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**NATIONAL
SENIOR CERTIFICATE**

GRADE 10

NOVEMBER 2020

**LIFE SCIENCES P1
(EXEMPLAR)**

MARKS: 150

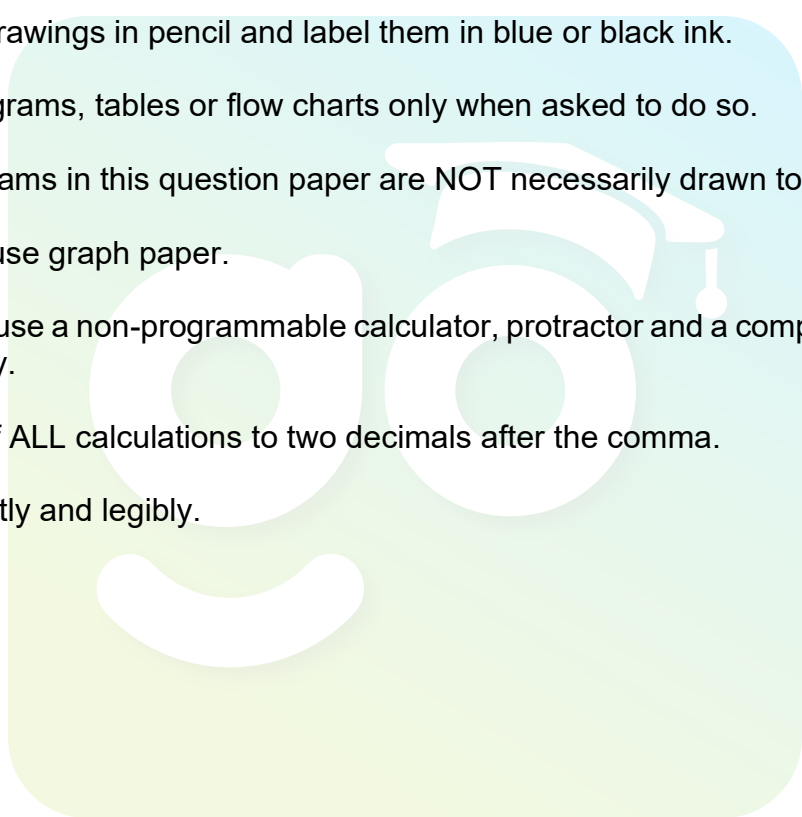
TIME: 2½ hours

This question paper consists of 13 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 answer 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. Round off ALL calculations to two decimals after the comma.
12. 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 (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 The common function of calcium and phosphorus in mammals is that it ...

- A forms part of nucleic acid.
- B plays a role in the synthesis of proteins.
- C prevents rickets.
- D is involved in the formation of haemoglobin.

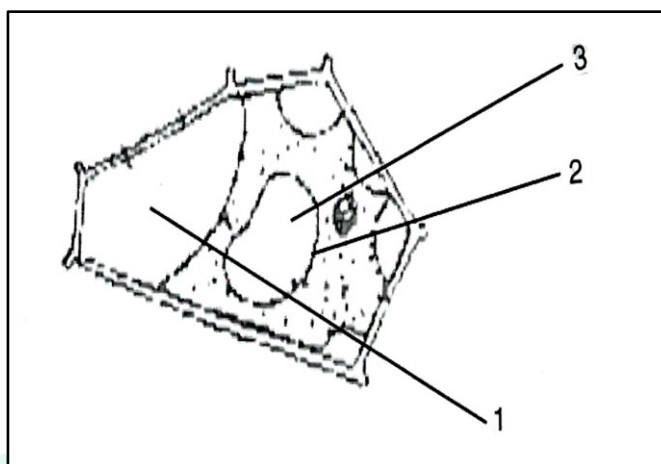
1.1.2 Which of the following substances are absorbed by the root hairs from the soil?

- (i) Mineral ions
 - (ii) Nitrates
 - (iii) Oxygen
 - (iv) Humus
 - (v) Water
- A Only (i) and (ii)
 - B (i), (ii), (iv) and (v)
 - C (i), (ii), (iii), (iv) and (v)
 - D (i), (ii), (iii) and (v)

1.1.3 In which of the following processes is mitosis NOT involved?

- 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.

