BERGVLIET HIGH SCHOOL

Grade 11 **LIFE SCIENCES PAPER 1** **20 November 2023**
Time: 2½ hours **150 Marks**
Examiner: Mrs F.Earl

Moderators: S.Lambrechts, G.O'Connor, K.Stuck and M.Wentworth

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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 **16** 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. You must use a non-programmable calculator, protractor and a compass, where necessary.
10. Write neatly and legibly.

NB DETACH THIS SHEET AND ATTACH IT TO THE FRONT OF YOUR FOOLSCAP

Name: _____ Teacher:_____

SECTION A

QUESTION 1

1.1. Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number.

1.1.1. The ***specific*** enzyme that breaks down Maltose is:

A. Disaccharase
B. Maltase
C. Carbohydrase
D. Amylase

1.1.2. When testing for starch in a leaf, the leaf is boiled in ethanol to…

A. Soften the leaf
B. Stop all metabolic reactions
C. Dissolve the chlorophyll
D. Remove excess water

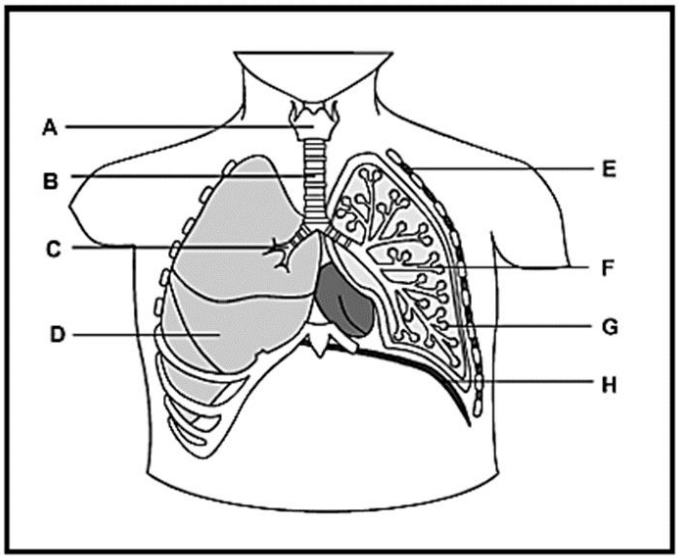
1.1.3. Which one of the following is **NOT** an excretory organ?

A. Skin
B. Lungs
C. Stomach
D. Kidneys

1.1.4 The main function of cilia in the respiratory tract is to…

A. Enlarge the area for gaseous exchange
B. Remove dust laden mucus
C. Secrete mucus
D. Warm the incoming air

1.1.5 The diagram below shows parts of the respiratory system



The parts labelled **A**, **B** and **E** respectively are:

A. Larynx, Bronchus and Intercostal muscle
B. Pharynx, Trachea and Diaphragm muscle
C. Trachea, Bronchus and intercostal muscle
D. Larynx, Trachea and Intercostal muscle

1.1.6 The function of bile in fat digestion is to:

A. Emulsify fats
B. Absorb fats
C. Hydrolyse fats
D. Emulsify and hydrolyse fats

1.1.7 The process by which digested foods are taken up and used by the body is called:

A. Absorption
B. Assimilation
C. Digestion
D. Egestion

1.1.8 Plants use oxygen:

A. During photosynthesis only
B. During the night only
C. During the day only
D. Continuously

1.1.9 During exhalation of air from the lungs…

A. The volume of the thoracic cavity increases and the pressure decreases.
B. The volume of the thoracic cavity decreases and the pressure increases.
C. The volume and the pressure within the thoracic cavity remain the same.
D. The pressure within the thoracic cavity remains constant, irrespective of the change in volume.

(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. The hormone responsible for regulating the salt balance of the blood.
1.2.2. The tough membrane surrounding the kidney.
1.2.3. The structure that prevents food from entering the trachea while swallowing.
1.2.4. The chemical used to test for the presence of starch.
1.2.5. The release of a useful substance.
1.2.6. The functional and structural unit of the kidney.
1.2.7. The finger- like projections of the small intestine.
1.2.8. The process in urine formation that occurs in the proximal convoluted tubule.

