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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

GRADE 10

LIFE SCIENCES PAPER 1

FINAL EXAMINATION

7 NOVEMBER 2024

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DURATION: 2½ hours **MARKS: 150**

This paper consists of 19 pages.

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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 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 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 must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

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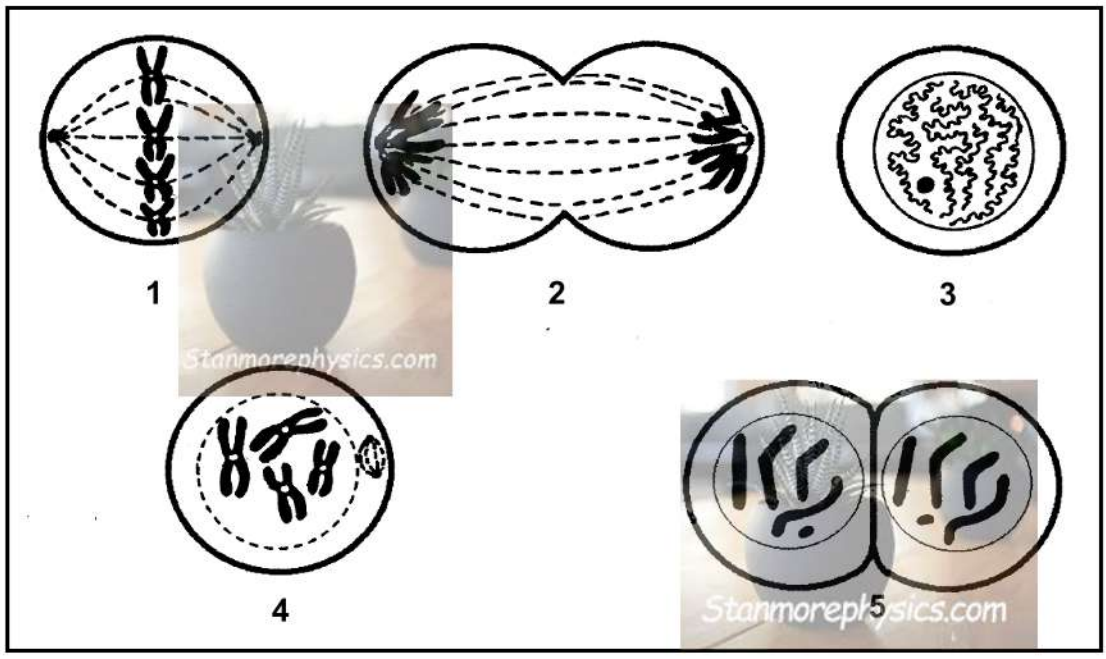
SECTION A
QUESTION 1

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 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Which ONE of the following is a nucleic acid?

A Protein
B Lipid
C DNA
D Phosphorus

1.1.2 The diagram below shows events during cell division



The correct sequence of events is …

A 1-2-3-4-5
B 2-4-3-2-1
C 3-1-2-4-5
D 3-4-1-2-5

1.1.3 Mitosis is responsible for…

A forming daughter cells with an unequal chromosome number
B forming a sperm cell
C causing variation in sex cells
D repairing skin cells worn out through friction

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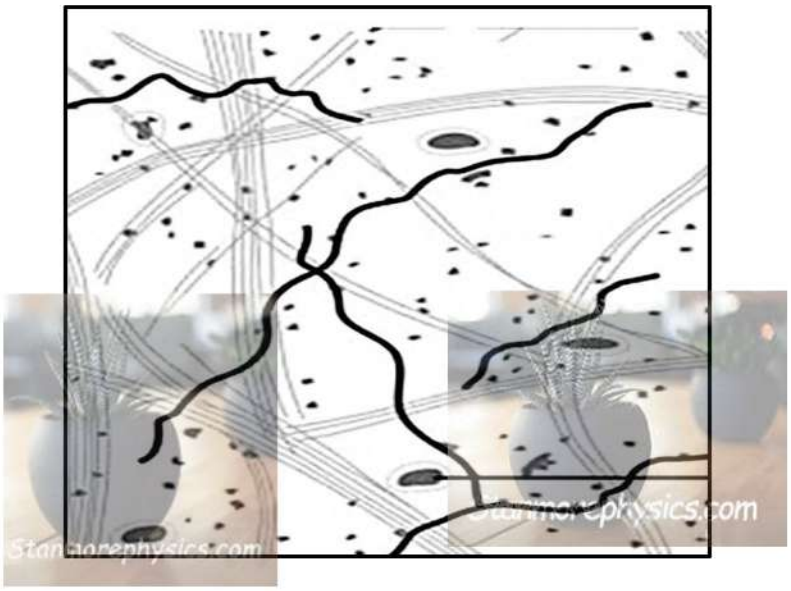
1.1.4 The phase during which the centromere splits is …

A telophase.
B prophase.
C anaphase.
D metaphase.

1.1.5 The diagram below represents a type of connective tissue.



The type of tissue represented above is …

A hyaline cartilage.
B loose areolar connective.
C dense fibrous tissue.
D blood tissue.

1.1.6 Which ONE of the following tissues prevents friction between the bones?

A Blood
B Cartilage
C Epithelium
D Muscle

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1.1.7 A biological washing powder contains enzymes that break down the stains caused by organic substances.

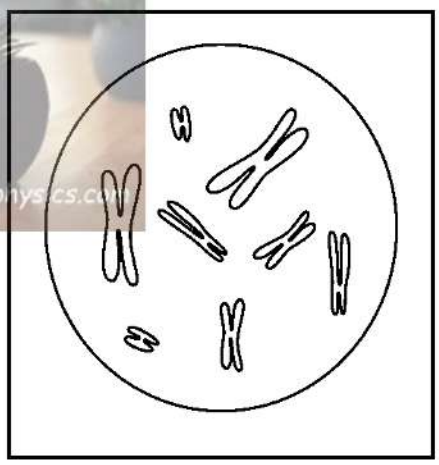
The table below shows the optimum functioning of enzymes.

Enzyme	Optimum pH
J	5
K	10
L	8
M	7 - 9

Which ONE of the following enzymes would be most effective in a washing powder that works in an acidic medium?

A **J**
B **K**
C **L**
D **M**

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



Which ONE of the statements describes the chromosome condition in the nucleus of the cell?

