education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 10

LIFE SCIENCES

JUNE 2024

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 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. 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 provided as possible answers to the following questions. Choose the correct answer and write only the letter (A-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 Proteins differ from carbohydrates and fats in that they all …

A are fairly large molecules.

B contain the element nitrogen.

C occur only in animal cytoplasm.

D function as enzymes.

1.1.2 The reagent used to test for the presence of proteins is …

A iodine solution.

B alcohol.

C Benedict's solution.

D Biuret reagent.

1.1.3 If a cell divides by mitosis, how many cells will there be after three divisions?

A 3 cells

B 4 cells

C 8 cells

D 16 cells

1.1.4 Cells in the leaf that do not contain chloroplasts.

A Guard cells

B Sclerenchyma cells

C Palisade cells

D Parenchyma cells

1.1.5 Which type of cell does not play a role in strength and support?

A Xylem vessel

B Collenchyma

C Companion cells

D Xylem tracheids

1.1.6 The growth tip of the root of a plant consists mainly of …

A companion cells.

B epidermal cells.

C meristematic tissue.

D conducting tissue.

1.1.7 Contains the genetic information of an organism

A Chloroplast

B Mitochondrion

C Nucleus

D Centrosome

1.1.8 A compound only found in plants cells.

A Cellulose

B Glucose

C Lipids

D Water

1.1.9 The organelle that plays a role in cell division is …

A vacuole.

B centrosome.

C chloroplast.

D ribosomes.

1.1.10 Component of the blood that destroys the bacteria.

A Red blood corpuscles

B Platelets

C White blood cells

D Plasma (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 number (1.2.1 to 1.2.5) in the ANSWER BOOK.

1.2.1 The vitamin that prevents night blindness

1.2.2 Organelle in animal cells that contain digestive enzymes

1.2.3 The red pigment found in erythrocytes

1.2.4 The bond between two amino acids

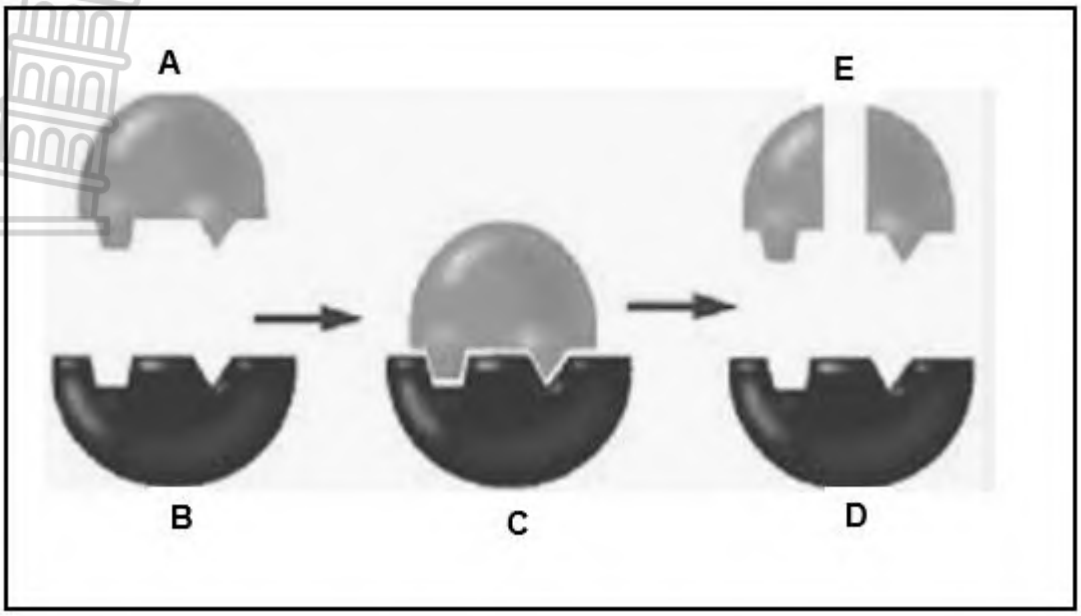
1.2.5 The collective name for the bone tissue and blood tissue (5 x 1) **(5)**

1.3 Indicate whether each of the statements 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 number (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	Organisms without a true nucleus	A. Prokaryote B. Eukaryote
1.3.2	Pore on a leaf that allows for gaseous exchange	A. Stroma B. Stoma
1.3.3	Type of reaction when a complex molecule is built up	A. Anabolic B. Catabolic

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

1.4 The diagram below shows enzyme activity.



1.4.1 Write down the LETTER that represent an enzyme (1)

1.4.2 Give a reason for your answer in 1.4.1 (1)

1.4.3 Name the substance labelled **C** (1)

1.4.4 Explain how part labelled **B** is affected by increasing pH. (3)

1.4.5 State ONE importance of enzymes in living organisms (1)

1.4.6 Mention the mechanism represented by the above diagram and describe how it explains the functioning of enzyme. (5)
(12)

1.5

Some washing powders are described as having **'biological'** action because they contain enzymes. These powders are particularly useful for removing stains such as blood, egg, chocolate and gravy. The manufactures suggest that such washing powders are most effective in lukewarm water, rather than cold or boiling water.

