BERGVLIET HIGH SCHOOL

Grade 11 **LIFE SCIENCES November Paper 1 Exam** **8 Nov 2024**
Time: 2 hr 30mins **150 Marks**
Examiner: S. Lambrechts
Moderators: M. Brouwer, G. O'Connor and M. Wentworth

Name: _____

Life Sciences Teacher: _____

SECTION A	**Q1**	**50**		
SECTION B	**Q2**	**50**		
	Q3	**50**		
TOTAL		**150**		**%**

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions. There are **15** pages in total.
2. Write ALL the answers on FOOLSCAP PAPER.
3. Start the answers 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 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 must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

DETACH THIS SHEET AND STAPLE IT TO THE FRONT OF YOUR FOOLSCAP PAPER

SECTION A

Answer this section on folio according to the instructions provided with each question.

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 numbers (1.1.1 to 1.1.10) on your FOLIO PAGE, e.g. 1.1.11 D.

1.1.1 Which of the following digestive juices contains no enzymes?

A Pancreatic juices.
B Gastric juices.
C Bile.
D Saliva. (2)

1.1.2 Which of the following factors will determine the rate of breathing in humans?

A Carbon dioxide levels in the blood.
B Levels of oxygen in the exhaled air.
C Amount of water in the blood.
D Amount of salts in the blood. (2)

1.1.3 Which ONE of the following stages of photosynthesis releases oxygen gas?

A Glycolysis.
B Light independent phase.
C Light dependent phase.
D Oxidative phosphorylation. (2)

1.1.4 The part of the brain that will be activated when a person begins to dehydrate is the…

A cerebrum.
B cerebellum.
C medulla oblongata.
D hypothalamus. (2)

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

A leaf with….

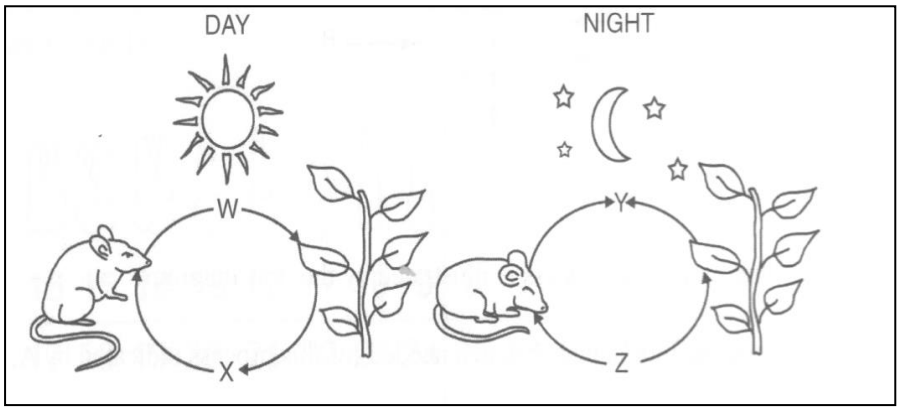
A a thick cuticle.

B many mesophyll cells with many chloroplasts.

C few stomata on the lower surface of the leaf.

D a large number of epidermal hairs. (2)

QUESTION 1.1.6: The diagram below shows the movement of two gases during the day and the night.



1.1.6 Which letters represent carbon dioxide?

A X and Y

B W and Z

C W and Y

D X and Z (2)

1.1.7 If a drop in the pH of the blood occurs, the kidneys will…

A increase the reabsorption of urea.

B decrease the reabsorption of sodium ions.

C increase the excretion of bicarbonate ions.

D increase the excretion of hydrogen ions. (2)

1.1.8 A portion of a person's large intestine was removed in an operation.

Which of the following will be reduced as a direct result of the operation?

A Digestion of cellulose.

B Detoxification of substances.

C Absorption of water.

D Production of Vitamin C. (2)

1.1.9 The epiglottis prevents the flow of …

A food and water into the trachea.
B oxygen into the lungs.
C carbon dioxide out of the trachea.
D viruses and bacteria into the lungs. (2)

1.1.10 Which ONE of the following raw materials, required for photosynthesis, is controlled by the stomata?

A Carbon dioxide
B Mineral salts
C Water
D Oxygen (2)

(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 to 1.2.8) on your FOLIO PAGE.

