

Hillcrest High School

Grade 11

LIFE SCIENCES – PAPER 1

NOVEMBER 2023

MARKS: 150

TIME: 2 ½ Hours

EXAMINER: Mrs L. Prior

MODERATOR: Mrs R. Harmse

This question paper consists of 3 Questions and 16 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.

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 1.1.10) in the ANSWER BOOK, for example 1.11 A.

- 1.1.1. Which one of the following controls the rate of breathing in the human body? The concentration of ...
- A. Oxygen in the tissue fluid.
 - B. Oxygen in the blood.
 - C. Carbon dioxide in the blood.
 - D. Sodium chloride in the tissue fluid.
- 1.1.2. A deficiency of proteins in the diet of a growing child results in ...
- A. diabetes mellitus
 - B. rickets
 - C. goitre
 - D. kwashiorkor
- 1.1.3. During the light phase of photosynthesis:
- A. Oxygen is absorbed and ATP and water is formed.
 - B. Oxygen is released and ATP and energy-rich hydrogen atoms are formed.
 - C. Carbon dioxide is absorbed and water is formed.
 - D. Carbon dioxide is released and ATP and energy-rich hydrogen atoms are formed.
- 1.1.4. Which is the correct sequence for the flow of urine?
- A. renal pelvis → ureter → bladder → urethra
 - B. bladder → renal pelvis → urethra → ureter
 - C. ureter → bladder → renal pelvis → urethra
 - D. urethra → renal pelvis → ureter → bladder
- 1.1.5. The products formed during fermentation in plant cells are...
- A. Alcohol and Water
 - B. Lactic acid and Alcohol
 - C. Carbon dioxide and Water
 - D. Alcohol and Carbon dioxide

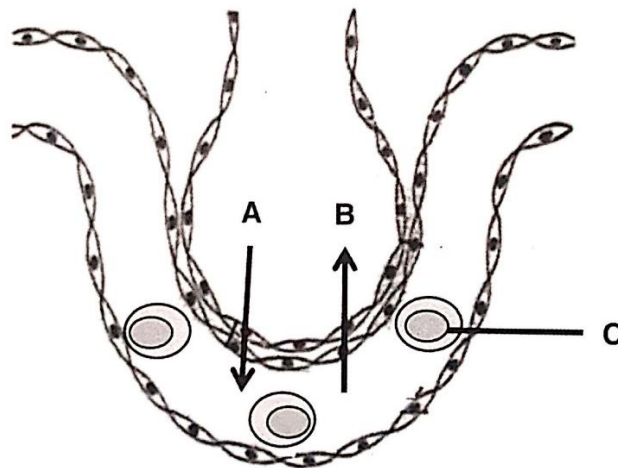
1.1.6. A patient is diagnosed with cancer of the colon. To save his life, part of his colon is removed during an operation. Which one of the following would decrease, due to the operation?

- A. secretion of bile
- B. absorption of glucose
- C. absorption of water
- D. digestion of proteins

1.1.7. A person living high above sea level, where the oxygen content of the air is reduced, has more _____ in his/her blood?

- A. Blood plasma
- B. Insulin
- C. Red blood cells
- D. Thyroxin

QUESTION 1.1.8 and 1.1.9 are based on the diagram below.



1.1.8. Gas **A** in the blood is mostly transported ...

- A. as bicarbonate ions
- B. as carbhaemoglobin
- C. in solution with blood plasma
- D. as oxyhaemoglobin

1.1.9. Identify **B** and **C**, respectively.

- A. **B** is carbon dioxide and **C** is blood plasma
- B. **B** is carbon dioxide and **C** is red blood cells
- C. **B** is oxygen and **C** is blood plasma
- D. **B** is oxygen and **C** is red blood cells

1.1.10. Apart from its excretory function, the mammalian kidney also ...

- A. controls the amount of protein in the blood.
- B. regulates the amount of sugar in the blood.
- C. produces sex hormones.
- D. controls the osmotic concentration of blood.

(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 1.2.8) in the ANSWER BOOK.

- 1.2.1. The part of the chloroplast where the dark phase of photosynthesis takes place.
- 1.2.2. Specialised cells in the inner wall of the Bowman's capsule.
- 1.2.3. The thin fibrous outer covering of the kidney.
- 1.2.4. The tissue which lines the nasal cavity and trachea.
- 1.2.5. Folded structures found on the inner membrane of the mitochondria.
- 1.2.6. Structures in the leaf through which gas exchange takes place.
- 1.2.7. Glands situated on the kidneys.
- 1.2.8. The leaf-like structure covering the opening of the trachea.