A 8 chromosomes, each with 4 chromatids
B 8 chromosomes, each with 2 chromatids
C 16 chromosomes each with 1 chromatid
D 16 chromosomes each with 8 chromatids

1.1.9 Below is a list of types of muscle tissues found in the human body.

(i) Cardiac muscle
(ii) Smooth muscle
(iii) Skeletal muscle

Which combination represents muscle tissue made up of muscle fibres?

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

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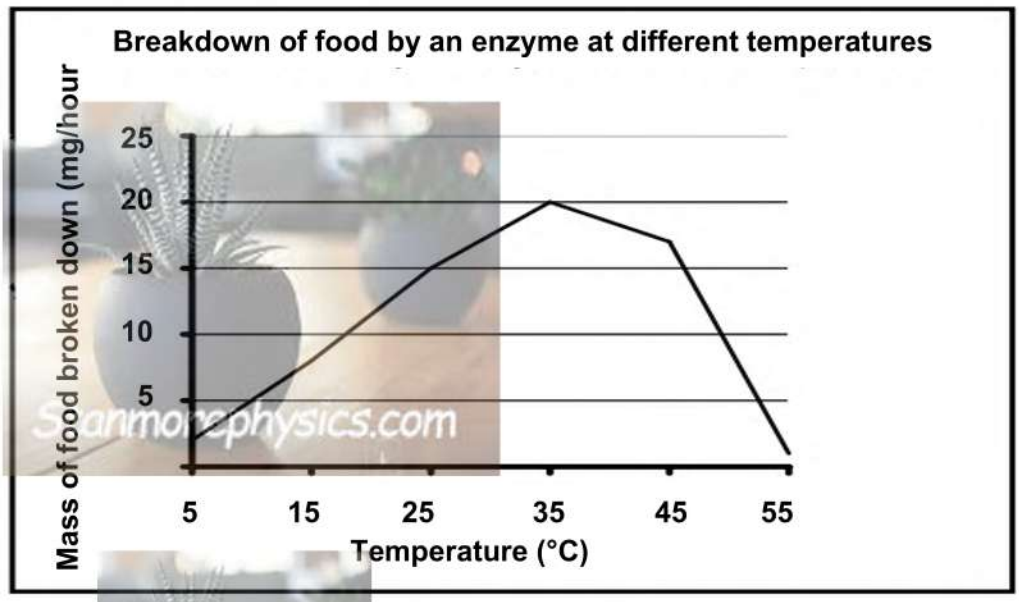
1.1.10 The graph below shows the enzyme activity at different temperatures.



Which ONE of the following is an explanation for the shape of the graph between 35 °C to 55 °C?

A The mass of food broken down increases, because as the temperature increases the enzyme activity increases.
B The mass of food broken down decreases, because as the temperature increases the enzymes activity decreases as enzymes denature.
C The temperature increases, because the mass of food broken down increases as the enzyme activity decreases as enzymes denature.
D The mass of food broken down increases, because as the temperature decreases the enzyme activity increases

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

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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 the ANSWER BOOK.

1.2.1 A disease caused by uncontrolled mitotic division of cells

1.2.2 Movement of water molecules from a region of high water potential to a region of low water potential through a semi-permeable membrane

1.2.3 The type of blood cell that transports oxygen in the body

1.2.4 The division of the cytoplasm during mitosis

1.2.5 Organic substances required in small quantities

1.2.6 Nutrients that are needed in small quantities by the body

1.2.7 The openings in a leaf that are responsible for gaseous exchange

1.2.8 Parenchyma tissue with chloroplasts in the cells

1.2.9 A collective name for xylem and phloem tissue

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

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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	The seven vertebrae in the neck region	A: Lumbar B: Cervical
1.3.2	Responsible for blood clotting	A: Platelets B: Red blood cells
1.3.3	Transmits impulses from the receptor to the central nervous system	A: Motor neuron B: Sensory neuron

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

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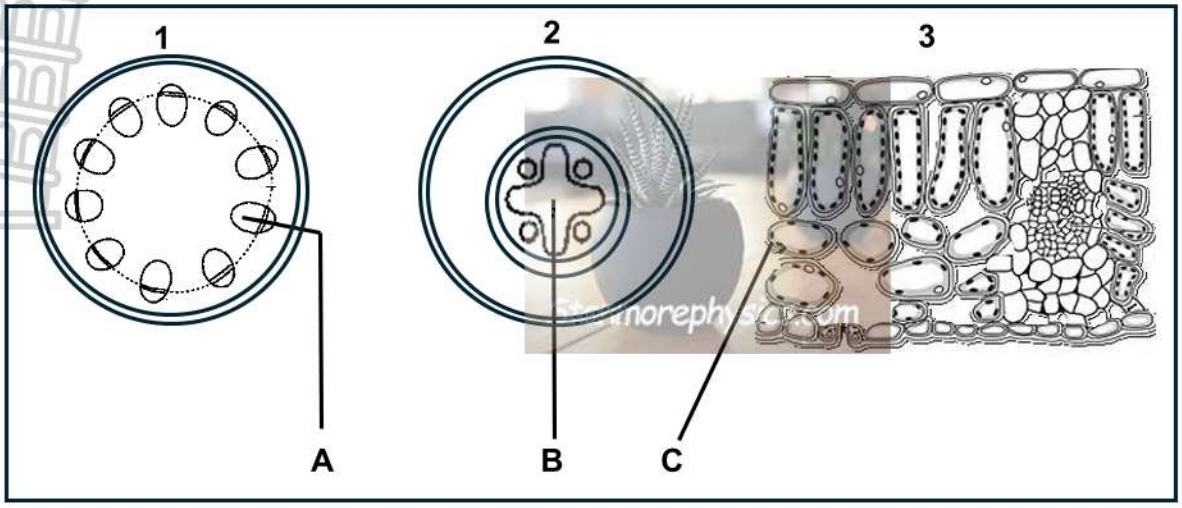
1.4 The diagram below represents internal structures of different plant organs.