1.2.1 The removal of metabolic waste products from living organisms.

1.2.2 Biting or grinding food with teeth to make it easier to swallow.

1.2.3 The molecule that is an important energy carrier in the cell.

1.2.4 The hormone that stimulates the conversion of glycogen into glucose.

1.2.5 The two branches that the trachea divides into.

1.2.6 The stage of cellular respiration during which two pyruvic acid molecules are synthesised.

1.2.7 The region of the brain that controls the rate of breathing in humans.

1.2.8 The uptake and use of nutrients by the cells.

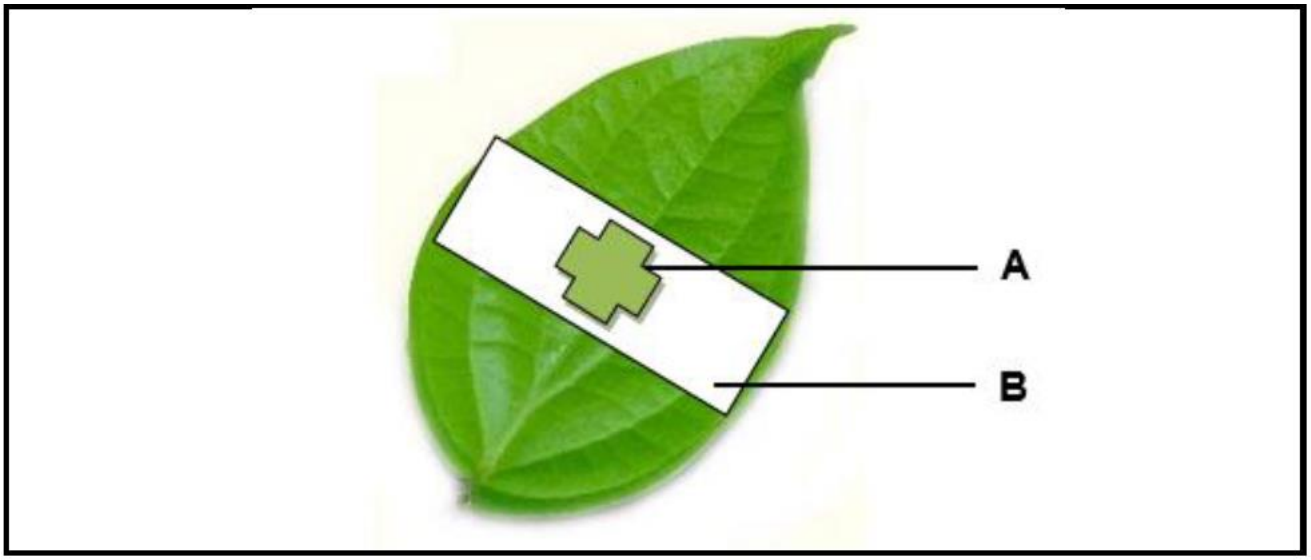
(8 x 1 = 8)

1.3 Indicate whether each of the descriptions in COLUMN I apply 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 1.3.4) on your FOLIO PAGE.

	COLUMN I	COLUMN II
1.3.1	Lined with ciliated columnar epithelium.	A: Nasal cavity B: Trachea
1.3.2	The site of chemical reactions of the dark phase.	A: Grana B: Cytoplasm
1.3.3	The process whereby excess amino acids are broken down in the liver	A: Detoxification B: Deamination
1.3.4	The phase of cellular respiration during which carbon dioxide is released	A: Krebs cycle B: Glycolysis

(4 x 2 = 8)

1.4 The diagram below shows how the leaf in a destarched plant was set up by a learner to perform an experiment. Study the diagram and answer the questions below.



