



HILLCREST HIGH SCHOOL

GRADE 10

JUNE 2022

LIFE SCIENCES

Time: 2 hours

Marks: 120

EXAMINER: MRS L. PRIOR

MODERATOR: MRS R. HARMSE

N.B. This question paper consists of 3 Questions and 12 Pages.

INSTRUCTIONS TO CANDIDATES

READ THESE INSTRUCTIONS CAREFULLY BEFORE ANSWERING THE QUESTIONS.

1. Answer **ALL** the questions in the answer booklet provided.
2. Number the questions exactly as the questions are numbered.
3. Write neatly and legibly.
4. All drawings should be done in pencil and labelled in ink.
5. Use **ONLY** blue or black ink.
6. Non-programmable calculators, protractors and compasses may be used.

SECTION A:

QUESTION ONE:

1.1. Various possible options are provided as answers to the following questions/statements. Choose the correct answer and write **ONLY** the letter (A – D) next to the question number (1.1.1 – 1.1.6) in the answer book.

1.1.1. The main source of energy for humans is...

- A. protein
- B. starch
- C. glucose
- D. lipids

1.1.2. The apical meristem in plants is mainly responsible for...

- A. growth in width
- B. translocation of food
- C. water absorption
- D. growth in length

1.1.3. The colourless plastids in plant cells are known as...

- A. vacuole
- B. leucoplast
- C. chloroplast
- D. chromoplast

1.1.4. The type of skeleton that humans have...

- A. hydrostatic skeleton
- B. cartilaginous skeleton
- C. endoskeleton
- D. exoskeleton

1.1.5. Starch is normally stored in...

- A. parenchyma
- B. collenchyma
- C. sclerenchyma
- D. phloem

1.1.6. Proteins differ from carbohydrates and fats in that they all...

- A. are fairly large molecules
- B. contain the element nitrogen
- C. occur only in animal cytoplasm
- D. function as enzymes

(6x2= 12)

- 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 – 1.2.8).
- 1.2.1. The monomers of carbohydrates.
 - 1.2.2. Rapid growth of algae and other water plants due to high levels of nitrates.
 - 1.2.3. The phase during which DNA replication occurs.
 - 1.2.4. The liquid part of blood tissue.
 - 1.2.5. Tissue that joins muscle to bone.
 - 1.2.6. Packing tissue found in the cortex of a stem.
 - 1.2.7. Bones that make up the vertebral column.
 - 1.2.8. A group of cells, each with its own function, but together performing a common function.

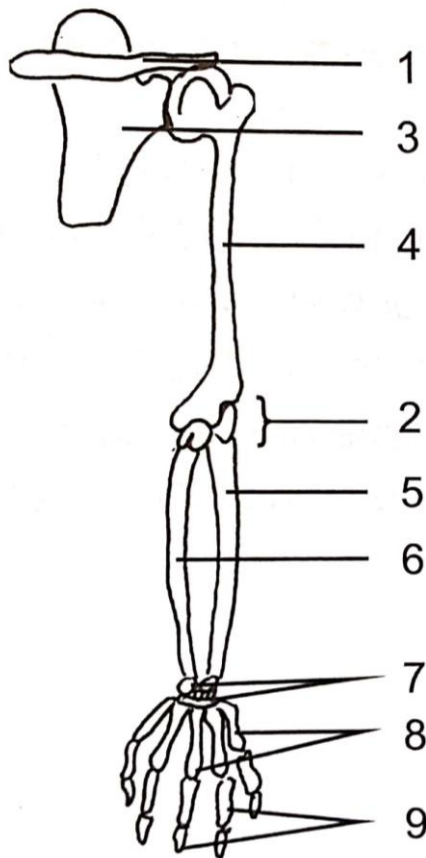
(8)

- 1.3. State whether for each of the phrases in COLUMN I, applies to **A only, B only, BOTH A and B** or **NONE** in COLUMN II.

