HILLCREST HIGH SCHOOL

Grade 10

LIFE SCIENCES

JUNE 2025

MARKS: 150

TIME: 2 ½ Hours

EXAMINER: Miss E. Blom
Mrs L. Prior

MODERATOR: Mrs R. Harmse

This paper consists of 15 pages.

Instructions:

1. Answer **ALL** the questions in the answer booklet provided.
2. This paper consists of **TWO** Sections and **THREE** Questions.
3. Number the questions exactly as the questions are numbered.
4. Write neatly and legibly.
5. All drawings should be done in pencil and labelled in ink.
6. Use **ONLY** blue or black ink.
7. Non-programmable calculators, protractors and compasses may be used.
8. This paper consists of 15 pages.

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 to D) next to the question number (1.1.1 to 1.1.9) in the ANSWER BOOK, for example 1.1.10 A.

1.1.1. The monomers of carbohydrates are …

A. amino acids
B. glycerol
C. starch
D. glucose

1.1.2. The single membrane surrounding a vacuole.

A. cell membrane
B. lysosome
C. tonoplast
D. plastid

1.1.3. The micronutrient that is needed for the formation of haemoglobin in red blood cells.

A. iodine
B. magnesium
C. potassium
D. iron

1.1.4. Which of the following is correct for the adaptation of spongy mesophyll?

A. Maximum absorption of light.
B. Storage of food.
C. Gaseous exchange.
D. Transport of water.

1.1.5. Which of the following animal tissues line the nasal cavity and removes dust particles?

A. Areolar connective
B. Ciliated columnar epithelium
C. Columnar epithelium
D. Squamous epithelium

The following diagram shows three stages in the cardiac cycle. Study the diagram and then answer Questions **1.1.6** and **1.1.7** based on it.

1 **2** **3**

1.1.6. Which of the following sequence is correct?

A. 2, 3, 1
B. 1, 2, 3
C. 2, 1, 3
D. 3, 1, 2

1.1.7. What is the name of the stage in diagram **3**?

A. General diastole
B. Ventricular systole
C. Atrial systole
D. Ventricular diastole

1.1.8. The tendency of liquids to move up narrow tubes due to adhesive forces is called ...

A. transpiration
B. root pressure
C. osmosis
D. capillarity

1.1.9. The colourless plastids in plant cells are known as …

A. leucoplasts
B. chromoplasts
C. chloroplasts
D. vacuoles **(9 x 2) (18)**

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 1.2.8) in the ANSWER BOOK.

1.2.1. The name given to the abnormal and uncontrollable division of cells leading to the formation of a tumour.

1.2.2. The phase in the cell cycle during which DNA replication occurs.

1.2.3. The liquid part of blood tissue.

1.2.4. Plant tissue that transports food.

1.2.5. Part of the microscope that holds the slide in place.

1.2.6. The movement of particles from a region of high concentration to a region of low concentration.

1.2.7. The lens at the top of the microscope that you use to view a specimen with.

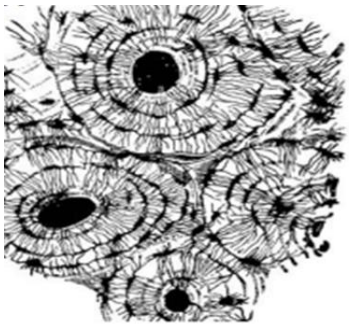
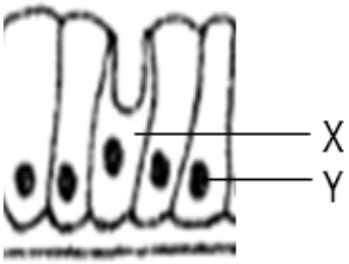
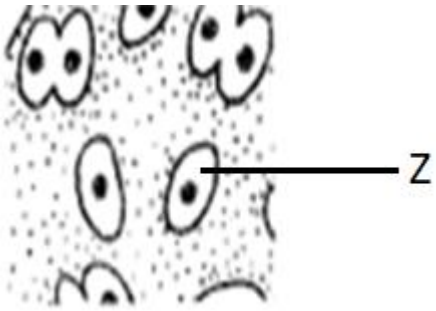
1.2.8. The epithelial tissue in animals which lines glands. **(8)**

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 only **A only**, **B only**, **Both A and B** or **none** next to the question number (1.3.1 to 1.3.5) in the ANSWER BOOK: e.g. 1.3.6 B only.