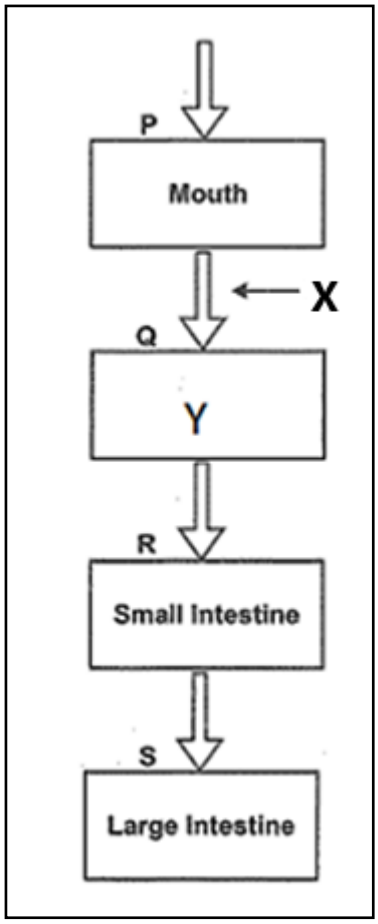
/8/

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 number.

COLUMN I	**COLUMN II**
1.3.1. The monomers of Fats	A. Glycerol
	B. Fatty acids
1.3.2 Produces ethanol and carbon dioxide during anaerobic respiration	A. Muscle cells
	B. Yeast cells
1.3.3. Act in an acidic environment	A. Lipases
	B. Carbohydrases
1.3.4 Increases the blood glucose concentration	A. Glucagon
	B. Glycogen

(4 x 2) ***/8/***

1.4. The diagram below shows the **main** parts of the digestive system.



1.4.1 Identify <u>structure</u> **X**. (1)

1.4.2 Give the term to describe the movement of food along structure X. (1)

1.4.3 Name the digestive juice produced in the part labelled **Y**. (1)

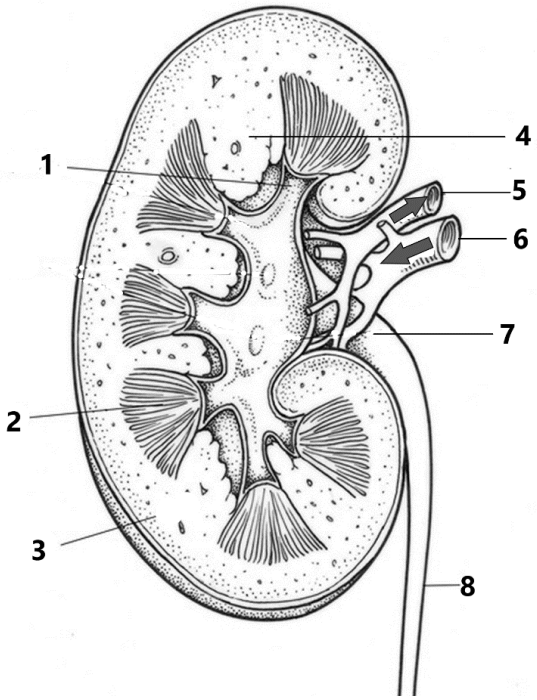
1.4.4 Which of the positions (**P,Q,R** or **S**) indicates the position of the pancreas? (1)

1.4.5 Give the name of the part of the digestive system where water is reabsorbed. (1)

1.4.6 What biological process is represented by the FIRST arrow? (1)

/6/

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



1.5.1 Provide labels for the parts numbered **1**, **2** and **7**. (3)

1.5.2 Identify the blood vessel number 6 **and** state how the blood in it differs from the blood in vessel **5**. (3)

1.5.3 What is the function of part **8**? (2)

1.5.4 Give the number of the **AREA** in the kidney where:

a) Malpighian bodies are located (1)

b) Collecting ducts are found (1)

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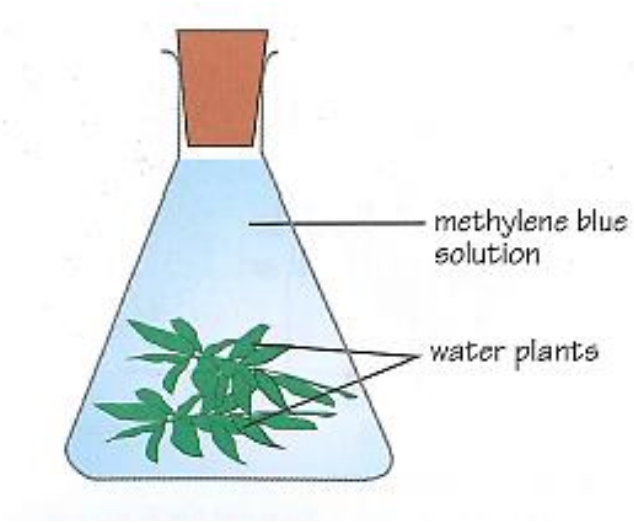
TOTAL SECTION A: 50