COLUMN I	COLUMN II
1.3.1. Ratio of H:O is greater than 2:1	A. Glucose
	B. Lipids
1.3.2. Holds the slide on stage.	A. Stage clips
	B. Diaphragm
1.3.3. Contains the genetic information of an organism.	A. Mitochondrion
	B. Chloroplast
1.3.4. Holds two chromatids together.	A. Centrosome
	B. Centromere
1.3.5. Carries blood towards the heart.	A. Artery
	B. Vein

(5x2= 10)

1.4. Study the diagram below and answer the following questions.



1.4.1. Provide labels for the parts numbered **1**, **3** and **4**. (3)

1.4.2. a) Name the type of joint located at part numbered **2**. (1)

b) Explain what is needed at joints to bring about movement. (2)

1.4.3. a) Name the connective tissue found at the ends of part numbered **4**. (1)

b) Write down ONE function of this tissue named in Q1.4.3 a). (1)

1.4.4. Explain TWO functions of the human skeleton. (2)

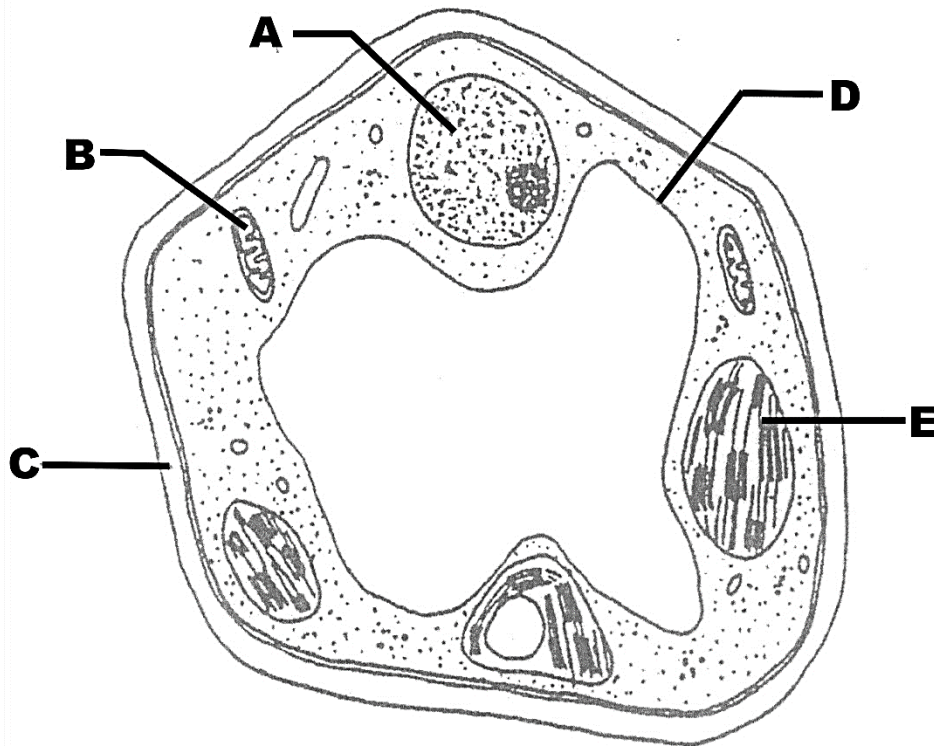
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Section A : 40 Marks

SECTION B:

Question Two:

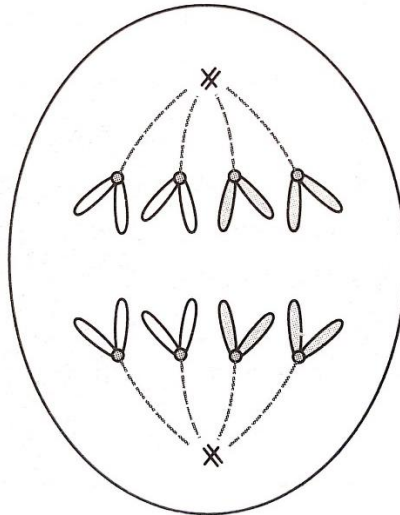
2.1. Study the diagram of a plant cell below and answer the questions that follow.



