education

Department of Education
FREE STATE PROVINCE

GRADE 10

LIFE SCIENCES

TOTAL: 150

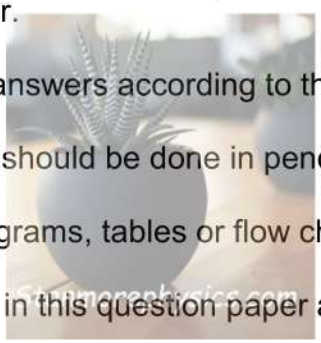
TIME: 2½ HOURS

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. ALL drawings should be done in pencil and labelled in blue or black ink.
7. Only draw diagrams, tables or flow charts when asked to do so.
8. The diagrams in this question paper are NOT all drawn to scale.
9. Do NOT use graph paper.
10. Non-programmable calculators, protractors and compasses may be used.
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 to D) next to the question number (1.1.1 to 1.1.10) in your ANSWER BOOK, for example 1.1.11 D.

1.1.1 The green pigment which is present in plant cells is the …

A leucoplast.
B chromoplast.
C chlorophyll.
D chloroplast.

1.1.2 Which ONE of the following is found in bone?

A Haversian tubules
B Erythrocytes
C Platelets
D Leukocytes

1.1.3 Study the following list of structures:

(i) Ligaments
(ii) Bones
(iii) Tendons

Which of the following structures play an important role in human locomotion?

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

1.1.4 Which ONE of the following determines the colour of a human's eyes?

A Vacuoles
B Chromosomes
C Plastids
D Cell membranes

1.1.5 A runner is competing in a 10 km race. Just before completing the race, he is out of breath and needs energy to finish the race.

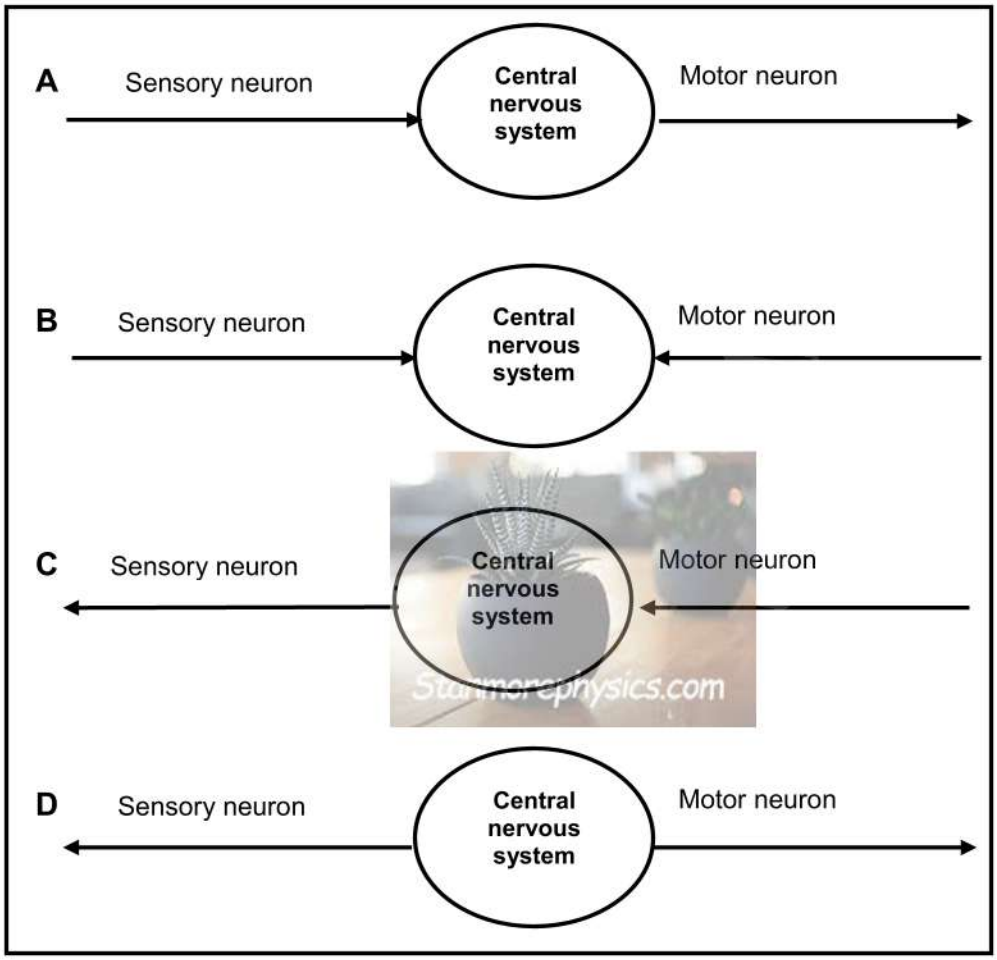
Which ONE of the following cell organelles in his body are most affected by the lack of energy?