COLUMN I	COLUMN II
1.3.1. Factor/s that decrease the rate of transpiration.	A. Temperature B. Humidity
1.3.2. The organic compound found in cell walls of plant cells.	A. Cellulose B. Glycogen
1.3.3. Packing tissue found in the cortex of a stem.	A. Collenchyma B. Sclerenchyma
1.3.4. Tissue that joins muscle to bones.	A. Ligament B. Tendon
1.3.5. Part of the nucleus that contains DNA.	A. Chromatin B. Nucleoplasm

(5 X 2) (10)

1.4. Study the diagrams below showing different animal tissues and answer the following questions.

		
A	**B**	**C**

1.4.1. Provide the **LETTER** and **NAME** of the tissue that gives shape and support to the body. (2)

1.4.2. State **TWO** places in the body where the tissue in Diagram **C** can be found. (2)

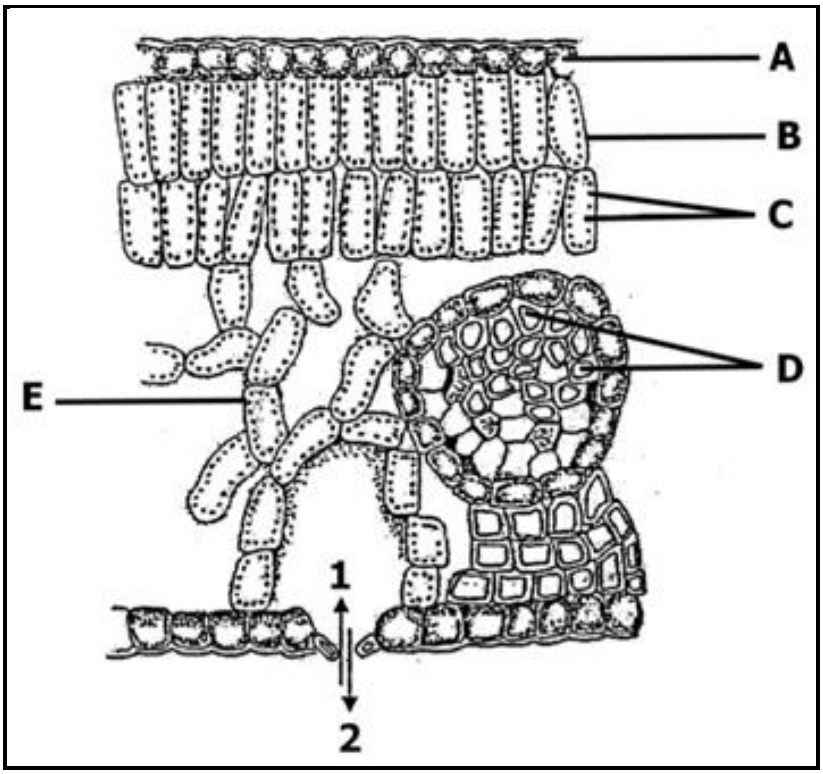
1.4.3. Identify the following cells in Diagram **B** and **C**:

(a) **X** (1)
(b) **Z** (1)

1.4.4. Name **ONE** mineral that is stored in Diagram **A**. (1)

(7)

1.5. The diagram below shows a transverse section of a leaf.



1.5.1. Identify the plant tissues labelled:

(a) **D** (1)
(b) **E** (1)

1.5.2. Name the gas that is represented by arrow **1** during the day. (1)

1.5.3. Name the cells that control the movement of gases **1** and **2** into and out of the leaf. (1)

1.5.4. State the function of part labelled **A**. (1)

1.5.5. List **TWO** ways in which the tissue labelled **B** is structurally suited to its function in the leaf. (2)

(7)