1.4.1 Give the NUMBER (**1**, **2** or **3**) of the diagram that represents the:

(a) Root (1)

(b) Stem (1)

(c) Leaf (1)

1.4.2 Identify tissue:

(a) **A** (1)

(b) **B** (1)

(c) **C** (1)

1.4.3 Describe the OBSERVABLE difference between organ 1 and 2 (2)
(8)

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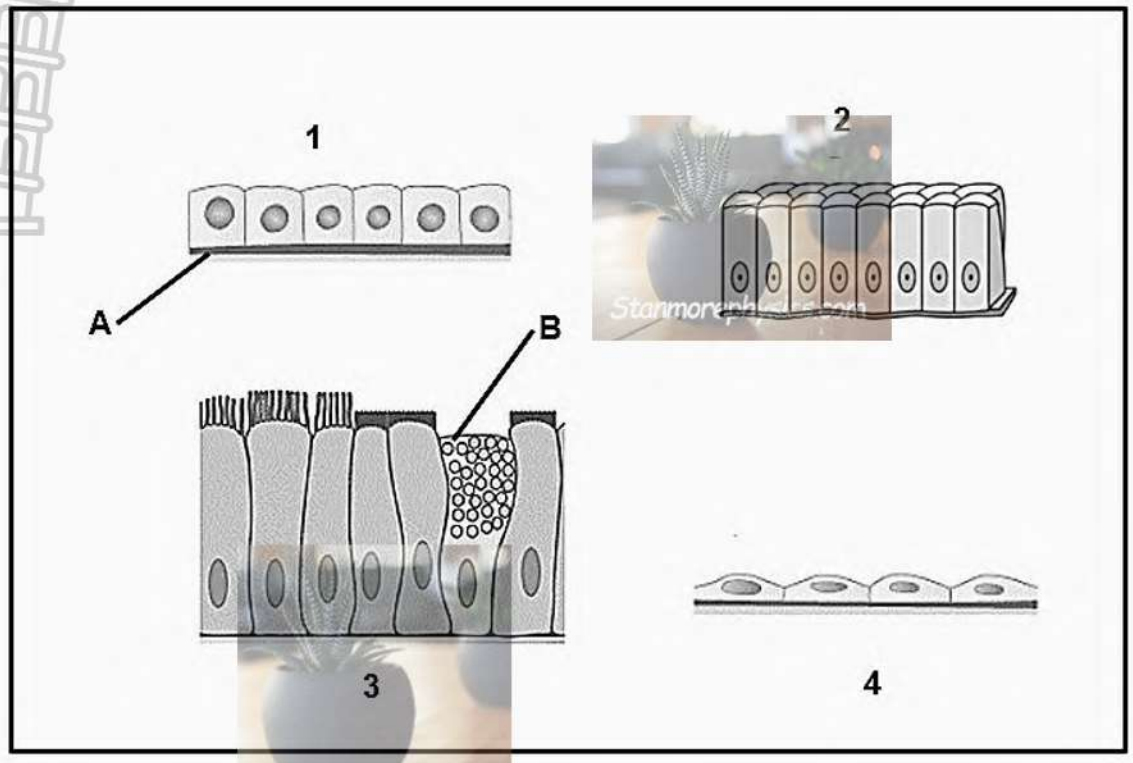
1.5 The diagrams below represent different epithelial tissues.



1.5.1 Identify:

(a) Part **A** (1)

(b) Epithelial tissue **2** (1)

(c) Epithelial tissue **4** (1)

1.5.2 Give the NUMBER of the tissue that is found lining the respiratory tract. (1)

1.5.3 Identify cell **B** that secretes mucus. (1)

1.5.4 Explain the consequence if cilia in the epithelium lining respiratory passages become damaged. (2)
(7)

TOTAL SECTION A: 50

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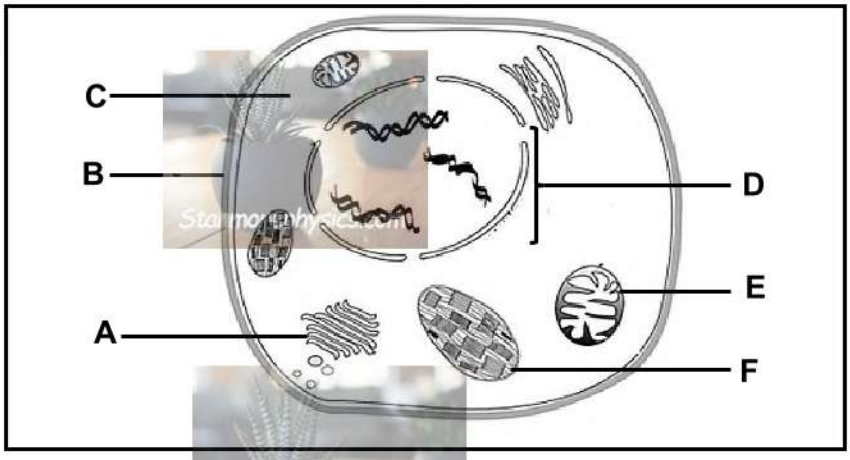
SECTION B

QUESTION 2

2.1 The diagram below shows a plant cell.



2.1.1 Give ONE observable reason why the cell in the diagram represents a plant cell. (1)

2.1.2 State ONE function of organelle:

(a) **A** (1)

(b) **E** (1)

2.1.3 Give LETTER and NAME of the organelle that contains genetic material. (2)

(2)

2.1.4 Why do animal cells contain more mitochondria than pant cells?

(2)

2.1.5 Name TWO organelles enclosed by a double membrane **(9)**

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2.2 The table below shows the details of a meal eaten by a Grade 10 learner.

Food eaten	Carbohydrate (g)	Protein (g)	Fat (g)	Vitamin C (g)	Iron (mg)
Sausage	5	9	24	0	1
Fried potato chips	70	8	20	20	2
Beans	20	10	1	4	3
Fruit pie	60	2	25	1	1
Ice cream	20	0	12	0	0

2.2.1 Identify the food:

(a) With the most proteins (1)

(b) Suitable for a person with anaemia (1)

2.2.2 Which food has the LEAST overall nutritional value? (1)

2.2.3 The total energy value of this meal is 5 000 kJ. In one day, this learner requires a total of 15 000 kJ of energy.

Calculate the percentage of daily energy need that this meal provides. Show ALL working. (3)
(6)