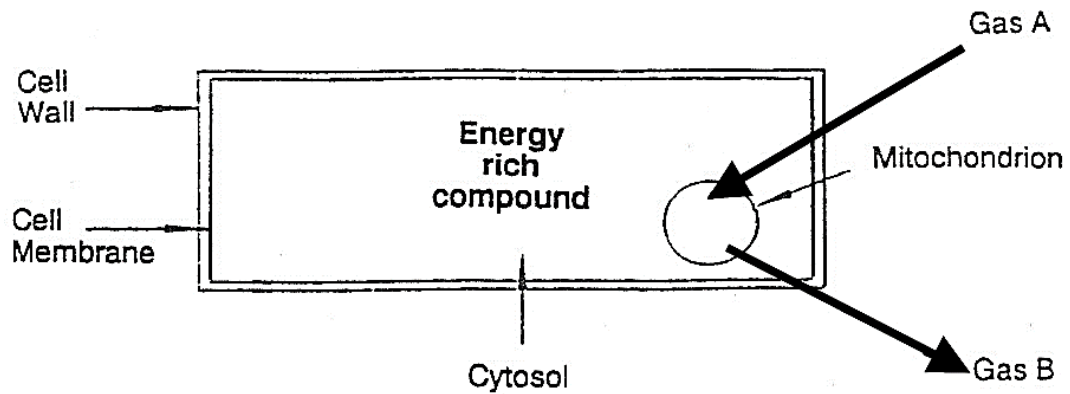
(8)

- 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 1.3.6) in the ANSWER BOOK: e.g. 1.3.7 B only.

COLUMN I	COLUMN II
1.3.1. Breathing muscles.	A. Intercostal muscles
	B. Diaphragm
1.3.2. Pumps out sodium ions for water reabsorption.	A. Loop of Henlé
	B. Distal convoluted tubule
1.3.3. The skin, lungs and kidneys all excrete.	A. Urea
	B. Mineral salts
1.3.4. Malpighian body.	A. Bowman's capsule
	B. Glomerulus
1.3.5. Movement of the rib cage upwards and outwards.	A. Exhalation
	B. Inhalation
1.3.6. Chemical that absorbs carbon dioxide.	A. Lime water
	B. Sodium hydroxide

(6 X 2) (12)

1.4. A metabolic process which takes place in living cells is shown below.



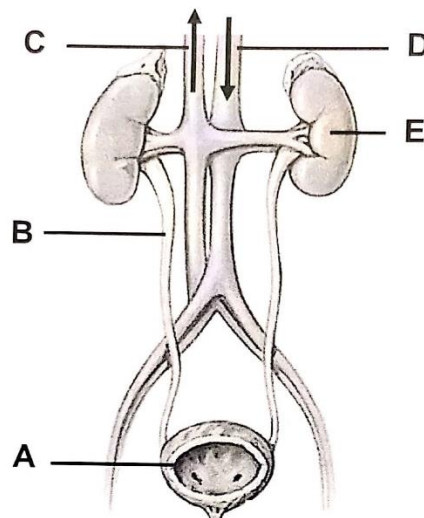
1.4.1. Name the process. (1)

1.4.2. Identify each of the following:

- a) The energy rich compound. (1)
- b) Gas A. (1)

1.4.3. Name the phases of this process that occurs within the mitochondrion. (2)
(5)

1.5. Study the diagram below and answer the questions that follow.



1.5.1. Identify the parts labelled **D** and **E**. (2)

1.5.2. Provide the function of part **A**. (1)

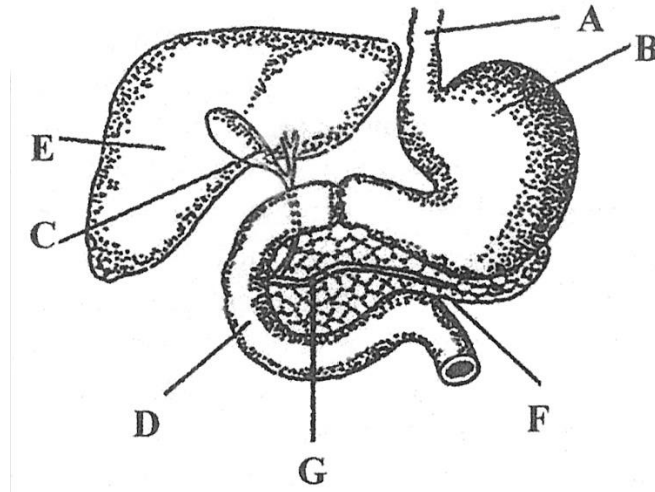
1.5.3. Write down the **LETTER** of the part that carries the least amount of nitrogenous waste. (2)

