Hoërskool Johan Jurgens

Grade 10 Life Sciences – Paper 1

School Based Assessment: End-Year Exam

Term 4 – 2025

Examiner: Mr K. da Gama

Moderator: Mrs S. Stoltz

Duration: 2 hrs 30 minutes **Total Marks: 150**

Name and Surname: _____

Grade: 10 key __

INSTRUCTIONS AND INFORMATION

1. Read the following instructions carefully before answering the questions.
2. Answer ALL the questions.
3. This paper consists of 10 pages and includes SIX questions
4. START EACH QUESTION ON A NEW PAGE.
5. Write ALL the answers on the ANSWER SHEET PROVIDED.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Present your answers according to the instructions of each question.
8. Do ALL drawings in pencil and label them in blue ink.
9. Draw diagrams, tables, or flow charts only when asked to do so.
10. The diagrams in this question paper are NOT necessarily drawn to scale.
11. You may use a non-programmable calculator, protractor, and a compass where necessary.
12. Round off all calculations to two decimals after the comma.
13. 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 number (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1. The strengthening tissue which has a cell wall with thickened corners is called … (2)

A. Phloem
B. Chlorenchyma
C. Collenchyma
D. Sclerenchyma

1.1.2. The main additional element present in proteins but not found in carbohydrates or lipids is … (2)

A. Carbon.
B. Nitrogen.
C. Hydrogen.
D. Oxygen.

1.1.3. In mammals, a diet rich in calcium and phosphorus is important for … (2)

A. producing energy.
B. preventing kwashiorkor.
C. efficient digestion.
D. building strong bones and teeth.

1.1.4. The part of the root in which meristematic cells are found is known as the … (2)

A. growing point.
B. root cap.
C. root hair region.
D. mature region.

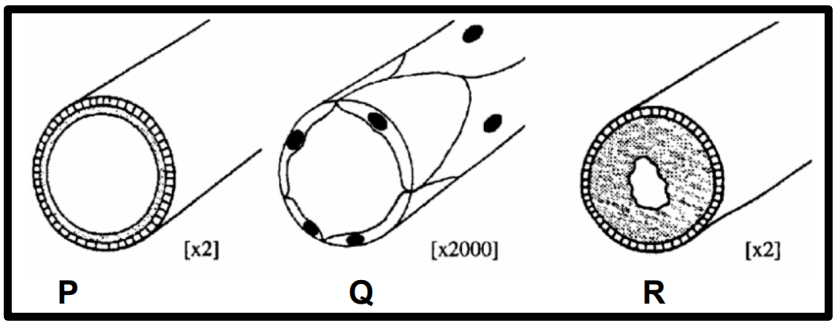
1.1.5. The most important function of water in nutrition is that it … (2)

A. serves as a source of energy.
B. is important for ATP formation of organisms.
C. acts as a reactant in breaking down food.
D. important to prevent goitre.

1.1.6. The tissue responsible for the transpiration of water is … (2)

A. Sponge Tissue
B. Vessels and Tracheids
C. Phloem
D. Xylem

1.1.7. The drawing shows the structure of three types of blood vessel, **P, Q** and **R**. They are drawn to the scales indicated. (2)



Which of the following statements are correct with respect to the blood vessels shown above?

A. **P** is a blood vessel that transports blood to the heart.
B. **Q** is a capillary with a thick muscular wall for diffusion.
C. **R** is an artery with a thin lining of squamous epithelium for diffusion.
D. **Q** only transports oxygenated blood.

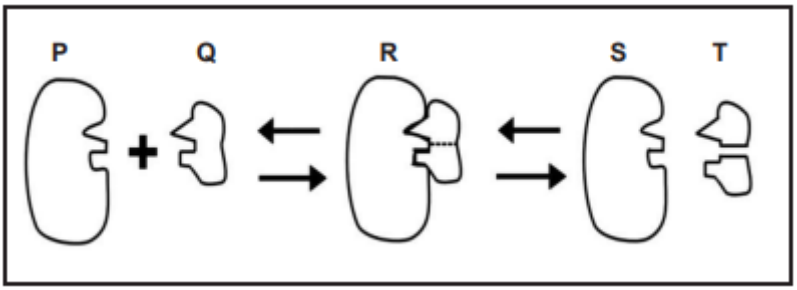
1.1.8. In which of the following processes is mitosis NOT involved? (2)

A. Production of sperms in the testes.
B. Replacement of cells in a cut through the skin.
C. Growth of an organism.
D. Production of identical daughter cells.

