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



MARKS: 150 **TIME: 2 ½ 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 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. ALL drawings should be done in pencil and labelled in blue or black ink.
7. Only draw diagrams 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 must 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 answer and write only the letter (A – D) next to the question number (1.1.1–1.1.10), in the ANSER BOOK for example 1.1.11 D.

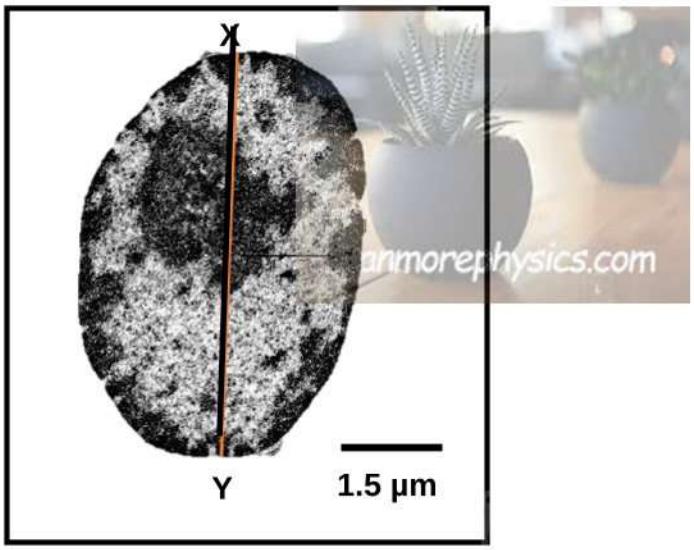
1.1.1 Identify the mineral needed in micro quantities:

A Iodine
B Calcium
C Nitrogen
D Potassium (2)

1.1.2 Monomer(s) of maltose:

A Glucose
B Fructose
C Glucose and galactose
D Galactose and fructose (2)

1.1.3 The electron micrograph below shows the nucleus of a cell



XY represents the length of the nucleus.

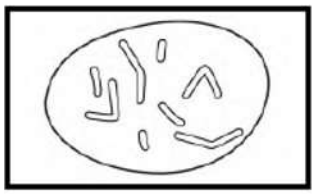
Which one of the following options gives the actual length of the nucleus?

A 4.5 µm
B 6.1 µm
C 15.0 µm
D 5.26 µm (2)

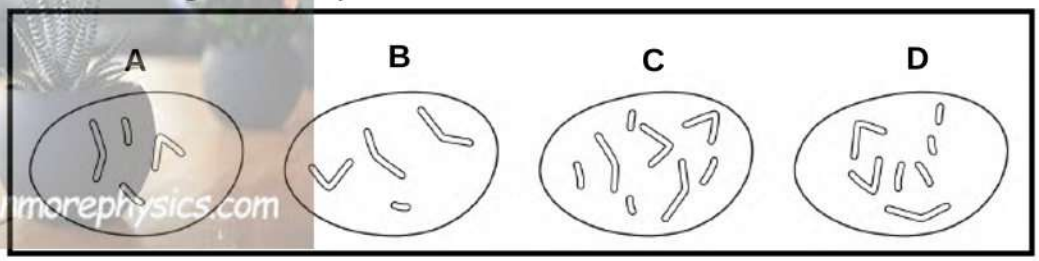
1.1.4 Identify the correct order of the levels of organisation in a multicellular organism:

A Systems → organism → cells → tissues → organ
B Organism → systems → tissues → organs → cells
C Tissues → systems → organs → organism → cells
D Cells → tissues → organs → systems → organism (2)

1.1.5 The diagram below depicts the nucleus in a cell that divides by mitosis



Identify the diagram below that represents the chromosomes in one of the daughter cells produced.