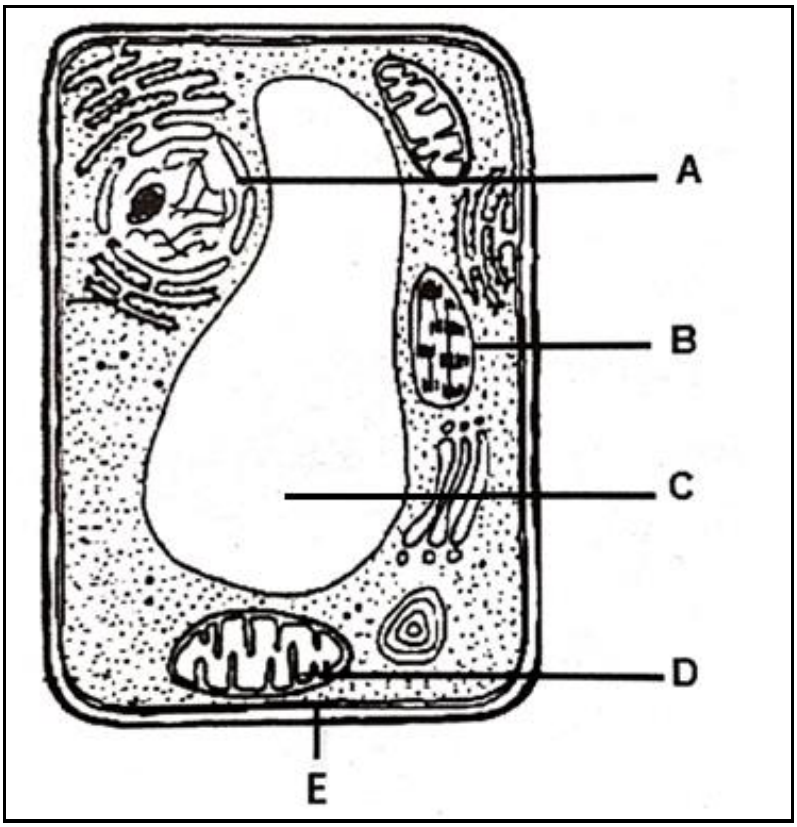
SECTION A: Q1: (50)

SECTION B

QUESTION 2

2.1.

Study the diagram below showing organelles found in a cell and then answer the questions that follow.



2.1.1. (a) State whether this cell is an animal or plant cell. (1)

(b) Write down **TWO** visible reasons for your answer. (2)

2.1.2. Identify part labelled **E** and explain fully its function in the cell. (3)

2.1.3. State the function of organelle **B**. (1)

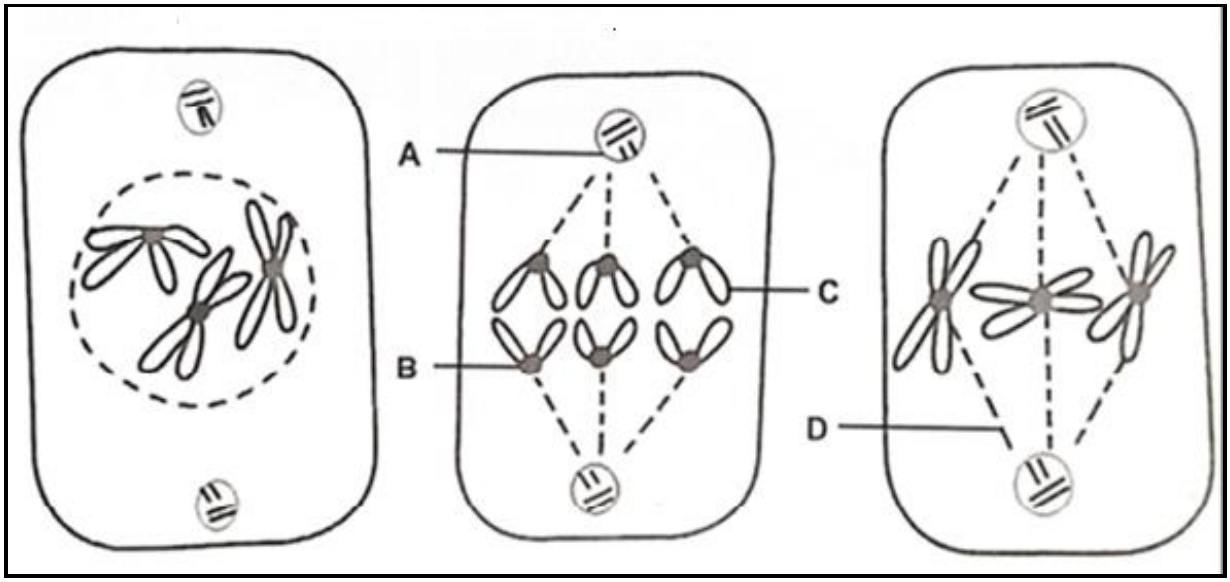
2.1.4. Draw a fully labelled diagram of organelle **A**. (5)

