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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2023

LIFE SCIENCES P1

MARKS: 150

TIME: 2½ hours

This question paper consists of 14 pages.

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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. Write neatly and legibly.

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SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 During anaerobic respiration in animals, the pyruvic acid is converted to …

A ethyl alcohol.
B lactic acid.
C hydrochloric acid.
D acetic acid.

1.1.2 Which ONE of the following represents a metabolic waste excreted by the lungs?

A Urea
B Ammonia
C Carbon dioxide
D Uric acid

1.1.3 Which ONE of the following pathways correctly represents air movement in the lungs?

A Alveolus → bronchiole → trachea → bronchus
B Bronchiole → trachea → bronchus → alveolus
C Trachea → bronchus → bronchiole → alveolus
D Trachea → bronchiole → bronchus → alveolus

1.1.4 The blood vessel that transports absorbed nutrients from the small intestine to the liver is the …

A hepatic vein.
B hepatic portal vein.
C inferior vena cava.
D renal vein.

1.1.5 The gas released during photosynthesis is …

A carbon dioxide.
B oxygen.
C hydrogen.
D ozone.

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1.1.6 The main organelle that is involved in cellular respiration is the …

A mitochondrion.
B nucleus.
C Golgi-apparatus.
D endoplasmic reticulum.

1.1.7 Which ONE of the following features will allow an increased rate of photosynthesis?

A leaf with …

A a thick cuticle.
B many mesophyll cells with many chloroplasts.
C few stomata on the leaf on the lower surface of the leaf.
D a large number of epidermal hairs.

1.1.8 During glycolysis, the glucose molecule is broken down to form …

A pyruvic acid, ATP and energised hydrogen ions.
B pyruvic acid, ADP and an oxygen atom.
C pyruvic acid, ADP and a hydrogen ion.
D pyruvic acid, ATP and carbon dioxide.

1.1.9 The gas released during Kreb's cycle is …

A oxygen.
B carbon dioxide.
C carbon monoxide.
D hydrogen.

1.1.10 ONE of the differences between photosynthesis and cellular respiration:

	Photosynthesis	Cellular respiration
A	Takes place only during the day	Takes place only at night
B	Manufactures glucose	Breaks down glucose
C	Energy is released	Energy is absorbed
D	Enzymes are required	No enzymes are required

(10 x 2) (20)

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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 to 1.2.9) in the ANSWER BOOK.

1.2.1 The tissue lining the inner walls of an alveolus

1.2.2 The double membrane covering the outside of the lungs and the inside of the thoracic cavity

1.2.3 The part of the brain that controls the rate of heartbeat and the breathing rate

1.2.4 The hormone that stimulates conversion glycogen into glucose

1.2.5 The removal of undigested food waste from the body

1.2.6 The end-product of protein digestion

1.2.7 The finger-like structures that absorb digested food nutrients

1.2.8 A building with transparent walls and roof, usually of glass, for the cultivation and exhibition of plants under controlled conditions

1.2.9 The protective outer membrane of the kidney (9 x 1) (9)

1.3 Indicate whether each of the descriptions in COLUMN I applies 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 1.3.3) in the ANSWER BOOK.

	COLUMN I	COLUMN II
1.3.1	The site of chemical reactions of the dark phase	A: Stroma B: Cytoplasm
1.3.2	Function of haemoglobin	A: Transport of oxygen B: Transport of CO_2
1.3.3	Site of tubular excretion	A: Collecting duct B: Urethra