1.4.1 What was the aim of this experiment? (2)

1.4.2 How was the plant destarched? (1)

1.4.3 What chemical was used to test for the presence of starch in the leaf? (1)

1.4.4 What was the dependent variable in this experiment? (1)

1.4.5 What was the colour change observed in areas of the leaf that were:

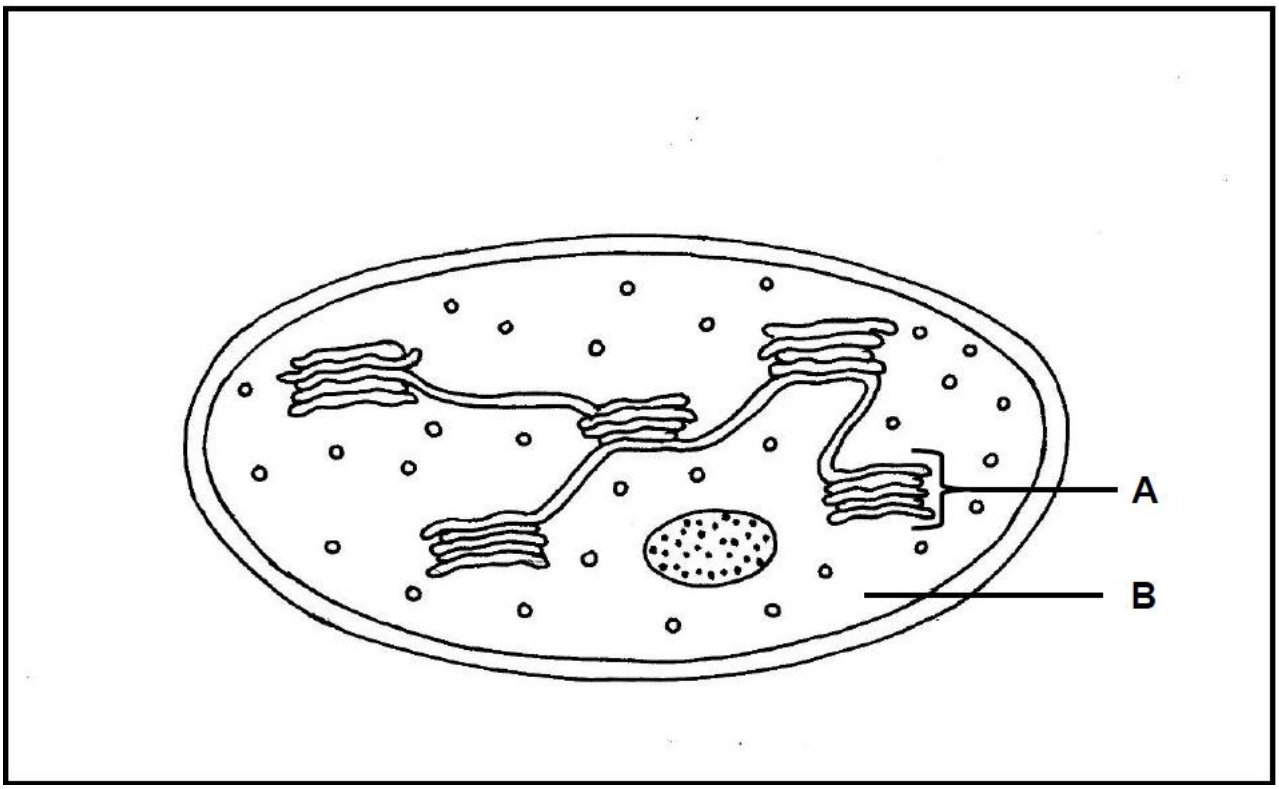
(a) Not exposed to sunlight. (1)

(b) Exposed to sunlight. (1)

1.4.6 Which gas would not be produced, if the plant is placed in a dark box? (1)

(8)

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 this organelle 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 Explain your answer to QUESTION 1.5.2. (2)

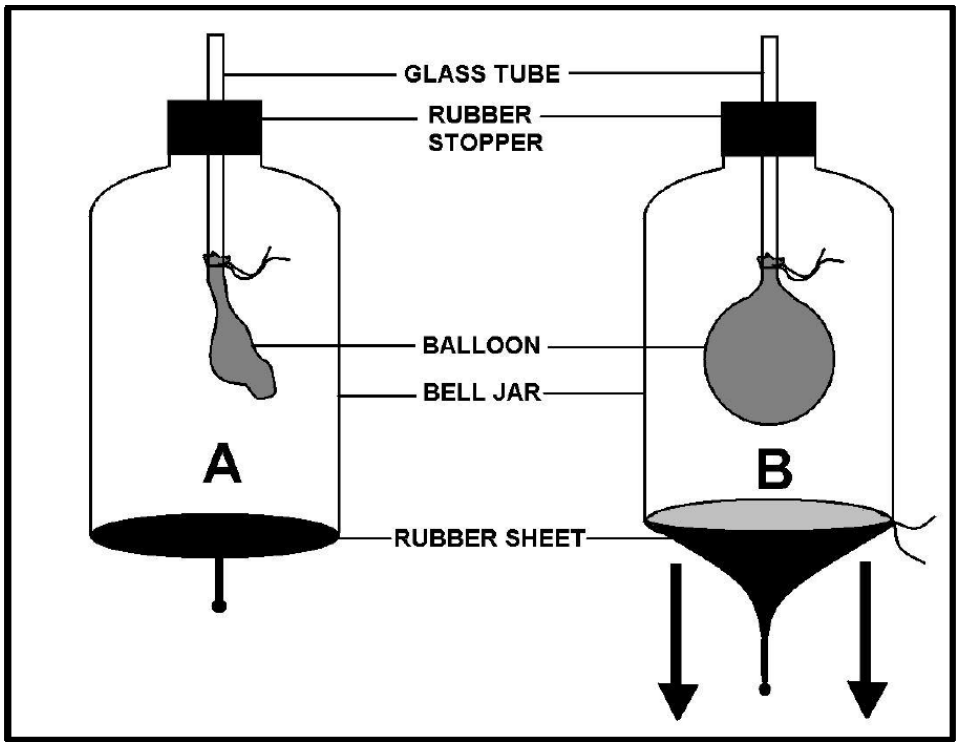
(6)

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SECTION B

QUESTION 2

2.1 The diagram below illustrates the mechanism of breathing. Study the diagram and answer the questions.



2.1.1 Which apparatus (A or B) represents inhalation? (1)

2.1.2 Describe the mechanism of inhalation in humans. (6)

2.1.3 Identify the human structures are represented by the:

(a) glass tube.