QUESTIONS 1.1.4 and 1.1.5 are based on the diagram below showing the cell placed in a strong salt solution.



1.1.4 The diagram above represents ...

- A diffusion.
- B osmosis.
- C plasmolysis.
- D turgor pressure.

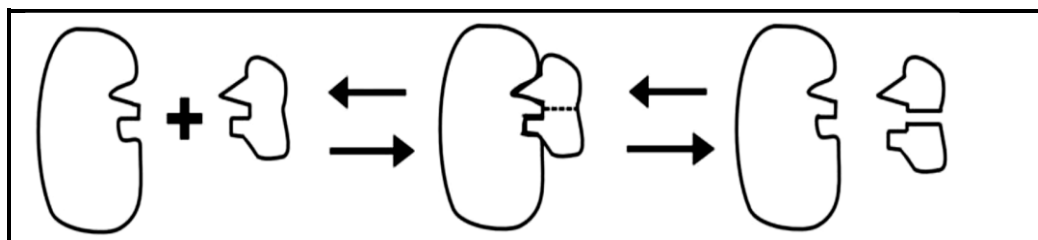
1.1.5 How will the water potential at 1, 2 and 3 compare?

- A Water potential at 2 and 3 higher than 1.
- B Water potential at 1, 2 and 3 are equal.
- C Water potential at 3 is higher than at 1 and 2.
- D Water potential at 1 is higher than at 2 and at 2 is higher than at 3.

1.1.6 Tomatoes are red because ...

- A more oxygen is absorbed by ripe tomatoes.
- B many chloroplasts are formed.
- C pigments are formed in cell sap.
- D many chromoplasts are formed.

1.1.7 Which property of enzymes is represented by the sequence of diagrams below?



- A Enzymes can speed up a chemical reaction.
- B Enzymes can lower the activation energy.
- C Enzymes are proteins.
- D Enzymes are specific in their function.

1.1.8 Which of the following are characteristics of erythrocytes?

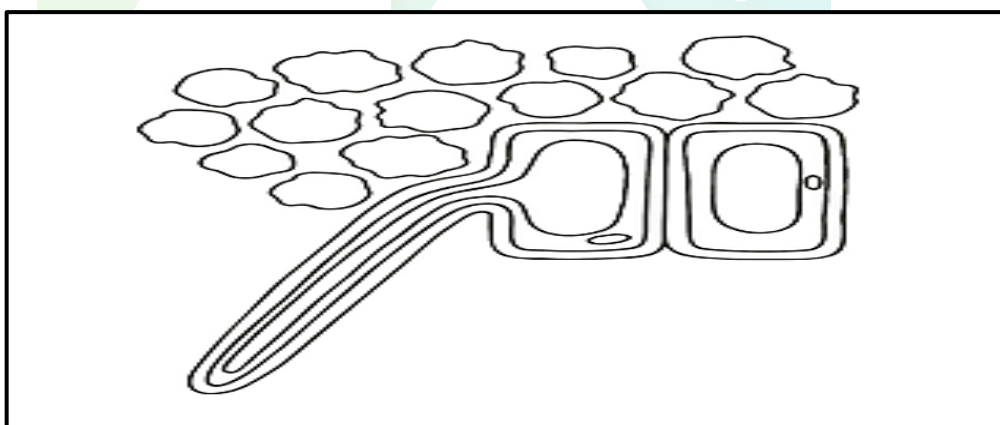
- (i) Contain haemoglobin.
- (ii) Destroy bacteria.
- (iii) Assists in blood clotting.
- (iv) Produced in spongy tissue of long erythrocytes.

- A (i) and (iv)
- B (ii) and (iii)
- C (iii) and (iv)
- D (i) and (ii)

1.1.9 The table below shows differences between plant and animal cells. Which comparison is **incorrect**?

	Plant cell	Animal cell
A	Large vacuole	Vacuole is small or absent
B	Cell membrane present	Cell membrane absent
C	Cellulose cell wall present	No cellulose cell wall
D	Chloroplasts present	No chloroplasts

1.1.10 Study the diagram below.



The main function of the plant organ in the diagram above is ...