1.1.9. A ligament joins … (2)

A. two bones.
B. bone to a muscle.
C. two muscles.
D. the femur to the ulna.

1.1.10. The diagram below shows enzyme action. (2)



What does **T** represent?

A. An enzyme.
B. Enzyme-substrate complex.
C. Product.
D. Substrate.

[20]

1.2. Give the correct biological term for each of the following descriptions. Write ONLY the term next to the question numbers (1.2.1–1.2.10) in the ANSWER BOOK.

1.2.1. Content of the cell excluding the nucleus. (1)
1.2.2. Waterproof, waxy layer on the outside of leaves. (1)
1.2.3. Carbohydrate made up of three or more monosaccharides. (1)
1.2.4. A group of similar cells performing the same function. (1)
1.2.5. The first seven vertebra. (1)
1.2.6. The apparatus used to measure the rate of transpiration. (1)
1.2.7. Cells that are rich in haemoglobin and transport oxygen to all parts of the body. (1)
1.2.8. The chemical element in haemoglobin that is essential for the transport of oxygen. (1)
1.2.9. The microscopic channels which traverse the cell wall of the plant cells. (1)
1.2.10. The light trapping pigment found in the leaves. (1)

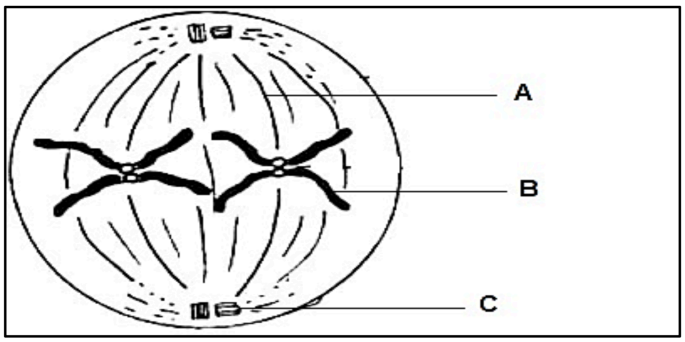
[10]

1.3. Indicate whether each of the statements in COLUMN A applies to A ONLY, B ONLY, BOTH A AND B, or NONE of the items in COLUMN B. Write A ONLY, B ONLY, BOTH A AND B, or NONE, next to the question numbers (1.3.1–1.3.3) in the ANSWER BOOK.

Column A		Column B	
1.3.1.	Denature proteins	A:	pH
		B:	Temperature
1.3.2.	Prevents water loss in a leaf	A:	Cuticle
		B:	Ribosomes
1.3.3.	The scientist who invented the electron microscope in 1939.	A:	Robert Hooke
		B:	Max Knott
1.3.4.	The place where the enzyme fits into the molecule	A:	Active Sites
		B:	Reaction site
1.3.5.	Simple squamous epithelium	A:	Secrete mucus from goblet cells
		B:	Contains cilia

[10]

1.4. The diagram below shows a cell undergoing a phase in cell division called mitosis.



1.4.1. Identify the phase of mitosis represented above. (1)

1.4.2. Give ONE reason for your answer to QUESTION 1.4.1. (1)

1.4.3. Identify parts labelled **A**, **B**, and **C**. (3)

1.4.4. Name the phase that comes after the one shown above. (1)

1.4.5. How many chromosomes will be present in the cell shown above at the end of mitosis? (1)

1.4.6. State THREE biologically important roles of mitosis. (3)

[10]

TOTAL SECTION A: 50

Section B

Question 2

2.1. Dietary minerals are the chemical elements that living organisms require to maintain health. The table below shows the some important elements that plants and animals need in their bodies. Study this table and answer the questions that follow.

ELEMENT							
Na	K	Ca	I	P	Fe	Mg	N

2.1.1. Identify TWO micro-nutrients from the table above. (2)

2.1.2. State two functions of Phosphorus and two functions of Potassium in the animal body. (4)

2.1.3. What mineral supplement would you recommend to an athlete that suffers from latent cramping? Motivate your answer, by referring to its deficiency. (3)

2.2. Below are three sentences which relate to the role of water in the maintenance of life. Study these sentences and answer the questions that follow.

Phase A	A jellyfish swimming in an aquarium.
Phase B	An athlete sweating after a run.
Phase C	Blood moving through the body.