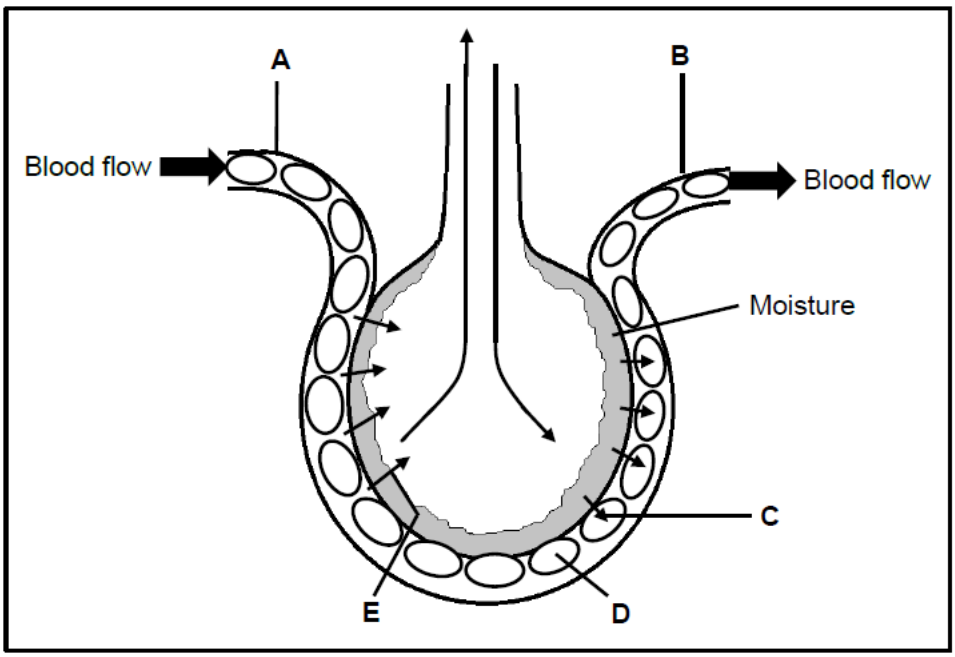
(b) bell jar.

(c) rubber sheet. (3)

2.1.4 One of the learners created a hole in the rubber sheet by pricking it with a nail. What would be the result when this punctured rubber sheet is stretched down? Give a reason for your response. (2)

(12)

2.2 The diagram below represents the structure of an alveolus.



2.2.1 Identify the:

(a) Gas represented by **C.** (1)

(b) Process at **E.** (1)

2.2.2 Give the LETTER and NAME of the part that:

(a) Transports deoxygenated blood. (2)

(b) Contains haemoglobin. (2)

