factor✓

Any 2 (2)

3.6.4 To increase reliability✓ (1)

3.6.5 - Remove hair from the skins✓
- Making beer, wine and vinegar✓
- Making of chocolates and syrups✓
- For tenderising meat✓
- Manufacturing of baby foods✓
- Manufacturing of fruits✓
- In baking✓
- In the rubber industry✓
- It speeds up the rate of the reaction✓
- It lowers the activation energy✓
- It is involved in metabolic processes ✓/respiration /photosynthesis

Any 3 (3)

(Mark first THREE only)

3.6.6 Fat-digesting enzyme exposed to high temperatures failed to remove fat stain✓✓ (2)

(12)/

OR

High temperature denatures fat digesting enzyme thus preventing it from removing fat stains✓✓

TOTAL SECTION B: 100
GRAND TOTAL: 150