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(2)

1.1.6 Choose the correct combination of locations where meristematic tissue is found in plants:

A	Epidermal layer	Xylem	Phloem
B	Bone marrow	Skin	Egg cells
C	Tips of leaves	Apical buds	Vascular bundles
D	Tips of roots	Tips of stem	Vascular bundles

(2)

1.1.7 Identify which option is NOT required to facilitate upward movement of minerals through the stem from the roots to the leaves.

A Root pressure
B Capillarity
C Phloem
D Transpiration pull (2)

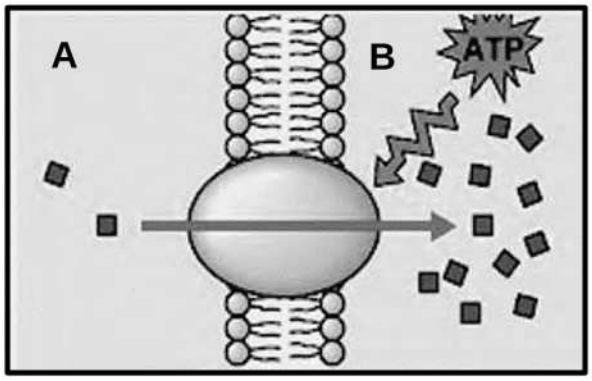
1.1.8 Each of the structures below form part of the human skeleton.

(i) Pectoral girdle
(ii) Pelvic girdle
(iii) Vertebral column
(iv) Upper limbs

Identify the structures found in the appendicular skeleton:

A (iii) only
B (i) and (iv) only
C (i), (ii) and (iii) only
D (i), (ii) and (iv) only (2)

Question 1.1.9 and 1.1.10 is based on the diagram below which illustrates transport in cells:



1.1.9 What type of transport is illustrated above?

A Active
B Passive
C Osmosis
D Diffusion (2)

1.1.10 Identify the statement that is FALSE for the above illustration:

A Process requires energy
B Transport occurs though a carrier protein
C Example of water movement to the stele of the root
D Substances move against the concentration gradient (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 1.2.10) in the ANSWER BOOK.

1.2.1 Organic substance soluble in ether/alcohol. (1)

1.2.2 Specialised protein that acts as catalysts for chemical reactions in living organisms. (1)

1.2.3 Movement of particles of a gas or a liquid, from a high- to a low concentration, down a concentration gradient, until equilibrium is reached. (1)

1.2.4 Continues system of fine membranes connected to the cell and nuclear membrane that has ribosomes on its outer surface. (1)

1.2.5 The growth or tumour that forms as a result of uncontrolled mitosis. (1)

1.2.6 Specialized epidermal tissue in plants that absorb water and minerals. (1)

1.2.7 Connective tissue that reduces friction between bones. (1)

1.2.8 Colourless plastid responsible for storage of starch, lipids and protein. (1)

1.2.9 Single stranded nucleic acid. (1)

1.2.10 Form in which glucose is stored in animals. (1)

(10)

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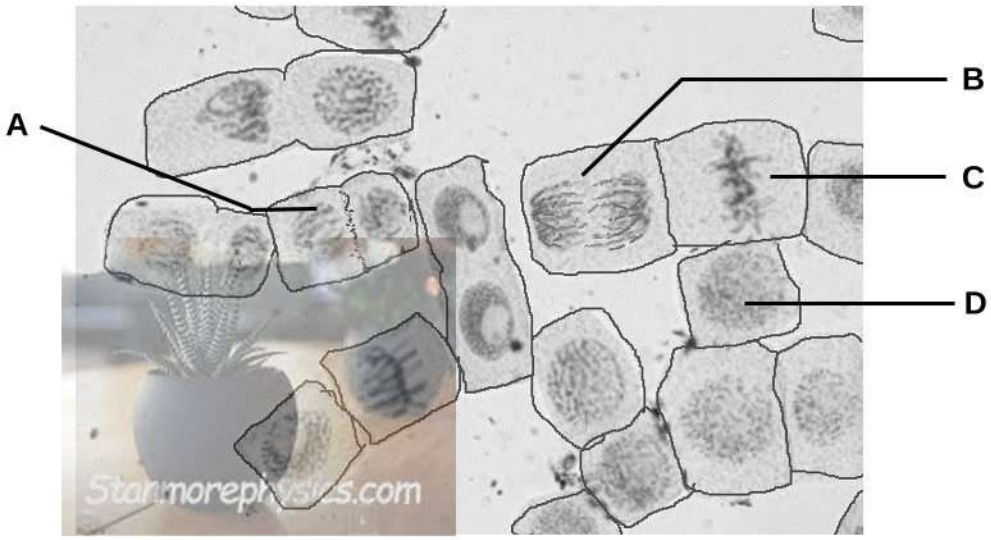
1.3 Indicate whether each of the descriptions in COLUMN I apply to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK.

