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**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2017

LIFE SCIENCES P1

MARKS: 150

TIME: 2½ hours

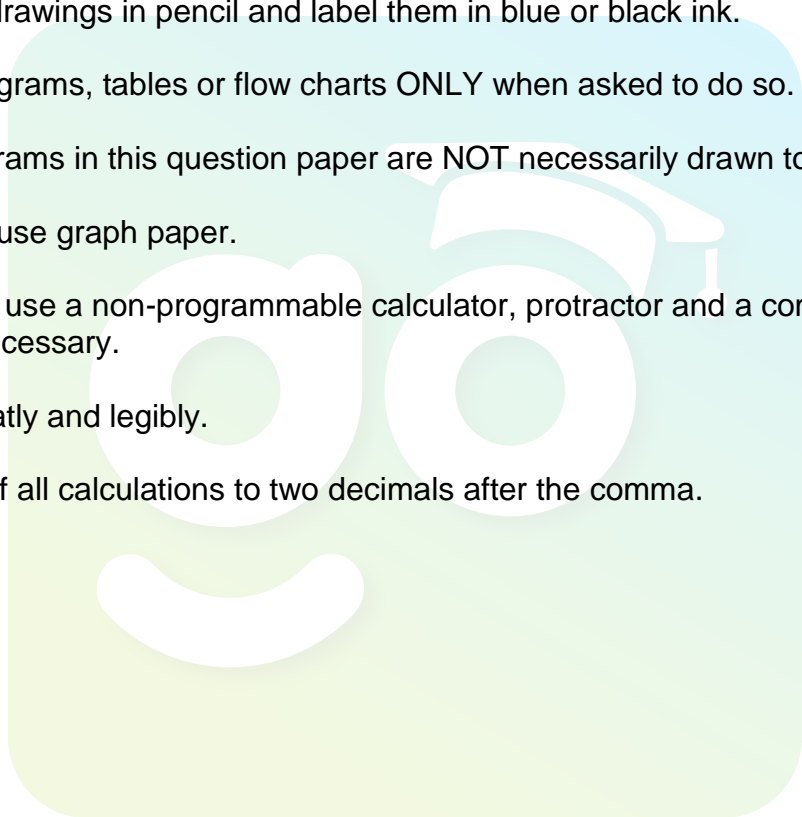


This question paper consists of 15 pages.

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.
12. Round off all calculations to two decimals after the comma.



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–D) next to the question numbers (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Plants use oxygen ...

- A continuously.
- B during the day only.
- C during the night only.
- D during photosynthesis only.

1.1.2 Which of the following substances can directly be absorbed by blood without further digestion?

- A Proteins
- B Starch
- C Glucose
- D Fats

1.1.3 Which of the following occurs during inhalation in a human?

- A Pressure within the thoracic cavity decreases
- B The lungs collapse
- C The diaphragm relaxes
- D Pressure in the abdominal cavity decreases

1.1.4 The rate of breathing is regulated by the medulla oblongata, mainly ...

- A under voluntary control.
- B according to the oxygen level of blood.
- C according to the blood pressure.
- D according to the carbon dioxide level of blood.

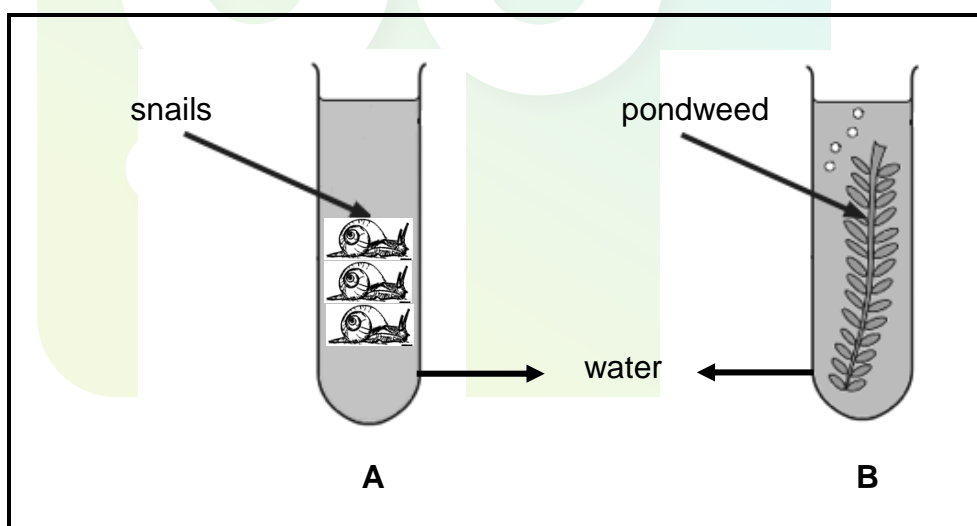
1.1.5 Which of the following is the correct sequence of activities that occurs during kidney functioning?