- 2.1.1. Provide the **LETTER** and **NAME** of the organelle in which photosynthesis takes place. (2)
- 2.1.2. a) Provide the name of the parts labelled **C** and **D**. (2)
- b) What would happen to the plant cell if part **D** shrinks due to water loss? (1)
- 2.1.3. Describe fully how the organelle labelled **B** is structurally adapted to carry out its function. You must include both the **NAME** and **FUNCTION** of this organelle in your answer. (5)
- 2.1.4. Draw a labelled diagram showing the structure of a cell membrane. (4)

(14)

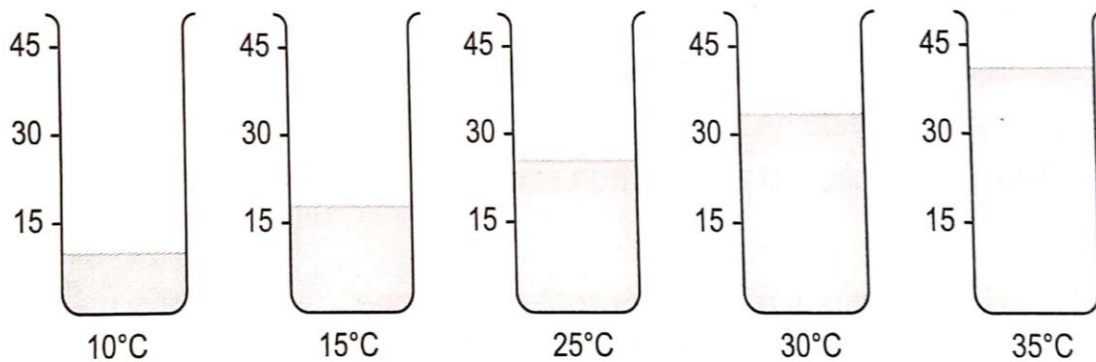
2.2. The diagram below shows a cell undergoing cell division. Study the diagram and then answer the questions that follow.



- 2.2.1. Which phase of Mitosis is shown in the diagram above? (1)
- 2.2.2. Describe what happens in this phase. (2)
- 2.2.3. How many cells will be formed at the end of this division? (1)
- 2.2.4. How many chromosomes will be present in the daughter cells at the end of the process of mitosis? (1)
- 2.2.5. Give **ONE** reason why this type of cell division is important. (1)
- (6)**

2.3. Enzymes are used commercially to extract fruit juices. The use of enzymes increases the volume of juice produced. An investigation was carried out to determine the volume of apple juice produced at different temperatures using enzymes. Mixtures of apple pulp and enzyme were left for 15 minutes at different temperatures. After 15 minutes, the mixtures were filtered and juice collected.

The diagram below shows the volume of juice collected from each mixture.



2.3.1. Write down a hypothesis for this experiment. (2)

2.3.2. Record the volume in ml, of juice extracted at:

a) 15°C and (1)

b) 25°C (1)