1.5.1 Give a reason why the biological washing powders are more effective to remove the stains mentioned above, than ordinary washing powders. (1)

1.5.2 At which temperature (in ^{o}C) would you say the lukewarm water must be for the best results? (1)

1.5.3 Explain why manufacturers suggest that biological washing powders are less effective at high temperatures. (2)

1.5.4 Suggest ONE reason why biological washing powders are more economical than ordinary washing powders. (1)

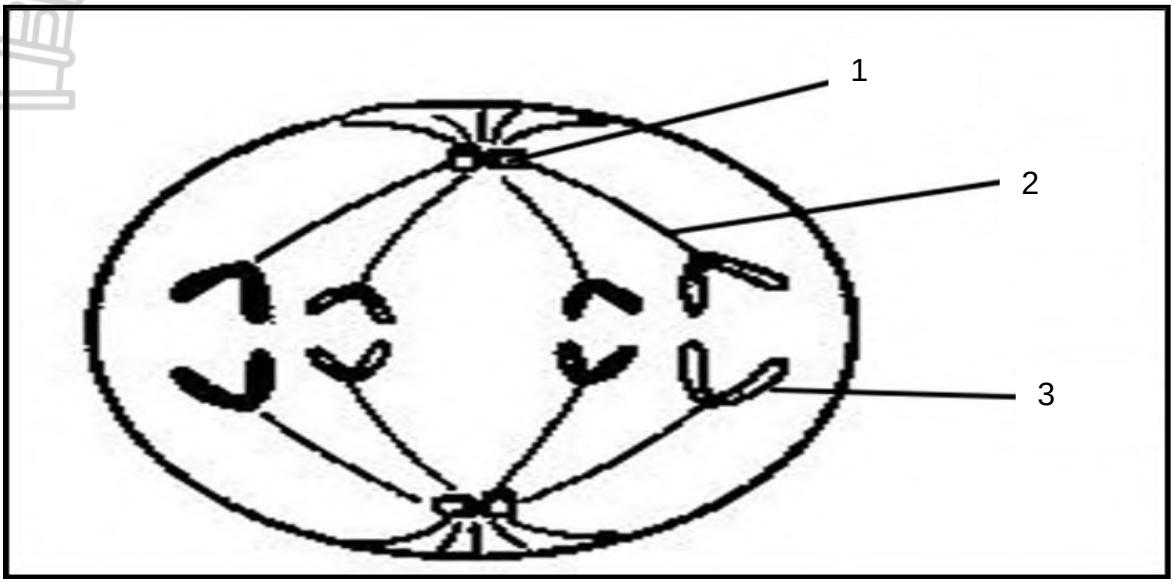
1.5.5 What is meant by term optimum temperature? (2)
(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below shows a cell during a cell division.



2.1.1 Provide the labels for parts 1, 2 and 3 (3)

2.1.2 How many chromosomes are shown in the diagram above? (1)

2.1.3 How many chromosomes would be found in the daughter cells at the end of cell division of the cell above? (1)

2.1.4 Mention TWO ways in which mitosis is biological significant. (2)

2.1.5 Make a neat labelled diagram of a cell with FOUR (4) chromosomes during metaphase of mitosis. (4)
(11)

2.2 Read the following extract about cancer.

CANCER- MITOSIS GONE WRONG

Colorectal cancer, also called colon cancer or large bowel cancer, includes cancerous growths in the colon, rectum and appendix. Colorectal cancer is the type of cancer that affects the colon (large intestine) and rectum.
With 655 000 deaths worldwide per year, it is the third most common form of cancer and the second leading cause of cancer-related deaths in the Western world. These mushroom-shaped growths are usually benign, but some may develop into cancer over time. The majority of the time, the diagnosis of localized colon cancer is through a colonoscopy. Therapy is usually through surgery, which in many cases is followed by chemotherapy.

2.2.1 What is meant by colorectal cancer? (1)

2.2.2 Explain the statement that cancer is 'mitosis gone wrong'. (2)

2.2.3 State TWO ways on how can cancer be treated. (2)
(5)

2.3 The root of an onion is rapidly growing part of the onion. Many cells will be in different stages of mitosis. A sample of an onion tip was stained and studied under a microscope.

The various phases of mitosis were identified and number of cells counted in each phase. The results are shown in the table below.