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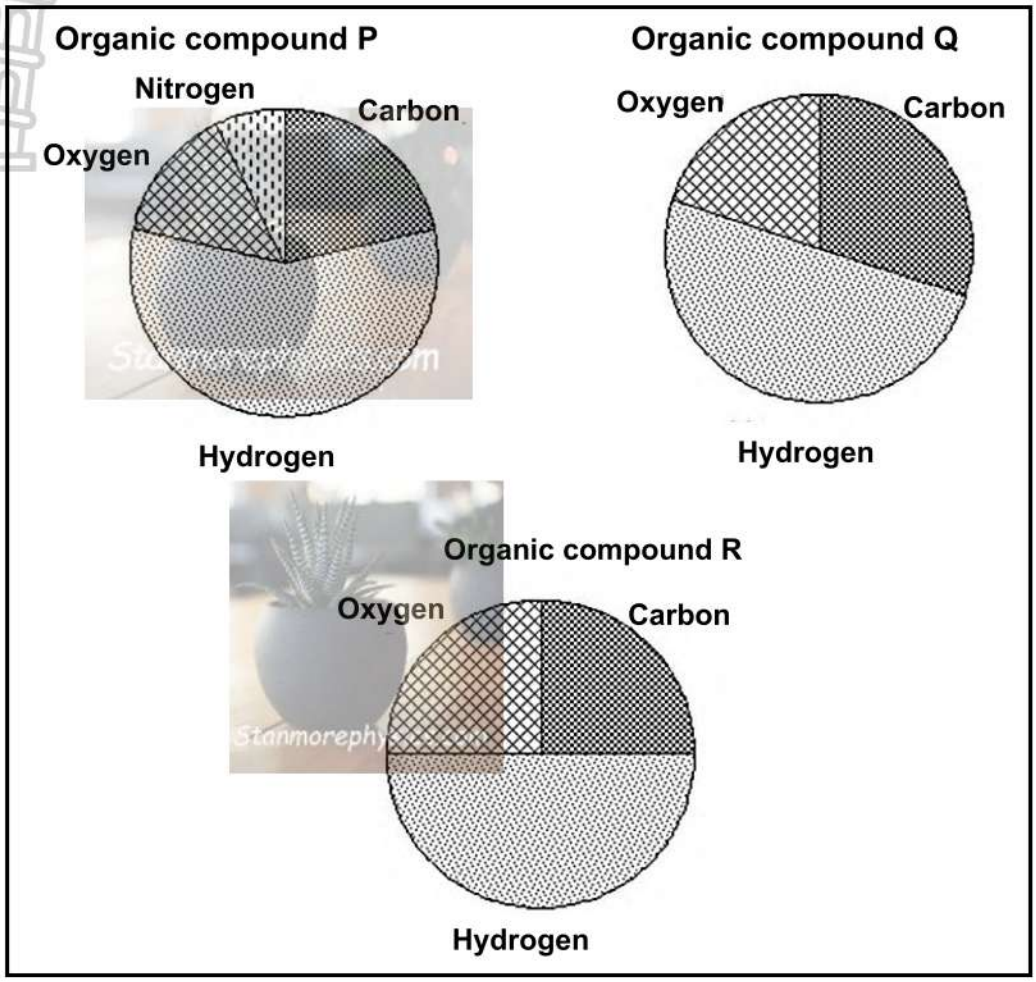
2.3 The following pie graphs show the composition of three organic compounds that are found in living organisms.



2.3.1 Identify compound **P**. (2)

2.3.2 Give a reason for your answer in 2.3.1 (1)

2.3.3 Give TWO reasons why compound **P** is biologically important. (2)

2.3.4 What is the ratio of Hydrogen to Oxygen in compound **R?** (1)

2.3.5 Explain why high temperature decreases enzyme activity. (3)
(8)

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2.4 The rate of enzyme activity increases as the substrate concentration increases up to a point where all enzyme active sites are occupied by substrates to form an enzyme-substrate complex.

Catalase is an enzyme in potatoes that is able to breakdown hydrogen peroxide to release oxygen gas which forms bubbles.

A learner conducted an investigation to determine the effect of increasing hydrogen peroxide concentration on the enzyme activity.

The procedure was done as follows:

- Seven test tubes, each containing different concentrations of hydrogen peroxide, were used.
- Three drops of dishwashing liquid were added into each test tube so that bubbles form a foam.
- One drop of food dye was added so bubbles could be seen more clearly.
- The potato segments of the same size and weight were put in six test tubes
- A potato segment was not put in the seventh test tube.
- The reaction was observed for 30 seconds.
- To measure enzyme activity, the height of the bubble foam was measured after the 30 seconds.

2.4.1 Identify in this investigation the:

(a) Independent variable (1)

(b) Dependent variable (1)

2.4.2 State TWO planning steps that were considered by the learners before doing the investigation. (2)

2.4.3 Give TWO factors that were kept constant in all the test tubes during the investigation. (2)

2.4.4 Which substance represents the substrate? (1)

2.4.5 Explain the purpose of the seventh test tube is in this investigation. (3)
(10)

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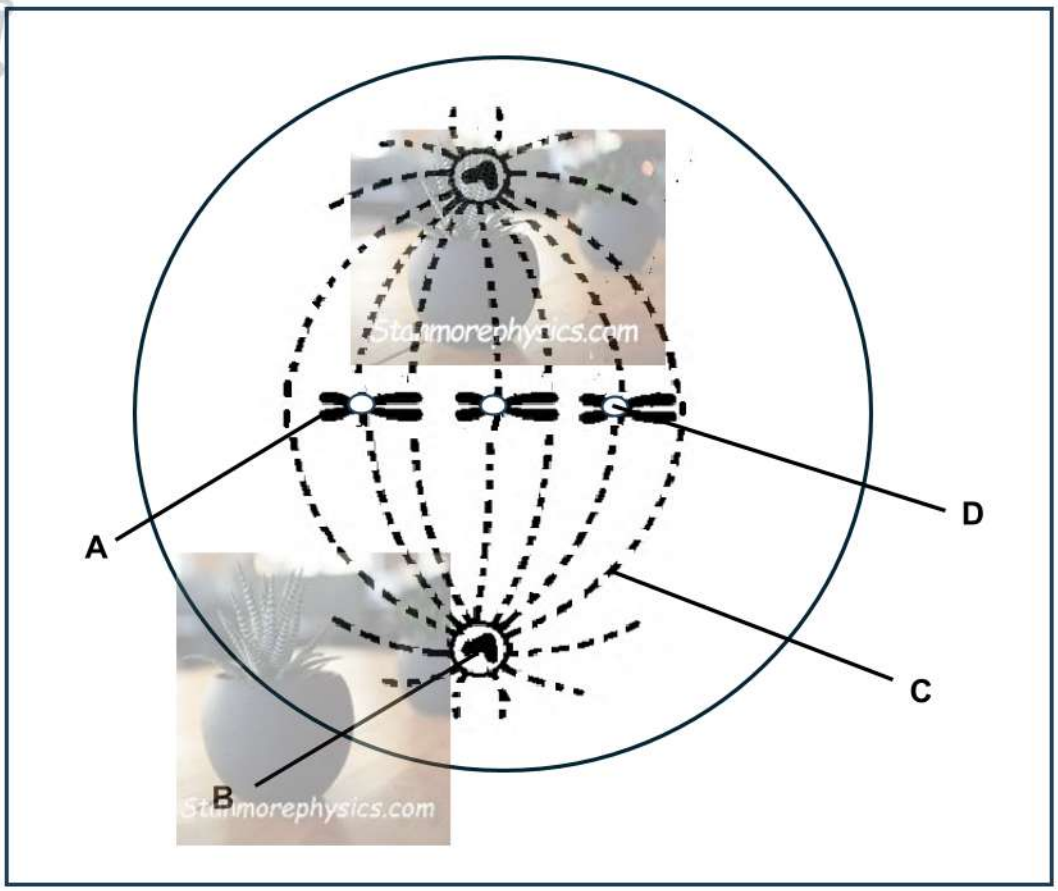
2.5 The diagram below represents a phase during mitosis.