- A pressure filtration → excretion → re-absorption
- B re-absorption → pressure filtration → excretion
- C excretion → pressure filtration → re-absorption
- D pressure filtration → re-absorption → excretion

1.1.6 Which of the following is part of the human circulatory system?

- A Glomerulus
- B Convoluted tubules
- C Loop of Henlé
- D Bowman's capsule

- 1.1.7 Which of the following is a density-dependent factor?
- A Drought
 - B Temperature
 - C Predation
 - D Fire
- 1.1.8 The disorder resulting from insufficient intake of energy food:
- A Kwashiorkor
 - B Marasmus
 - C Atherosclerosis
 - D Bulimia
- 1.1.9 Which ONE of the following statements is TRUE about the relationship between a predator and its prey?
- A There is interspecific competition.
 - B The size of the predator population is density-dependent and is controlled by the size of the prey population.
 - C An increased number of predators leads to an increased number of prey.
 - D A decreased number of predators leads to a decreased number of prey.
- 1.1.10 Test tubes A and B below were placed in bright light.



Which of the following is correct regarding the test tubes?

- A The amount of CO_2 in test tube A will decrease
 - B The amount of CO_2 in test tube B will increase
 - C The amount of O_2 in test tube B will increase
 - D The amount of O_2 in test tube A will increase
- (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 (1.2.1–1.2.8) in the ANSWER BOOK.

1.2.1 The green, light-trapping pigment in photosynthesis found in plant leaves

1.2.2 The splitting of water molecules into hydrogen and oxygen in the presence of light

1.2.3 Site of reactions of the dark phase in the chloroplast

1.2.4 The tiny finger-like projections in the small intestine

1.2.5 The products of digestion become part of the protoplasm of the body cells

1.2.6 A disorder in children caused by the diet that has high carbohydrate content but has insufficient proteins

1.2.7 The death of all members of a particular species

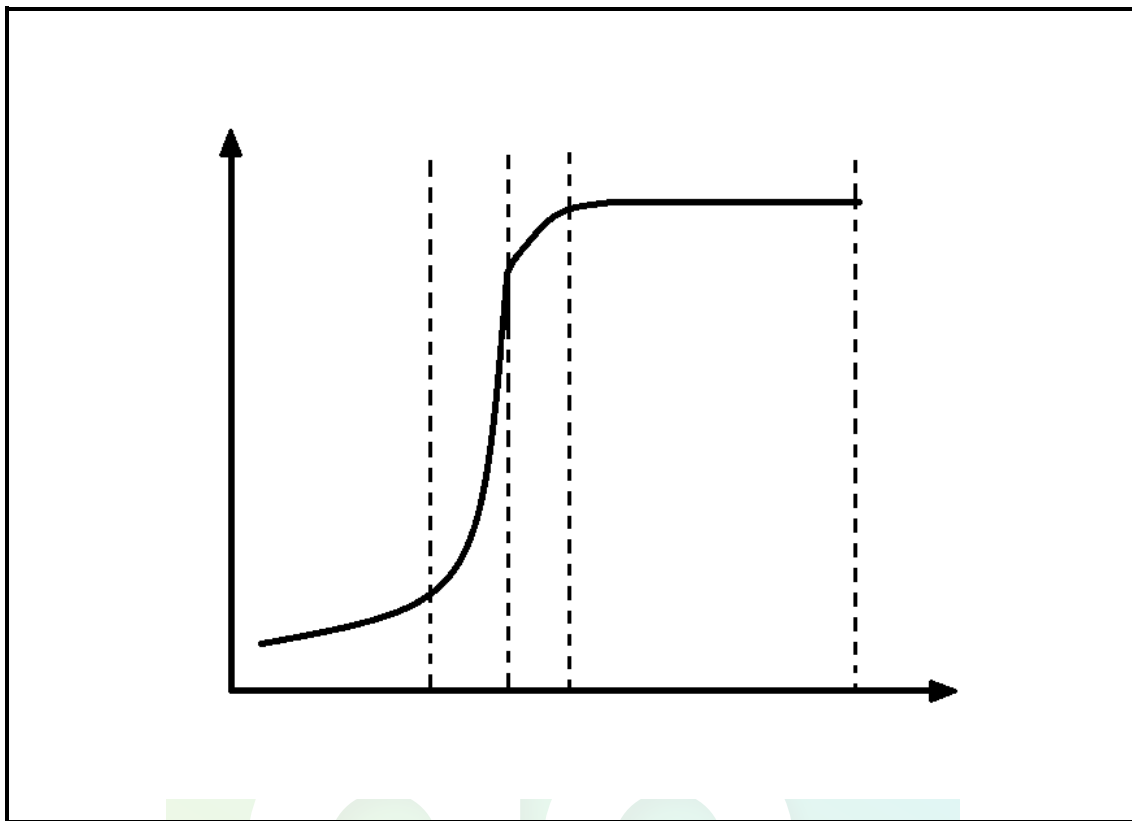
1.2.8 The general term which describes the plant species which is first to inhabit an environment (8 x 1) (8)

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 **A ONLY**, **B ONLY**, **BOTH A and B** or **NONE** next to the question number (1.3.1–1.3.3) in the ANSWER BOOK, for example 1.3.4 **B ONLY**.