- A transportation of water from roots to leaves.
 - B storage of water and mineral salts.
 - C increasing surface area for absorption.
 - D movement of substances throughout the plant.
- (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 numbers (1.2.1–1.2.10) in the ANSWER BOOK.

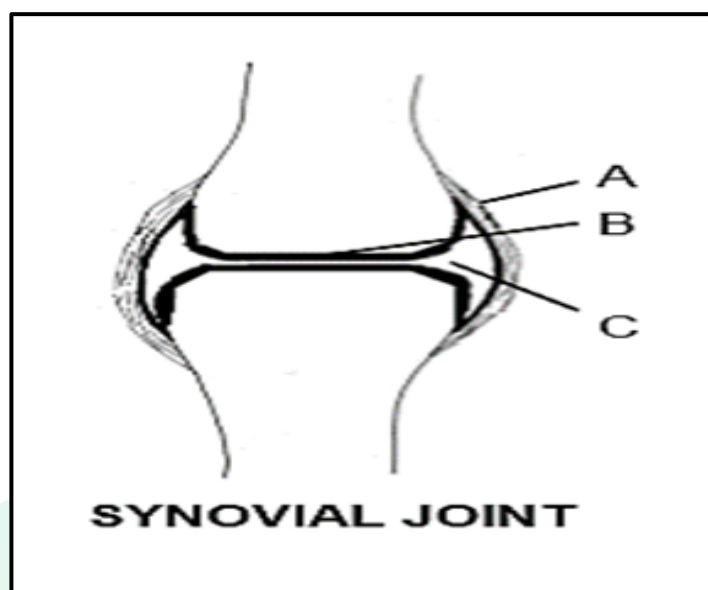
- 1.2.1 Carbohydrate made up of three or more monosaccharides
 - 1.2.2 The chemical element in haemoglobin that is essential for the transport of oxygen
 - 1.2.3 The waxy layer that covers the leaf, preventing excessive loss of water through evaporation
 - 1.2.4 An opening through which the spinal cord leaves the skull
 - 1.2.5 Blood group known as a universal donor
 - 1.2.6 Use of chemical agents to treat cancer
 - 1.2.7 Fats mainly derived from plants and are liquid at room temperature
 - 1.2.8 The type of tissue in the vascular bundle causing secondary thickening
 - 1.2.9 A collection of cells of the same type performing the same function
 - 1.2.10 The loss of water in the form of vapour through aerial parts of a plant
- (10 x 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	Reactions in which enzymes are involved	A:	Catabolic
		B:	Anabolic
1.3.2	The medium in which chemical reactions take place in the body	A:	Enzymes
		B:	Water
1.3.3	The scientist who invented the electron microscope in 1939	A:	Robert Hooke
		B:	Max Knott

(3 x 2) (6)

1.4 The diagram below represents a synovial joint.



1.4.1 Label parts **A** and **B**. (2)

1.4.2 Identify the synovial joint illustrated in the diagram above. (1)

1.4.3 Explain what would happen if fluid in the cavity labelled **C** dries out. (2)

1.4.4 Name TWO diseases that can affect the joints. (2)

1.5 Complete the table below that is based on chemical tests for organic food compounds:

Organic compounds	Chemical Reagents	Change for a positive result
Starch	1.5.1	Brown iodine solution turns blue-black colour
Proteins	1.5.2	1.5.3
1.5.4	Ether	1.5.5
1.5.6	1.5.7	Orange-brown colour results

(7)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

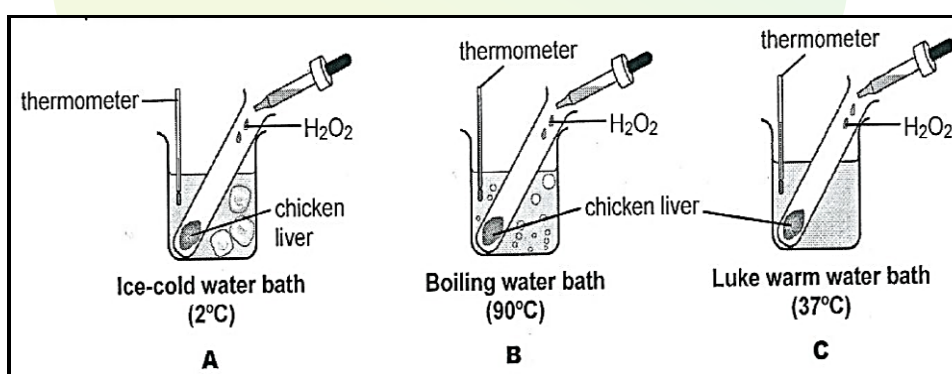
2.1 Read the extract below and answer the questions that follow.