	Number of cells			
	1	**2**	**3**	**Total**
Interphase	47	49	58	154
Prophase	5	7	18	30
Metaphase	2	4	1	7
Anaphase	10	10	2	22
Telophase	4	4	4	12

2.3.1 Which phase produced:

(a) Highest number of cells (1)

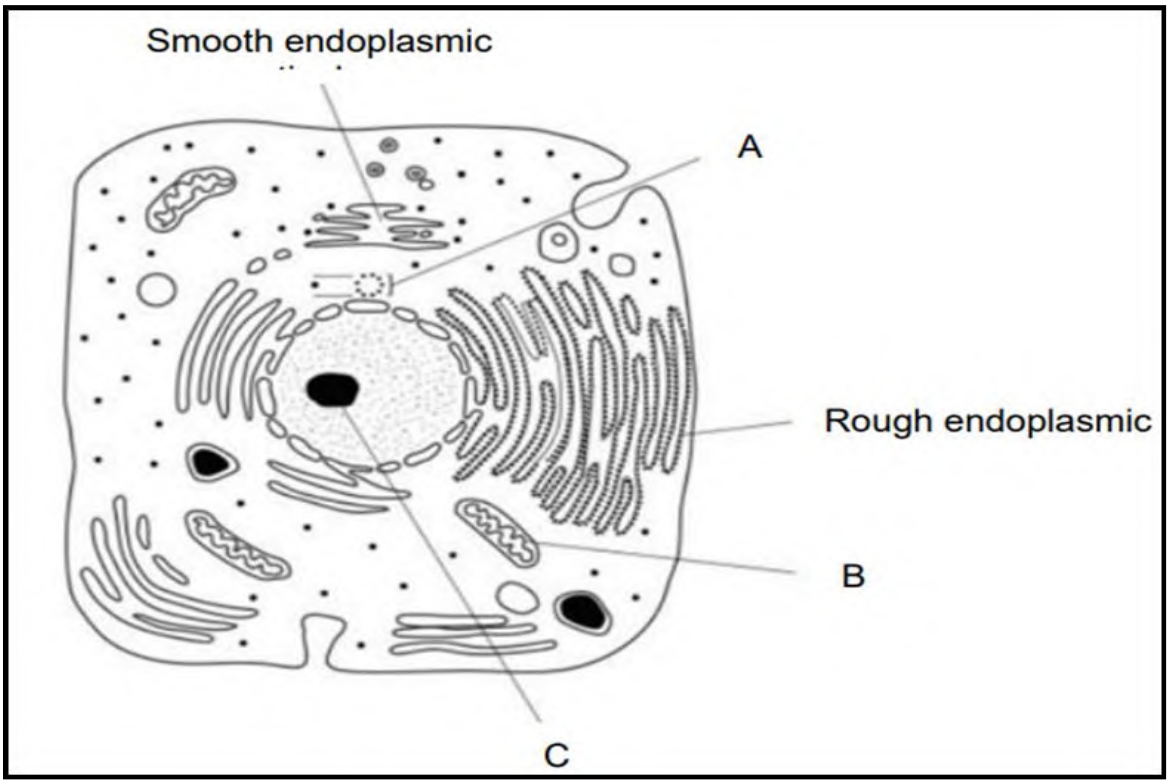
(b) Lowest number of cells (1)

2.3.2 Calculate the percentage increase between cell 1 and cell 3 of cells produced during interphase. (3)

2.3.3 Briefly describe what happens during the Prophase stage of mitosis. (4)

2.3.4 Draw a bar graph to represent the total number of cells in each phase of the cell cycle. (6)
(15)

2.4 The diagram below represents a cell of a living organism.



2.4.1 Does this cell represent a plant or animal cell? (1)

2.4.2 Give TWO visible reasons for your answer in QUESTION 2.4.1 (2)

2.4.3 Write down only the LETTER of the part that is associated with the:

(a) Process of cellular respiration (1)

(b) Transmission of hereditary characteristics (1)
(5)

2.5 The vacuole is membrane bound organelle and plays an important role in plant cells.

2.5.1 Name the membrane surrounding a vacuole. (1)

2.5.2 Mention TWO functions of the vacuole in plant cells. (2)
(3)

2.6 Tabulate THREE differences between plant and animal cells. **(7)**

2.7 Study the data in the following table and answer the questions that follow.

Comparison of the composition of the types of blood cells per mm^3 blood

Types of blood cells	Number of blood cells per mm^3 blood in three people		
	Nceba	**Zhandalee**	**Vastheek**
Erythrocytes (red blood cells)	8 350 000	2 200 500	6 000 500
Leucocytes (white blood cells)	580	6 950	5 300
Thrombocytes (blood platelets)	247 500	258 000	175

2.7.1 Identify the person:

(a) Who is most immune to disease (1)

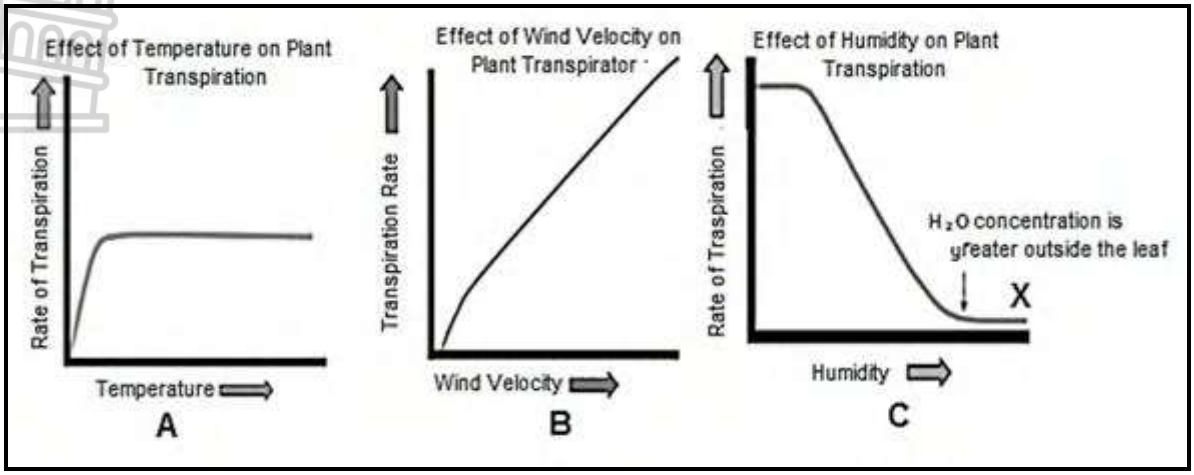
(b) Who suffers from haemophilia (blood cannot clot) (1)