A Nucleus
B Ribosomes
C Mitochondria
D Cell membrane

1.1.6 Excessive fertiliser in water may lead to eutrophication. Eutrophication is ...

A the modification of DNA in aquatic organisms that leads to extinction.
B the production of plants having a high alcohol content.
C the increased amount of oxygen in water which may cause toxic bubbles.
D a high growth rate of water plants which may deplete the oxygen stores.

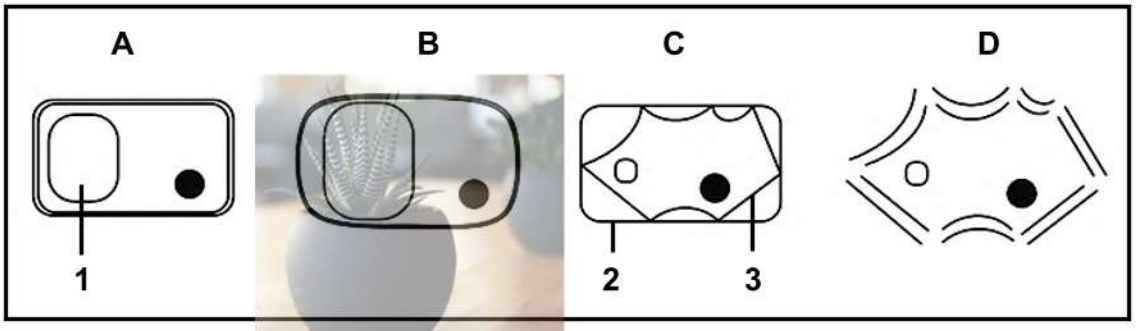
1.1.7 Which ONE of the diagrams below identifies neurons and the direction of nerve impulses?



QUESTIONS 1.1.8 AND 1.1.9 ARE BASED ON THE FOLLOWING INFORMATION:

Plasmolysis refers to the separation of the cell membrane from the cell wall due to loss of water from the cell vacuole as a result of osmosis. A leaf of fresh water pond weed was dropped into seawater for 10 minutes and was then observed under a microscope.

1.1.8 Which ONE of the diagrams best illustrates what cells of the pond weed would look like after 10 minutes?



1.1.9 Labels **1**, **2** and **3** refer to the …

A nucleus, cell wall and vacuole.
B vacuole, cell wall and cell membrane.
C vacuole, cell membrane and cell wall.
D nucleus, cell wall and cell membrane.

1.1.10 Which ONE of the following is part of blood?

A Osteocytes
B Platelets
C Haversian tubules
D Chondrocytes (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 1.2.6) in your ANSWER BOOK.