2.3.3. Identify the independent variable for this experiment. (1)

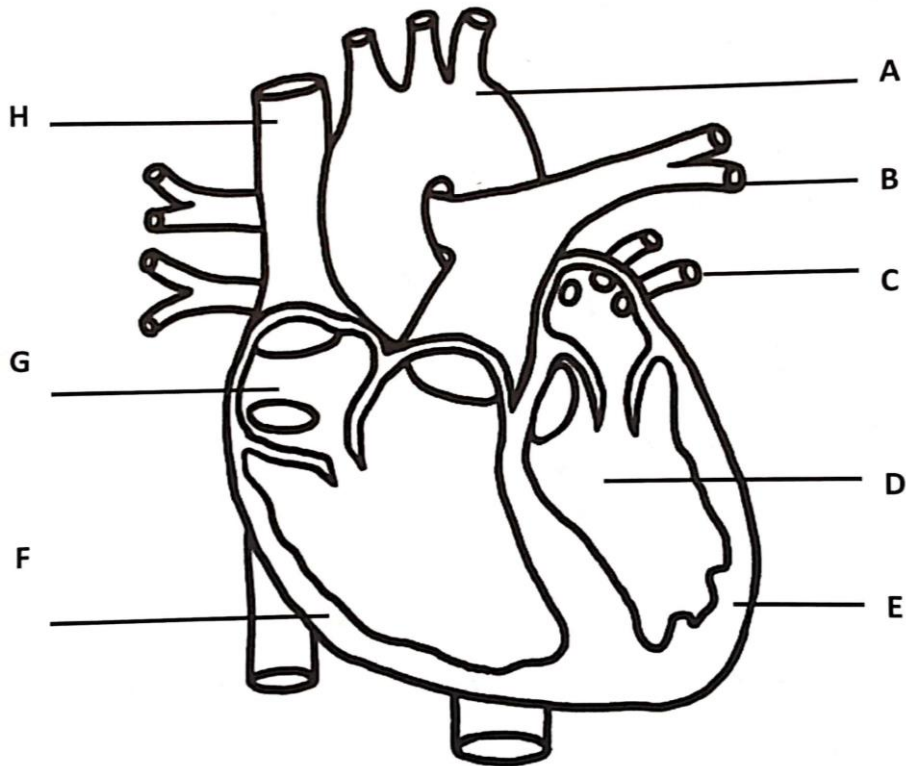
2.3.4. Identify the dependent variable for this experiment. (1)

2.3.5. State **TWO** controlled variables for this experiment. (2)

2.3.6. Write down a suitable conclusion for these results. (2)

(10)

2.4. Study the diagram of a heart below and answer the questions that follow.



2.4.1. Identify the heart chambers labelled **G** and **D**. (2)

2.4.2. Write down the **LETTER** only of an artery that carries:

a) Oxygenated blood (1)

b) Deoxygenated blood (1)

2.4.3. Explain why the walls labelled **E** and **F** differ in thickness. (2)

2.4.4. Name the muscle tissue that the heart is made up of. (1)

2.4.5. a) Name the valves labelled (i) and (ii) that are found between the atria and ventricles of the heart. (2)

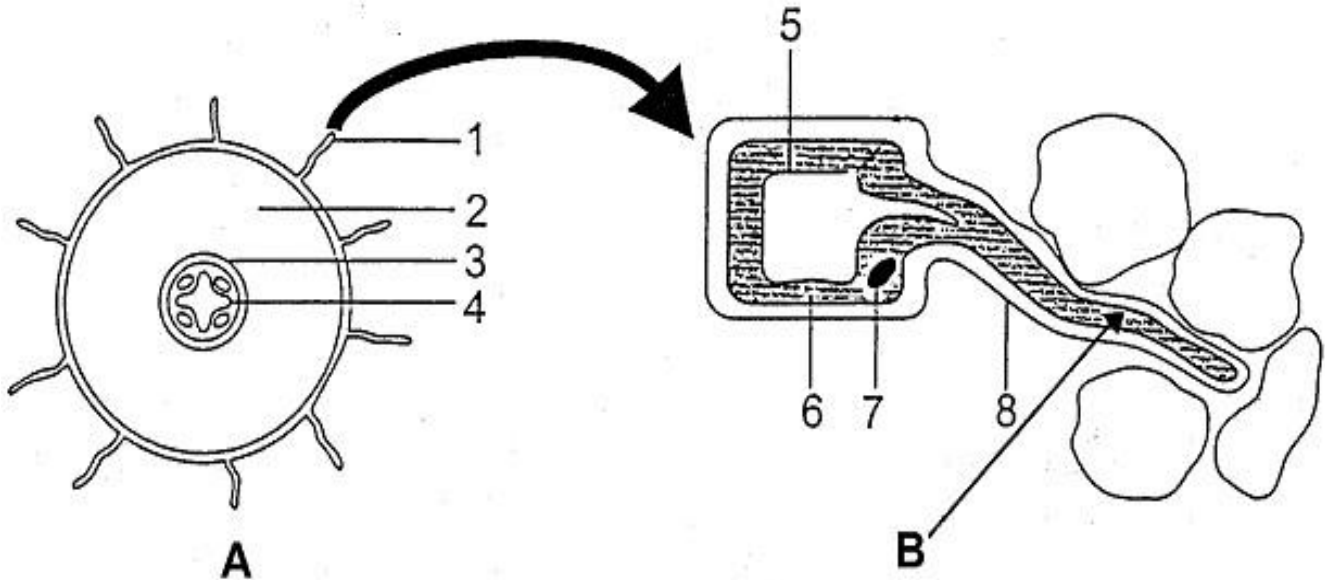
b) State **ONE** function of the valves named in Q2.4.5a). (1)