2.7.2 Explain the function of an erythrocyte (2)
(4)

TOTAL QUESTION 2: [50]

QUESTION 3

3.1 The graphs below shows the transpiration rates in different environmental conditions.



3.1.1 Define the term transpiration. (2)

3.1.2 From the graph A, describe the relationship between temperature and the rate of transpiration. (2)

3.1.3 Explain the shape of the graph at **X**, in graph **C**. (2)

3.1.4 Explain how night time affects transpiration in plants. (2)
(8)

3.2 A scientist wanted to investigate whether light is required for the germination of seeds.

She filled two plant pots of the same size with equal amounts of soil. Pot 1 was labelled 'LIGHT' and pot 2 'DARK'. Five lettuce seeds were planted in each of the pots. Both plants were given sufficient water.
Pot 1 was put in direct sunlight. A cardboard box was placed over Pot 2 and no light was allowed to enter.

3.2.1 Identify the:

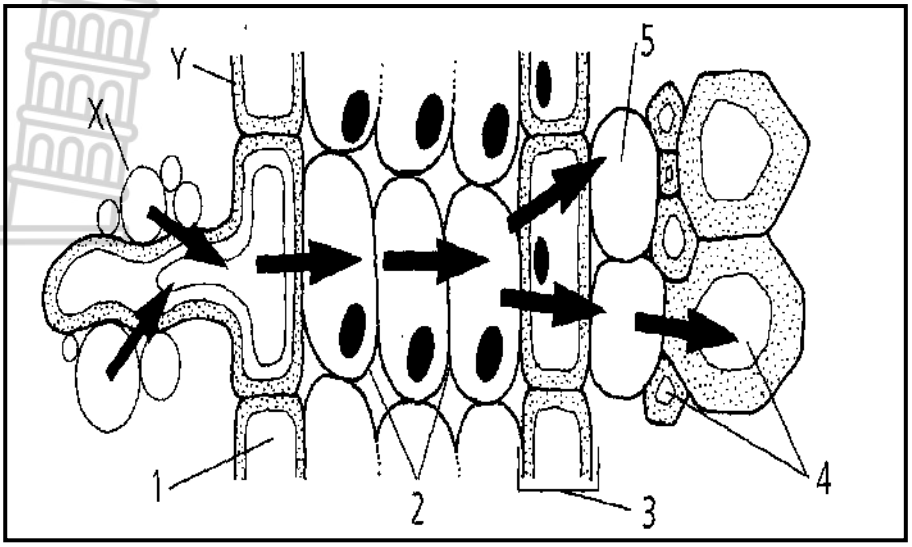
(a) Independent variable (1)

(b) Dependent variable (1)