SECTION B

QUESTION 2 (*start at the top of a clean/new page*)

2.1. Study the diagram below which shows a water plant submerged in a solution of Methylene blue.

Methylene blue is colourless in the absence of oxygen but turns blue when oxygen is present. The flask was placed in bright sunlight at the start of the investigation.



2.1.1. State the aim of this investigation (2)

2.1.2. What do you expect to observe after a few hours had elapsed? (1)

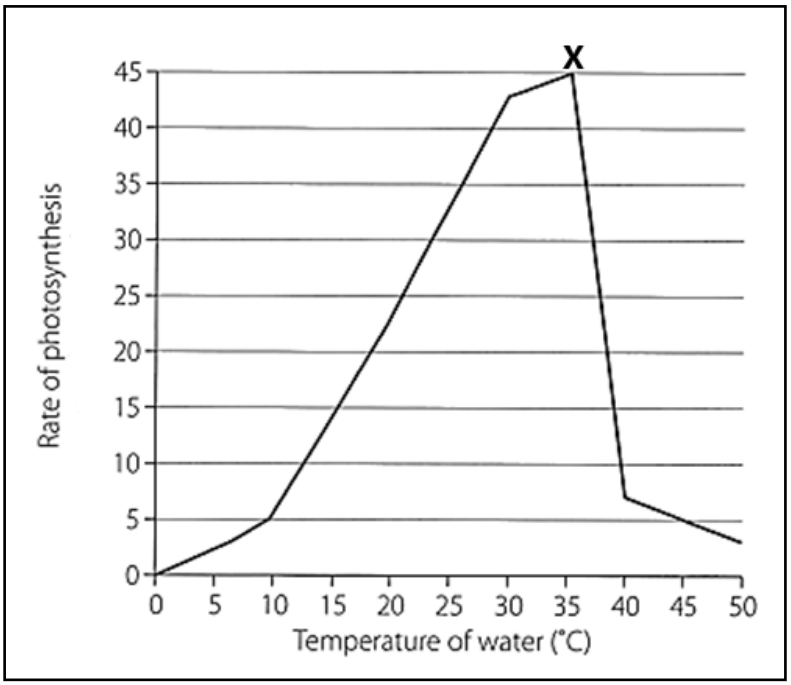
2.1.3. How would you set up a control for the experiment above? (2)

2.1.4. Explain what you would observe if the flask was placed in a dark cupboard for 6 hours immediately after set up. (2)

2.1.5. List **THREE** requirements for the process of photosynthesis. (3)

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2.2. Study the graph below showing the effect of water temperature on the rate of photosynthesis of a water plant.



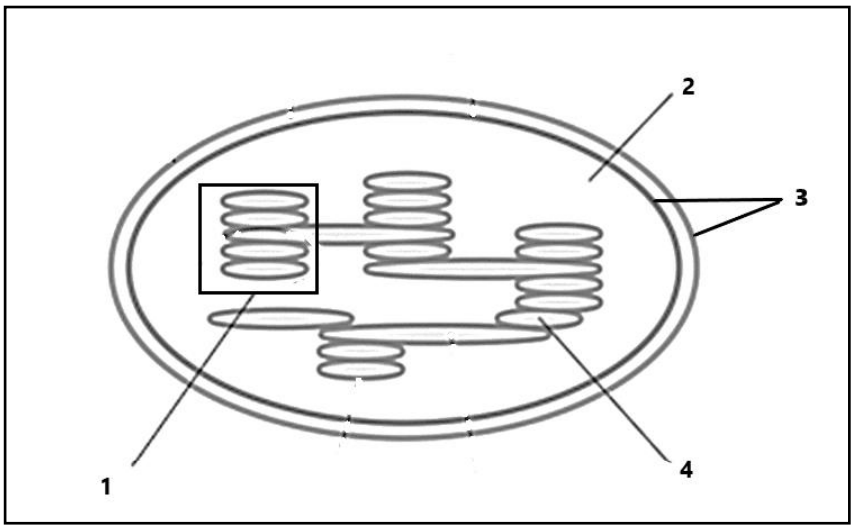
2.2.1 What is the *relationship* between temperature and rate of photosynthesis from 0°C to point X on the graph? (2)