2.2.1. State and explain how phases C and B relate to the role water plays in the maintenance of life. (6)

2.2.2. Name another animal that uses the role in Phase A as an important part of its life. (1)

2.3. What are organic compounds? (1)

2.4. Read the passage below and answer the questions that follow.

Cholesterol is an organic chemical substance which is an important component in cell membranes. The major dietary sources of cholesterol include cheese, egg, pork, poultry, fish and shrimp. Cholesterol is carried through the body by proteins in the blood known as lipoproteins.

2.4.1. Name the two types of lipoprotein. (2)

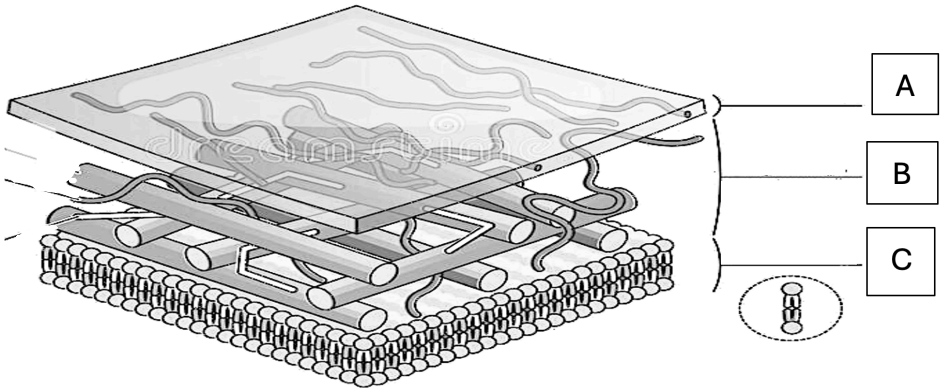
2.4.2. State which one of the two answers provided in 2.4.1. is known as the “bad” cholesterol, then motivate your answer by stating why it is known as the “bad” cholesterol. (2)

2.4.3. Explain how Cholesterol causes heart disease. (4)

[25]

Question 3

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



3.1.1. What does the above diagram represent? (1)

3.1.2. State three functions of the structure represented above. (3)

3.1.3. Provide the name of Label A and C. (2)

3.1.4. Which Label is also known as plasmalemma? (1)

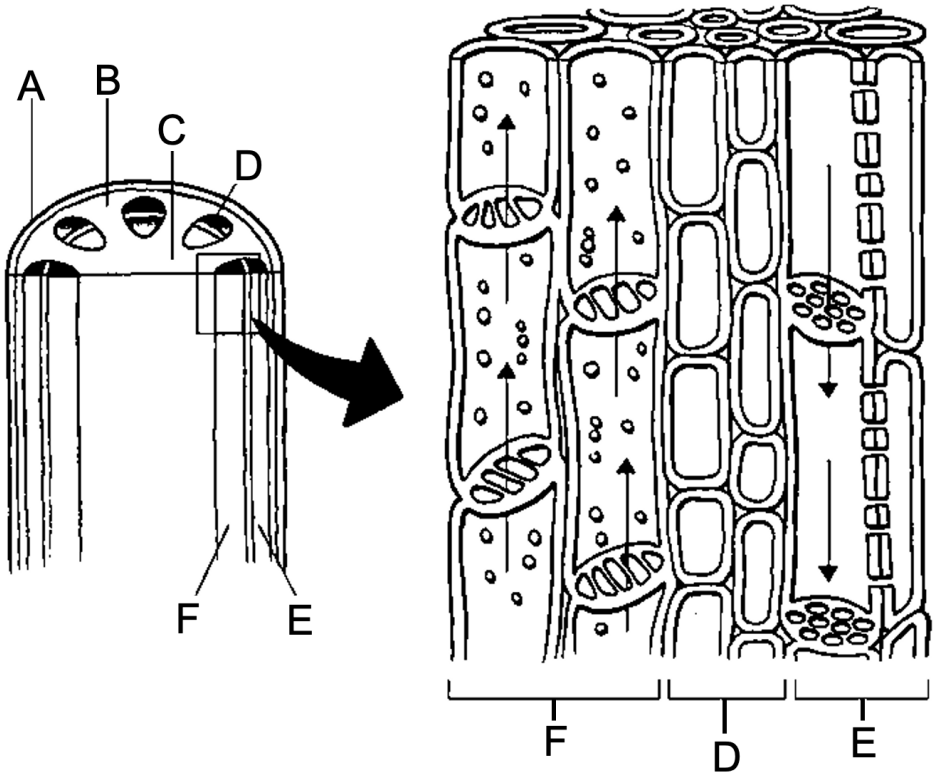
3.1.5. What is the structure at Label B composed of? (1)

3.2. Name two organelles found in the animal cell. (2)

[10]

Question 4 Plant and Animal Tissues

4.1. Study the figure below that shows how vascular tissues are arranged in a vascular bundle, and answer the questions that follow.