3.2.2 List TWO variables that were kept constant. (2)

3.2.3 Suggest ONE way in which the reliability of the experiment could be improved. (1)
(5)

3.3 The diagram below shows the movement of water across the plant tissues.



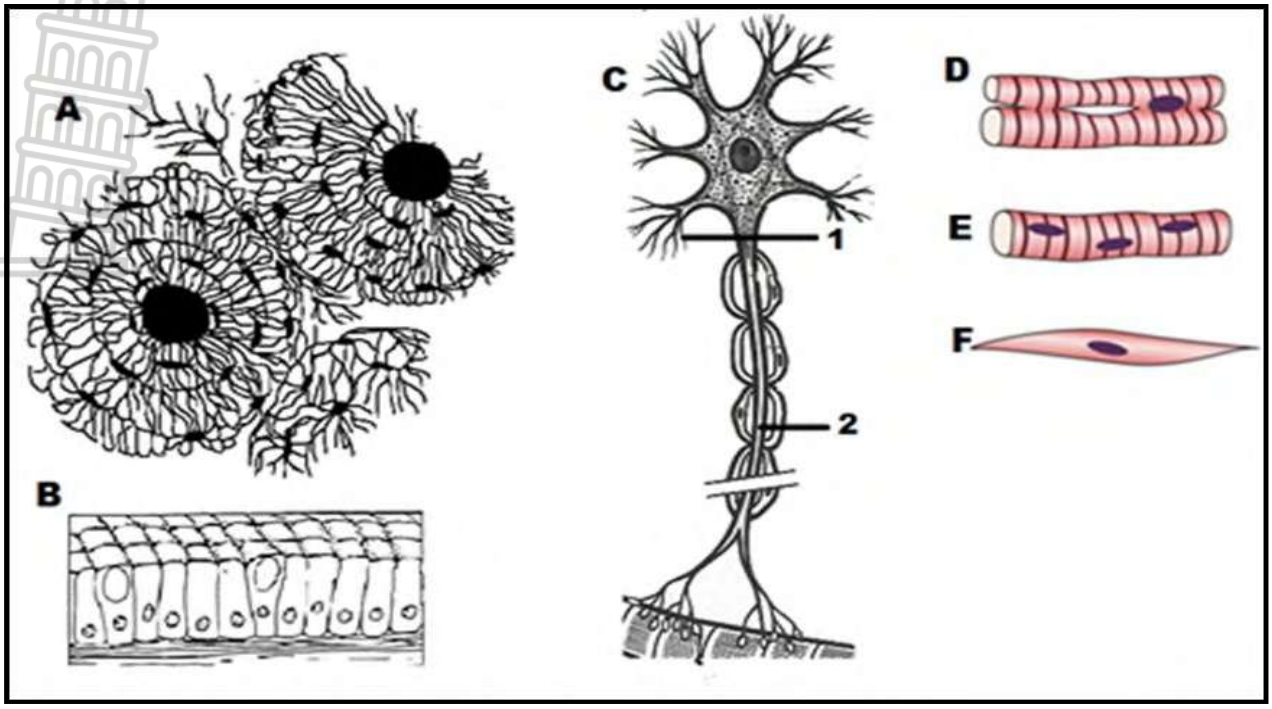
3.3.1 Give labels for parts numbered **1**, **4** and **5**. (3)

3.3.2 Explain the process of water absorption from **X** through the root. (6)

3.3.3 Explain the difference in water potential between the root hair and ground water to make water uptake possible. (2)

3.3.4 Name THREE forces responsible for the movement of water through the tissue indicated by number **4**. (3)
(14)

3.4 The diagrams below shows different animal tissues.



3.4.1 Identify the animal tissue labelled:

(a) **A** (1)

(b) **C** (1)

3.4.2 Identify part:

(a) **1** (1)

(b) **2** (1)

3.4.3 Tissue **B** is made up of specialized cells. Give the name of the specialized cells (1)

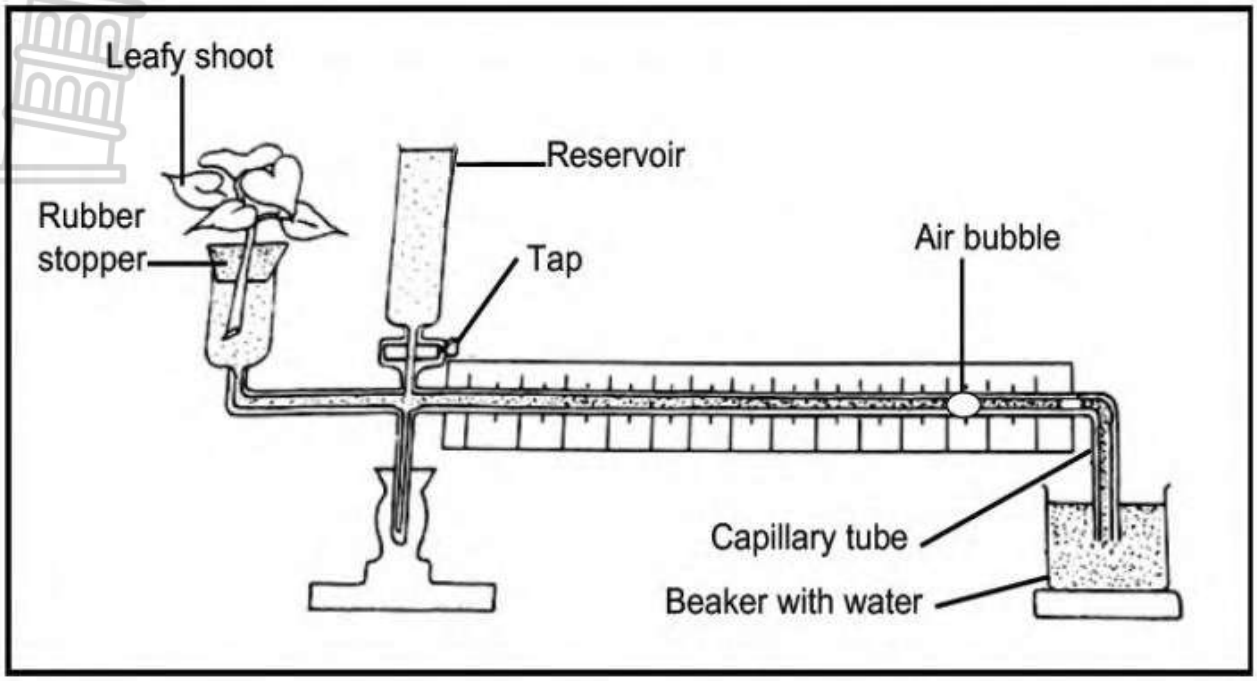
3.4.4 Write down the LETTER of the tissue that:

(a) Is found in the walls of the digestive system, respiratory system and reproductive system. (1)

(b) Is found in the heart and make up the walls of the heart. (1)

3.4.5 State the function of the tissue labelled **E**. (1)
(8)

3.5 A group of Grade 10 learners set up the apparatus shown below to investigate the effect of temperature on the rate of transpiration. This investigation was done three times.