	COLUMN I	**COLUMN II**
1.3.1	Chromatids are pulled to opposite poles	A: Metaphase B: Interphase
1.3.2	Tissue that transmits chemical and electrical control signals	A: Nerve B: Connective
1.3.3	Vascular tissue	A: Xylem B: Phloem
1.3.4	Direction of impulses in a neuron	A: Dendrite to axon B: Axon to dendrite
1.3.5	Results due to a vitamin D deficiency	A: Rickets B: Beri-beri

(5 X 2) **(10)**

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1.4 The micrograph below show cells that are in various stages of the cell cycle



1.4.1 Identify the above cells as belonging to an animal or plant AND provide a VISUAL reason for the answer. (2)

1.4.2 Identify the stage of mitosis represented by:

(a) **A** (1)

(b) **B** (1)

(c) **C** (1)

(d) **D** (1)

1.4.3 Provide a reason for the answer provided in QUESTION 1.4.2 (c). (1)

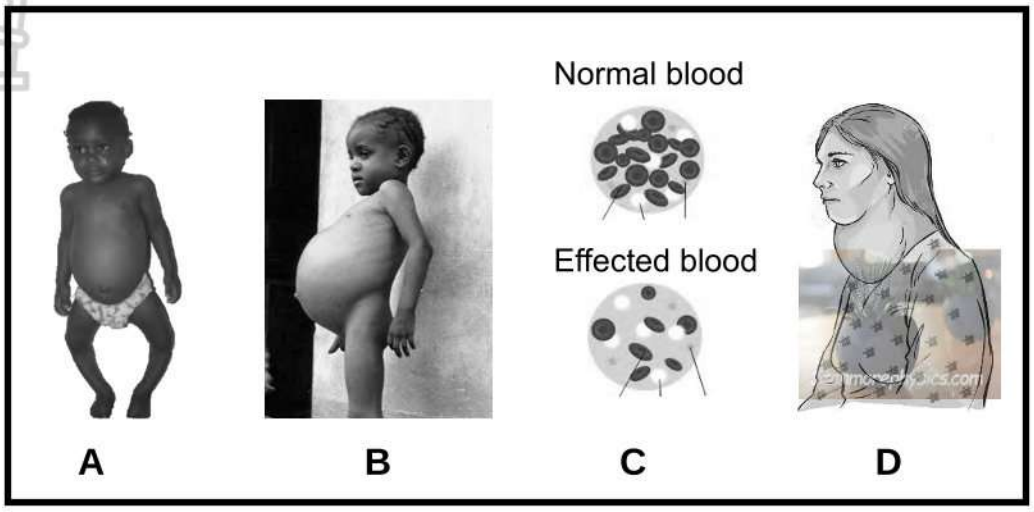
1.4.4 Draw a diagram of stage **B** if the mother cell contained 2 chromosomes. (3)
(10)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Study the pictures below depicting different conditions as a result of deficiencies in MINIRALS and answer the questions that follow:



2.1.1 Identify the condition AND mineral that resulted in the depiction in picture:

(a) **A** (2)

(b) **B** (2)

(c) **C** (2)

(d) **D** (2)

2.1.2 Name a deficiency in a VITAMIN that could result in the condition depicted in **A**. (1)

2.1.3 How does the vitamin given in QUESTION 2.1.2 contribute to the strengthening of bones and teeth? (1)
(10)

2.2 Amylase is an enzyme that hydrolyses (breaks down) starch into maltose (a sugar) in humans.

Elijah conducted an investigation where a solution of amylase was mixed with a starch suspension. The mixtures were kept in test tubes at different temperatures for 15 minutes.