1.2.1 The red pigment in blood

1.2.2 A set of muscles where, if one contracts the other relaxes

1.2.3 Strengthening tissue with thickened cell walls especially in the corners

1.2.4 The total number of thoracic vertebrae in the human body

1.2.5 The organic substance found in cell walls

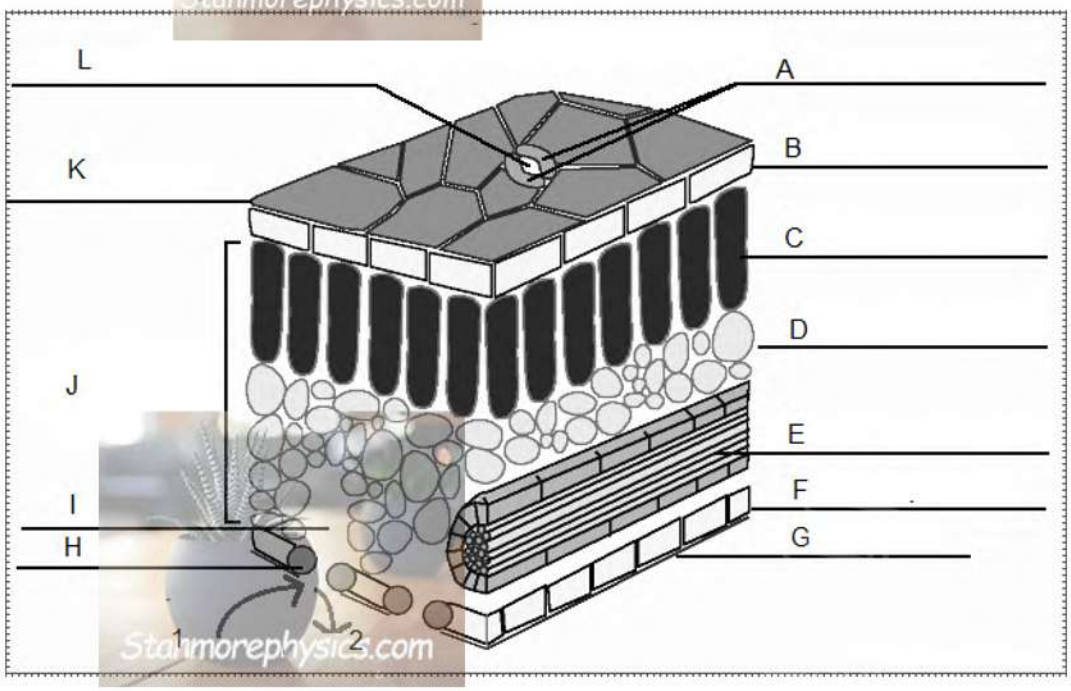
1.2.6 The plant tissue that divides continuously to form new cells **(6)**

1.3 Indicate whether each of the statements 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 1.3.4) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	The thin membrane surrounding a muscle fibre	A: Periosteum B: Sarcolemma
1.3.2	The first vertebra of the human vertebral column	A: Axis B: Foramen magnum
1.3.3	Transport organic food in plants	A: Phloem B: Sieve tubes
1.3.4	Necessary for the functioning of the thyroid gland	A: Iron B: Iodine

(4 x 2) **(8)**

1.4 The diagram below is a schematic representation of a plant organ.



1.4.1 Provide a suitable heading for the diagram. (1)

1.4.2 Give the LETTER and NAME of the part that:

(a) Protect the plant against water loss (2)

(b) Have big intercellular spaces (2)

(c) Protect the inner tissues (2)

1.4.3 Identify substances **1** and **2**. (2)
(9)

1.5 A group of grade 10 learners was given samples of four different types of food to test.

- The samples were prepared by grinding the foods into a powder and then dissolving the powdered food in distilled water.
- The four food samples were identified as **A**, **B**, **C** and **D**.
- They were also given a sample of distilled water.
- They carried out three tests on the five samples.
- Test **1** was for **glucose**, test **2** was for **protein** and test **3** was for **starch**.

The results of the tests are shown in the table below.