(5)

SECTION A: Q1: (50)

SECTION B
QUESTION TWO

2.1. The following drawing shows part of the human digestive system and associated organs.



2.1.1. Name the parts labelled **A**, **D** and **F**. (3)

2.1.2. State **TWO** functions of the part labelled **E**. (2)

2.1.3. Name the substance stored in **C**. (1)

2.1.4. If the substance in **C** had a pH of 2, how would this affect the functioning of the intestinal juice in **D**? (2)

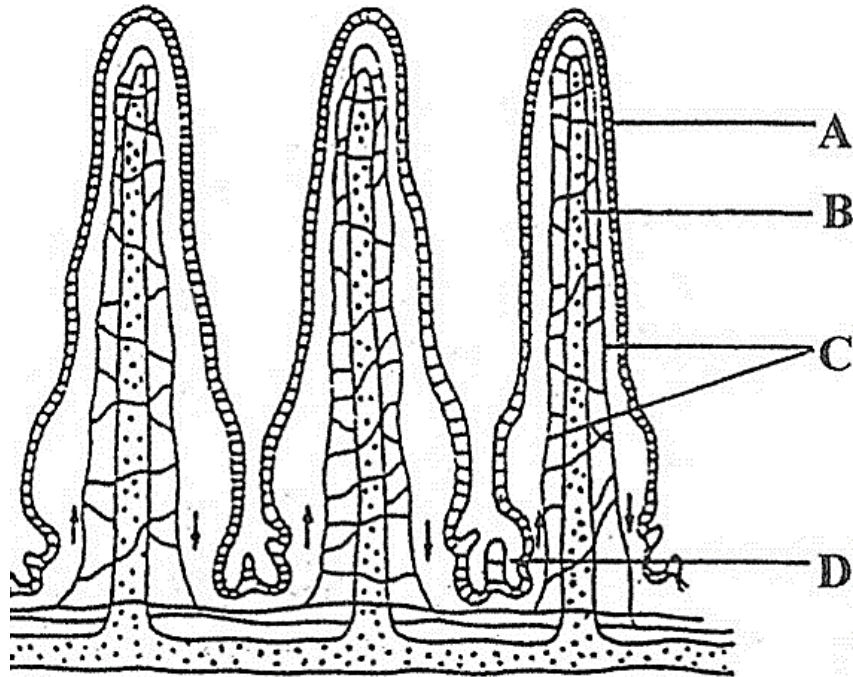
2.1.5. Give the letter of the part where each of the following are found:

a) Gastric juice. (1)

b) The islets of Langerhans. (1)

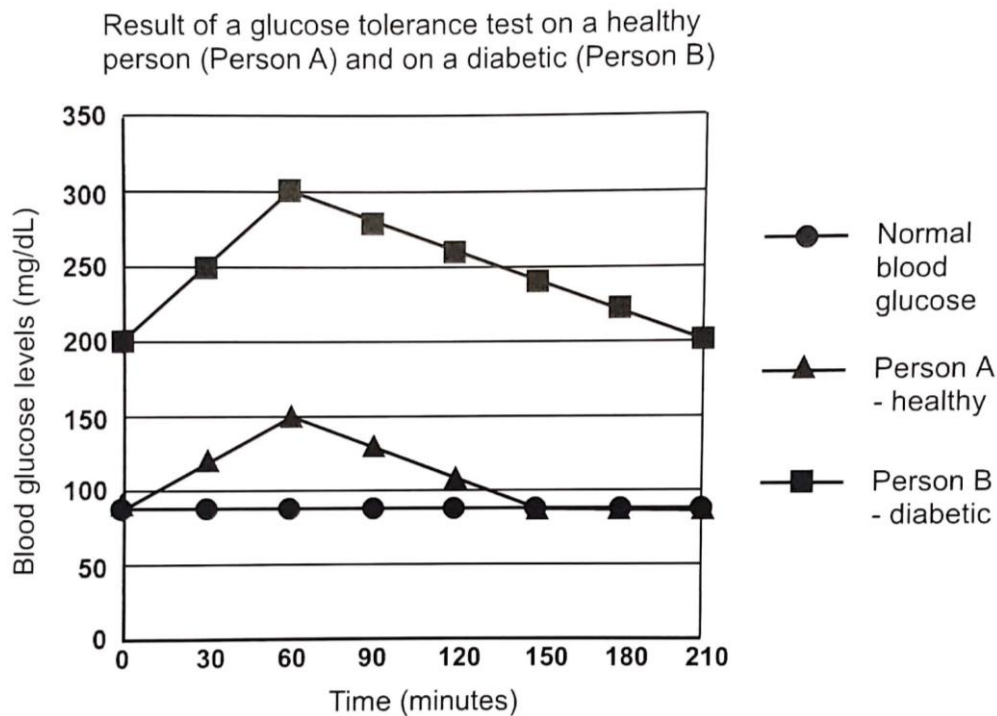
(10)