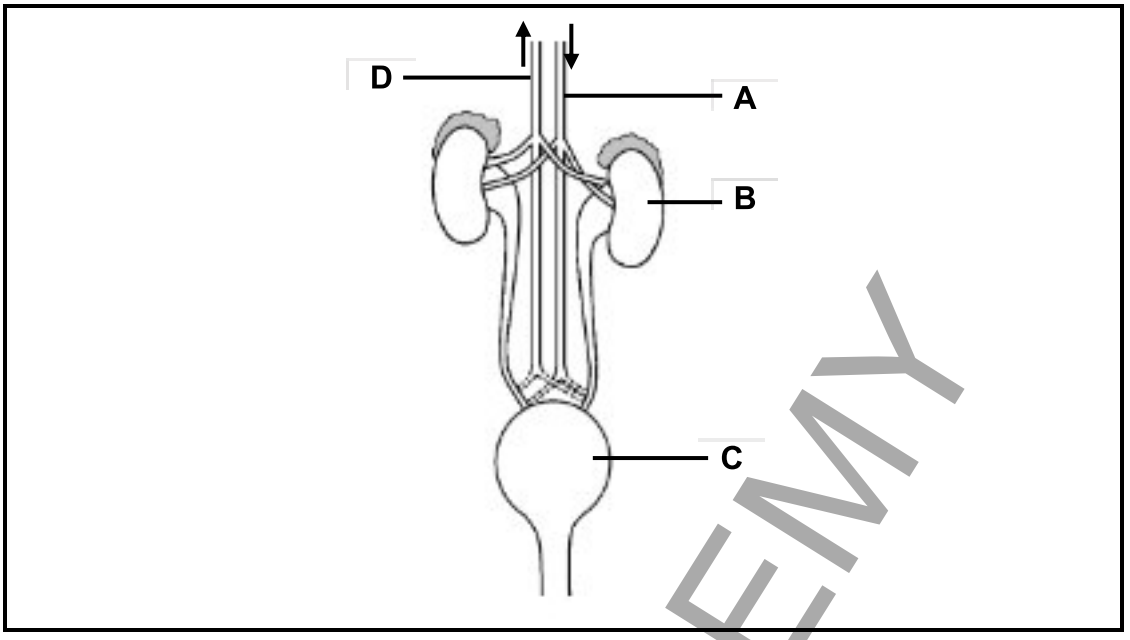
(3 x 2) (6)

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1.4 The diagram below represents the human kidneys.



1.4.1 Identify parts:

(a) **A** (1)

(b) **D** (1)

1.4.2 Name the:

(a) Blood vessel that transports blood containing metabolic waste products directly into the kidney (1)

(b) Tube that transports urine into part **C** (1)

(c) Part that stores urine temporarily (1)

1.4.3 Give THREE functions of part **B.** (3)

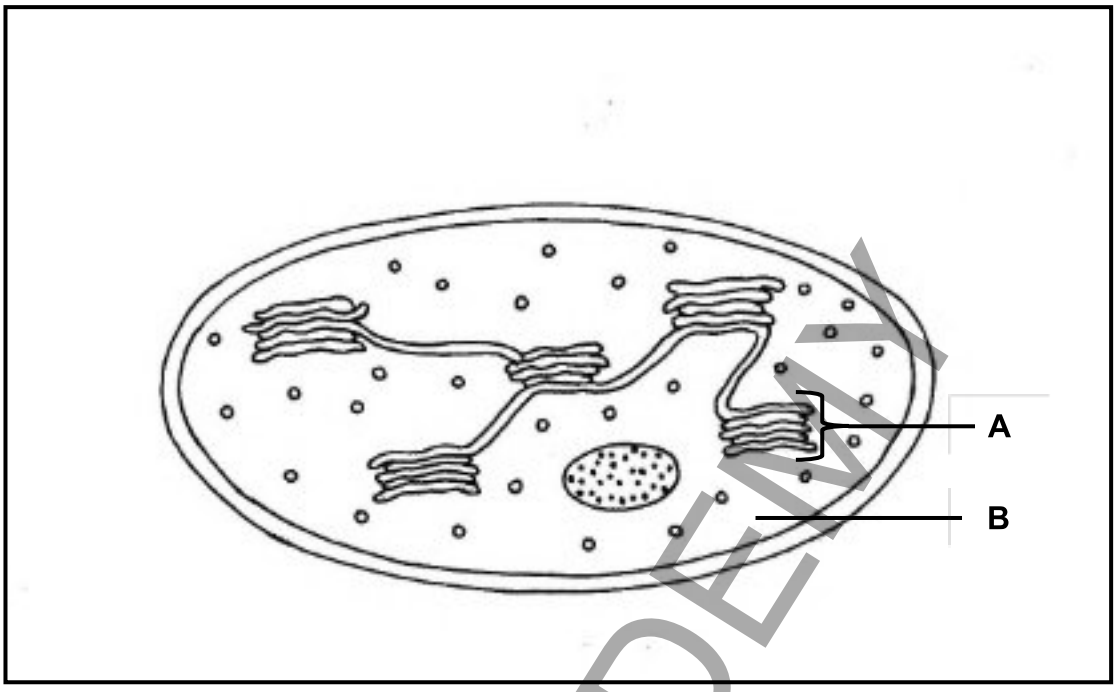
1.4.4 Which ONE of the labelled blood vessels has the highest blood pressure? (1)