2.2.3 Name the tissue that lines the alveolus. (1)

2.2.4 Which large blood vessel receives blood from **B**? (1)

2.2.5 Explain why there is a layer of moisture in the alveolus. (2)

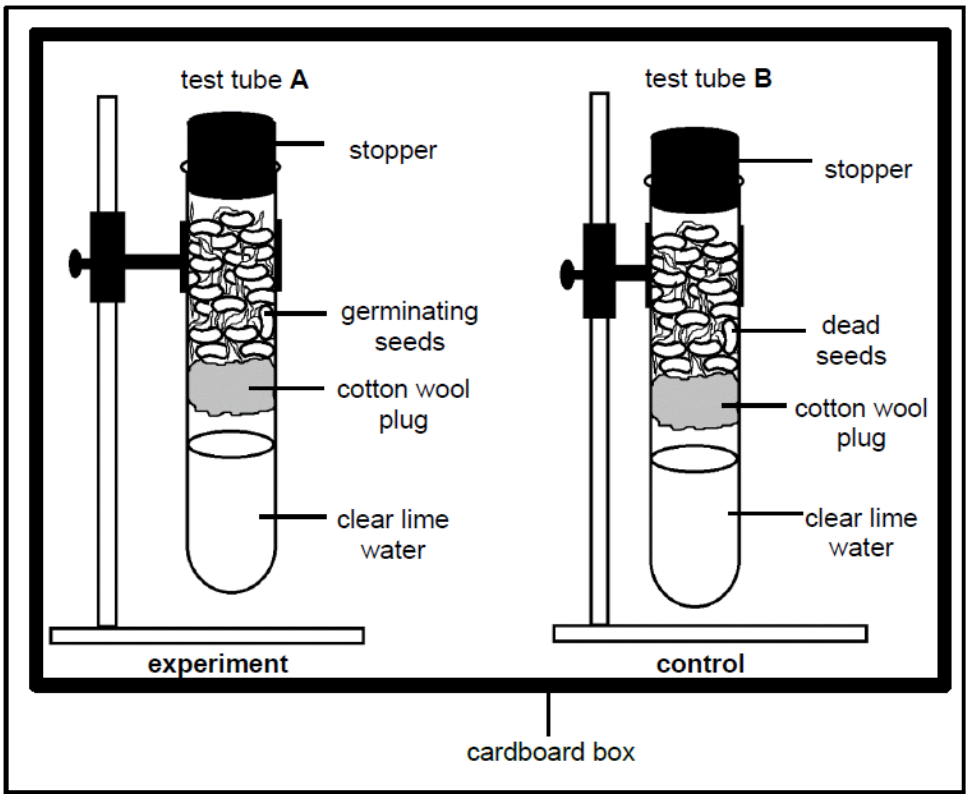
(10)

2.3 Describe the homeostatic control of carbon dioxide when it is high in blood. **(6)**

2.4 An investigation was conducted to determine which gas was released during cellular respiration**.**

The procedure was as follows:

- 120 seeds of the same species were germinated.
- 60 of them were separated and placed in boiling water for 30 minutes.
- The other germinating seeds were placed in test tube **A**, while the seeds from the boiling water were placed in test tube **B** after cooling.
- Both sets of apparatus were rinsed with formalin to remove any micro-organisms which might have been present.
- Both sets of apparatus were set up as shown in the diagram below.



2.4.1 Identify the:

(a) independent variable. (1)

(b) dependent variable. (1)

2.4.2 Name the gas released during cellular respiration. (1)

2.4.3 How was the test for the gas mentioned in QUESTION 2.4.2 carried out? (1)

2.4.4 Explain why germinating seeds were used in the experiment? (2)

2.4.5 Explain why the result was different in the control part as compared to the experiment. (2)

2.4.6 Why was a cotton wool plug used as a barrier instead of using a rubber block? (2)

2.4.7 How would you improve the reliability of this experiment? (1)

2.4.8 Which TWO environmental factors must be kept constant during this experiment? (2)

(13)

2.5 Anaerobic cellular respiration, in yeast and muscle cells, can be represented by the following equations:

In yeast:	glucose	→	(gas)	+	alcohol	+	2 ATP
In muscle cells:	glucose	→	(gas)	+	**Y**	+	2 ATP

2.5.1 Name the gas produced in both equations. (1)

2.5.2 Name the product formed at **Y**. (1)

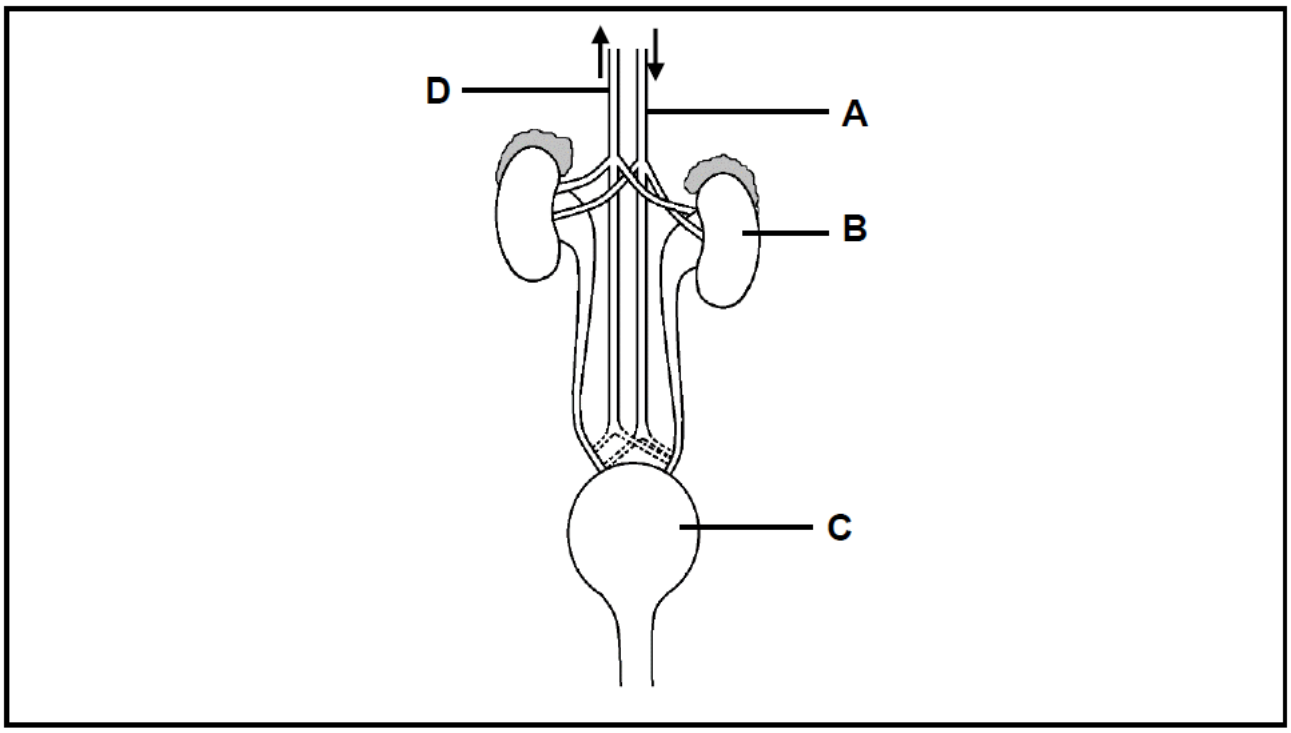
2.5.3 Tabulate any THREE differences between aerobic and anaerobic respiration. (7)