2.5.1 Identify part:

(a) **A** (1)

(b) **C** (1)

2.5.2 State ONE function of part:

(a) **B** (1)

(b) **D** (1)

2.5.3 How many chromosomes:

(a) Were present in the cell before the start of the cell division (1)

(b) Will be present in each daughter cell at the end of this division (1)

2.5.4 Explain what would happen if part **C** failed to contract. (3)
(9)

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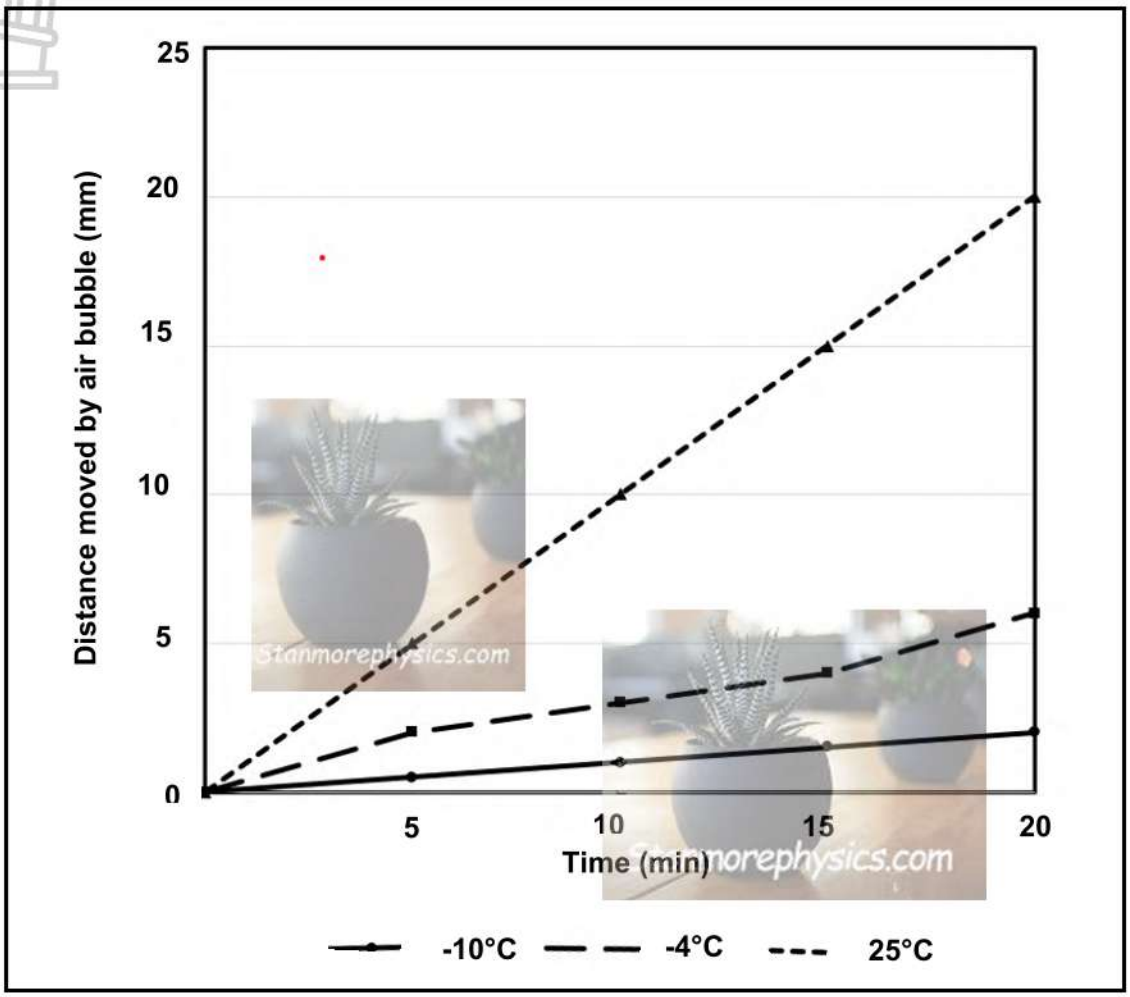
2.6 A learner investigated the effect of temperature on the rate of transpiration in a leafy twig. She measured and recorded the distance travelled by the air bubble inside the capillary tube.

The graph below represents the results recorded by the learner.



2.6.1 Provide a suitable caption for the graph. (1)

2.6.2 Name the apparatus that can be used to measure the rate of transpiration in plants. (1)

2.6.3 Give a reason why the leafy twig had to be cut under water. (1)

2.6.4 Explain why the distance moved by the air bubble was the highest at 25^0C . (2)

2.6.5 Explain how using a needle shaped leaf twig would affect the rate of transpiration (2)

2.6.6 Name ONE other environmental factor that increases the rate of transpiration (1)

(8)
[50]