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1.5 The diagram below represents an organelle that plays an important role in a plant cell.



1.5.1 Name the:

(a) Organelle shown in the diagram (1)

(b) Biochemical process in which the organelle shown in the diagram plays an important role (1)

1.5.2 Give the LETTER and NAME of the structure in which the light dependent reaction takes place. (2)

1.5.3 Give a reason(s) for your answer in QUESTION 1.5.2. (2)

TOTAL SECTION A: 50

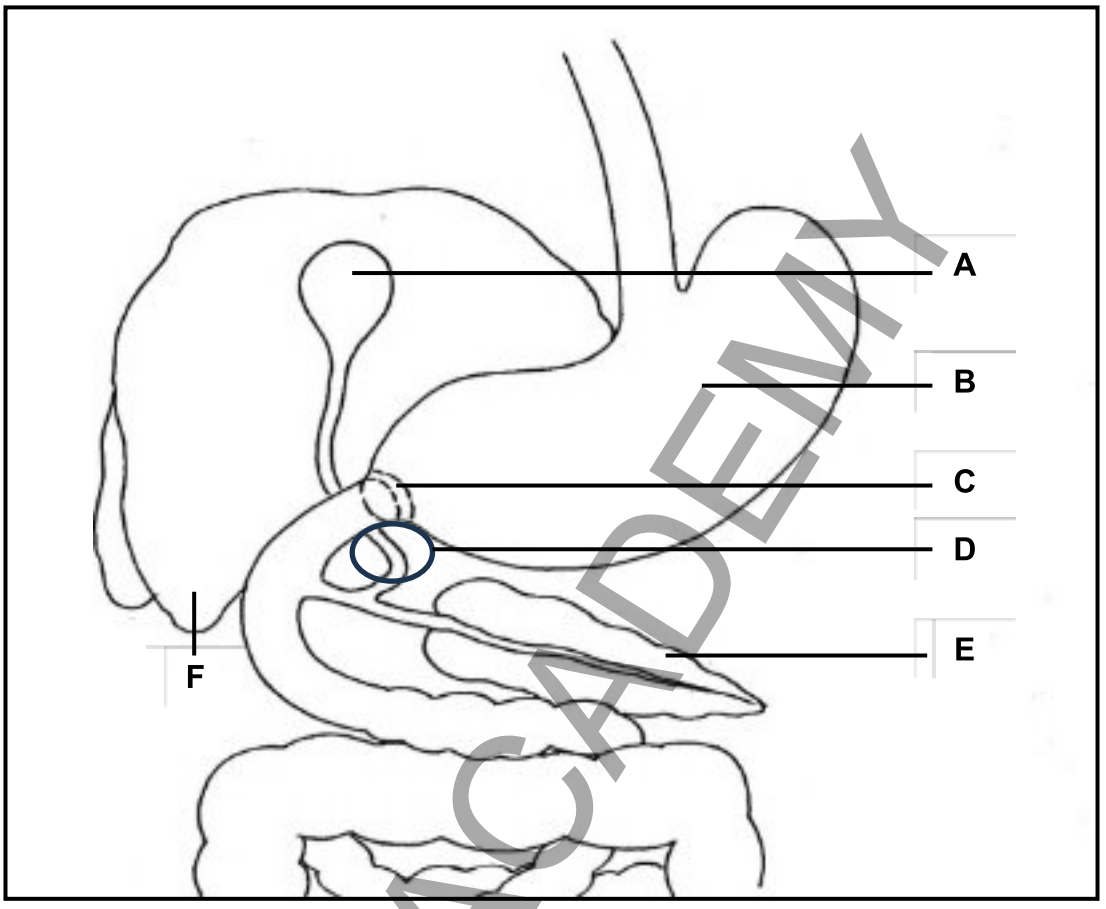
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SECTION B