At the end of the time period, the samples were analysed to determine the effect of temperature on the production of sugar. The results of the above investigation are recorded in the table below:

Temperature (°C)	Units of sugar (arb.)
0	10
10	36
20	65
30	90
40	90
50	30
60	9
70	0

2.2.1 Provide the main type of organic compound amylase forms part of. (1)

2.2.2 Name the bond found between the monomers of the compound mentioned in QUESTION 2.2.1. (1)

2.2.3 The above results could be plotted as a line graph to aid in the interpretation of the data.

Explain why a line graph will be used to depict the above results and NOT a bar graph? (2)

A test to determine the presence of reducing sugars was performed on the end product produced at each temperature in the respective test tubes. An array of different colours were observed.

2.2.4 Give the name of the disaccharide produced in the investigation. (1)

2.2.5 Name the test performed. (1)

2.2.6 Write down the TEMPERATURE one would MOST LIKELY observe the following colours at:

(a) Red (1)

(b) Blue (1)

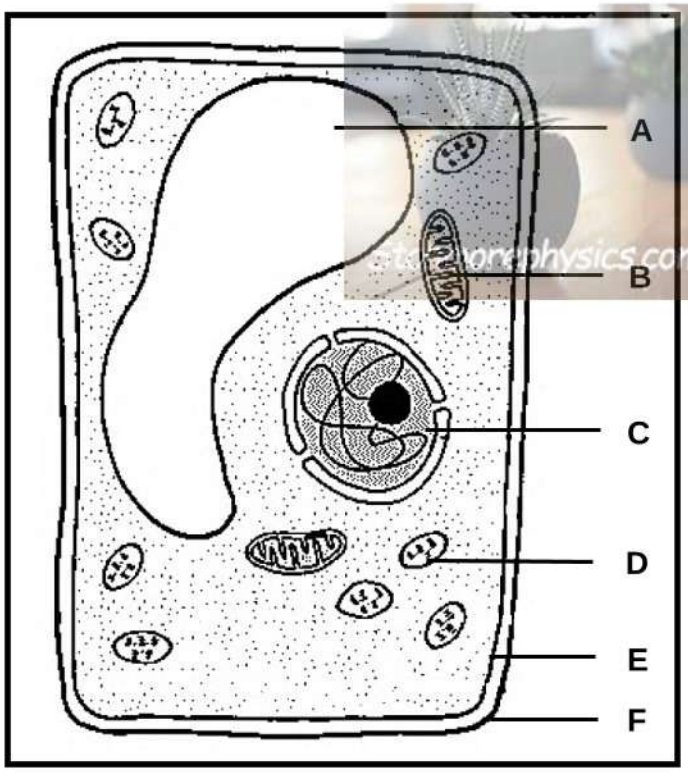
2.2.7 The test mentioned in QUESTION 2.2.5 is a QUANTITATIVE test. The test for starch is QUALITATIVE.

Define the term *quantitative* in the context of the test performed. (2)

(10)

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2.3 The diagram below shows the structure of a plant cell.