2.1.5. Explain what would happen to the above cell if the part labelled **C** becomes smaller in size. (2)

(14)

2.2. The diagrams below show stages of a cell undergoing cell division.

Study the diagrams and answer the questions that follow.



1 **2** **3**

2.2.1. Name the type of cell division shown above. (1)

2.2.2. Identify the parts labelled:

(a) **B** (1)

(b) **C** (1)

2.2.3. State the function of part labelled **D.** (1)

2.2.4. (a) Name the phase visible in Diagram **2**. (1)

(b) Explain what happens in this phase. (2)

2.2.5. State the number of chromosomes which will be present in each of the daughter cells at the end of this cell division. Shown in the diagram. (1)

2.2.6. Give **TWO** reasons why this type of cell division is biologically important. (2)

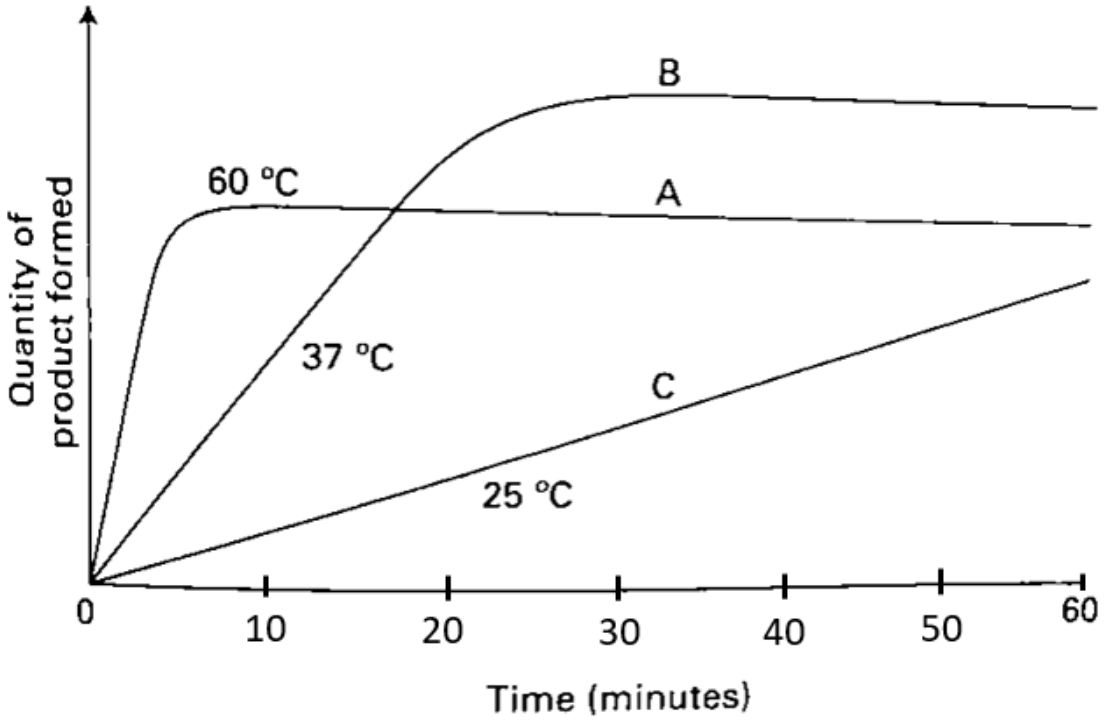
(12)

2.3. Millions of people are lactose intolerant and cannot consume dairy products. In order to produce lactose-free milk, researchers at The Dairy Company needed to determine the optimum temperature for enzyme lactase to break lactose down into glucose and galactose.