COLUMN I		COLUMN II
1.3.1	Tube that carries urine from the kidney to the bladder	A: ureter B: urethra
1.3.2	The hormone/s secreted by the adrenal gland to regulate the salt concentration of the blood	A: ADH B: aldosterone
1.3.3	Characteristic feature(s) of a declining population	A: high death rate B: low birth rate

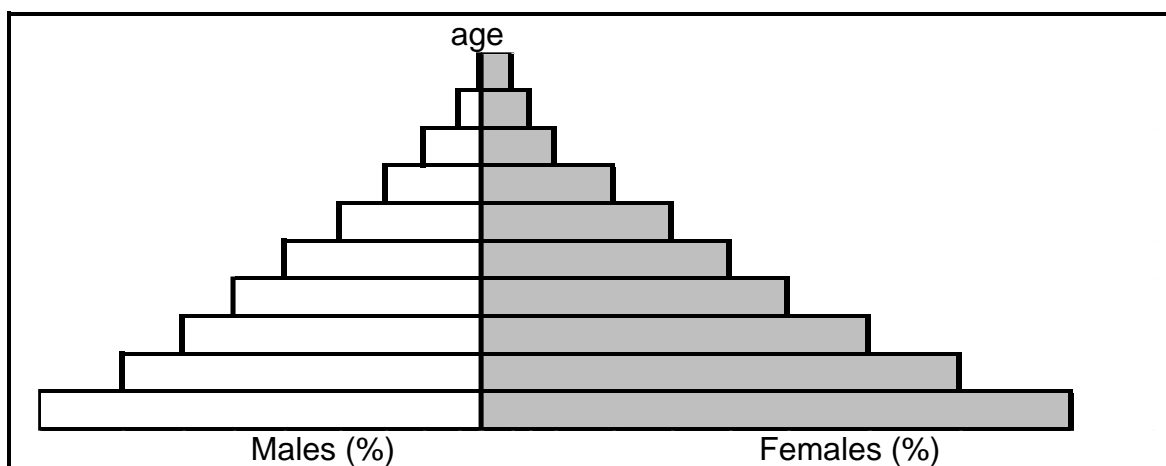
(3 x 2) (6)

- 1.4 The graph below shows the growth pattern of a rabbit population in a specific habitat over 20 years.



- 1.4.1 Identify the growth pattern illustrated in the above graph. (1)
- 1.4.2 Name the phases **A–D**. (4)
- 1.4.3 During which phase:
- (a) Does natality equal mortality? (1)
 - (b) Is population growth the fastest? (1)
 - (c) Does natality exceed mortality to the greatest extent? (1)
 - (d) Does environmental resistance come into effect? (1)