2.3.1 Identify organelle:

(a) **B** (1)

(b) **D** (1)

2.3.2 Give TWO STRUCTURAL similarities between organelle **B** and **D**. (4)

2.3.3 Identify structure **F** AND provide THREE functions thereof. (4)

2.3.4 Provide the LETTER that:

(a) Would be significantly reduced in size/absent in an animal cell (1)

(b) Would be found in large quantities in active muscle cells (1)

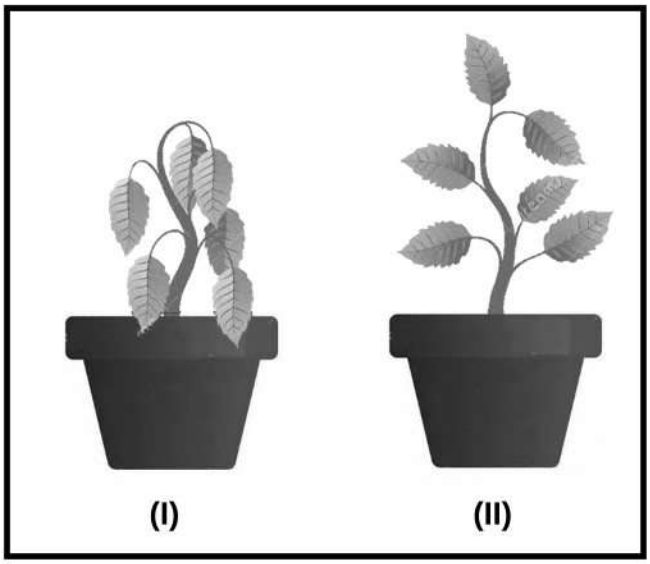
(c) Is responsible for photosynthesis (1)

(d) Is known as the “power house” of the cell (1)

(d) Contains lignin as a structural component (1)

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2.3.5 Michael observes a plant containing no secondary tissue at 2 pm on a very hot day **(I)**; he waters the plant and observes it again at 3 pm **(II)** as displayed in the diagram below:



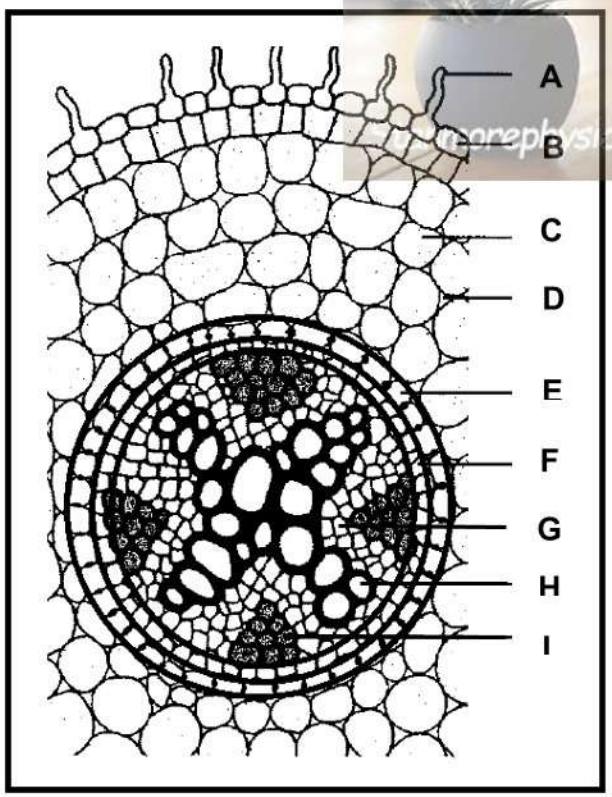
The diagram of a plant cell as Michael would have observed it under a microscope AFTER the plant was watered is given in QUESTION 2.3.