QUESTION 2

2.1 The diagram below represents part of the alimentary canal.



2.1.1 Identify:

(a) Part **A** (1)

(b) Part **C** (1)

2.1.2 Give THREE general functions of gland **F**. (3)

2.1.3 The acid produced in part **B** does not destroy its walls. Explain why is this possible. (2)

2.1.4 Explain why the blockage in part **D** will disrupt the digestive process in the small intestine. (5)

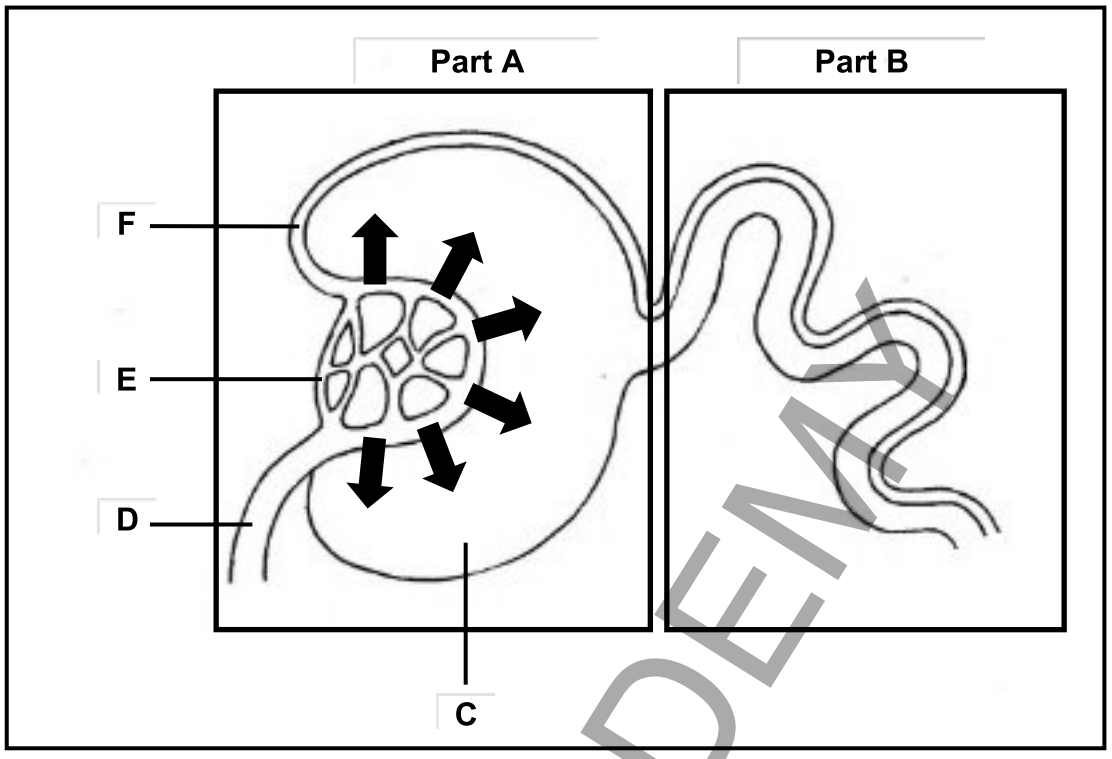
2.1.5 State, with reasons, why is part **E** is regarded as an endocrine as well as an exocrine gland. (4)

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2.2 The diagram below represents a certain portion of a nephron.