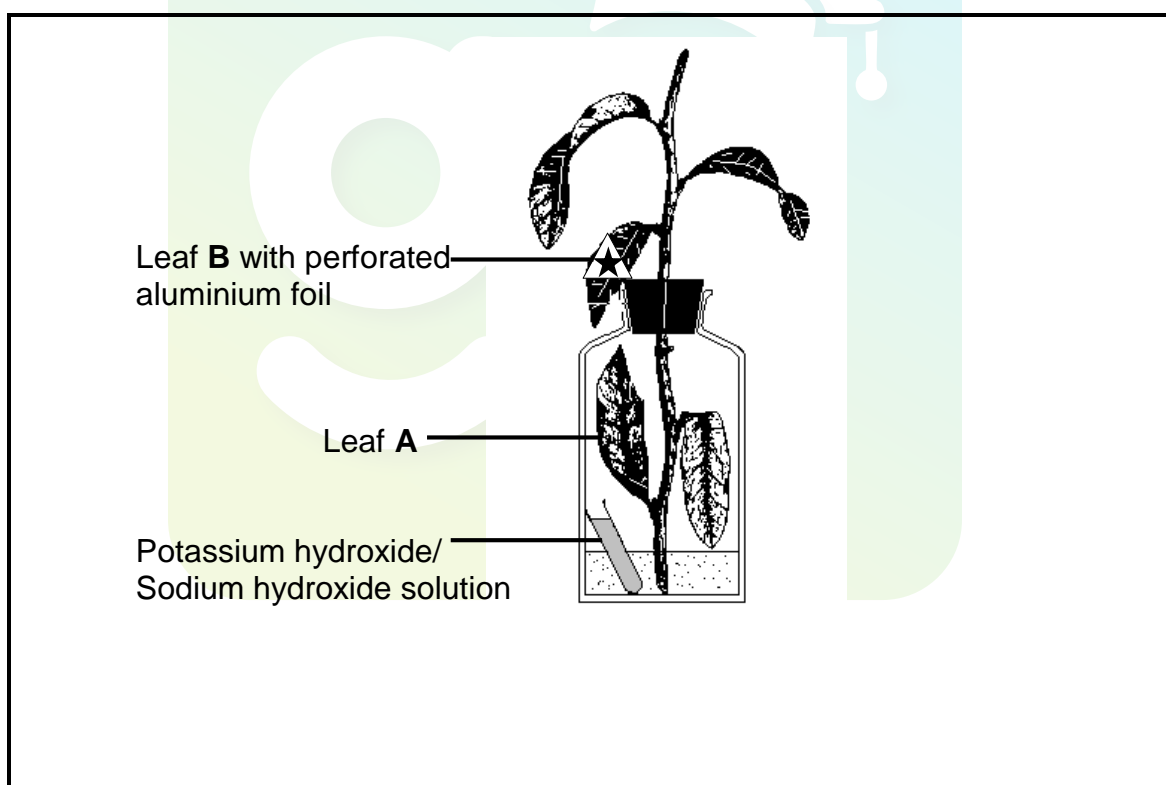
1.5 Study the population pyramid below:



1.5.1 Does the pyramid represent a developed or developing country? (1)

1.5.2 Which gender lives the longest as shown in this pyramid? (1)

1.6 Study the diagram and then answer the questions.



1.6.1 Why was the plant kept in a dark place for 48 hours before it was placed in sunlight? (1)

- 1.6.2 Looking at the diagrams given, which leaf (**A** or **B**) would be used:
- (a) To show that CO_2 is necessary for photosynthesis? (1)
 - (b) To show that light is necessary for photosynthesis? (1)
- 1.6.3 What is the role of the potassium hydroxide / sodium hydroxide in this experiment? (1)
- 1.6.4 With which chemical will you test to see if photosynthesis takes place? (1)

TOTAL SECTION A: 50



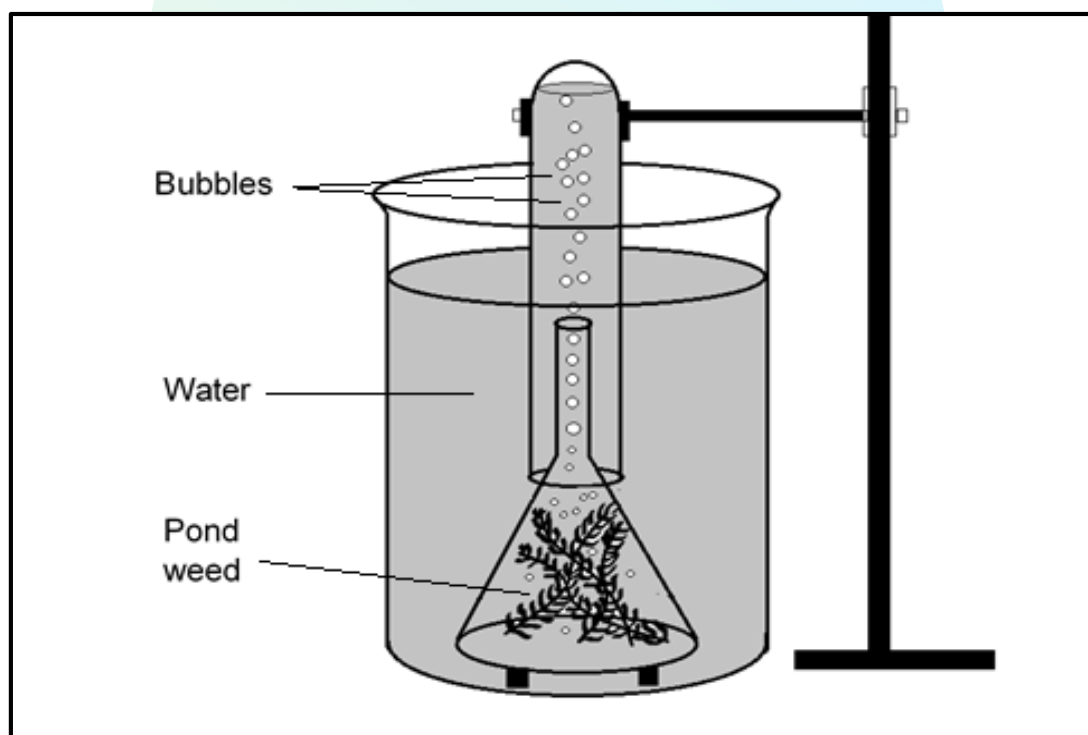
SECTION B

QUESTION 2

- 2.1 When light shines on pondweed, *Elodea* sp, bubbles of gas are released. The rate at which bubbles of gas are produced can be used to measure the rate of photosynthesis. An investigation was carried out to study the effect of different colours of light on the rate of photosynthesis in the pondweed.