Draw a diagram to depict how the plant cell in QUESTION 2.3 would have looked PRIOR to receiving water. (4)

2.3.6 Give the phase in the cell cycle depicted in the above diagram AND provide a visual reason for the answer. (2)

2.3.7 Provide TWO reasons why mitosis is important. (2)
(23)

2.4 The diagram below represents a detailed transverse section of part of a young dicotyledonous root:



2.4.1 Identify the TISSUE labelled:

(a) **B** (1)

(b) **C** (1)

(c) **I** (1)

2.4.2 Provide the LETTER for the part:

(a) Structurally adapted to increase the surface area (1)

(b) Serving as packaging tissue (1)

(c) Transporting water and minerals (1)

(d) Responsible for secondary growth (1)

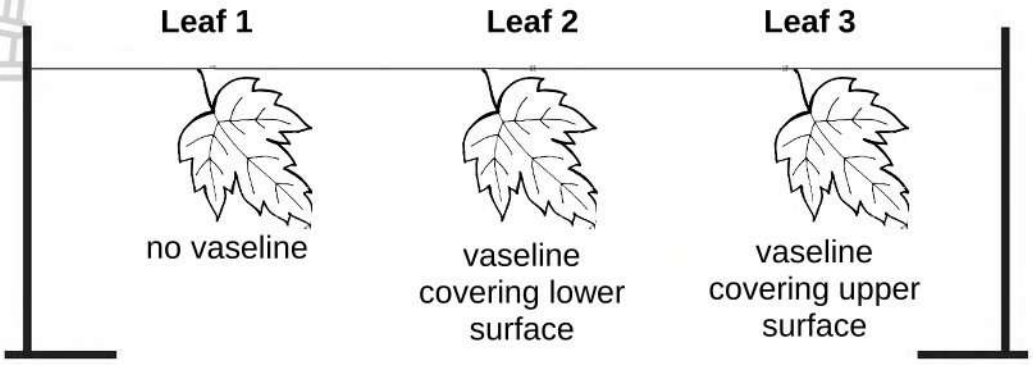
(7)

[50]

QUESTION 3

3.1 Okuhle carried out an investigation on water loss from leaves. He wanted to determine which surface of a leaf loses most water.

He set up the investigation in the following way:



He weighed the leaves at the start of the investigation and hung them on the line. He weighed them again at the end of the investigation (after 24 hours).

The table below shows the percentage decrease in mass of the three leaves upon completion of the investigation.

Leaf	Surface covered with vaseline	Mass/g		Percentage decrease in mass
		Start	End	
1	Neither	1.9	1.3	32
2	Lower	1.8	1.6	11
3	Upper	2.0	1.6	

3.1.1 Write down a planning steps for the investigation. (1)

3.1.2 Provide an aim for the investigation. (2)

3.1.3 Identify the following variables:

(a) Independent (1)

(b) Dependant (1)

3.1.4 What leaf acted as a control? Provide a reason for the answer. (2)

3.1.5 Calculate the percentage decrease in the mass of leaf **3**. Show ALL workings. (3)

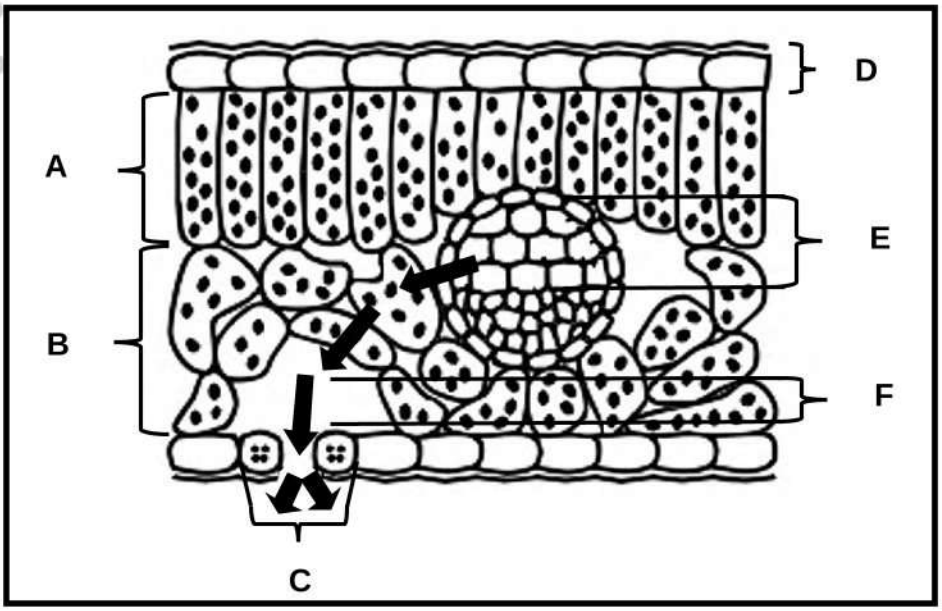
3.1.6 Explain why the percentage decrease in mass is used to compare the results. (2)