2.2.1 Identify part:

(a) **A** (1)

(b) **B** (1)

2.2.2 Name the process that takes place at:

(a) **A** (1)

(b) **B** (1)

2.2.3 Explain why blood vessels **D** and **F** are structurally different in size. (4)

2.2.4 What components of blood in part **E** are absent from the fluid in part **C**? (2)

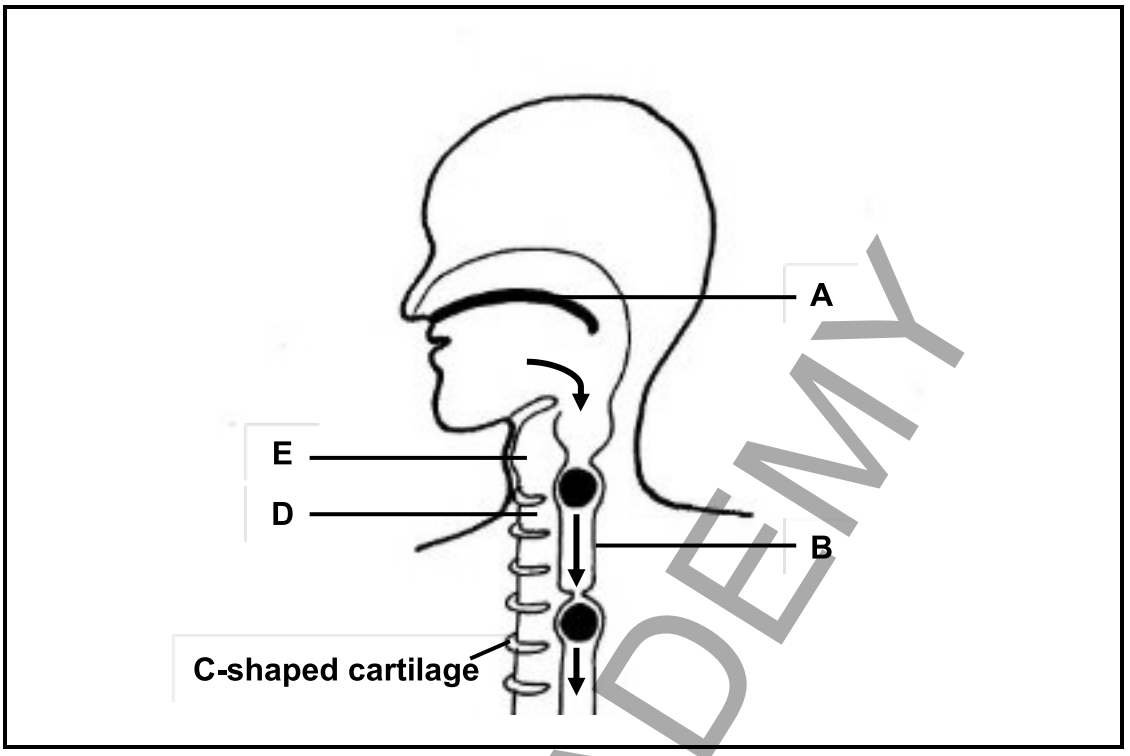
2.2.5 Explain how the structure labelled part **B** is structurally suited for its function. (4)

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2.3 The diagram below represents the upper parts of the digestive and gaseous exchange systems.