3.5.1 Identify the apparatus shown above. (1)

3.5.2 Explain why the leafy shoot should be cut underwater. (2)

3.5.3 Explain the purpose of the air bubble. (2)

3.5.4 What is the purpose of the water in the reservoir? (1)

3.5.5 State TWO precautions you would take to ensure reliable results. (2)
(8)

3.6 A learner carried out three food tests on samples of peanuts, apple and potato.
The following table shows the results of the tests that were carried out.
On the table, a tick (✓) shows a positive result and a cross (x) shows a negative results.

TEST	CHEMICAL/ REAGENT	PEANUT	APPLE	POTATO
P	Iodine solution	✓	✓	✓
Q	Fehling's A and B OR Benedict's solution	X	✓	X
R	Ether OR alcohol	✓	X	X

3.6.1 Which type of food test was carried out at:

(a) **P** (1)

(b) **Q** (1)

(c) **R** (1)

3.6.2 What colour change would the learner observe at the end of testing:

(a) An apple sample in test **Q**? (1)

(b) A potato sample in test **P**? (1)

3.6.3 If a protein test was done on peanuts:

(a) Name the reagent/ chemical used to test it. (1)

(b) What colour would the learner observe in a positive test? (1)

(7)

TOTAL QUESTION 3: [50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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PROVINCIAL ASSESSMENT

GRADE 10

LIFE SCIENCES
MARKING GUIDELINES

JUNE 2024

MARKS: 150

These marking guidelines consist of 10 pages.

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

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

9. **Non-recognised 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 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 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 letter is asked for and only name is given (and vice versa**)
    Do not credit.

15. **If units are not given in measurements**
    Candidates will lose marks. Marking guideline 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, graphs, tables, etc.) must have 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. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

19. **Changes to the memorandum**
    No changes must be made to the memoranda. The provincial internal moderator must be consulted, who in turn will consult with the national internal moderator (and the Umalusi moderators where necessary).

SECTION A

QUESTION 1

1.1.1 B✓✓

1.1.2 D✓✓

1.1.3 C✓✓

1.1.4 B✓✓

1.1.5 C✓✓

1.1.6 C✓✓

1.1.7 C✓✓

1.1.8 A✓✓

1.1.9 B✓✓

1.1.10 C✓✓

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

1.2.1 Vitamin A✓ (1)

1.2.2 Lysosomes✓ (1)

1.2.3 Haemoglobin✓ (1)

1.2.4 Peptide bond✓ (1)

1.2.5 Connective tissue✓ (1)

(5 x 1) **(5)**

1.3.1 A only✓✓

1.3.2 B only✓✓

1.3.3 A only✓✓

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

1.4.1 (a) B✓ (1)

(b) It has catalyzed the reaction without itself being changed during the reaction.✓ (1)

(c) Enzyme-substrate complex✓ (1)

(d) Denatures✓
loses a specific shape and function✓
due to the hydrogen bonds being broken✓ (3)

(e) - Enzymes are proteins that control the speed of chemical

- reactions in the body.✓
- Used in making of fruit juices to break down cellulose✓ (1)
- used in making lactose free milk✓
- used in production of baby food✓

mark first one only

(f) **Lock and key theory**✓*

- Each enzyme has a specific/particular shape✓
- The substrate on which the enzyme works fit into enzyme✓
- An enzyme-substrate complex is formed✓
- A chemical reaction occurs and substrate is changed✓
- The enzyme and the product are then separated✓
- The enzyme is free to react with more of the substrate✓

(✷Compulsory mark, then any four) (5)

(12)

1.5.1 They contain enzymes✓ (1)

1.5.2 Approximately 37^{o}c ✓ (1)

1.5.3 High temperature cause the enzymes to denature✓/change shape and cannot function✓effectively. (2)

1.5.4 Less washing powder✓/ less electricity is needed✓ (1)

1.5.5 It is the temperature at which enzymes function the best✓✓ (2)

(7)

TOTAL SECTION A: [50]

SECTION B

QUESTION 2

2.1.1 1 Centriole✓ (1)