4.1.1. Name and define label A. (5)

4.1.2. What is the function of label F. (2)

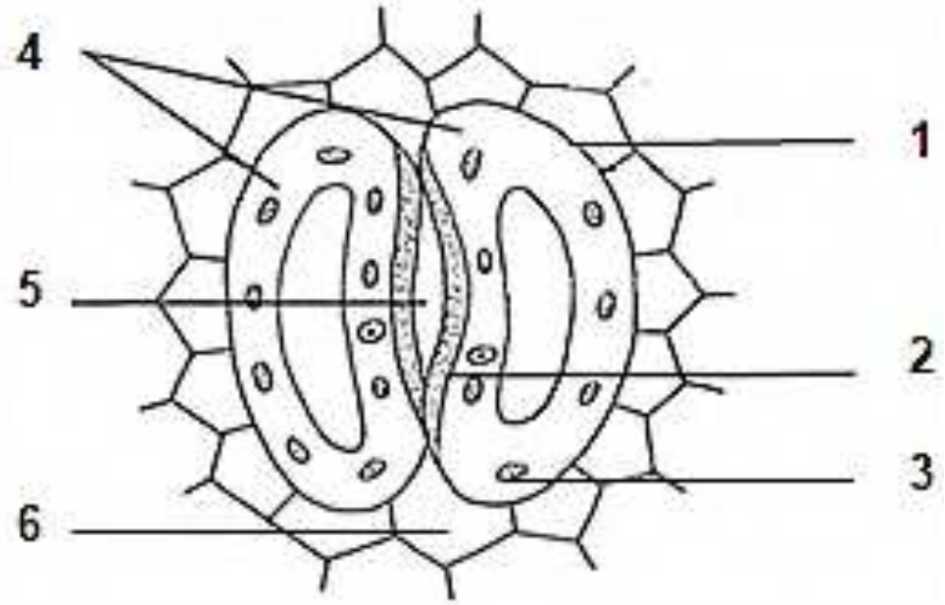
4.1.3. Tabulate two structural adaptations label A has undergone to help with the plant's function? (5)

4.1.4. Provide the name of label D. (1)

4.1.5. How does the answer in 4.1.4. contribute to the growth in thickness and width of roots and stems. (3)

4.2. Name three simple permanent plant tissue. (3)

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



4.3.1. Identify the tissue illustrated above. (1)

4.3.2. Name TWO processes in which this tissue is involved. (2)

4.3.3. Identify the parts numbered 1-5. Write the number and its label. (5)

4.4. State THREE ways in which the leaf has adapted to its functions. (3)

[30]

Question 5

5.1. An investigation was carried out to compare the rate of water absorption and the rate of transpiration of plant over 24 hours. The results of the investigation are shown in the table below:

Time of day	**Rate of absorption of water (cm^3/h)**	**Rate of water loss by transpiration (cm^3/h)**
00:00	2,0	0,5
04:00	1,5	0,3
06:00	1,5	0,5
08:00	1,5	2,0
10:00	2,2	3,5
12:00	3,5	5,0
14:00	4,7	6,4
16:00	5,6	7,3
18:00	6,0	4,5
20:00	3,4	O,9
24:00	2,0	0,5

5.1.1. Draw a line graph on the same set of axes to illustrate the data in the table above. (7)

5.1.2. Identify

(a) Dependent variable. (1)

(b) Independent variable. (1)

5.1.3. Give ONE way to ensure that the results are valid. (2)

5.1.4. At what time was sunrise? Give a reason for your answer. (2)

5.1.5. At what time of the day was the rate of transpiration at its maximum? (1)

5.1.6. Was there a net loss or a net gain of water by the plant during the 24-hour period? Show how you arrived at your answer. (4)

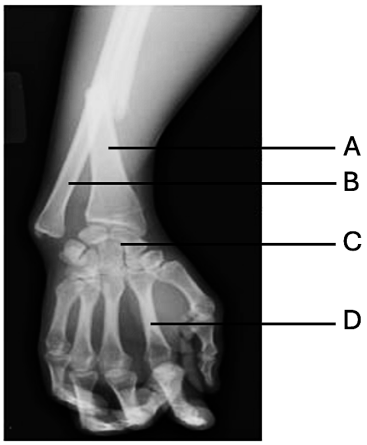
[18]