The apparatus was set up as shown in the diagram below.

- The pondweed was exposed to one colour of light and left for 5 minutes before measurements were taken.
- The time taken for the release of 20 bubbles was recorded.
- The procedure was repeated using light of different colours but of equal intensity.
- The results are given in the table below.



Colour of light	Time (in seconds) for 20 bubbles to form
Violet	80
Green	40
Blue	160
Red	140
Yellow	70

2.1.1 Which colour light is the best for photosynthesis? (1)

2.1.2 Name the:

(a) Independent variable (1)

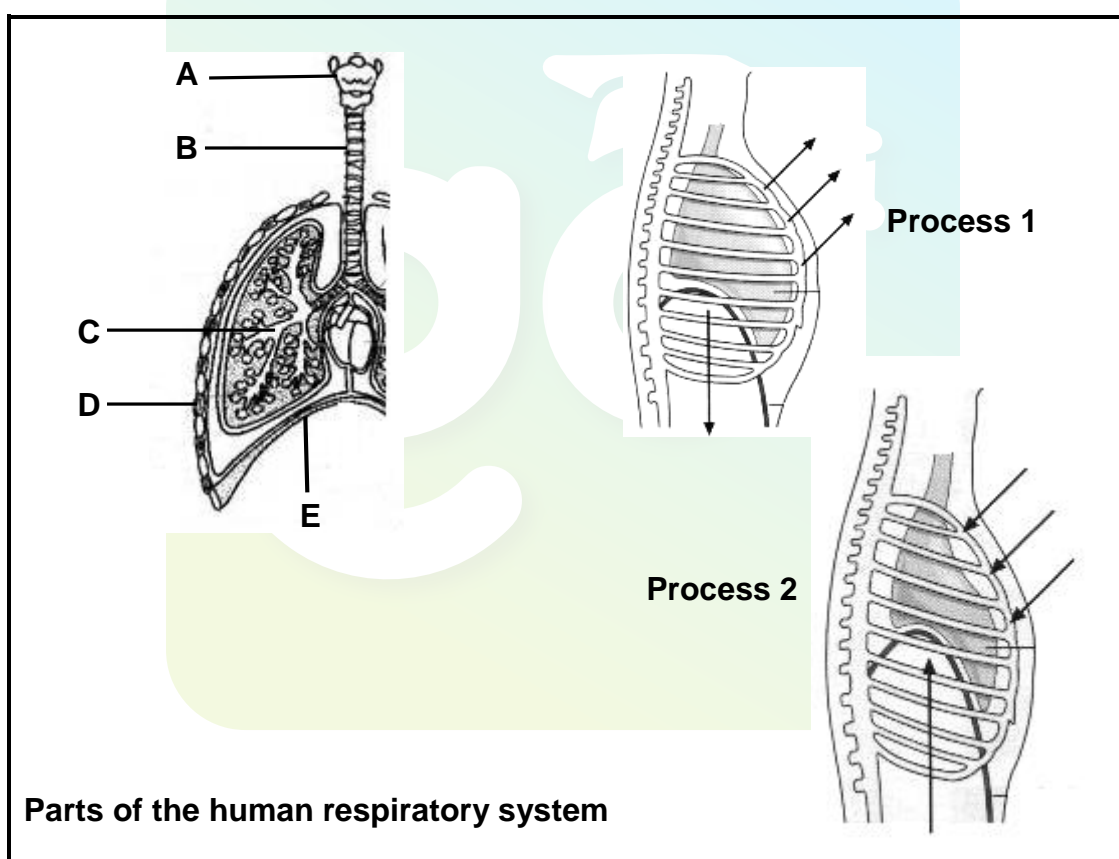
(b) Dependent variable (1)

(c) Two fixed variables (2)

2.1.3 Calculate the average time taken to release 20 bubbles for all the colours together. Show all your calculations. (2)