<u>The following method was used:</u>

- Three beakers were labelled **A**, **B** and **C**,
- 1000mL of cow's milk was added to each beaker.
- 5mL of lactase was added to each beaker
- Each beaker was stirred for 1 minute.
- Beakers were then placed in different water baths each with a different temperature, for 60 minutes.

The results are displayed in the graph below:



2.3.1. Provide an AIM for this experiment. (2)

2.3.2. Identify the independent variable. (1)

2.3.3. At what temperature does the reaction begin the fastest for the first two minutes? (2)

2.3.4. (a) According to the graph, which temperature is the best for this enzyme? (1)

(b) Provide a reason for your answer. (1)

2.3.5. List **TWO** ways in which the researchers ensured the validity of this experiment. (2)

(9)

2.4. The table below shows the nutritional contents of various food types per 100g serving.

Food type	Energy (kJ)	Fats (g)	Carbohydrates (g)	Proteins (g)	Vitamin A (µg)	Vitamin B (µg)	Iron (mg)	Calcium (mg)
Bread	1061	1.6	55.1	8.2	0	0	1.9	99
Milk	274	3.9	4.7	3.2	83	0.05	0.1	119
Butter	3121	82.4	0	0.3	2010	1	0	1.4
Beans	376	0.4	18.0	5	301	0	2.2	63

2.4.1. Identify the food type which provides the most energy per serving. (1)

2.4.2. (a) Identify the food type that has the best overall nutritional content. (1)
(b) Provide a reason for your answer. (1)

2.4.3. The dietary requirement of iron is 18mg per day.

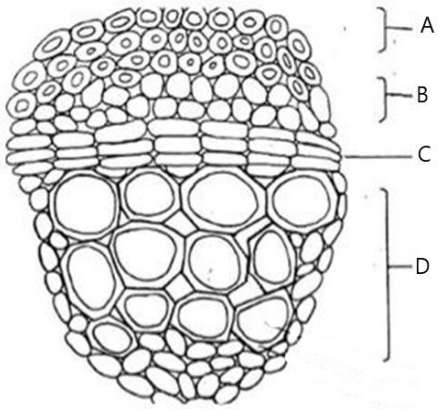
Calculate the percentage of daily intake of iron that is provided by 100g of beans? Show ALL your working. (3)

2.4.4. Which food type would you expect to have a positive result when tested for starch? (1)

2.4.5. Identify the food type you would recommend to an individual suffering from night blindness. Provide evidence from the table for your choice. (2)

(9)

2.5. The diagram below shows a vascular bundle of a sunflower stem.



2.5.1. Part labelled **C** represents meristematic tissue.

(a) Name the type of meristem that is found at part labelled **C**. (1)
(b) Explain the function of this tissue within the vascular bundle. (2)

2.5.2. Write down the LETTER of the part that transports water. (1)

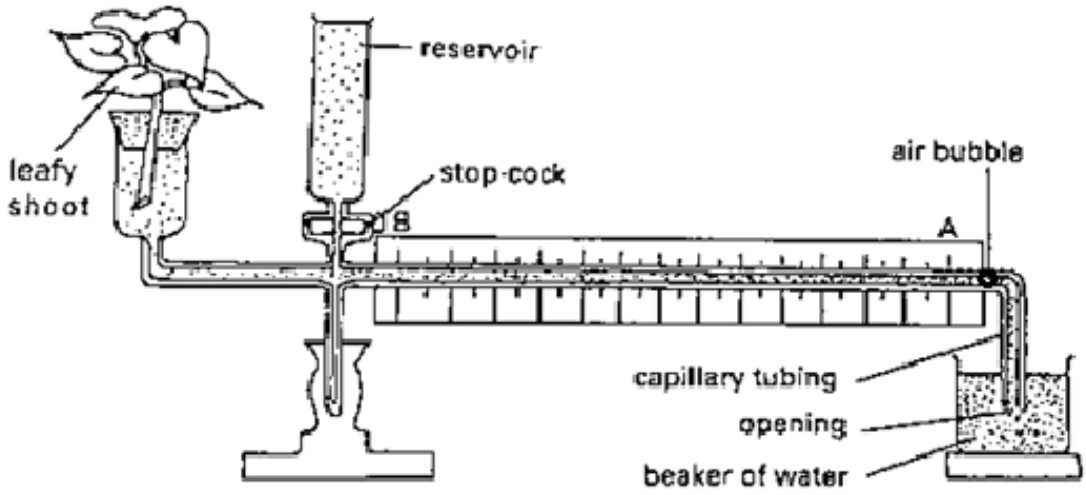
2.5.3. Discuss **TWO** ways in which this tissue identified in Q 2.5.2 is structurally suited to perform its function. (2)