Question 6

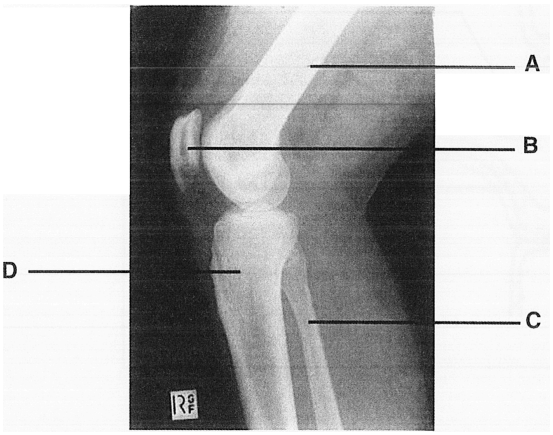
6.1. Study the X-rays below and answer the questions that follow.

- X-ray 1 shows one bone is been broken and the other is completely dislocated.
- X-ray 2 shows no structural damage of the upper leg, the knee and lower leg area.

X-ray 1



X-ray 2



6.1.1. Refer to X-ray 1

(a) Identify label and name the bone that is dislocated. (2)

(b) Identify label and name the bone that is broken. (2)

(c) Provide the name of labels C and D. (2)

(d) Name the bones that make up the fingers. (1)

6.1.2. Refer to X-ray 2

(a) Provide the names of the labels A – D. (4)

(b) What impact absorbing tissue is found between Bone A and Bone D. (1)

(c) Name ONE function of the tissue mentioned in 6.1.2.b. (1)

6.1.3. Name the tissues which join:

(a) bone to bone. (1)

(b) muscle to bone. (1)

6.1.4. List any TWO functions of the skeleton. (2)

[17]

TOTAL SECTION B: 100

GRAND TOTAL: 150

GRADE 10 LIFE SCIENCES P1 END-YEAR EXAM GRID 2025 TERM 4

MARKING GUIDELINES

SECTION A	Cognitive Levels				Question Levels					
Question 1	A	B	C	D						
Everything in term 1 & 2	Basic knowledge	Comprehension	Application	Analysis, Synthesis & Evaluation	Easy	Moderate	Difficult	Very difficult	Investigation/ Experiment	Total Question 1 (50)
1.1.1.	X				X					2
1.1.2.	X				X					2
1.1.3.	X				X					2
1.1.4.	X				X					2
1.1.5.	X				X					2
1.1.6.	X				X					2
1.1.7.	X				X					2
1.1.8.	X				X					2
1.1.9.	X				X					2
1.1.10.	X				X					2
1.2.1.	X				X					2
1.2.2.	X				X					2
1.2.3.	X				X					2
1.2.4.	X				X					2
1.2.5.	X				X					2
1.3.1.	X				X					2
1.3.2.	X				X					2
1.3.3.	X				X					2
1.3.4.	X				X					2
1.3.5.	X				X					2
1.4.1.			X			X			X	1
1.4.2.		X			X				X	1
1.4.3.		X			X				X	3
1.4.4.			X			X			X	1
1.4.5.	X									1
1.4.6.			X			X			X	3
Total Q 1	41	4	5	0						50

SECTION B	Cognitive Levels				Question Levels					
Question 2	A	B	C	D						
Biosphere to ecosystems	Basic knowledge	Comprehension	Application	Analysis, Synthesis & Evaluation	Easy	Moderate	Difficult	Very difficult	Investigation/ Experiment	Total Question 2 (25)
2.1.1.	X				X					2
2.1.2.	X				X					4
2.1.3.				X			X			3
2.2.1.		X					X			6
2.2.2.	X					X				1
2.3.	X				X					1
2.4.1	X				X					2
2.4.2.		X				X				2
2.4.3.		X				X				4
Total Q 2	10	12	0	3						25

Question 3	Cognitive Levels				Question Levels					
	A	B	C	D						
Biodiversity & Classification	Basic knowledge	Comprehension	Application	Analysis, Synthesis & Evaluation	Easy	Moderate	Difficult	Very difficult	Investigation/ Experiment	Total Question 3 (10)
3.1.1.	X				X					1
3.1.2.	X				X					3
3.1.3.	X					X				2
3.1.4.	X				X					1
3.1.5.	X				X					1
3.2.	X				X					2
Total Q 3	10	0	0	0						10