- 2.2. Study the diagram below of a section taken from the **duodenum** of the small intestine and then answer the questions.



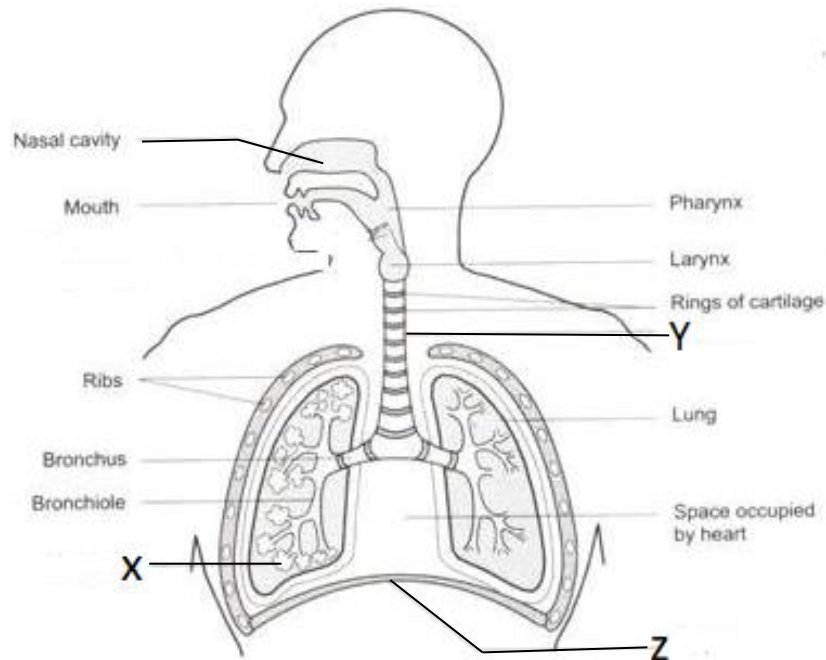
- 2.2.1. Identify the structures represented in the diagram. (1)
- 2.2.2. Identify the parts labelled **A**, **B** and **C**. (3)
- 2.2.3. Name the end products of digestion found in Part **B**. (2)
- 2.2.4. Name and explain the importance of the structure labelled **D**. (3)
- (9)**

- 2.3. The graph below shows the results of a glucose tolerance test on a healthy individual (Person A) and on a diabetic person (Person B). After fasting for ten hours they each were given a drink of glucose solution containing 50g glucose. The amount of glucose in their blood was then measured every 30 minutes for the next 3 hours.



- 2.3.1. What was the greatest concentration of glucose in the diabetic's blood? (2)
- 2.3.2. From the graph, determine how long it would take for the glucose concentration of the healthy person to return back to the level at which it was at point 0 in the graph. (The start) (2)
- 2.3.3. Briefly describe the homeostatic control of blood glucose. (5)
- (9)**

2.4. Study the diagram below that represents the human respiratory system and answer the following questions.



2.4.1. a) Identify part labelled **Y**. (1)

b) Explain the structural adaptation of part labelled **Y**. (2)