(6)

QUESTION 2: (50)

QUESTION THREE:

3.1. Grade 10 learners set up five sets of the apparatus below. They used these to measure the effects of temperature and wind on the rate of water loss from a plant shoot. All experiments were carried out under the same amount of light.



The results are shown in the table below:

	WINDY		CALM	
TEMPERATURE	**25°C**	**5°C**	**25°C**	**5°C**
TIME TAKEN FOR THE BUBBLE TO MOVE 10cm (in minutes)	5	7	8	12

3.1.1. Name the piece of equipment shown above. (1)

3.1.2. Write down **TWO** ways that the learners could have made this experiment more reliable. (2)

3.1.3. Draw a **BAR GRAPH** showing the results on a single set of axes. (6)

3.1.4. Which effect had the most significant change on the rate of water loss? (1)

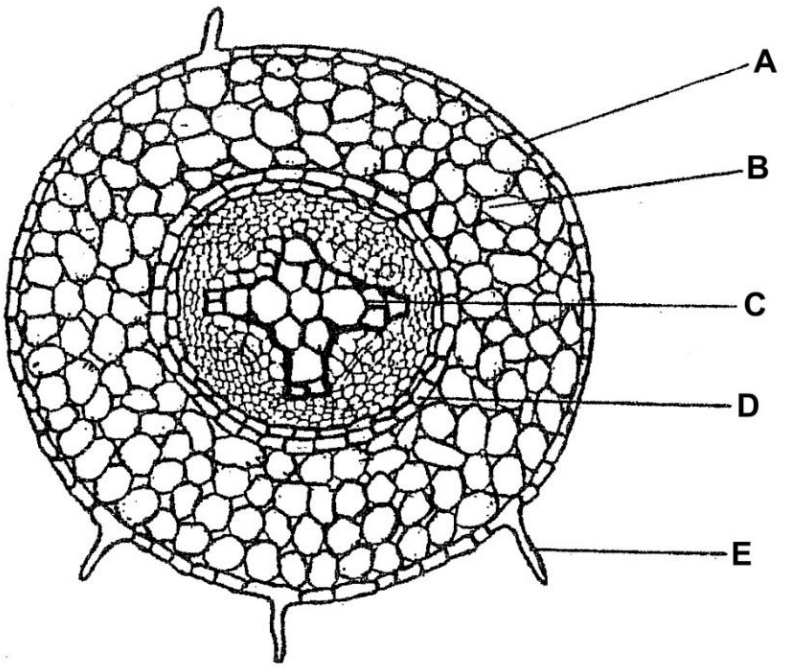
3.1.5. Provide a reason for your answer in Q 3.1.4. using evidence from the table. (1)

3.1.6. List any **TWO** precautions that must be taken when setting up this experiment. (2)

3.1.7. Why was a leafy shoot used? (1)

(14)

3.2. The diagram below shows a cross section through a plant organ.
Study the diagram and then answer the questions that follow.