Question 4	Cognitive Levels				Question Levels					
	A	B	C	D						
History of life on Earth	Basic knowledge	Comprehension	Application	Analysis, Synthesis & Evaluation	Easy	Moderate	Difficult	Very difficult	Investigation/ Experiment	Total Question 3 (30)
4.1.1.		X			X					5
4.1.2.	X				X					2
4.1.3.				X		X				5
4.1.4.	X				X					1
4.1.5.			X			X				3
4.2.	X				X					3
4.3.1.	X				X					1
4.3.2.	X					X				2
4.3.3.	X				X					5
4.4.	X				X					3
Total Q 4	17	5	3	5						30

Question 5	Cognitive Levels				Question Levels					
	A	B	C	D						
The chemistry of life	Basic knowledge	Comprehension	Application	Analysis, Synthesis & Evaluation	Easy	Moderate	Difficult	Very difficult	Investigation/ Experiment	Total Question 3 (18)
5.1.1.				X		X				7
5.1.2. a)	X				X					1
5.1.2. b)	X				X					1
5.1.3.	X				X				X	2
5.1.4.		X				X				2
5.1.5.		X			X					1
5.1.6.			X			X				4
Total Q 5	4	3	4	7						

Question 6	Cognitive Levels				Question Levels					
	A	B	C	D						
Cells: The basic unit of life	Basic knowledge	Comprehension	Application	Analysis, Synthesis & Evaluation	Easy	Moderate	Difficult	Very difficult	Investigation/ Experiment	Total Question 3 (17)
6.1.1. a)		X			X					2
6.1.1. b)	X				X					2
6.1.1. c)	X				X					2
6.1.1. d)	X				X					1
6.1.2. a)	X				X					4
6.1.2. b)	X					X				1
6.1.2. c)		X			X					1
6.1.3. a)	X				X					1
6.1.3. b)	X				X					1
6.1.4.	X				X					2
Total Q 6	14	3	0	0						

SUMMARY										
Quest 1	**41**	**4**	**5**	**0**						**50**
Quest 2	**10**	**12**	**0**	**3**						**25**
Quest 3	**10**	**0**	**0**	**0**						**10**
Quest 4	**17**	**5**	**3**	**5**						**30**
Quest 5	**4**	**3**	**4**	**7**						**18**
Quest 6	**14**	**3**	**0**	**0**						**17**
Total	**96**	**27**	**12**	**15**						**[150]**

Hoërskool Johan Jurgens

Grade 10 Life Sciences

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Term 4 2025 – Marking Guideline

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Section A

Question 1

1.1

1.1.1.	D.	sclerenchyma	✓✓ (2)
1.1.2.	B.	nitrogen.	✓✓ (2)
1.1.3.	D.	building strong bones and teeth.	✓✓ (2)
1.1.4.	A.	growing point.	✓✓ (2)
1.1.5.	C.	acts as a reactant in breaking down food.	✓✓ (2)
1.1.6.	D.	Xylem	✓✓ (2)
1.1.7.	A.	P is a blood vessel that transports blood to the heart.	✓✓ (2)
1.1.8.	A.	Production of sperms in the testes.	✓✓ (2)
1.1.9.	A.	two bones.	✓✓ (2)
1.1.10.	C.	Product.	✓✓ (2)

(10x2= 20)

1.2.

1.2.1.	Cytoplasm	✓ (1)
1.2.2.	Cuticle	✓ (1)
1.2.3.	Polysaccharides	✓ (1)
1.2.4.	Tissue	✓ (1)
1.2.5.	The cervical vertebra	✓ (1)
1.2.6.	A potometer.	✓ (1)
1.2.7.	Blood Cells	✓ (1)
1.2.8.	Iron	✓ (1)
1.2.9.	Plasmodesmata	✓ (1)
1.2.10.	Chlorophyll	✓ (1)

(10x1= 10)

1.3.

1.3.1.	*BOTH A AND B*	✓✓ (2)
1.3.2.	*A ONLY*	✓✓ (2)
1.3.3.	*NONE*	✓✓ (2)
1.3.4.	*A ONLY*	✓✓ (2)
1.3.5.	*NONE*	✓✓ (2)

(5x2= 10)

1.4.