3.1.7 What conclusion can be drawn from the investigation? (1)

(13)

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agram below represents a cross section through a dicotyledonous leaf



3.2.1 Name AND describe THREE ways in which **A** is adapted for optimal light absorption. (6)

3.2.2 Define the term *transpiration*. (2)

3.2.3 Describe the path of transpiration pull as it occurs in the leaf. Make specific mention of the names of the parts labelled **B**, **C**, **E** and **F** AND the processes involved in the movement of substances through the cells. (6)

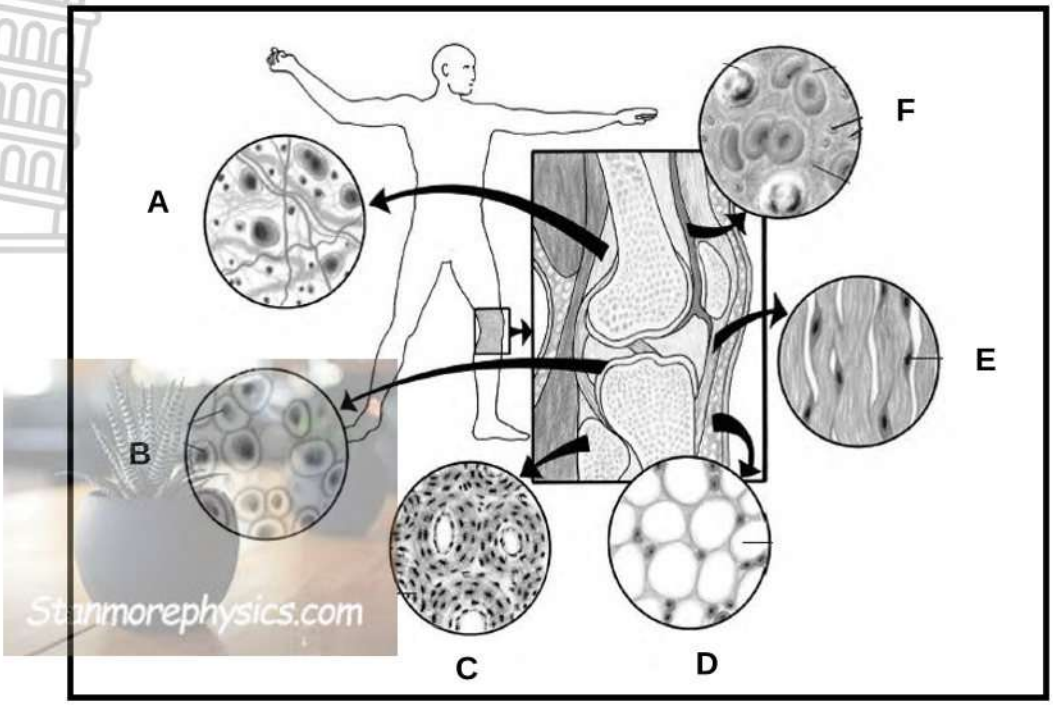
3.2.4 Name AND explain the effect on transpiration rate if the following environmental factors are increased around the leaf:

(a) Temperature (4)

(b) Humidity (4)

(22)

3.3 The diagram below displays different types of connective tissues found in humans:



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3.3.1 Differentiate between ligaments and tendons. (2)

3.3.2 Provide the LETTER of connective tissue that:

(a) Is found under the skin (1)