2 Spindle fibre✓ (1)

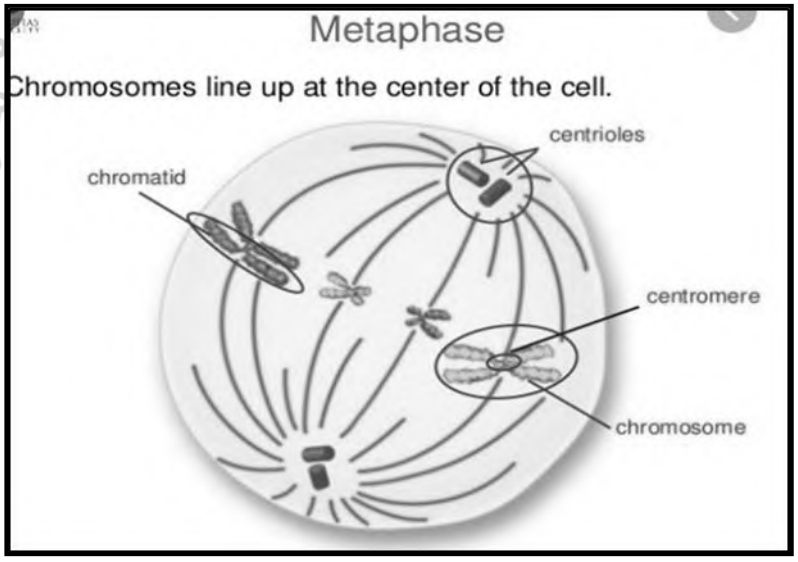
3 Chromatid✓ (1)

2.1.2 Four / 4✓ (1)

2.1.3 Four/ 4✓ (1)

2.1.4
- Growth/ increase in size of an organism✓
- Replacement of dead cells✓
- Responsible for asexual reproduction in certain plants and animals✓
- Repairs damaged tissue✓ **(Any two**) (2)

2.1.5



1 mark for the correct representation of metaphase stage (4)
3 marks for any correct labels

(11)

2.2.2 Is the type of cancer that affects the colon and rectum✓ (1)

2.2.2 Refers to cells that are undifferentiated✓ and are dividing in an uncontrolled manner✓ (2)

2.2.3 Surgery✓ and chemotherapy✓ (2)

(5)

2.3.1 (a) Interphase✓ (1)

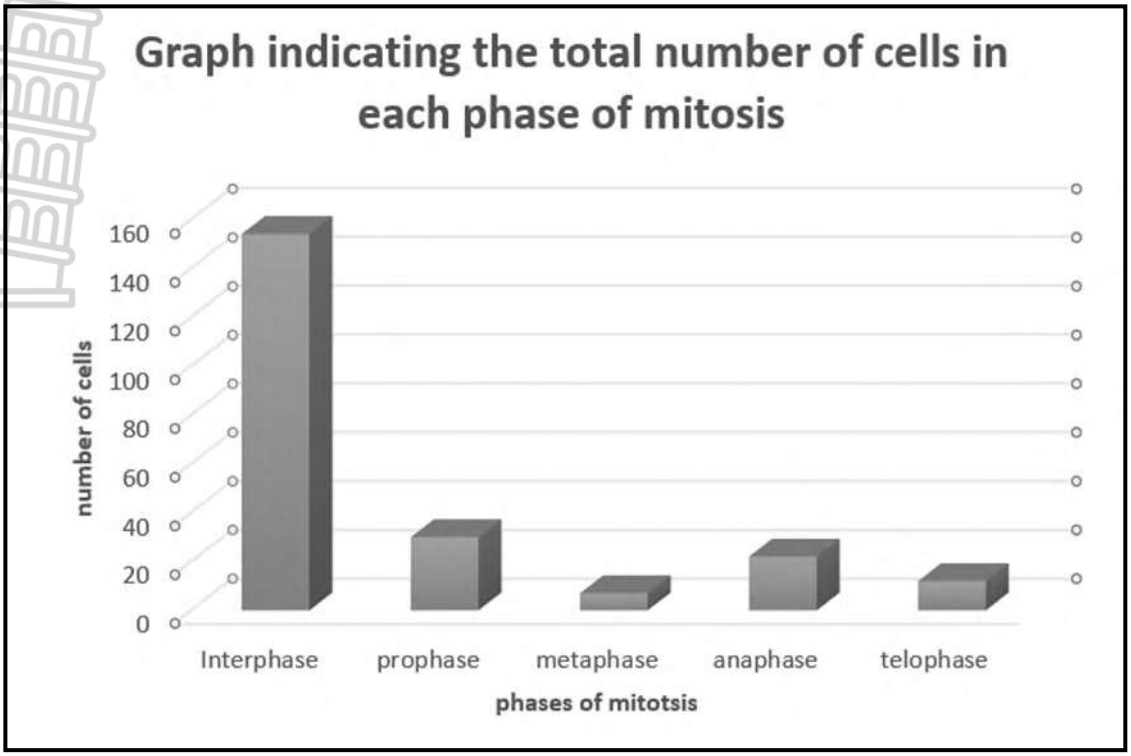
(b) Metaphase✓ (1)

2.3.2 58- 47✓ ÷ 47✓ x 100 = 23,4✓ (3)

2.3.3
- The nuclear membrane disappears✓
- Chromosomes are visible✓
- Centrosome split into two centrioles✓
- Centrioles move to opposite poles of the cell✓
- Spindle fibers develops at the centrioles✓ (4)

(Any four)

2.3.4



Rubric for assessing the graph

CRITERIA	MARK
Correct type of graph, bar graph (not histogram) (**T**)	1
Caption including both variables (**C**)	1
Labels for X and Y- axes including units (L)	1
Appropriate scale for X (width of bars and intervals) and Y-axes (**S**)	1
Plotting of points on the graph (**P**)	1: correctly plotted one to four points 2: correctly plotted all six points

(6)

NB: - if the wrong type of graph is drawn, marks will be lost for the correct type and plotting.
- If axes are transposed, marks will be lost for labelling and scale.