2.2.2 Explain fully the shape of the graph from point X to 50°C (3)

2.2.3 At what temperature does maximum photosynthesis occur? (1)

/6/

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



2.3.1. Identify the organelle illustrated above (1)

2.3.2 Provide labels for the parts numbered **2, 3** and **4**. (3)

2.3.3 Give the collective term for the parts in the area numbered **1**. (1)

2.3.4 Write only the **number** of the part in which the following occurs:

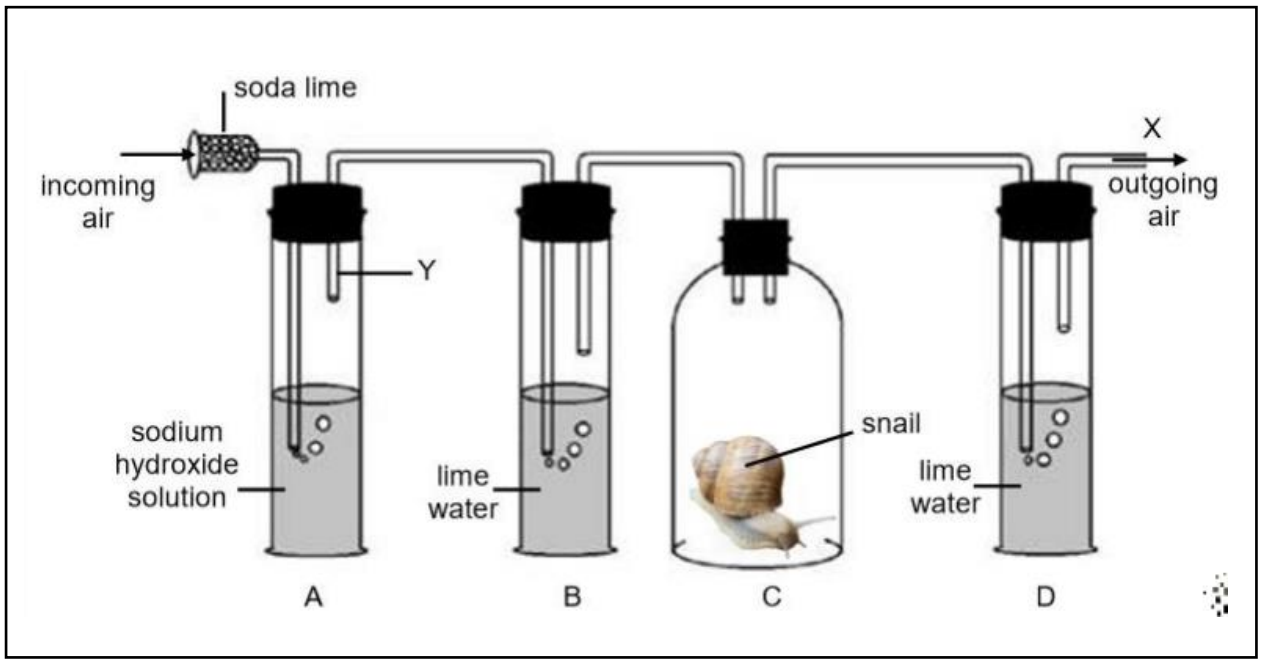
a) The Light phase. (1)

b) The Dark phase. (1)

2.3.5 Is the gas oxygen released during the light or dark phase mentioned above? (1)

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2.4 Study the apparatus showing an experiment related to cellular respiration. Air is drawn through the apparatus by means of a suction pump. Both soda lime and sodium hydroxide solution have the effect of ***removing*** carbon dioxide from the air/solution.