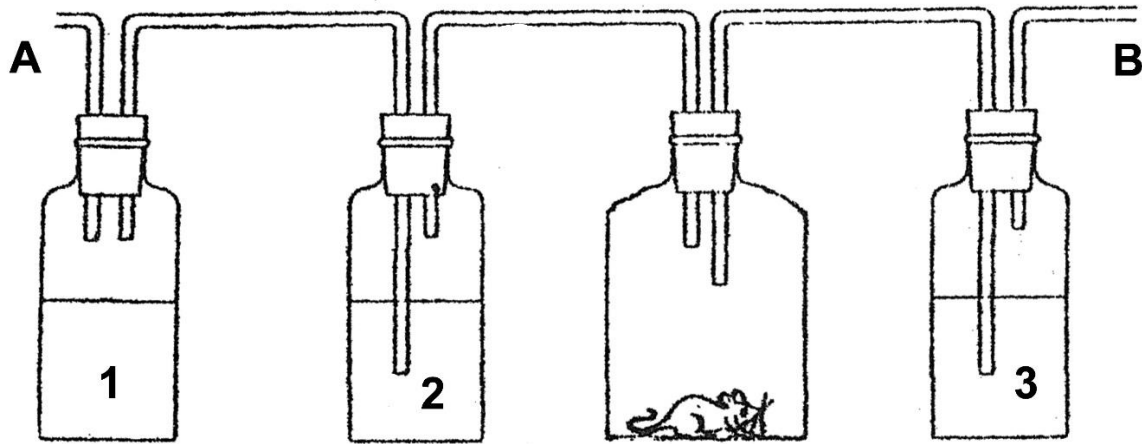
2.4.2. Describe the role of part labelled **Z** when air is drawn into the nasal cavity. (3)

2.4.3. Explain how the nasal cavity is structurally suited in breathing. (2)

2.4.4. Name the structures labelled **X** and explain **TWO** ways how they are adapted to their function. (5)

(13)

2.5. Observe the diagram of an experiment setup and then answer the questions that follow:



Sodium hydroxide

Lime water

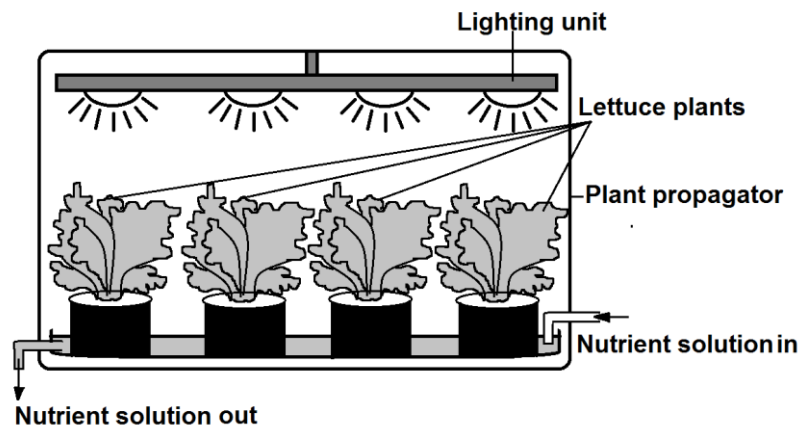
Lime water

- 2.5.1. During the experiment, air should be drawn into the apparatus. Should the air be drawn into the apparatus in the direction **A to B** or **B to A**? (1)
- 2.5.2. What is the aim of conducting this experiment? (2)
- 2.5.3. State the function of the lime water. (1)
- 2.5.4. Tabulate **TWO** differences between aerobic and anaerobic respiration. (5)
- (9)**