2.1.4 Draw a bar graph of the results shown in the table. (6)

2.2 Study the diagrams below showing some parts of the human respiratory system. Answer the questions that follow.



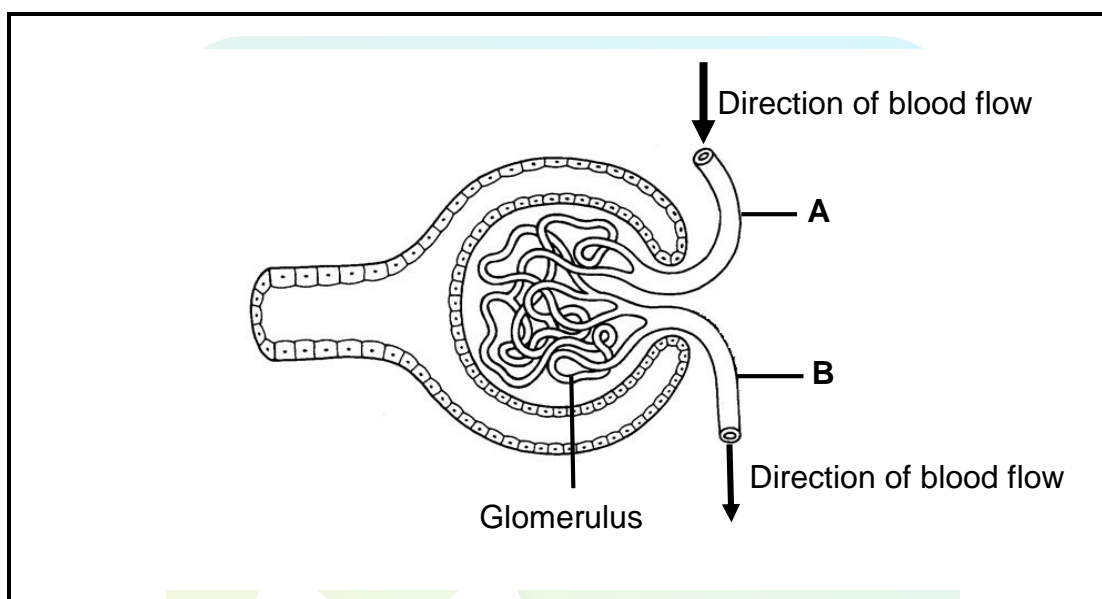
2.2.1 Identify parts **A**, **B** and **C**. (3)

2.2.2 Which process in the above diagrams illustrates inhalation (**Process 1** or **Process 2**)? (1)

2.2.3 Give TWO reasons from the diagrams to support your answer to QUESTION 2.2.2. (2)

- 2.2.4 Give the LETTERS and the NAMES of the muscles shown in the diagram that are involved during inhalation. (4)
- 2.2.5 Draw and label a diagram showing gaseous exchange across an alveolus. Use arrows to show the direction of gas movement. (5)
- 2.2.6 When one makes use of a heater to warm a room, one is advised to place a small bowl of water next to the heater. Explain the purpose of this practice. (4)
- 2.2.7 A person's thoracic wall is punctured during a motor vehicle accident. Explain how this injury will affect the breathing process. (2)

2.3 Study the representation of a Malpighian corpuscle of the nephron.



- 2.3.1 Identify the represented part of the nephron shown. (1)
- 2.3.2 Name the parts labelled **A** and **B**. (2)
- 2.3.3 Explain why the above diagram does not accurately represent one of the structural adaptations for the process taking place in it. (3)

[40]

QUESTION 3

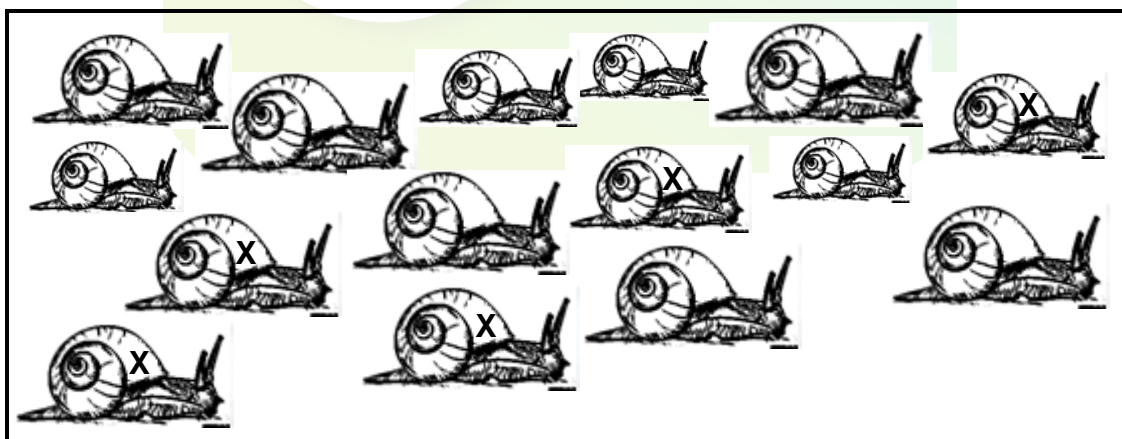
- 3.1 Study the following table that shows the flow rate and concentration of certain substances taken at regions **A**, **B**, **C** and **D** of the nephron in the human kidney.