(9)

[50]

QUESTION 3

3.1 The diagram below represents the human kidneys.



3.1.1 Identify parts:

(a) **A** (1)

(b) **D** (1)

3.1.2 Name the:

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

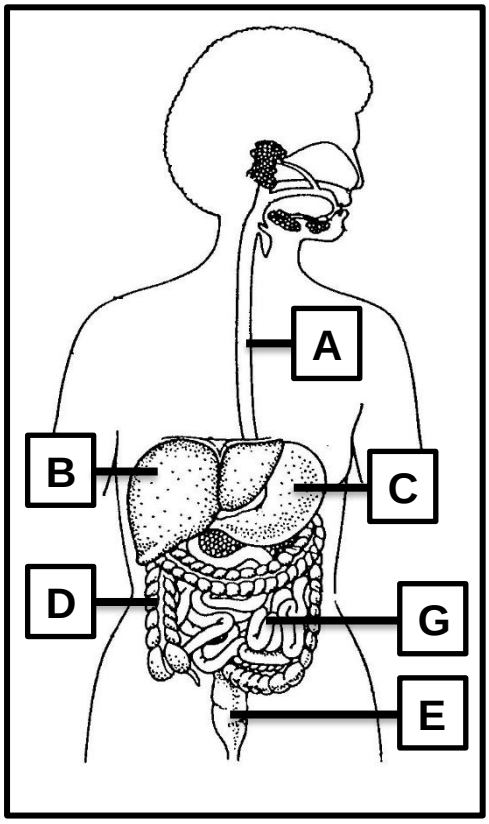
(b) Tube that transports urine into part **C.** (1)

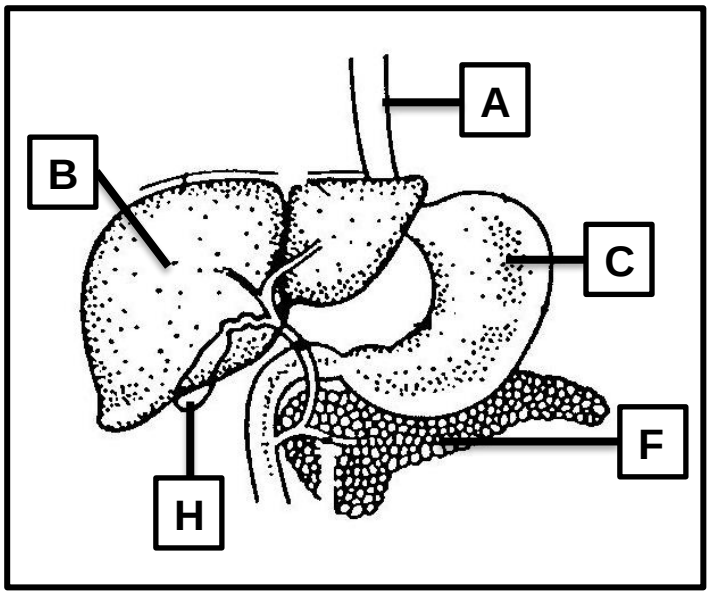
(c) Part that stores urine temporarily. (1)