(b) Makes up the endoskeleton of mammals (1)

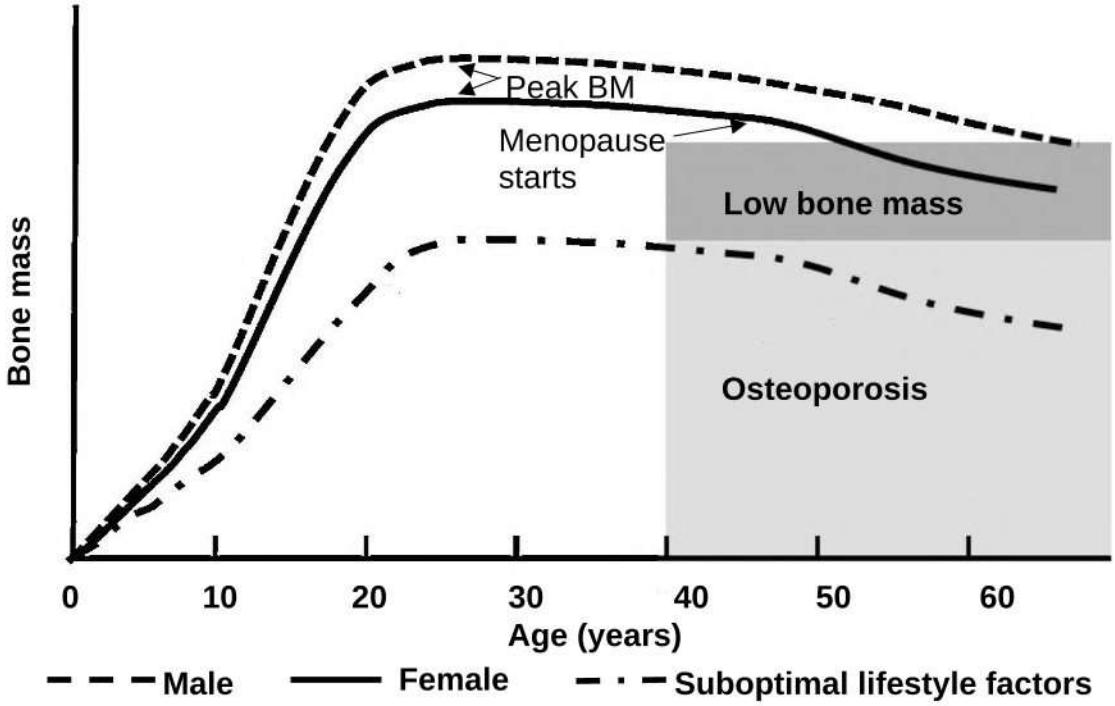
(c) Is a liquid (1)

(d) Is effected by osteomalacia (1)
(6)

3.4 Osteoporosis is a bone disease that results in the thinning and weakening of bones resulting in the reduction on bone mass (BM). Bones become porous and crack due to aging but can also occur due to lifestyle factors such as poor nutrition and absorption as well as lack of exercise, increasing the risk of fractures. Other factors such as pregnancy, breastfeeding and menopause in woman can also play a role. Oestrogen is required for the formation and maintenance of bone, the excretion thereof peaks in woman of reproductive age and reduces after menopause.

The graph below illustrates bone mass acquisition to reach peak bone mass in men and woman. The impact of suboptimal lifestyle factors is also shown

Study the graph below and answer the questions that follow:



3.4.1 Write down the age that:

(a) Bone mass reaches its peak (1)

(b) Menopause starts (1)

3.4.2 Explain why is it very important that people between the age of 0 and 20 obtain optimal nutrition? (2)

3.4.3 Propose how breastfeeding and pregnancy could contribute to the development of osteoporosis. (2)

3.4.4 Suggest why bone mass decreases at a faster pace after 50 in comparison to younger ages in woman. (3)

(9)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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