Part of nephron	Flow rate (cm ³ /min)	Solute concentration (g/100cm ³)				
		Proteins	Glucose	Sodium ions	Ammonium ions	Urea
A	4	0	0,0	0,60	0,04	1,80
B	200	0	0,1	0,72	0	0,05
C	40	0	0,0	0,30	0	0,15
D	2000	7	0,1	0,72	0	0,05

- 3.1.1 State with a reason which of the parts (**A**, **B**, **C** or **D**) of the nephron represent the following:

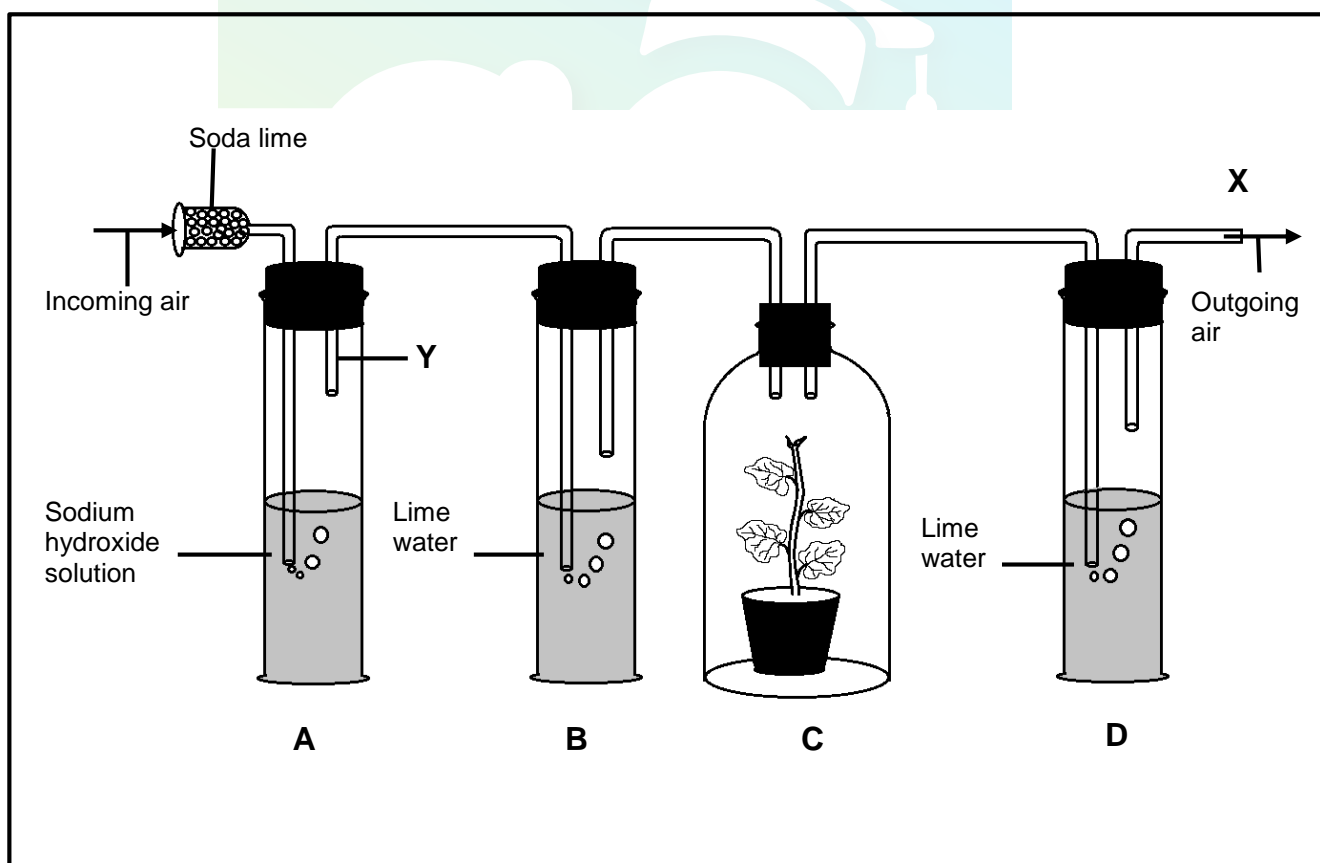
- (a) Afferent arteriole (2)
- (b) Bowman's capsule (Capsular space) (2)
- (c) Loop of Henlé (2)
- (d) Duct of Bellini/Collecting duct (2)

- 3.2 In an investigation to determine the size of the snail population in a garden, snails were collected at random. Each one was marked with an **X** and then returned to the garden. After one week, a second sample of snails was collected. The diagram shows the snails that were caught during the second selection.