(10)

Question 2: 40 Marks

Question Three:

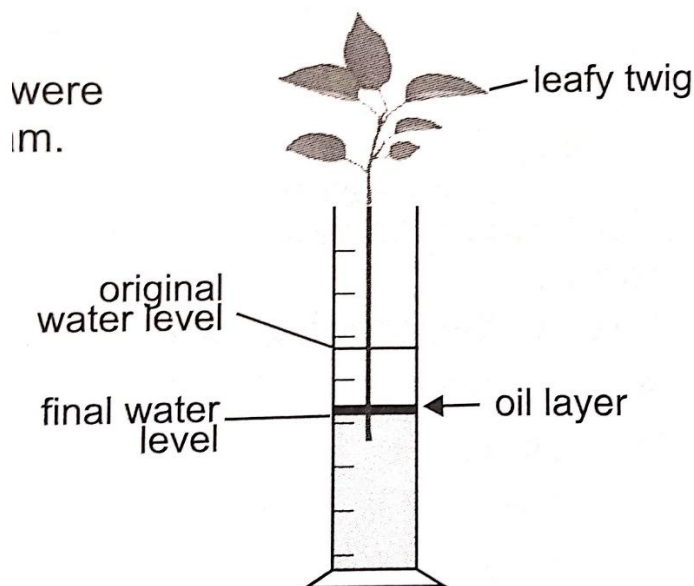
3.1. The diagrams below represent a plant organ.



- 3.1.1. Which plant organ is represented by cross-section **A**? (1)
- 3.1.2. Identify parts numbered **2**, **4**, **5** and **7**. (4)
- 3.1.3. Provide the **NAME** and **FUNCTION** of the part numbered **1**. (2)
- 3.1.4. Explain **ONE** structural characteristic which allow effective functioning of part numbered **4**. (2)
- 3.1.5. Write down **ONE** function if this plant organ. (1)

(10)

3.2. Three measuring cylinders, **A**, **B** and **C** were set up as the one shown in the diagram below.



Each measuring cylinder contained a leafy twig and 70 ml water covered with a layer of oil. The three cylinders were left in the laboratory but were treated differently:

CYLINDER A: placed in wind.

CYLINDER B: placed in sunlight.

CYLINDER C: leafy twig was covered in a clear plastic bag that was wet on the inside.

After 2 hours, final water levels in the three cylinders were recorded and the following results were obtained.