2.3.1 Name the:

(a) Part that separates the nasal cavity from the mouth cavity (1)

(b) Process that facilitates the movement of food through part **B** (1)

(c) TWO muscles that are involved in the process mentioned in QUESTION 2.3.1(b) (2)

2.3.2 Explain why food normally flows into part **B** instead of part **D.** (2)

2.3.3 How do the C-shaped cartilage rings on part **D** provide a functional advantage to part **B**? (2)

2.3.4 Explain the possible consequence of a bacterial infection at part **E.** (2)

2.3.5 Explain why an obstruction/blockage in part **D** for more than 20 minutes may lead to death. (4)

2.4 Consumption of food items such as pickles, chips and salty crackers may change the salt concentration in the blood.

Describe how the correct salt concentration in the blood is normalised by the homeostatic process in these circumstances. (6)
[50]

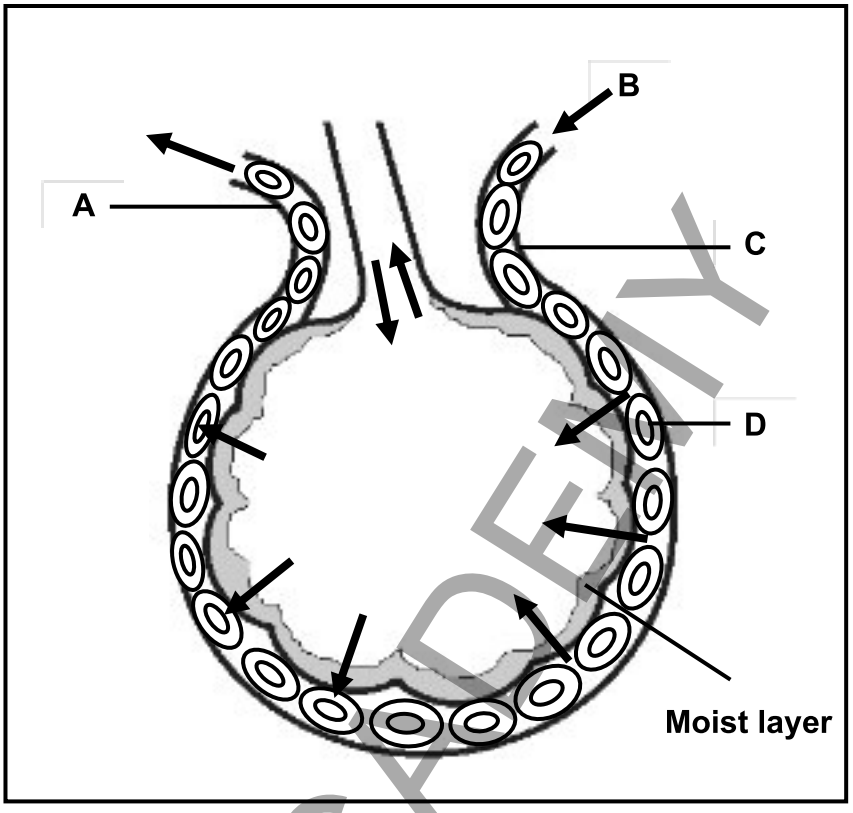
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QUESTION 3