2.4.1 State the **aim** of the investigation above. (2)

2.4.2 What is the function of lime water in this experimental set up? (2)

2.4.3 What gas does the snail require from the incoming air? (1)

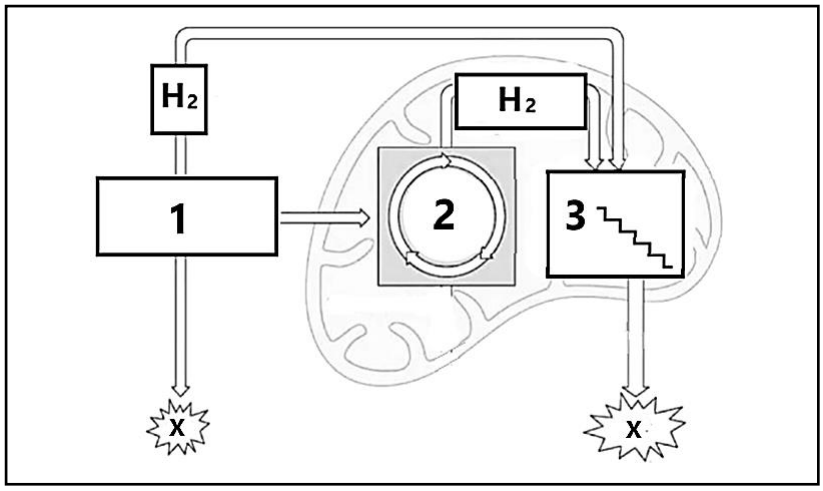
2.4.4 After some time has elapsed, the lime water in flask **B** remains clear but the lime water in **D** turns milky. Provide a full explanation for this. (4)

2.4.5 How would you set up a control for the investigation above? (2)

2.4.6 Does cellular respiration occur during the day **OR** night **OR** at all times? (1)

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2.5 Study the diagram below that shows the process of cellular respiration.



2.5.1 Identify the three phases of cellular respiration labelled **1**, **2** and **3** (3)

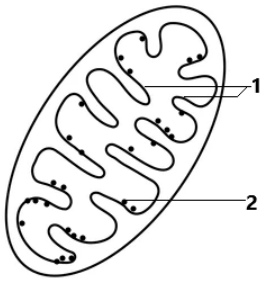
2.5.2 Where exactly in the mitochondrion does phase **2** and **3** occur respectively? (2)

2.5.3 During which phase, **1**, **2** or **3**, is carbon dioxide released? (1)

2.5.4 What product is indicated by **X**? (1)

2.5.5 Which phase, **1, 2** or **3** is considered to be anaerobic? (1)

2.5.6 . Study the detail of the mitochondrion shown below.



Name **and** state the significance of:

a) The folds indicated by label number **1.** (3)

b) The structure indicated by label **2.** (3)

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[50]

QUESTION 3 (*start at the top of a clean/new page*)

3.1 A student at the UCT Lung institute conducted an investigation to determine the effect of different concentrations of carbon dioxide on the rate and depth of breathing.

The student chose a fit and healthy person for their investigation, and subjected him to the following conditions:

- He spent the duration of the investigation lying down.
- He was given air to breathe via a mask that had different concentrations of carbon dioxide.
- The concentration of oxygen delivered via the mask was however kept constant.



During the investigation, his rate and depth of breathing at each different CO_2 concentration was measured.

The results are shown below:

Concentration of CO_2 breathed in (%)	**Number of breaths per minute**	**Total volume of air breathed per min (litres)**
0.04	**14**	**9.4**
0.08	**14**	**10.3**
1.50	**15**	**11.9**
2.30	**15**	**13.7**
3.10	**15**	**18.5**
5.50	**20**	**29.5**
6.00	**27**	**56.8**

3.1.1 State the:

a) Independent variable (1)

b) Dependent variable (1)

3.1.2 State **TWO** ways in which the reliability of this investigation could be improved. (2)

3.1.3 Plot a line graph to show the relationship between the concentration of carbon dioxide and the **number of breaths per minute** only. (6)

3.1.4 What conclusion would the UCT student come to about the effect of CO_2 on the rate and depth of breathing? (2)

3.1.5 Describe the homeostatic mechanism that regulates carbon dioxide levels in the blood of a person who engages in very strenuous physical exercise. (6)

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3.2 The table below depicts the fluids **urine**, **blood** and the **glomerular filtrate**. Study the table carefully and answer the questions that follow.

	Fluid X (g/100 ml)	**Fluid Y (g/100 ml)**	**Fluid Z (g/100 ml)**
Glucose	0.12	0.12	0
Plasma proteins	0	7.2	0
Urea	0.032	0.032	1.2
Water	94	98	88

3.2.1 Identify **Fluid Z** and give a reason for your answer. (2)

3.2.2 Identify **Fluid Y** and give a reason for your answer. (2)

3.2.3 Identify **Fluid X** and give a reason why there are no plasma proteins present. (2)

3.2.4 The amount of water has changed between the fluids indicated above. What term describes this role of the kidneys? (1)

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3.3 Study the diagrams below and answer the questions that follow.