3.1.3 Give TWO functions of part **B**. (2)

(7)

3.2 Study the diagrams of the human alimentary canal and answer the questions that follow.





3.2.1 Provide labels for the parts marked **E** and **G**. (2)

3.2.2 State the LETTER of the organ:

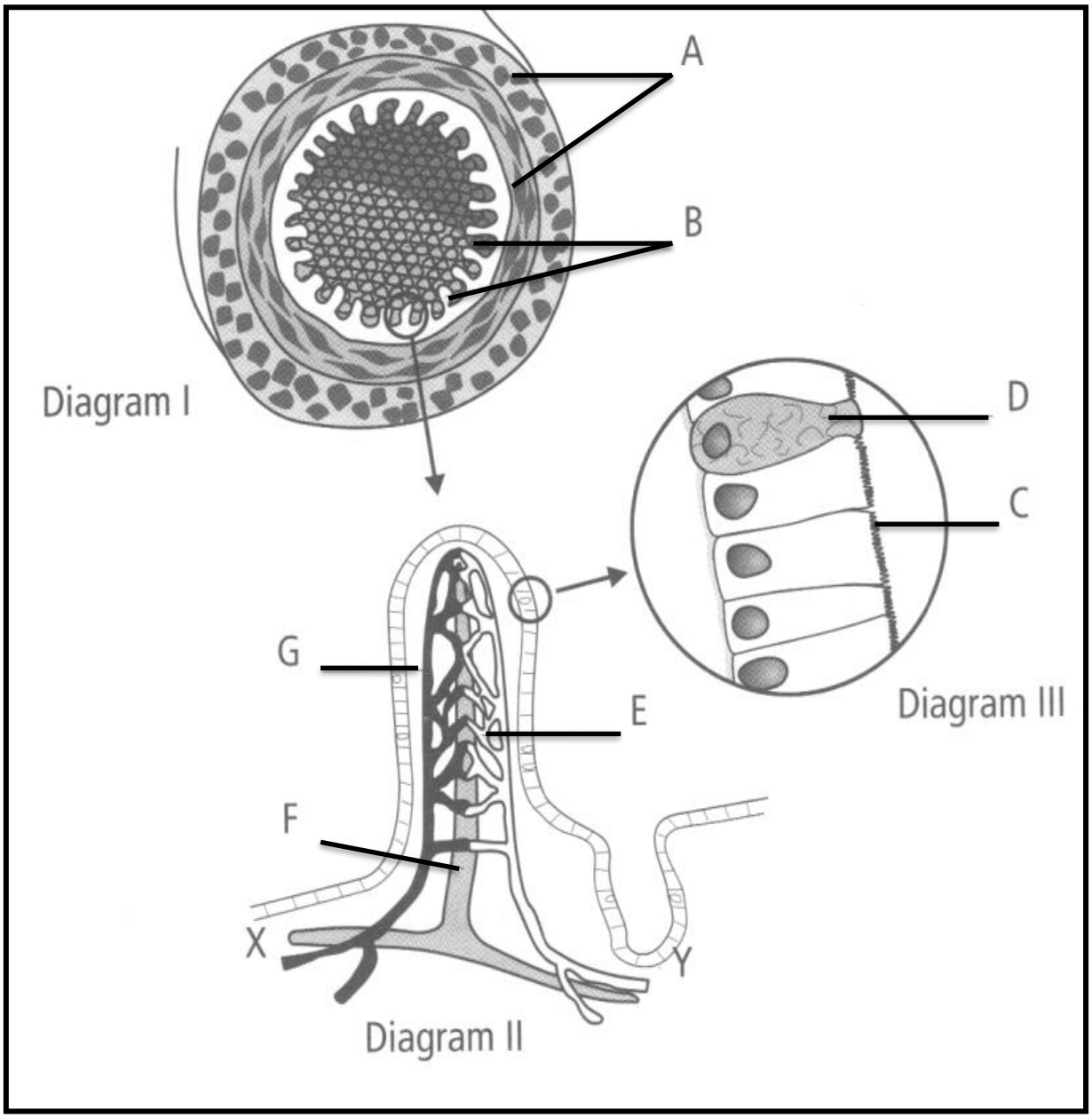
(a) that stores bile. (1)

(b) where the Islets of Langerhans are located. (1)

(c) where digestion takes place at a pH of **3**. (1)

(5)

3.3 Study the diagram below of structures in the digestive system of humans.



3.3.1 Which part of the alimentary canal is represented by the section shown in **Diagram I**? (1)

3.3.2 Provide labels for the parts marked **B**, **C** and **D**. (3)

3.3.3 Explain TWO ways, as seen in the diagram, in which the part represented by **Diagram II** is structurally suited for its function of food absorption. (4)