- 3.2.1 Name the technique that was used to determine the population of snails in this investigation. (1)
- 3.2.2 Would you consider this method to be a direct or indirect method? (1)
- 3.2.3 Why must you use a water-resistant marker? (2)

- 3.2.4 Why was there an interval of only one week between taking the two samples and not a month or more? Give TWO reasons. (2)
- 3.2.5 Using a formula it is determined that there are 60 snails in the population. How many snails were there in the first sample? (4)
- 3.2.6 State TWO ways in which the reliability of this method can be improved. (2)
- 3.3 Define the following terms:
- (a) Carrying capacity of a habitat (2)
- (b) Ecological succession (2)
- 3.4 The diagram below shows the apparatus that was used to demonstrate that CO_2 is released during cellular respiration. The apparatus was set up as shown in the diagram and placed in a dark cupboard for a few hours. A suction pump was connected at the outlet marked X, to ensure a steady flow of air through the apparatus.

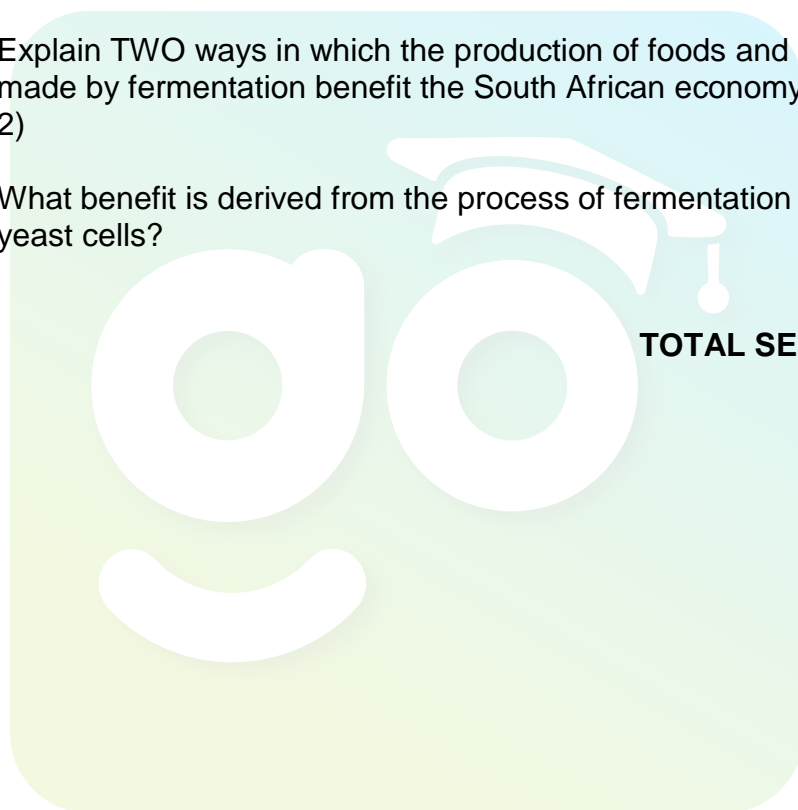


- 3.4.1 What is the function of the soda lime? (1)
- 3.4.2 Why was the apparatus placed in the dark? (1)

- 3.4.3 Why was the glass tube marked **Y** placed above the surface of the solution? (2)
- 3.4.4 After a number of hours, what observation would you expect to make in bottle **B** and **D**? Explain your observations. (5)
- 3.5 Study the following extract and answer the questions which follow.

Many food and beverage industries are entirely dependent on the fermentation process to manufacture their products. Some of the products manufactured are being distributed and sold locally while the others are exported to foreign countries.

- 3.5.1 Name ONE food and beverage product which makes use of the fermentation process in its manufacture. (1)
- 3.5.2 Explain TWO ways in which the production of foods and beverages made by fermentation benefit the South African economy. (2 x 2) (4)
- 3.5.3 What benefit is derived from the process of fermentation by the yeast cells? (2)

[40]**TOTAL SECTION B: 80**

SECTION C

QUESTION 4

- 4.1 Describe the digestion and absorption of food that contains only carbohydrates. Also, describe the transport of the products of carbohydrate digestion, following their absorption.

Content: (17)
Synthesis: (3)

NOTE: NO marks will be awarded for answers in the form of flow charts, tables or diagrams.

TOTAL SECTION C: 20
GRAND TOTAL: 150