RESULTS: 55 ml, 45 ml, 48 ml

3.2.1. Name the process that is being demonstrated in the experiment above. (1)

3.2.2. What is the purpose of the oil layer? (1)

3.2.3. Name **ONE** precaution that needs to be taken when setting up this experiment for the results to be valid. (1)

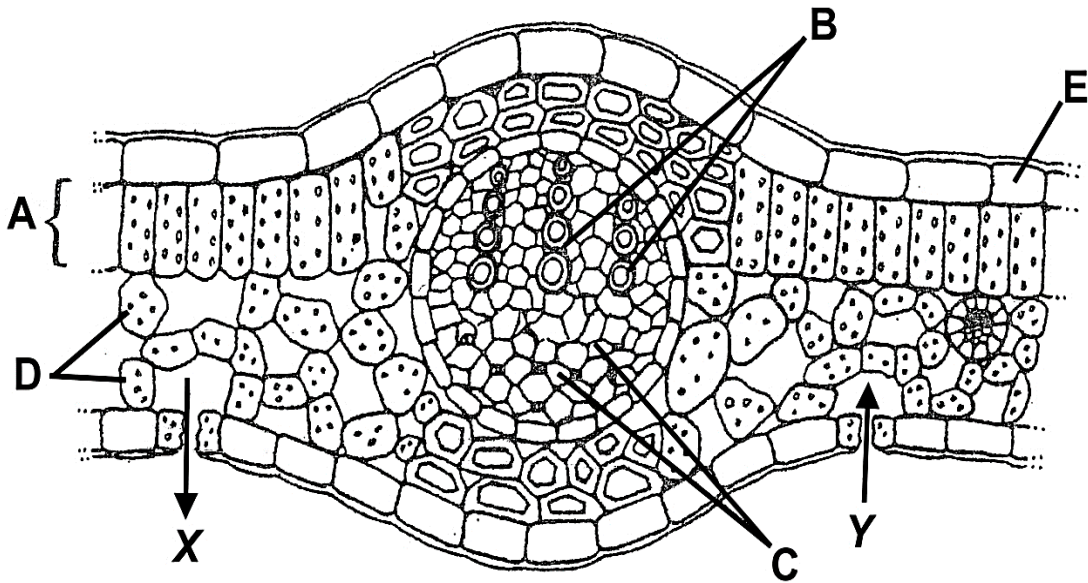
3.2.4. Suggest **ONE** way in which Cylinder **A** could be set up within a laboratory. (1)

3.2.5. Draw up a **TABLE** that shows the results you would expect to have been recorded from Cylinders A, B and C.

(HINT: Original water level – Final water level = Amount of water lost.) (5)

(9)

3.3. Study the diagram of a section through a leaf and answer the questions that follow:



3.3.1. Name the parts labelled **A**, **C** and **E**. (3)

3.3.2. Identify gases **X** and **Y**. (2)

3.3.3. Give **TWO** reasons why cells in **A** are best suited to produce most of the energy rich organic compounds in a leaf. (2)

3.3.4. a) Name the opening through which gases enter and leave the leaf surface. (1)

b) Name the cells that control that opening. (1)

(9)

3.4. Bone and teeth are made largely of protein and calcium salts. The hardness of the material depends on the amount of calcium salts present. The table below shows the amounts of calcium salts and protein in bone, dentine and enamel. Dentine and enamel are the two materials which make up teeth.

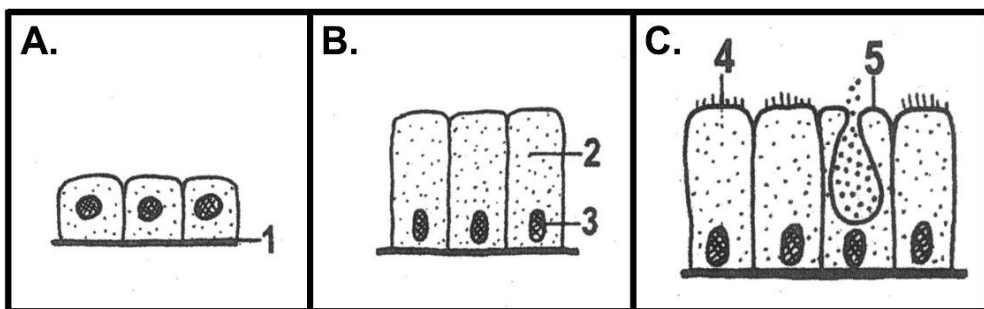
Material	Composition (% dry mass)	
	Calcium salts	Protein
Bone	60	40
Dentine	80	20
Enamel	100	10

3.4.1. Name the hardest material of the three minerals named in the table above. (1)

3.4.2. Discuss **ONE** reason why bone contains more protein than the other two materials. (1)

3.4.3. Draw a **BAR GRAPH** to show the amounts of calcium salts and protein in bone, dentine and enamel using the data in the table and on the same set of axes. (5)
(7)

3.5. Study the diagrams below of different types of epithelial tissues and answer the questions that follow.



3.5.1. Identify tissues **A** and **B**. (2)

3.5.2. Refer to diagram **C**:

- Name **ONE** area in the body where this tissue would be found. (1)
 - Give the name of the cell labelled **5**. (1)
 - What is the function of cell **5**? (1)
- (5)

Question 3: 40 Marks

Section B : 80 Marks