3.1 The diagram below represents an alveolus.



3.1.1 Identify the gas which is at high concentration in blood vessel **B**. (1)

3.1.2 State TWO ways in which this gas in **B** is transported in the blood. (2)

3.1.3 Which large blood vessel receives blood from **A**? (1)

3.1.4 Give an observable reason for your answer to QUESTION 3.1.3. (1)

3.1.5 Explain TWO ways in which the blood cell labelled **D** is structurally suited for its function. (4)

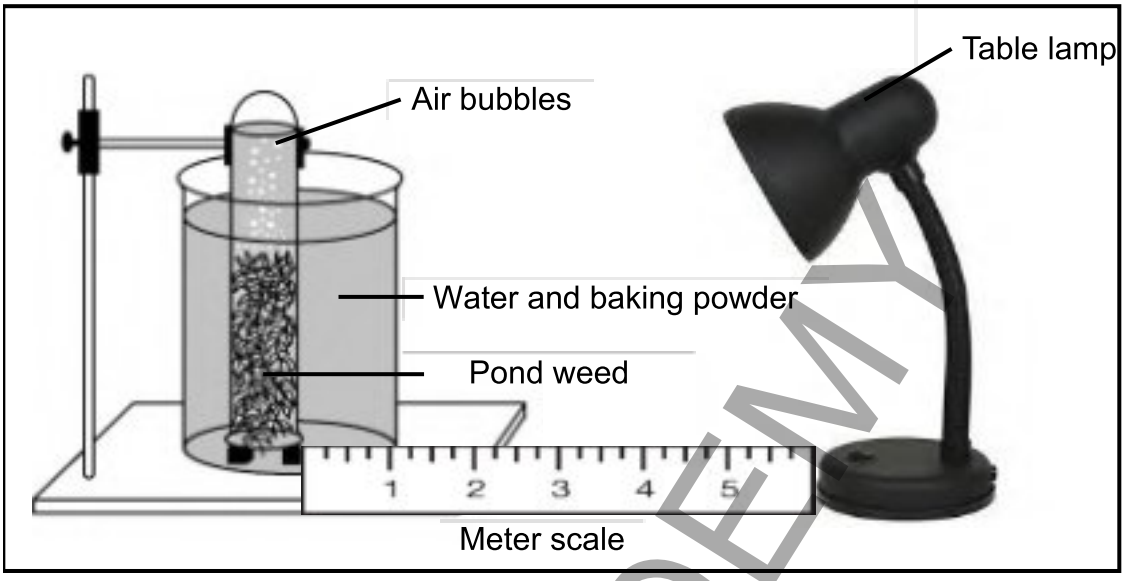
3.1.6 Explain why it is not advisable to sleep in an unventilated room where a heater is switched on. (3)

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3.2 A student set up an experiment as shown in the diagram below, to determine the effect of carbon dioxide concentration on the rate of photosynthesis of a pond weed.



The procedure was as follows:

- The student used five similar pieces of pond weed and five different concentrations of baking powder (Sodium hydrogen carbonate) solution, which produces carbon dioxide
- A control experiment was set up using a similar piece of pond weed
- The student counted the number of bubbles produced by the pond weed over a period of five minutes
- The student repeated the investigation three times at each concentration of baking powder solution and calculated the average rate of photosynthesis

Carbon dioxide concentration %	Number of bubbles per minute			
	1st	2nd	3rd	Average
0	3	2	4	3
0,1	6	4	5	5
0,2	12	7	11	10
0,3	14	15	16	15
0,4	18	22	21	20
0,5	19	23	21	21

3.2.1 Identify the:

(a) Dependent variable (1)

(b) Independent variable (1)

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3.2.2 How was the rate of photosynthesis measured? (1)

3.2.3 Identify THREE variables that should have been kept constant. (3)

3.2.4 How did the student increase the reliability of this investigation? (1)

3.2.5 Give a reason for setting up a control for this experiment. (2)

3.2.6 Plot a bar graph to represent the average number of bubbles released at different concentration of carbon dioxide by the pond weed. (6)