3.2.1. (a) Name the plant organ in transverse section shown above. (1)

(b) State its function. (1)

3.2.2. Describe how the part labelled **D** is structurally suited to direct water towards the part labelled **C**. (3)

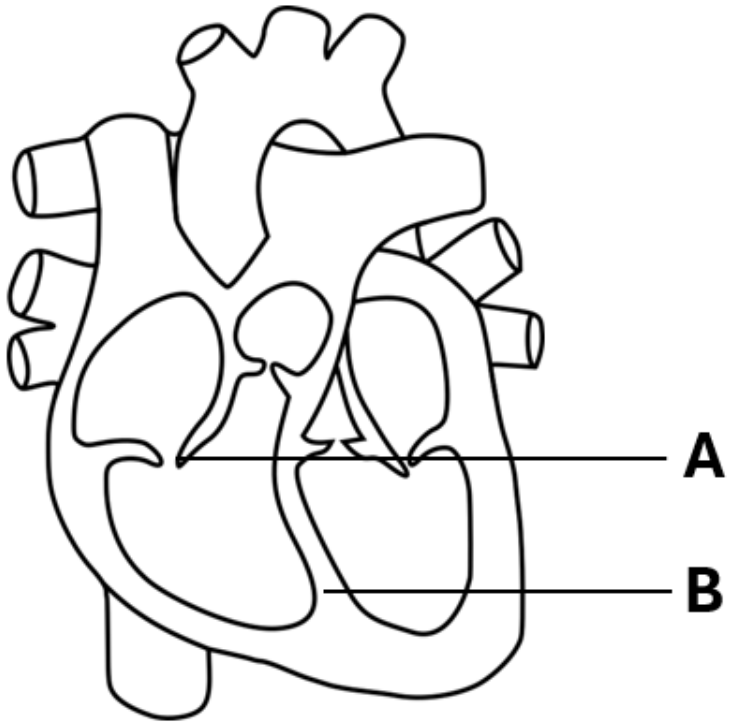
3.2.3. Identify the **region** of this plant organ where cells labelled **B** are found. (1)

3.2.4. (a) Identify part labelled **E.** (1)

(b) List **THREE** ways in which structure labelled **E** is suited to its function. (3)

(10)

3.3. The diagram below shows the internal structure of the human heart.



3.3.1. (a) Identify part labelled **A**. (1)

(b) State its function in the heart. (1)

3.3.2. Name structure **B** and describe its importance. (2)

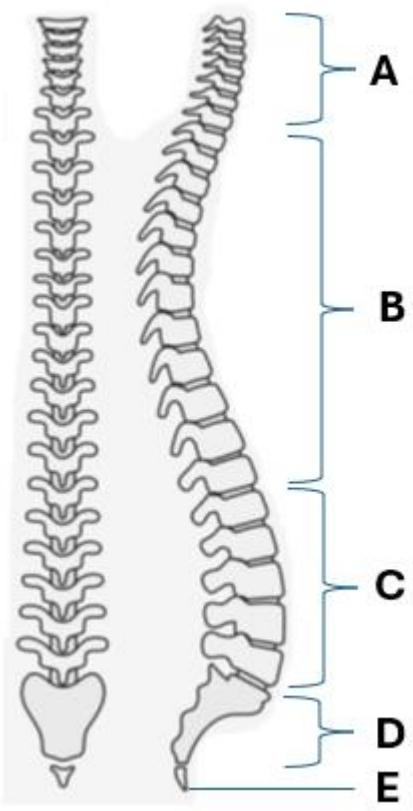
3.3.3. Explain why the walls of the left ventricle are thicker than the walls of the right ventricle. (2)

3.3.4. Describe fully the flow of blood from when it enters the heart from the vena cavae to when it leaves the heart through the aorta. (5)

3.3.5. Tabulate **TWO** differences between an artery and a vein. (5)

(16)

3.4. The diagram below shows the vertebral column in a human skeleton.



3.4.1. Provide labels for the following regions of the vertebral column:

(a) **A** (1)

(b) **D** (1)

3.4.2. Write down the LETTER of the region onto which the ribs are attached. (1)

3.4.3. State **TWO** functions of the connective tissue found between the vertebrae. (2)

3.4.4. Describe **ONE** function of the vertebral column. (2)

3.4.5.(a) NAME the type of skeleton you would expect to find in an insect, such as an ant. (1)

(b) Describe **TWO** disadvantages of this type of skeleton. (2)

(10)

QUESTION 3: (50)
TOTAL SECTION B: 100
GRAND TOTAL: 150