Food test	Test 1 Glucose	Test 2 Protein	Test 3 Starch
Sample A	Blue	Purple/wine-red	Brown
Sample B	Orange/brick-red	Blue	Brown
Sample C	Blue	Blue	Blue-black
Sample D	Orange/brick-red	Purple/wine-red	Brown
Distilled water	Blue	Blue	Brown

1.5.1 Which colour indicates the presence of protein? (1)

1.5.2 What is the name of the solution which gives:

(a) An orange/brick-red colour if glucose is present (1)
(b) A blue-black colour if starch is present (1)

1.5.3 Which ONE of the samples contained protein and glucose but no starch? (2)

1.5.4 Explain why the learners also carried out tests on distilled water? (2)
(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Study the table below which shows the composition of certain food types in the human diet per 100g units.

Food type	Energy (KJ)	Proteins (g)	Fats (g)	Carbo-hydrates (g)	Calcium (mg)	Iron (mg)	Vit A (Ug)	Vit C (Ug)
Bacon	1983	18,0	52,0	0	15	0	0	0
Beans	376	7,0	0,4	22,0	65	2,4	298	0
Bread	1072	8,8	1,4	58,1	102	1,8	0	0
Butter	3230	0,2	87,3	0	1,7	0	2015	1,5
Milk	281	3,9	4,6	5,4	129	0,15	87	0,1

2.1.1 Which food type provides the most energy per unit mass? (1)

2.1.2 Give the building blocks of:

(a) Lipids (fats) (2)

(b) Proteins (1)

2.1.3 Identify TWO mineral salts. (2)

2.1.4 Which food type supplies the most in the nutritional needs of the human body? (2)

2.1.5 Give a reason for your answer in QUESTION 2.1.4. (1)

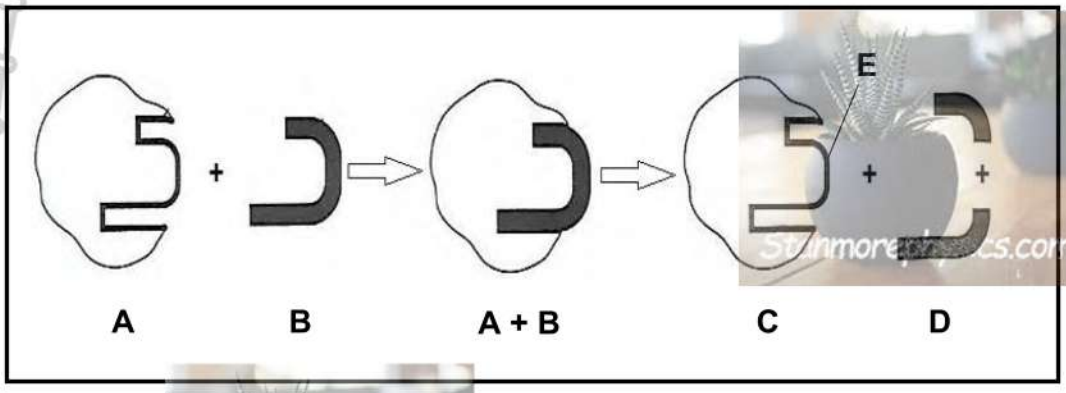
2.1.6 Which food type would be the most beneficial for:

(a) Growth and development (1)

(b) Normal night vision (1)

(c) Preventing anaemia (1)
(12)