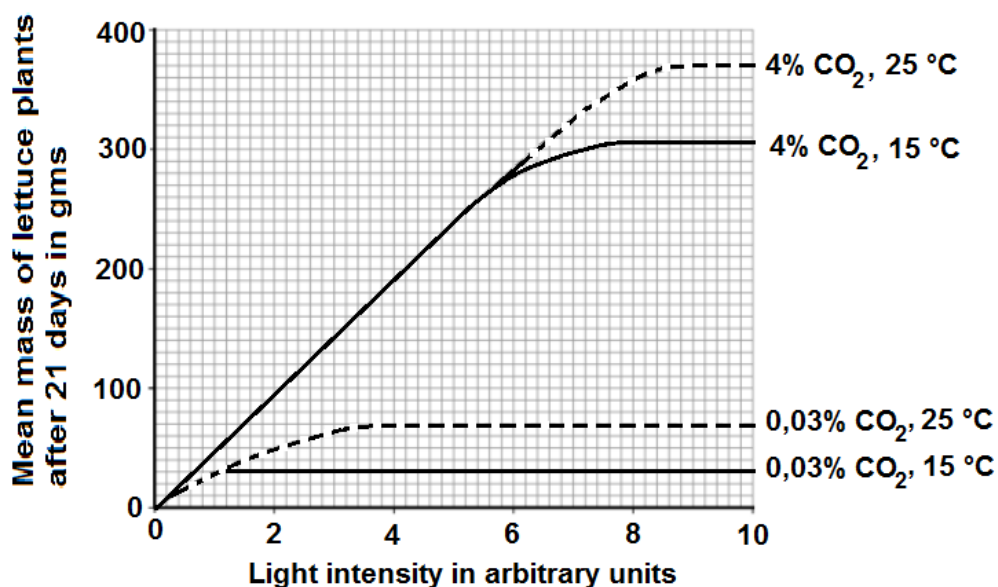
QUESTION 2: (50)

QUESTION THREE:

- 3.1. The diagram shows a plant propagator in which scientists can control temperature, light intensity and carbon dioxide concentration:



Study the results given below and answer the following questions:



- 3.1.1. What is the influence of light intensity on mean mass of lettuce plants? (2)
- 3.1.2. Name the **TWO** limiting factors that influence the photosynthesis as the light intensity increases. (2)
- 3.1.3. How were the scientists able to increase the rate of photosynthesis to the maximum level? Provide evidence in your answer. (4)
- 3.1.4. a) What would happen to the rate of photosynthesis if the temperature is raised beyond 35°C? (1)
- b) Give a reason for your answer. (2)

(11)

3.2. An experiment was conducted to determine whether light is necessary for photosynthesis.

The procedure followed is given below:

- A potted-plant was destarched.
- A piece of aluminium foil with a cross cut-out was secured over both sides of one leaf.
- The potted-plant was exposed to bright sunlight for 4-5 hours.
- After 5 hours the aluminium foil stencil was removed and the leaf removed to test for the presence of starch.

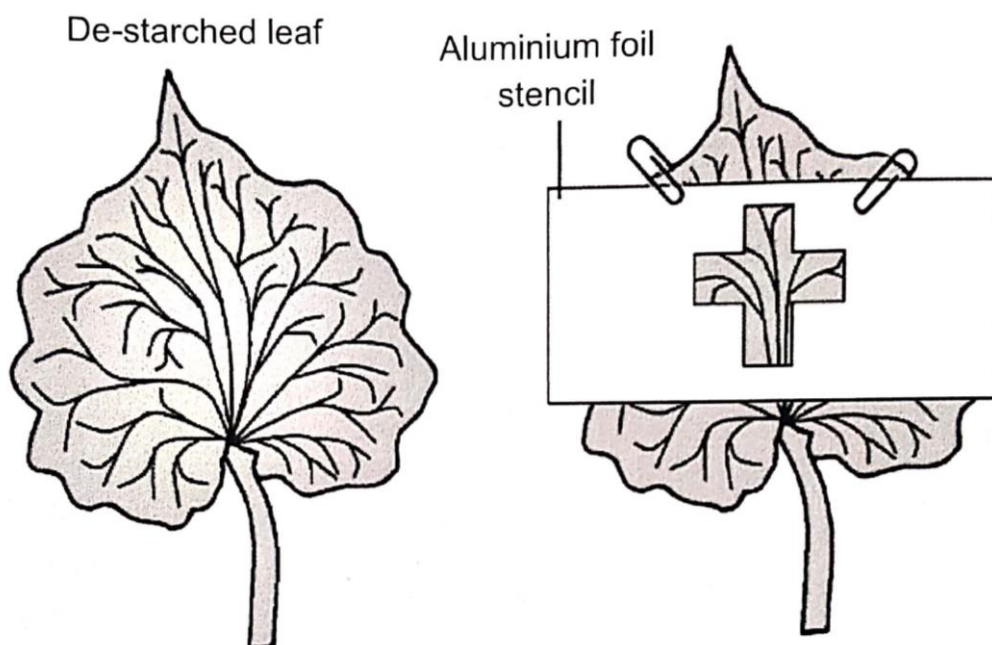
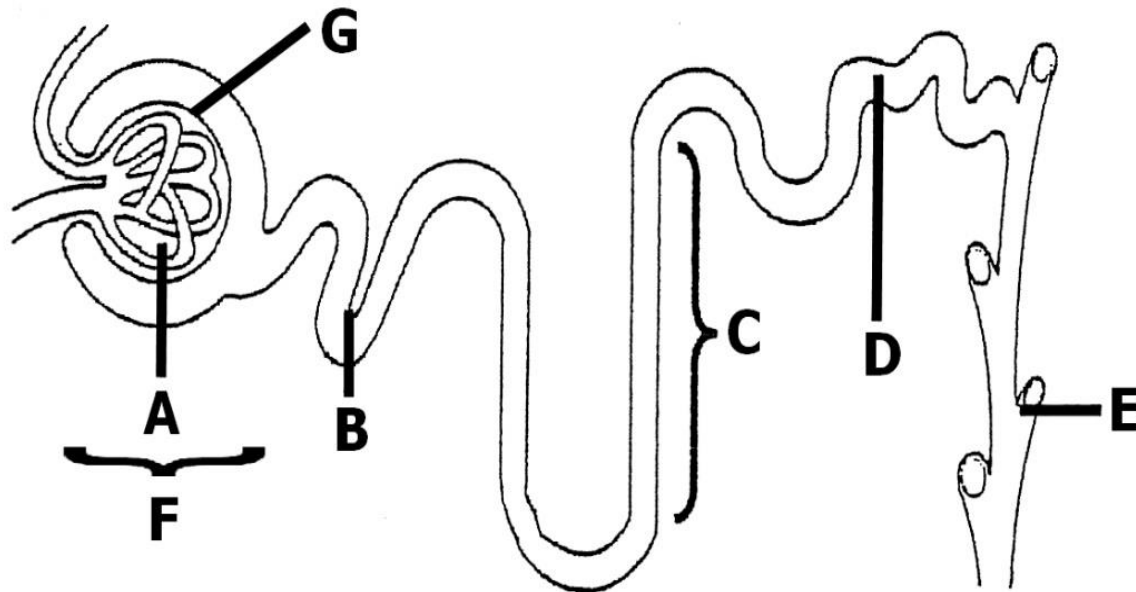