3.2.7 What conclusion can be drawn from the results? (2)

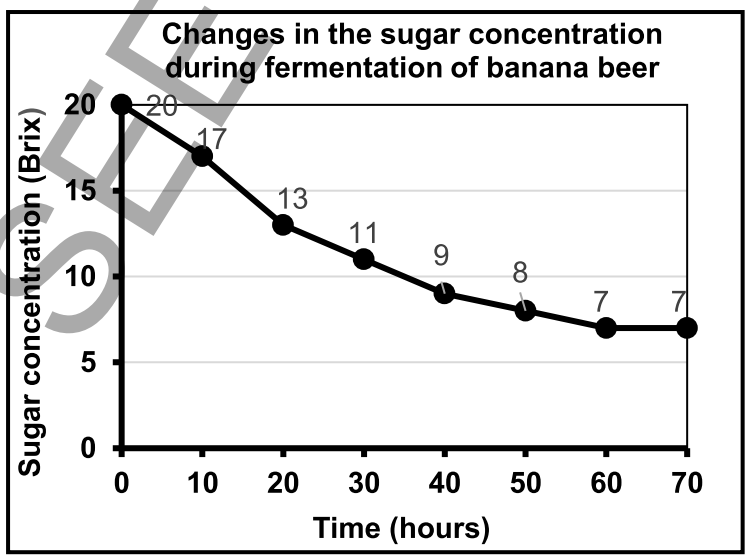
3.3 The extract below describes the microbial activities that occur during the production of banana beer.

Banana beer, *urwagwa*, is one of the oldest and major alcoholic drinks traditionally made in Rwanda. The banana beer is manufactured from the fermentation of banana juice and roasted red sorghum.

When a microbial analysis was done, lactic acid bacteria and yeast were found growing together during the 70-hour fermentation period. The process involved lactic acid fermentation followed by alcoholic fermentation.

A symbiotic relationship could explain the presence of both yeast and lactic acid bacteria in the banana beer, with lactic acid bacteria creating an acid medium favourable for the multiplication of yeast. The yeast produces vitamins and increases other nutritional factors such as amino acids into the environment, for growth of lactic acid bacteria.

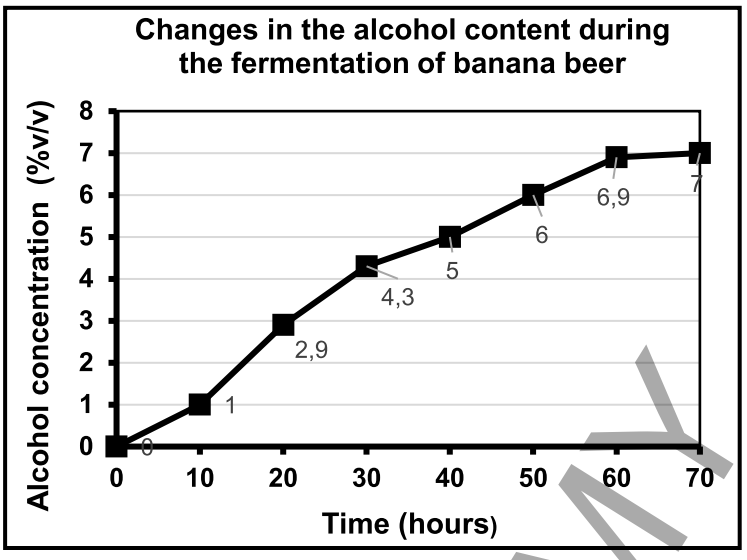
The graphs below show the biochemical changes that occurred during the fermentation process.



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3.3.1 From the graph, indicate the:

(a) Initial sugar level of banana juice (1)

(b) Final alcohol content of the banana beer (1)

3.3.2 Name ONE by-product, other than alcohol, formed during the fermentation process. (1)

3.3.3 Describe the symbiotic relationship between lactic acid bacteria and yeast during the fermentation process. (4)

3.3.4 Calculate the percentage decrease in sugar concentration from the 10th hour to the 70th hour. Show ALL your working. (3)

3.3.5 From the graph, how would you determine the completion of fermentation? (1)

3.3.6 Explain why the sugar level decreased with fermentation time. (3)

3.4 A person has consumed two large bars of chocolate and two cups of soft drink containing a high sugar content during lunch break.

Describe the homeostatic process that restores the correct level of glucose in the blood. (7)
[50]

TOTAL SECTION B: 100
GRAND TOTAL: 150

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