(15)

2.4.1 Animal cell✓ (1)

2.4.2 - Presence of cell membrane only✓
- Presence of centriole✓
- Invagination✓/ cleavage furrow appears
- No cell wall formed✓/ No cell plate formed (2)
(Any two)

2.4.3 (a) B✓ (1)

(b) C✓ (1)
(5)

2.5.1 Tonoplast✓ (1)

2.5.2 - Gives turgidity✓/rigidity/turgor pressure to the cell
- Maintains shape✓/ swollen appearance to the cell
- Storage of cell sap with water and salts✓
- Storage of pigment that give colour to petals of flowers✓
- Plays a part in water balance in cells✓/ osmosis (2)
(Mark the first two)
(3)

2.6

Plant cell	Animal cell
Regular shape✓	Irregular shape✓
Both cell wall and cell membrane✓	Only cell membrane no cell wall✓
Large vacuole✓	Small or absent vacuole✓
No centrioles/ centrosome present✓	Centrioles present/ centrosome✓
No lysosome present✓	Lysosome present✓

Table 1 mark & any 3 x 2 (7)

2.7.1 (a) Zhandalee✓ (1)

(b) Vastheek✓ (1)

2.7.2 It contains haemoglobin✓ which transport oxygen to body cells✓ (2)
(4)

TOTAL QUESTION 2: [50]

QUESTION 3

3.1.1 Transpiration is the loss of water in the form of water vapour✓ from the aerial parts of a plant.✓ (2)

3.1.2 As temperature increases✓, transpiration rate increases✓ when it reaches an optimal temperature✓, transpiration rate stays the same✓, the graph levels off. (2)
(Any two)

3.1.3 - Humidity is very high✓ / lots of water vapour in the air

- Water potential gradient between inside of the leaf stomata and atmosphere is very low.✓ (2)
- Transpiration rate decreases✓/ greatly decreased to the minimal level.

(Any two)

3.1.4 Stomata tend to close at night✓,reducing the transpiration rate✓ (2)

(8)

3.2.1 (a) Sunlight✓/ Light (1)

(b) Amount of seed that germinated✓ (1)

3.2.2
- Amount of soil✓
- Size of pots✓
- Type of seeds (lettuce)✓/ Number of seeds
- Amount of water✓ (2)

(Any two)

3.2.3
- Repeat the experiment more than once✓
- Use more seeds✓/ increase sample size (1)

(Any one)

(5)

3.3.1 1 Epidermal cells✓ (1)

4 Xylem✓ (1)

5 Pericycle✓ (1)

3.3.2
- Water enter root hairs by osmosis✓
- Osmosis is the movement of water molecules from the region of high water potential to the region of low water potential.✓
- in the soil there is a region of high water potential✓
- root hairs a region of lower water potential✓
- water moves through the semi-permeable membranes✓ of the cells
- then moves across the cortex✓ of the root
- via the endodermis✓ into the xylem tissue✓ (6)

(Any six)

3.3.3 The soil must have high water potential✓ and the root low water potential✓ (2)

3.3.4 Root pressure✓ (1)

Guttation✓ (1)

Capillarity✓ (1)

(14)

3.4.1 (a) Bone tissue✓ (1)

(b) Nerve tissue✓ (1)

3.4 .2 1 Dendrites✓ (1)

2 Axon✓ (1)

3.4.3 Goblet cells✓ (1)

3.4.4 (a) F✓ (1)

(b) D✓ (1)

3.4.5 They are attached to the bones to enable movement of the skeleton✓ (1)

(8)

3.5.1 Potometer ✓ (1)

3.5.2 To prevent air from entering✓and blocking the xylem vessel✓ (2)

3.5.3 To measure the rate of absorption ✓which indicates the rate of transpiration✓ (2)

3.5.4 To move the air bubble back✓ (1)

3.5.5 Apparatus must be airtight✓ (2)
Only one factor must be changed in relation to the normal condition✓
Cut the leafy twig under water✓
Use a leafy twig from a growing plant✓
Leave entire apparatus for 30 minutes, for the plant to become adjusted to the factor been investigated✓

(Mark first two)

(8)

3.6.1 (a) P- Starch✓ (1)

(b) Q- Glucose✓ (1)

(c) R- Lipid test✓ (1)

3.6.2 (a) Bright orange✓ (1)

(b) Blueish black✓/ Purplish black/ Black (1)

3.6.3 (a) Milion's reagent (1)

(b) Brick red✓ colour (1)

(7)

TOTAL QUESTION : [50]

TOTAL SECTION B: 100

GRAND TOTAL: 150