Diagram showing the leaf used in the above investigation.

- 3.2.1. How was the plant destarched? (2)
- 3.2.2. Explain why an aluminium foil stencil was used in the experiment. (2)
- 3.2.3. Describe the various steps that were followed during the starch test in the experiment above. (4)
- 3.2.4. Draw a labelled diagram of the leaf showing the result of the investigation above. (4)
- (12)**

3.3. Study the diagram below and answer the following questions:



- 3.3.1. Give the biological name for the structure represented in the diagram. (1)
- 3.3.2. Identify the parts labelled **A**, **C** and **E**. (3)
- 3.3.3. Name and describe the process that takes place in the part labelled **B**. (3)
- 3.3.4. Name the part of the kidney in which the structure labelled **F** would be located. (1)
- 3.3.5. Describe **ONE** structural adaptation of the cells found in layer **G** (2)
- 3.3.6. The skin and kidneys of a human being both excrete moisture. On a hot day, you can sweat more and your urine will be a darker yellow in colour than on a cold day.
Explain how this structure ensures that you will not dehydrate on a hot day. (4)

(14)

3.4. An investigation was conducted to determine the effect of smoking in males on the risk of lung cancer.

The following procedure was followed:

- 40 males were selected to be part of the investigation
- Only males who regularly smoke were included
- All males were of the same age group
- The males in the investigation smoke the same type of cigarette

Their risk of developing lung cancer was measured and recorded.

The following results were obtained from the investigation.

Number of cigarettes smoked daily	Risk of lung cancer (%)
10	20
20	30
30	55
40	80
More than 40	85

- 3.4.1. State the independent variable for the investigation. (1)
- 3.4.2. State the hypothesis for this investigation. (2)
- 3.4.3. List **TWO** ways how the validity of this investigation was increased. (2)
- 3.4.4. Other than repeating the investigation, state **ONE** way in which the reliability of the results could be increased. (1)
- 3.4.5. Draw a **BAR GRAPH** showing the results from the investigation. (5)
- 3.4.6. Write down a suitable conclusion. (2)
- (13)**

QUESTION 3: 50

TOTAL MARKS: SECTION A (50) + SECTION B (100)