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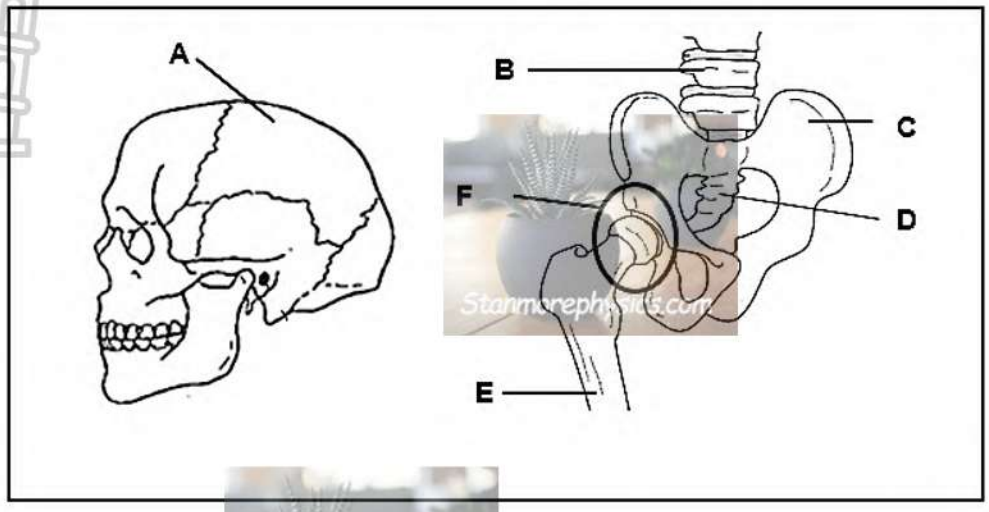
QUESTION 3

3.1 The diagram below represents the skull and pelvis.



3.1.1 Identify parts:

(a) **B** (vertebrae) (1)

(b) **C** (1)

(c) **D** (1)

3.1.2 Name the bone that encloses the brain. (1)

3.1.3 Give TWO letters of the parts that are classified as part of the axial skeleton. (2)

3.1.4 Give FOUR functions of the human skeleton. (4)

3,1,5 Name the opening at the base of the skull. (1)

3.1.6 State the function of the part mentioned in QUESTION 3.1.5 (1)
(12)

3.2 Tabulate TWO differences between tendons and ligaments. **(5)**

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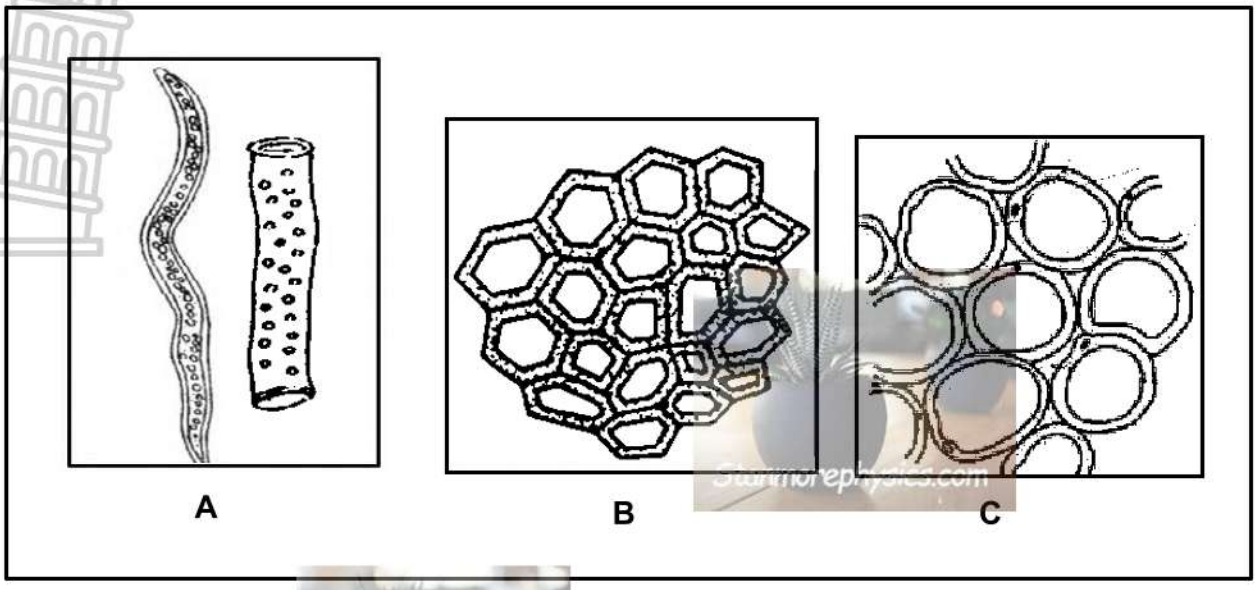
3.3 The diagrams below represent types of permanent tissues in plants.



3.3.1 State what is meant by a *permanent tissue*. (1)

3.3.2 Identify the tissue represented as:

(a) **A** (1)

(b) **B** (1)

3.3.3 State ONE function of tissue **C**. (1)

3.3.4 Explain TWO ways in which tissue **A** is structurally suited for its function. (4)
(8)

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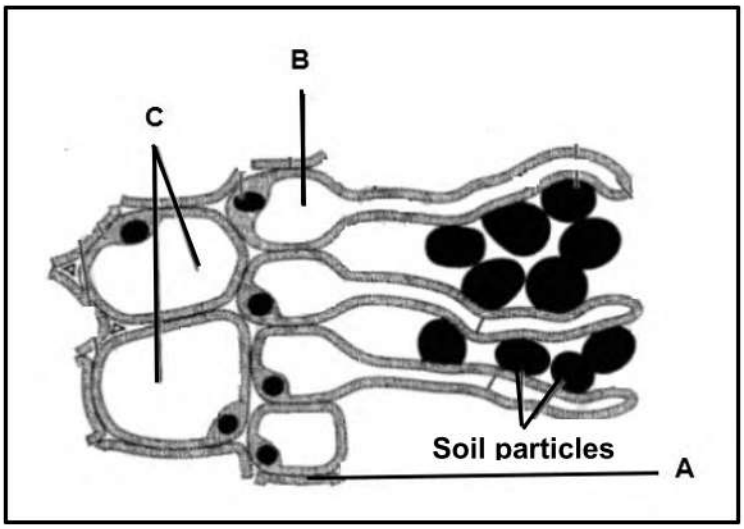
3.4 The diagram below represents the outer tissues of a root showing the root hair.



3.4.1 Identify part:

(a) **A** (1)

(b) **B** (1)

3.4.2 Give TWO ways in which the root hair is structurally suited for the absorption of water. (2)

3.4.3 Describe TWO ways water can move through layer **C** to reach the endodermis. (2)

3.4.4 Explain the effect of soil water with a high salt concentration on part **B**. (3)
(9)

3.5 Describe the THREE forces involved in the upward movement of water. **(6)**

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3.6 The table below shows the results obtained in an investigation to determine the relationship between age of the leaf and the number of ribosome present in the leaf cells.