1.4.1.	Metaphase	✓	(1)
1.4.2.	Chromosomes line up at the equator/ middle of the cell.	✓	(1)
1.4.3.	A – Spindle fibre	✓	(3)
	B – Chromosome / chromatid	✓	
	C – Centriole	✓	
1.4.4.	Anaphase	✓	(1)
1.4.5.	2 Chromosomes	✓	(1)
1.4.6.	- Growth	✓	(3)
	- Replace and repair worn out cell or tissue	✓	
	- Asexual reproduction	✓	

[10]

TOTAL SECTION A: 50

Section B

Question 2

2.1.

2.1.1. Any 2 ✓✓ (2)
- Na / Sodium
- Fe / Iron
- I / Iodine

2.1.2. (4)

Phosphorus helps with:	Potassium helps with:
– bone and teeth formation ✓	– salt-water balance ✓
– forms cell membrane ✓	– heart, muscles & nerve functions✓

2.1.3. A Na supplement ✓as a deficiency in it could lead to muscle cramping. ✓✓ (3)

2.2.

2.2.1. (6)

B – ***Temperature regulation***✓	C – ***Transport medium***✓
- The sweat glands produce sweat which cools the body as it evaporates✓✓	- water transports substances around the body. For example, water is the main constituent of blood and enables blood cells to be transported around the body. ✓✓

2.2.2. Worms, sponges, squids, etc. any animal with a hydrostatic skeleton may be awarded a mark. ✓ (1)

2.3. Organic compounds are compounds essentially having carbon atoms in the structure along with other atoms. ✓ (1)

2.4.

2.4.1. High Density Lipoprotein / HDL✓ (2)
Low Density Lipoprotein / LDL✓

2.4.2. - LDL is often known as “bad” cholesterol because higher levels of LDL are associated with heart disease. ✓✓ (2)
OR
- LDL because it has a lower proportion of protein relative to cholesterol✓ which can cause with heart disease. ✓

2.4.3. Cholesterol causes heart disease when it builds up in the arteries. ✓ This leads to a hardening and narrowing of these vessels✓, which interferes with the transport of blood, ✓ and can potentially lead to a heart attack. ✓ (4)

[25]

Question 3

3.1.

3.1.1. The Cell wall✓ (1)

3.1.2. (3)
- The main function of the wall is to protect the inner parts of the plant cell, it gives plant cells a more uniform and regular shape and provides support for the plant body. ✓
- The cell wall is completely permeable to water and mineral salts which allows distribution of nutrients throughout the plant. ✓
- The openings in the cell wall are called plasmodesmata which contain strands of cytoplasm that connect adjacent cells. This allows cells to interact with one another, allowing molecules to travel between plant cells. ✓

3.1.3. A - Middle lamella✓ (2)
C – Cell /Plasma membrane / plasmalemma✓

3.1.4. C✓ (1)

3.1.5. B - is mainly composed of cellulose. ✓ (1)

3.2. Any two organelles ✓✓ (2)
- Mitochondria
- Endoplasmic reticulum
- Ribosomes
- Golgi apparatus/body
- Vesicles and lysosomes
- Vacuoles
- Centrioles
- Plastids
- Chloroplast
- Chromoplast
- Leucoplast

[10]

Question 4 Plant and Animal Tissues

4.1.

4.1.1. Epidermis ✓ - The epidermis is a single layer of cells ✓ that covers plants' leaves, flowers, roots and stems. ✓ It is the outermost cell layer✓ of the plant body and plays a protective role in the plant. ✓ (5)

4.1.2. Supporting the plant ✓ and transporting water and dissolved mineral salts from the roots to the stems and leaves. ✓ (2)

4.1.3. Any 2 (4) + 1 mark for the table = 5 (5)

Structure	Function
Layer of cells covering surface of entire plant.	Acts as a barrier to fungi and other microorganisms and pathogens.
Layer is thin and transparent.	Allow for light to pass through, thereby allowing for photosynthesis in the tissues below.
Epidermal tissues have abundant **trichomes** which are tiny hairs projecting from surface of epidermis. Trichomes are abundant in some plant leaves.	Leaf trichomes trap water in the area above the stomata and prevent water loss.
Root hairs are elongations of epidermal cells in the root.	Root hairs maximise the surface area over which absorption of water from the soil can occur.
Epidermal tissues in leaves are covered with a waxy **cuticle**.	The waxy outer layer on the epidermis prevents water loss from leaves.
Epidermal tissues contain **guard cells** containing chloroplasts.	Guard cells control the opening and closing of the pores known as **stomata** thus controlling water loss in plants.
Some plant epidermal cells can secrete poisonous or bad-tasting substances.	The bitter taste of the substances deter browsing and grazing by animals.