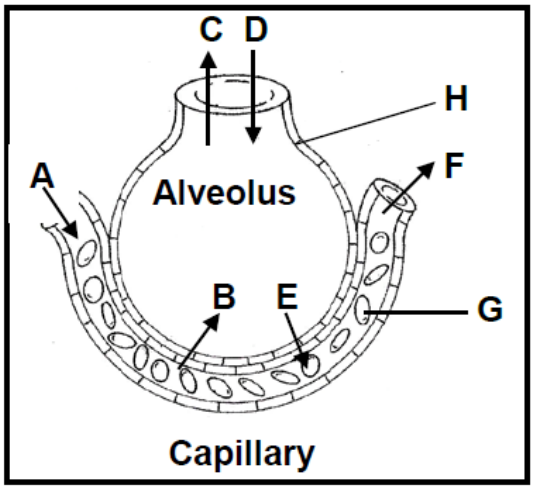


Diagram 1

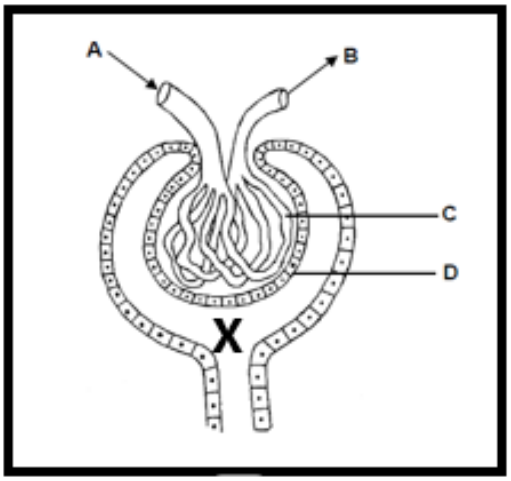


Diagram 2

3.3.1 Name the ***process*** that occurs in:

a) Diagram 1 (1)

b) Diagram 2 (1)

3.3.2 Explain TWO structural adaptations visible in **Diagram 1** that assists in the process referred to in 3.3.1 (a) above. (2x2) (4)

3.3.3 Identify <u>part</u> C in **Diagram 2.** (1)

3.3.4 Give one term for the liquid found at **X** in **Diagram 2** (1)

3.3.5 Name the pigmented protein found in part **G**. (1)

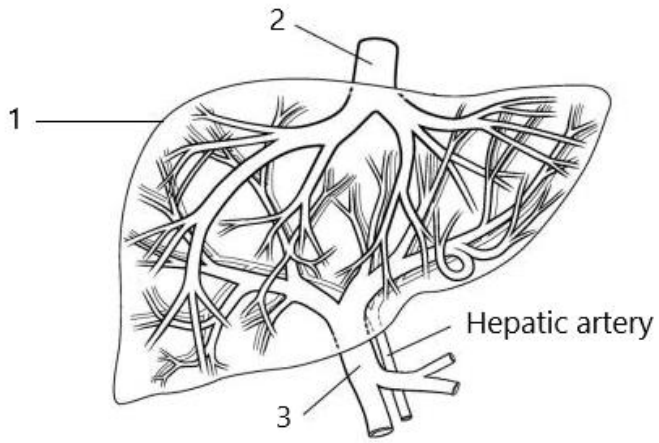
3.3.6 State **TWO** ways in which oxygen can be carried by the blood. (2)

3.3.7 Write down the **LETTER** and the **NAME**, from **<u>Diagram 2</u>**, which represents cells that have filtration slits between them. (2)

3.3.8 What is the significance of the different diameters of vessels A and B in **Diagram 2**? (2)

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



3.4.1 Identify the blood vessel numbered **3** that takes blood with digested food from the intestine to the liver. (2)

3.4.2 Will the concentration of urea be **lower or higher** in blood vessel **2** as compared to blood vessel **3**? (1)

3.4.3 Name the digestive juice made in the liver. (1)

3.4.4 Where is the digestive juice referred to in 3.4.3, stored? (1)

3.4.5 Name the process and describe how urea is formed. (4)

3.4.6 To which organ in the body is urea transported? (1)

/10/

[50]

TOTAL SECTION B: 100

GRAND TOTAL: 150 Marks