Age of a leaf (days)	Number of ribosomes (per $10cm^2$)
5	17
15	32
20	40
30	45
35	45

3.6.1 State the relationship between the age of the leaf and the number of ribosomes. (2)

3.6.2 Calculate the percentage increase of ribosomes from day 5 to day 35. Show ALL working. (2)

3.6.3 Draw a line graph to represent the data in the table. (6)
(10)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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GRADE 10

LIFE SCIENCES

PAPER 1

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MARKING GUIDELINE

NOVEMBER 2024

Blue – Changes to Memo
Green – alternate answers that may be accepted but not in memo
Red – marking notes

MARKS: 150

These amended marking guidelines consist of 11 pages.

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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 a part of it is required**
   Read all and credit the relevant part.

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.

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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 marking guideline discussion meeting.

14. **If only the letter is asked for but only the name is given (and vice versa)**
    Do not credit.

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15. **If units are not given in measurements**
Candidates will lose marks. Marking guideline 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 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.

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SECTION A

QUESTION 1

1.1	1.1.1	C✓✓		
	1.1.2	D✓✓		
	1.1.3	D✓✓		
	1.1.4	C✓✓		
	1.1.5	B✓✓		
	1.1.6	B✓✓		
	1.1.7	A✓✓		
	1.1.8	B✓✓		
	1.1.9	B✓✓		
	1.1.10	B✓✓	(10 x 2)	**(20)**

Answer is incorrect if 2 letters are written even if first is correct (e.g. C,D X)

1.2	1.2.1	Cancer✓		
	1.2.2	Osmosis✓		
	1.2.3	Red blood cell ✓ /erythrocyte		
	1.2.4	Cytokinesis✓		
	1.2.5	Vitamins✓		
	1.2.6	Micronutrients		
	1.2.7	Stomata✓ /stoma		
	1.2.8	Chlorenchyma✓		
	1.2.9	Vascular tissue✓	(9 X 1)	**(9)**

1.3	1.3.1	B only✓✓		
	1.3.2	A only✓✓		
	1.3.3	B only✓✓		
			(3 X 2)	**(6)**

1.4	1.4.1	(a) 2✓	(1)
		(b) 1✓	(1)
		(c) 3✓	(1)
	1.4.2	(a) Xylem✓	(1)
		(b) Xylem✓	(1)
		(c) Spongy tissue/ spongy mesophyll/ Spongy tissue / spongy parenchyma	(1)
	1.4.3	1 - Vascular bundles/xylem/phloem arranged in a ring✓ 2 - Vascular bundles/xylem at the centre✓	
		OR	
		1 – no endodermis✓ 2 - endodermis✓	(2)

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(8)

1.5 1.5.1 (a) Basement layer✓ (1)

(b) Columnar✓epithelium (1)

(c) Squamous✓ epithelium (1)

1.5.2 3✓ (1)

1.5.3 Goblet cell✓ (1)

1.5.4 - Dust particles/ micro-organisms/mucus will not be removed from the trachea✓
- causing lung infection✓/ person to cough (2)
(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 2.1.1 - Presence of chloroplasts✓
- Presence of a cell wall✓ Any (1)
(Mark first ONE only)

2.1.2 (a) Transport of proteins✓/enzymes (1)
(b) Cellular respiration✓/ provides energy (1)

2.1.3 D✓ - nucleus✓
OR
E✓- mitochondrion✓
OR
F✓- chloroplast✓ (Any 1 x 2) (2)
(Mark first ONE only)

2.1.4 -To provide **more** energy✓
-needed for movement✓ (2)

2.1.5 -Chloroplast✓
-Mitochondrion✓
-Nucleus✓ Any (2)
(Mark first TWO only) **(9)**

2.2 2.2.1 (a) Beans✓
(b) Beans✓ (2)

2.2.2 Ice cream✓ (1)

2.2.3 $\frac{5000}{15000}$ ✓ X 100✓ = 33.33✓% (3)

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(6)

2.3 2.3.1 Protein ✓ (1)

2.3.2 Contains C, H, O, N✓ (carbon, hydrogen, oxygen and nitrogen) (1)
Contains Nitrogen✓

2.3.3
- Source of amino acids✓
- Provide structure/support✓ forms cell membranes
- Involved in transport✓
- Allow movement as constituent of muscles✓
- Speeds up chemical reactions as enzymes✓
- Provide protection as antibodies✓
- Involved in coordination as hormones ✓
- Reserve source of energy✓ Any (2)

(Mark first TWO only)

2.3.4 2:1✓

2.3.5
- Enzymes denatured✓/lose their shape
- Active site damaged✓ at high temperature
- therefore, can no longer act on the substrate✓/ cannot perform their function (3)

(8)

2.4 2.4.1 (a) Hydrogen peroxide concentration✓ (1)
(b) Enzyme activity✓ (1)

2.4.2
- Decide on apparatus✓ /collect apparatus needed
- Decide on the concentrations of hydrogen peroxide to use✓
- Decide how the results will be recorded✓ Any (2)

(Mark first TWO only)

2.4.3
- Same amount /3 drops of dish washing liquid✓
- Same amount/ 1 drop of food dye✓
- Same time of observation ✓ /observed for 30 seconds Any (2)

(**Mark first TWO only)**
NOT (same) amount of potato

2.4.4 Hydrogen peroxide✓ (1)

2.4.5
- A control✓ / to compare
- To show that the oxygen bubbles✓are / enzyme activity is due to
- Catalase present in potato ✓
- which acts on hydrogen peroxide✓

OR

- A control✓ / to compare
- To show that in the absence of the potato there is no catalase✓
- to act on hydrogen peroxide✓
- therefore, no oxygen bubbles will be released✓ Any (3)

(10)

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2.5	2.5.1	(a)	Chromatid✓	(1)
		(b)	Spindle fibre✓	(1)
	2.5.2	(a)	Forms spindle fibres✓	(1)
		(b)	Holds two chromatids together✓/ attaches to spindle fibre in mitosis/ metaphase	(1)
	2.5.3	(a)	3✓	(1)
		(b)	3✓	(1)
	2.5.4		- Centromere will not split✓ , - sister chromatids will not be pulled to the opposite poles✓, - daughter cells formed will not contain required chromosome number✓ /unequal chromosome number	(3) **(9)**
2.6	2.6.1		Distance moved by air bubble at different temperatures for 20 minutes✓/ over time	(1)
	2.6.2		Potometer✓	(1)
	2.6.3		To prevent air bubbles to block/get into xylem✓	(1)
	2.6.4		Higher temperature provided more (kinetic) energy✓ for faster movement/evaporation of water molecules✓ /increased transpiration	(2)
	2.6.5		Surface area will decrease✓ decreasing the rate of transpiration✓	(2)
	2.6.6		- High light intensity✓ - High wind velocity✓ - Low humidity✓ **(Mark first ONE only)**	Any (1) **(8)**
				[50]