2.2 The diagram below illustrates a mechanism how enzymes work.



2.2.1 Which LETTER represents the enzyme? (1)

2.2.2 Give a reason for your answer in QUESTION 2.2.1. (1)

2.2.3 Give labels to:

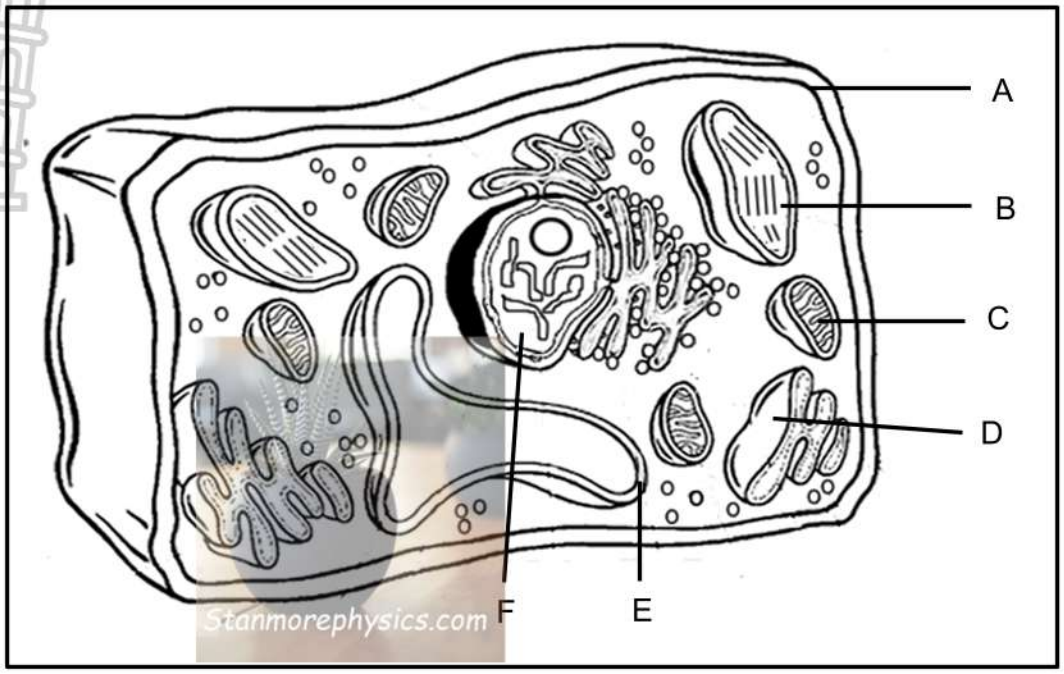
(a) **A + B** (1)

(b) **E** (1)

2.2.4 Give ONE reason why enzymes are important in living organisms. (1)

2.2.5 Explain what would happen if the temperature at which the above enzyme functions at, is increased far above the optimum temperature. (2)
(7)

2.3 The diagram below shows a cell.



2.3.1 Identify the type of cell shown in the diagram. (1)

2.3.2 Give THREE visible reasons for your answer in QUESTION 2.3.1. (3)

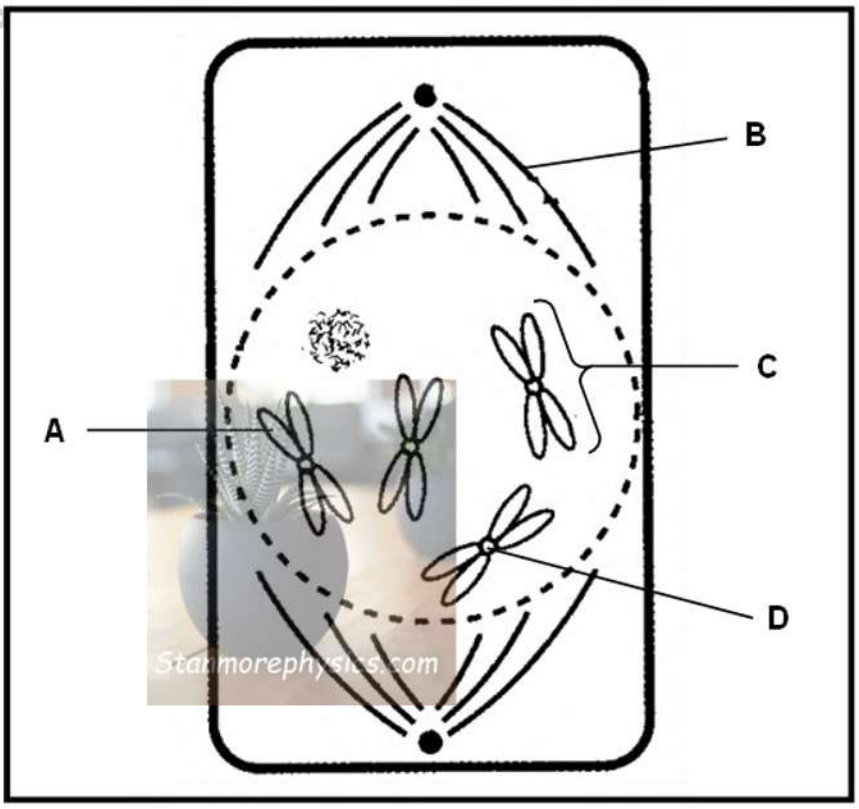
2.3.3 Give the LETTER/S and NAME/S of the part/s:

(a) Where photosynthesis takes place (2)

(b) Which is semi-permeable (4)

(c) Which controls all the activities of the cell (2)
(12)

2.4 The diagram below shows a phase of mitosis.



2.4.1	Provide labels for structures **A, C** and **D**.	(3)
2.4.2	Describe ONE function of **B**.	(2)
2.4.3	Which phase of mitosis is shown in the diagram?	(1)
2.4.4	Give ONE visible reason for your answer in QUESTION 2.4.3.	(1)
2.4.5	Which phase will follow the phase named in QUESTION 2.4.3?	(1)
2.4.6	Write down the number of chromosomes in each daughter cell when the nuclear division shown above is completed.	(1) **(9)**

2.5 The root tip of an onion is a 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 the number of cells counted in each phase.

The results are recorded 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

2.5.1 Which phase produced the lowest number of cells? (1)

2.5.2 Assuming a cell takes 24 hours to complete one cycle. Calculate the duration of interphase. Show ALL calculations. (3)

2.5.3 Draw a bar graph to represent only pothe TOTAL number of cells in each phase of the cell cycle. (6)
(10)
[50]

QUESTION 3

3.1 The diagrams below show the cross section of a dicotyledonous root and stem.

DIAGRAM 1

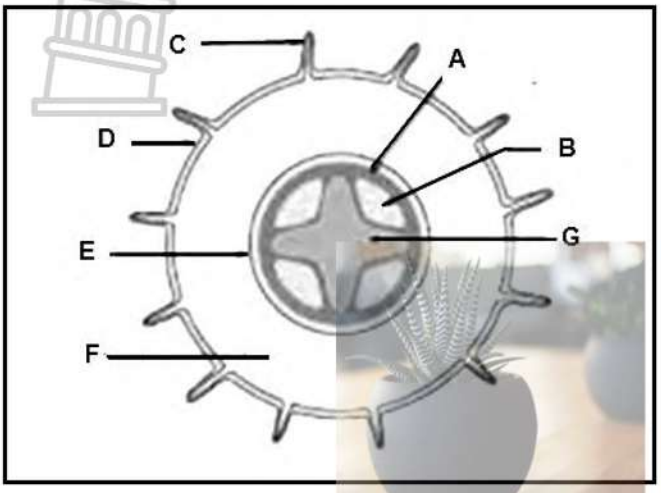
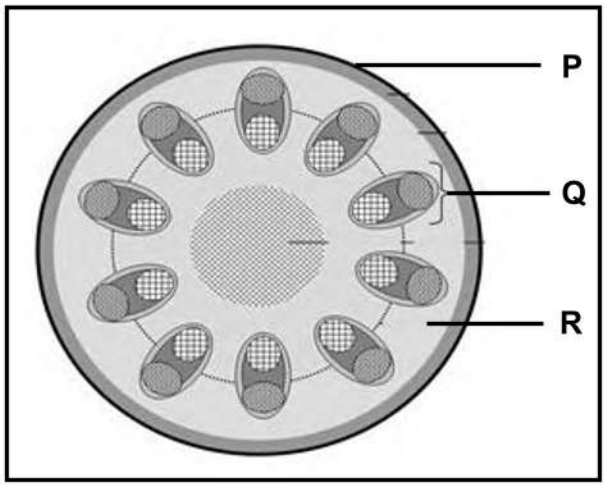