4.1.4. Cambium/ Vascular Cambium ✓ (1)

4.1.5. Vascular cambium ✓ divides to make more xylem and phloem tissue, ✓ resulting in the growth in thickness or width of roots and stems. ✓ (3)

4.2. Sclerenchyma ✓
Parenchyma ✓
Collenchyma ✓ (3)

4.3.

4.3.1. Stomata or Epidermal tissue showing stoma/ of a leaf ✓ (1)

4.3.2. Any 2 ✓✓ (2)

Photosynthesis

Gaseous exchange

Transpiration

4.3.3. 1 - Thin outer wall ✓ (5)
2 - Thick inner wall ✓
3 - Nucleus /chloroplast ✓
4 - Guard cells ✓
5 - Stoma/ stomal pore ✓

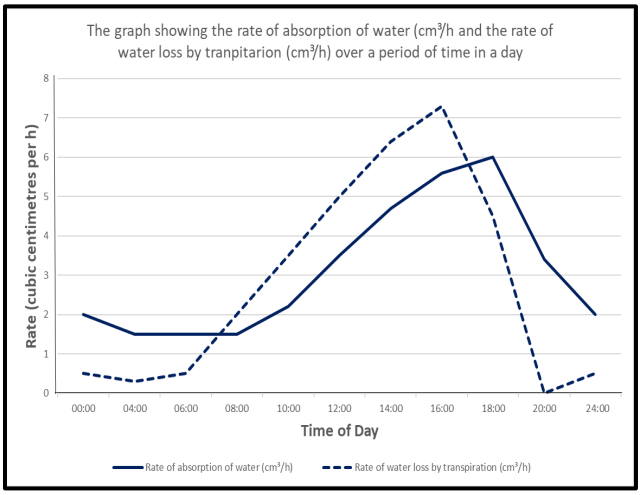
4.4. • It is flattened to provide a large surface area for maximum light absorption✓ (2)
• The cuticle and epidermis are transparent to allow light to enter the mesophyll region. ✓
• The palisade cells are arranged at right angles to the epidermis/ rod shaped to allow for maximum light absorption✓
Any relevant answer is also acceptable.
(Any 2)

[30]

Question 5

5.1.

5.1.1.



Rubric for assessment of the graph:

Correct type of graph (line graph)		1
Caption for graph		1
Correct label for X-axis (including unit) AND scale for X-axis		1
Correct label for Y-axis (including unit) AND scale for Y-axis		1
Plotting:	1 to 10 points correct All 11 points correct	2/ 3

(7)

5.1.2. Identify

(a) Any 1 (1)

Rate of absorption of water ✓

Rate of water loss by transpiration ✓

(b) Time of day ✓ (1)

5.1.3. Any 1 (2)

Use same type / species of plant✓✓

Same amount of water ✓✓

Same environmental conditions✓✓/ sunlight / humidity

5.1.4. 06:00 AND 08:00✓ because, an increase in the light intensity occurred at sunrise, this increased the transpiration✓ (2)

5.1.5. 16:00 ✓ (1)

5.1.6. (1.5+1.2+1.0+1.5+2.5+1.5)✓– (0.5+1.3+1.5+1.7+1.7) =2.5✓ (4)
∴ There is a net gain✓ of 2.5ml✓

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Question 6

6.1.

6.1.1. (a) B ✓– Ulna ✓ (2)

(b) A ✓– Radius✓ (2)

(c) C – Carpals ✓ D – Metacarpals ✓ (2)

(d) The phalanges. ✓ (1)

6.1.2. (a) A – Femur ✓ C – Fibula ✓ (4)
B – Patella / Knee cap ✓ D – Tibia ✓

(b) Cartilage ✓ (1)

(c) Any 1 (1)
- Gives structure, shape and strength. ✓
- Reduces friction. ✓
- Absorbs shock of impact. ✓
- Provides support. ✓

6.1.3. (a) Ligaments✓ (1)

(b) Tendons✓ (1)

6.1.4. Any 2 ✓✓ (2)
The skeleton helps with:
- Movement
- Protection
- Support
- Storage of minerals
- Hearing

[17]

TOTAL SECTION B: 100 GRAND TOTAL: 150