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QUESTION 3

3.1 3.1.1 (a) Lumbar✓ vertebrae NOT lower back vertabrae (1)
(a) (b) Ilium✓ NOT hipbone (1)
(c) Sacrum✓ / coccyx (1)

3.1.2 Cranium✓ (1)

3.1.3 A✓
B✓ (2)
D✓

3.1.4
- Important for movement✓
- Protects (delicate) internal organs✓
- Provides support, strength and shape✓
- Storage of minerals✓
- Site for formation of red blood cells✓
- (Bone in ear) enable hearing✓
- Stores and releases fats✓ Any (4)

(Mark first FOUR only)

3.1.5 Foramen magnum✓ (1)

3.1.6 Allows (vertical) entry of the spinal cord into the skull✓ (1)
(12)

3.2

Tendons	Ligaments
Attach muscle to bone✓	Attach bone to bone✓
Made up of inelastic/ white fibrous connective tissue. ✓/ not able to stretch	Consist of elastic/ yellow, connective tissue✓ / able to stretch

(2 X 2) + 1 table **(5)**

3.3 3.3.1 Tissue specialised/differentiated to perform a specific function✓ (1)

3.3.2 (a) Xylem Tissue✓ (1)
(b) Sclerenchyma✓ (1)

3.3.3
- Provides support✓
- Allows gaseous exchange✓
- Packaging tissue✓ / fills in around other tissue
- Storage✓ Any (1)

(Mark first ONE only)

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3.3.4
- No end walls✓ forming continuous tubes for water movement✓
- Contain dead cells✓ making them hollow to allow transport of water✓
- Presence of pits✓ for lateral(sideway) water movement✓
- Lignified walls✓ to provide support✓ / prevents walls from collapsing from the water pressure
- Joined end to end✓ to make a continuous tube ✓
- Tube are hollow
- That allows for the smooth movement of water

(Mark first TWO only) Any (2 X 2) (4)

(8)

3.4

3.4.1 (a) Epidermal cell✓ / cell wall (1)
(b) Cell sap✓ vacuole (1)

3.4.2
- Large surface area✓
- Permeable cell wall✓
- Cell sap with high solute concentration✓/ lower water potential/ low water concentration compared to surrounding soil water
- Large vacuole✓ to store water (keep water potential of cytoplasm low)
- Thin cell wall ✓
- Numerous/many mitochondria✓

(Mark first TWO only) Any (2)

3.4.3
- Water moves through the intercellular air spaces✓
- Water moves through cell wall, cell membrane and cytoplasm ✓ (2)

(*Do NOT accept Symplastic and Apoplastic as question asked learners to describe*)

3.4.4
- Soil water has lower water potential✓ (compared to the cell sap).
- Water moves out of the vacuole✓ by osmosis✓ to the soil.
- Part B/ root hair vacuole will shrink✓*

1 *compulsory + any 2 (3)

(9)

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3.5
- Root pressure✓
- water entering the roots pushes water into the stem✓
- Capillarity✓
- of the water molecules causes water to move to a certain height within the xylem of the stem✓ / water moves due to adhesive and cohesive properties of water
- Transpiration pull✓
- suction force caused by loss of water vapour in the leaves pulls water from the xylem of the stem to the leaves✓ **(6)**

3.6 3.6.1
- As the age of the leaf increases (from 5 days to 30 days) the number of ribosomes also increases✓ then
- remains constant/ does not change from 30 to 35 days✓ (2)

3.6.2 45 – 17 = 28

$(\frac{28}{17}$ X 100)✓ = 164,71✓%/ 165 / 164,7 ANSWER SHOULD BE LEFT OFF AT 2 DECIMALS (2)

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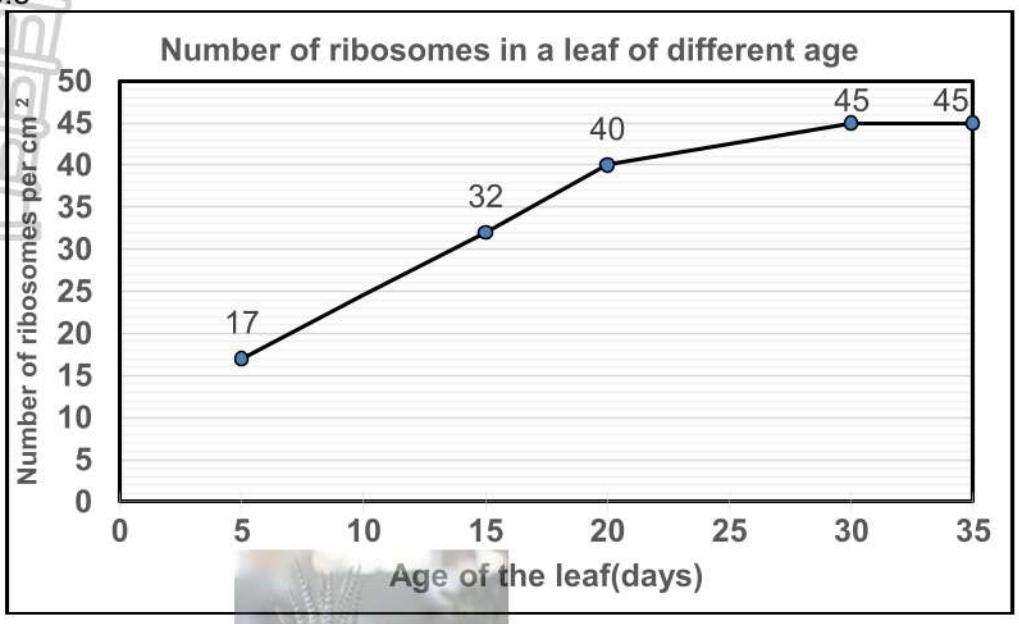
3.6.3



RUBRIC FOR MARKING GRAPH

Caption of graph (both variables stated (**C**)	✓
Type of Graph (**T**)	✓
X-axis and Y-Axis label with units (**L**)	✓
Correct Scale for X- and Y-axis (**S**)	✓
Only 1-4 coordinates plotted correctly All 5 coordinates plotted correctly(**P**)	✓ ✓✓

(6)
(10)

C ✓ do not mark on grph, use letters to mark
T ✓
L ✓
S ✓
P ✓

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150