DIAGRAM 2



3.1.1 Identify:

(a) **F** (1)

(b) **R** (1)

(c) **Q** (1)

3.1.2 Give the LETTER and NAME of the tissue that:

(a) Transports water up in the plant (2)

(b) Protects the inner tissue of the stem. (2)

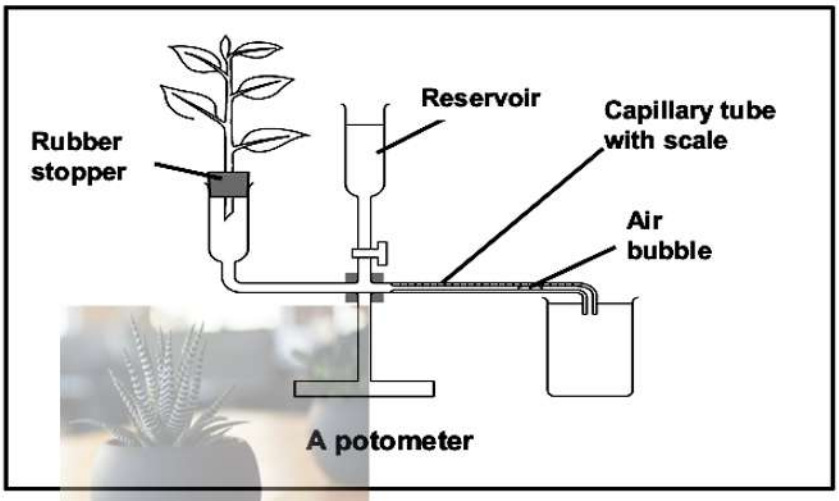
3.1.3 Describe ONE way in which the **C** is structurally adapted for its function. (2)

3.1.4 Explain what will happen if cell **C** is placed in a solution with a higher concentration of dissolved substances than its cell sap. (2)

3.1.5 Predict what would possible happen if **C** was absent. (2)
(13)

3.2 A learner investigated the influence of temperature on the rate of transpiration from a leafy shoot.

The diagram below shows the set-up of the investigation.



3.2.1 The learner cut the shoot and put it into the potometer under water. Explain why he did this. (2)

3.2.2 The learner wanted to calculate the rate of water uptake by the shoot in cm^3 per minute. What measurements did he need to take? (2)

3.2.3 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. Explain your answer. (3)

3.2.4 Identify the:

(a) Independent variable (1)

(b) Dependent variable (1)

3.2.5 The learner measured the rate of water uptake three times.

(a) How does the reservoir allow for measurements to be repeated? (2)

(b) Why did he repeat the measurements? (1)

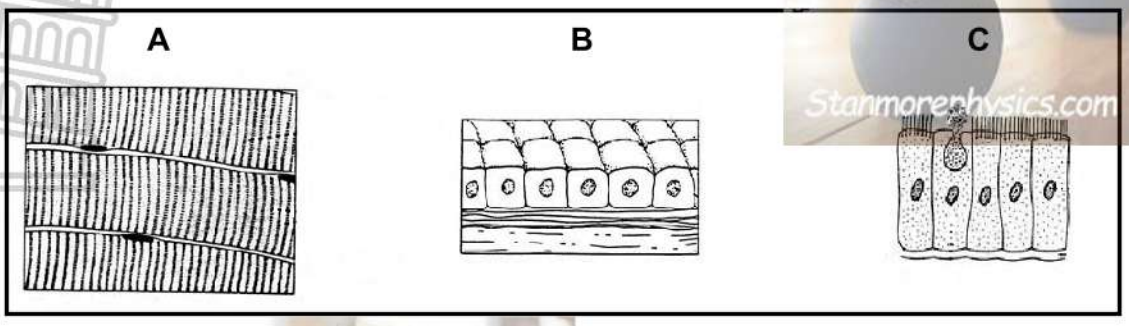
3.2.6 A heater was placed close to the potometer to investigate the effect of temperature on the transpiration rate.