3.3.4 (a) Which letter represents the vessel that transports the end products of fat digestion? (1)

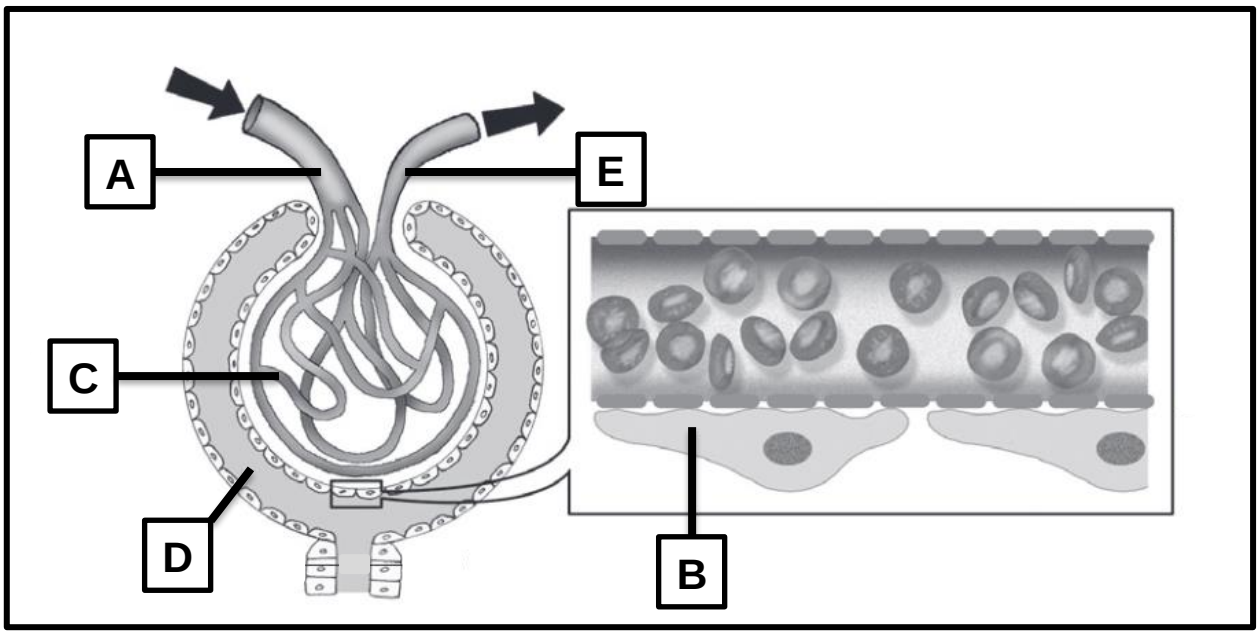
(b) Name the enzyme that digests fat. (1)

3.3.5 (a) Glucose is absorbed into part **E** and is transported to the liver. Name the hormone that is secreted by the pancreas to control the levels of glucose in the blood when it rises to above the optimal level. (1)

(b) Explain the role that this hormone plays in regulating glucose levels. (4)

(15)

3.4 The diagram below shows the structure of a Malpighian body. Study the diagram and answer the questions that follow.



3.4.1 Name the parts labelled **A**, **C**, **D** and **E** respectively. (4)

3.4.2 Explain how the difference in the parts labelled **A** and **E** is responsible for the process that occurs in the Malpighian body. (3)

3.4.3 Name one component that will be absent from the fluid in part **D**. (1)

3.4.4 Name the specialised cells found at **B**. (1)

3.4.5 Describe how the cells mentioned in QUESTION 3.4.4 are structurally suited for their function. (2)

(11)

3.5 Read the extract below.

> Hypernatremia is the medical term used to describe having too much sodium in the blood. Sodium is an important nutrient for proper functioning of the body. Most of the body's sodium is found in the blood.
>
> Hypernatremia can occur when there is too much water loss or too much sodium gain in the body. The result is too little body water for the amount of total body sodium.

3.5.1 What is *hypernatremia*? (1)

3.5.2 With reference to the extract, state TWO possible reasons for hypernatremia. (2)

3.5.3 Explain why sodium ions are actively pumped out at certain regions of the loop of Henle into the medulla region of the kidney. (3)

3.5.4 Describe how constant sodium concentration in the blood of a healthy human is maintained, when the level of sodium is decreased below the normal level (4)

3.5.5 Explain why the levels of antidiuretic hormone (ADH) remains high in a patient who is severely dehydrated with diarrhoea and vomiting (2)

(12)

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END OF EXAM

GRAND TOTAL: 150 MARKS