Sometimes during cell metabolism, chemical substances which are poisonous to the body are formed. However, the body cells are not destroyed due to the presence of enzymes that decompose these poisonous substances into harmless products. One such poisonous substance that is released as a by-product during normal cellular reactions is *hydrogen peroxide*. However, the enzyme, catalase, ensures that this poisonous substance is converted into two harmless products as quickly as possible.



[Source: Liesl Sterrenberg & Helena Fouche, 1975]

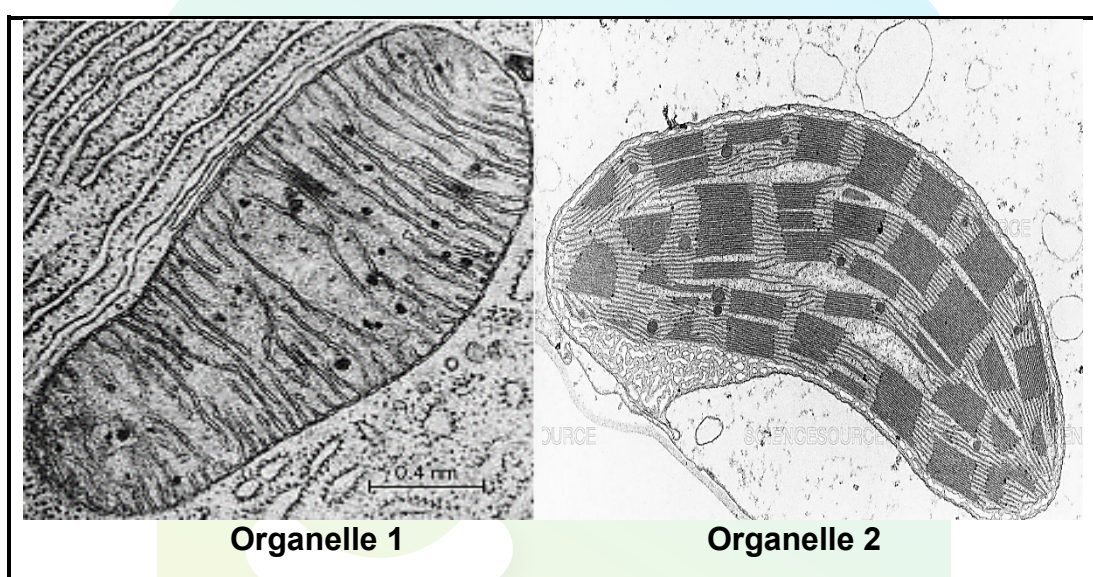
- 2.1.1 (a) What is the function of an enzyme? (2)
- (b) Describe the benefits that humans derive from the function of enzymes mentioned in QUESTION 2.1.1. (2)
- (c) Identify TWO harmless products released during decomposition of hydrogen peroxide. (2)
- (d) What effect does the involvement of an enzyme in a chemical reaction have on its structure and its ability to take part in subsequent reactions? (2)
- 2.1.2 An experiment was conducted to determine the effects of different temperatures on the action of the enzyme catalase, found in raw chicken livers. The apparatus was set-up as shown below.