The results are shown in the table below.

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

3.2.7 What can you conclude about the relationship between temperature and transpiration rate? (3)
(15)

3.3 A learner examined sections of animal tissue and observed the following:



3.3.1 Identify tissue:

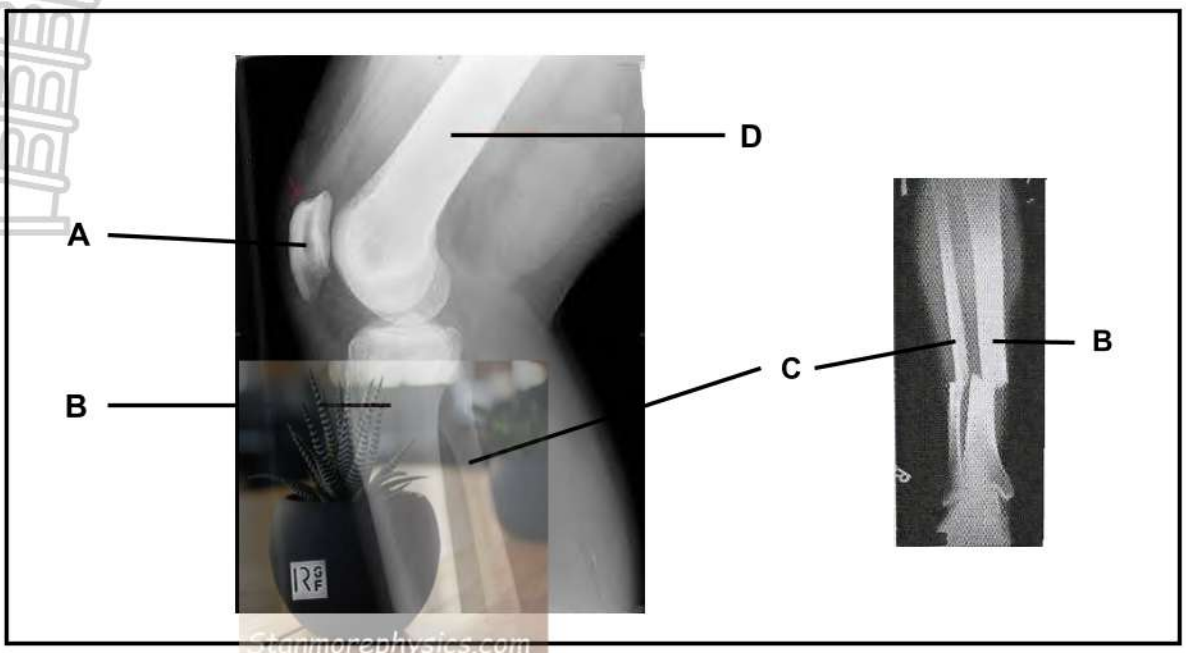
(a) **A** (1)

(b) **B** (1)

3.3.2 Why can **A, B** and **C** all be classified as tissues? (2)

3.3.3 Tabulate TWO visible differences between **B** and **C.** (5)
(9)

3.4 The diagrams below show the upper and lower leg and knee joint of a human.



3.4.1 Provide labels for parts **A, B**, **C** and **D**. (4)

3.4.2 Name the bone in the lower arms to which you can compare bone **B**. (1)

3.4.3 Explain TWO ways in which the internal structure of bone **D** helps in either support or movement of the body. (4)

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

(13)
[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150