- (a) Formulate a hypothesis for this investigation. (2)
- (b) In which test tube, **A**, **B**, or **C**, would the reaction take place the fastest? Give a reason for your answer. (2)

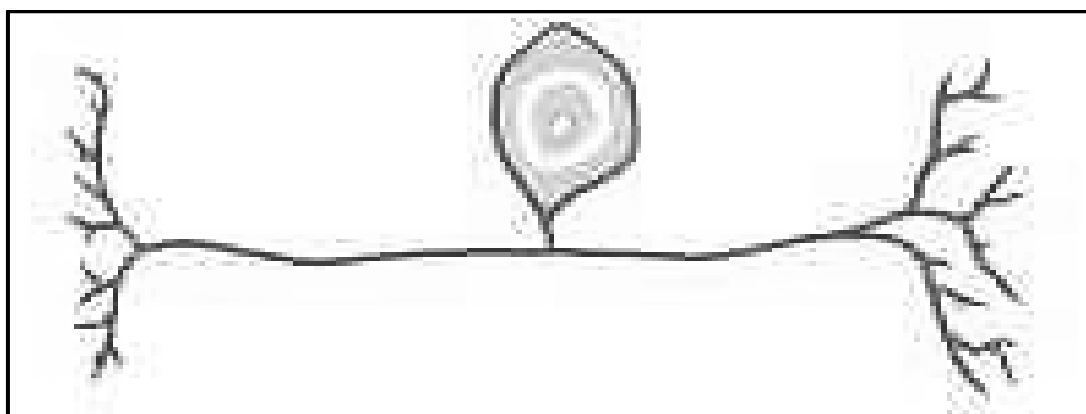
- (c) Which observation would indicate a positive reaction from the catalase? (1)
- (d) What results would be observed after the experiment in test tubes **A** and **B** respectively? (4)
- (e) Name the property of enzymes that is being investigated in this investigation. (1)
- (f) Identify the TWO factors that must be kept constant in this investigation. (2)
- (g) Give a reason why the investigation was repeated more than once using many samples. (1)

2.2 Study the micrographs below showing two organelles.



- 2.2.1 Identify organelles **1** and **2** respectively. (2)
- 2.2.2 Which ONE of the organelles shown above is found in a plant cell only? (1)
- 2.2.3 Draw a fully labelled diagram of organelle **2**. (5)
- 2.2.4 In which part of organelle **2** is the pigment responsible for the absorption of light found? (1)
- 2.2.5 Support the statement that says organelle **1** is called the 'powerhouse' of the cell. (2)
- 2.2.6 Which cell between a muscle cell and a skin cell contains more of organelle **1**? Explain your answer. (2)
- 2.2.7 Tabulate THREE differences between organelle **1** and organelle **2**. (7)
- 2.2.8 Calculate the actual size of the micrograph of organelle **2** in micrometres if the measured size of the image using a ruler is 86 mm and the electron microscopic magnification is 4000x. (3)

2.3 Study the diagram below.



2.3.1 Supply the caption for the diagram above. (1)

2.3.2 Redraw a labelled diagram of the above structure and indicate with an arrow the direction of flow of an impulse. (3)

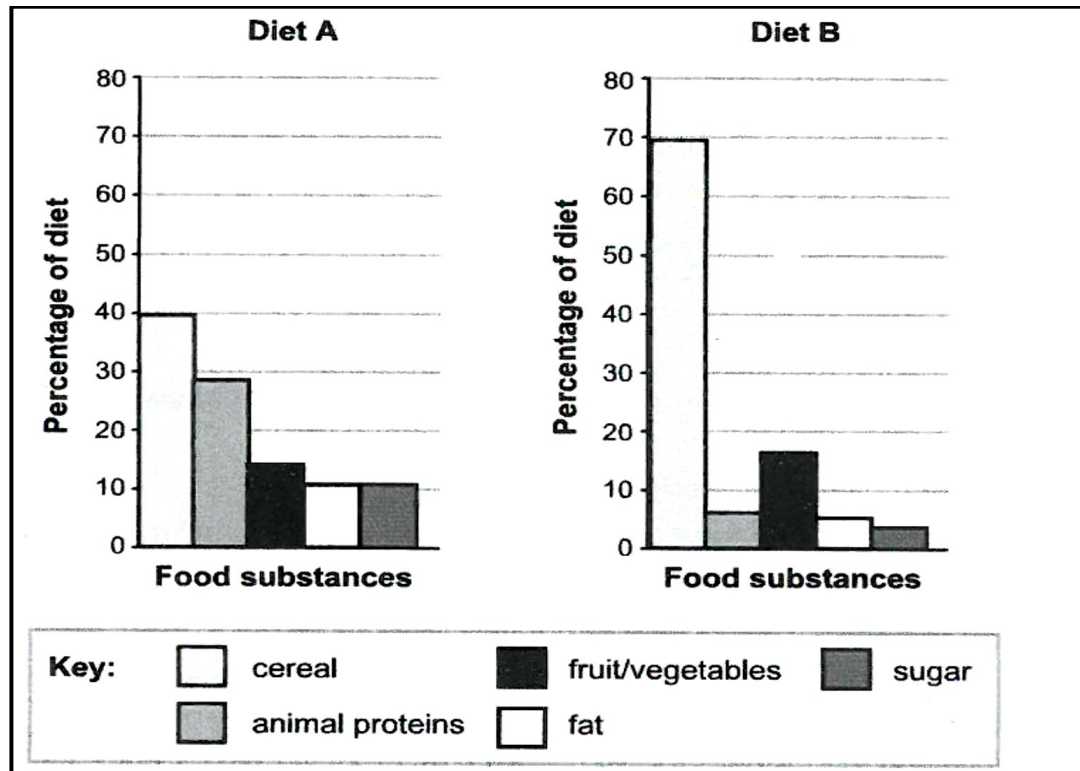
2.3.3 From the diagram in QUESTION 2.3.2 identify a structure with the following function:

- (a) Provides nutrition and energy to the impulse
- (b) Forms a synoptic cleft and transports impulse away from the neuron

(2)
[50]

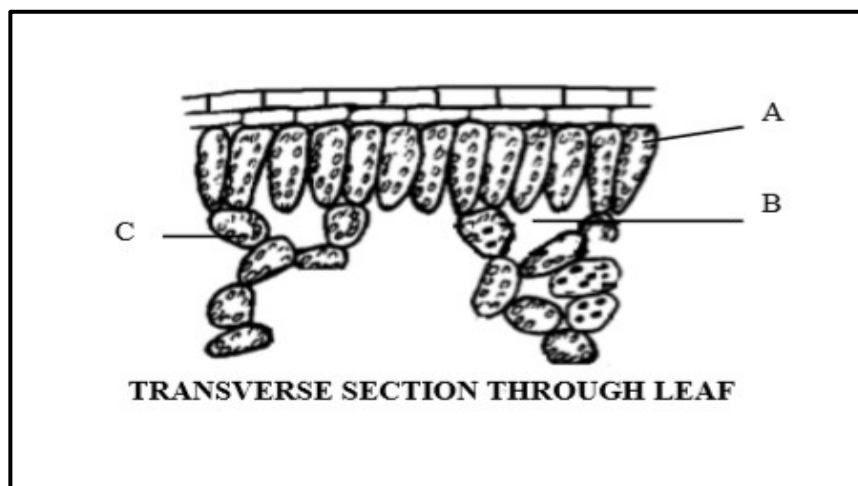
QUESTION 3

3.1 The histogram below shows the composition of diets of two people.



- 3.1.1 (a) From the histograms, name TWO types of food substances from diet **B** that represent a very similar percentage diet. (2)
- (b) Give TWO functions of cereal in a diet. (2)
- (c) Calculate the difference between the percentages of fruit / vegetables in diets **A** and **B**? (3)
- (d) Which diet provides more energy? Give a reason for your answer. (2)
- (e) Diet **B** is eaten by a vegetarian. However, it is evident that this person also consumes dairy products. Provide evidence from the graph. (1)
- 3.1.2 (a) Define the term *obesity*. (2)
- (b) Give ONE reason why obesity is regarded as a life-threatening condition. (2)
- (c) Diabetes is one of the sicknesses caused by obesity. Give the causes, ways of prevention and treatment of diabetes. (7)

3.2 The diagram below shows a dicotyledonous leaf.



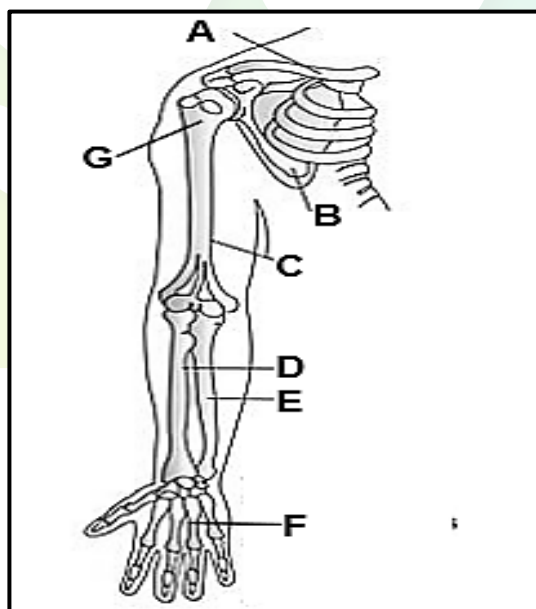
3.2.1 Give TWO functions of this plant organ. (2)

3.2.2 What is the collective name for the parts labelled **A** and **C**? (1)

3.2.3 Name the metabolic process that takes place at **B**. (1)

3.2.4 Identify the LETTER and NAME of the tissue with compact cells where photosynthesis takes place. (2)

3.3 The diagram below shows a part of a human skeleton.



3.3.1 Name the synovial joint that joins bone **C** to bones **D** and **E**. (1)

3.3.2 Give LETTERS of the bones that make up the pectoral girdle. (3)

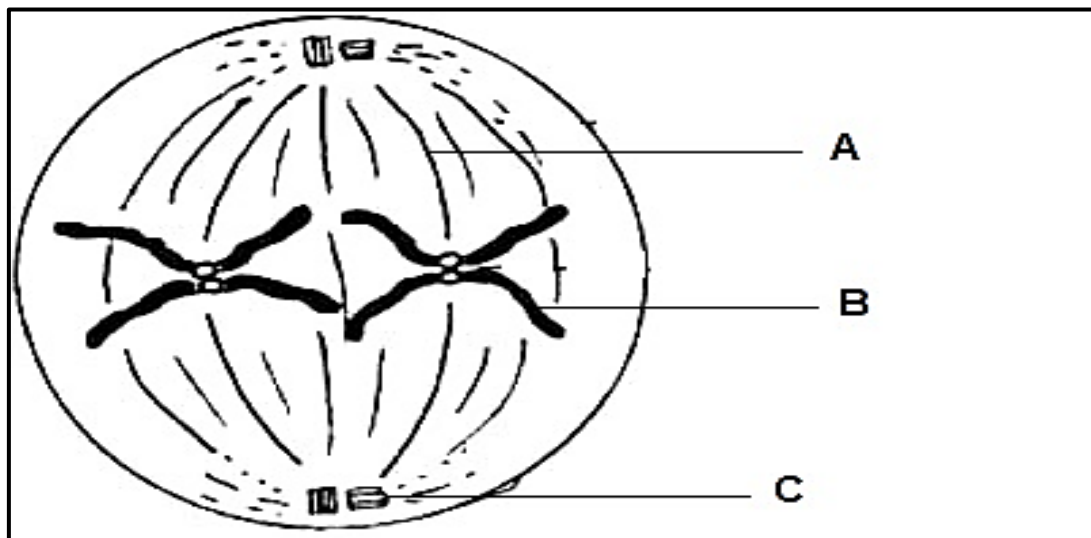
3.3.3 Provide labels for parts numbered **F** and **G**. (2)

3.3.4 Write down the number of phalanges found in each hand. (1)

3.3.5 TWO sets of muscles are attached to the front and back of the humerus respectively.

- (a) Name these TWO muscles. (2)
- (b) Name the substance that builds up and repairs muscle tissue. (1)
- (c) Describe how these muscles function to bring about movement. (1)
- (d) What would be the consequences if the muscle attached to the back of the humerus malfunctions? (1)

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



- 3.4.1 Identify the phase of mitosis represented above. (1)
- 3.4.2 Give ONE reason for your answer to QUESTION 3.4.1. (1)
- 3.4.3 Identify parts labelled **A**, **B**, and **C**. (3)
- 3.4.4 Name the phase that comes after the one shown above. (1)
- 3.4.5 How many chromosomes will be present in the cell shown above at the end of mitosis? (1)
- 3.4.6 What name is given to the abnormal and uncontrollable division of cells leading to the formation of a tumour? (1)
- 3.4.7 State THREE biological importance of mitosis. (3)

[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150