



# education

Department:  
Education  
**REPUBLIC OF SOUTH AFRICA**

## SENIOR CERTIFICATE EXAMINATION - 2006

**BIOLOGY P1**

**STANDARD GRADE**

**FEBRUARY/MARCH 2006**

**306-2/1 E**

**Marks: 150**

**2 Hours**

**This question paper consists of 15 pages.**

BIOLOGY SG: Paper 1



306 2 1E

SG

**X05**



**INSTRUCTIONS AND INFORMATION TO CANDIDATES**

Read the following carefully before answering the questions:

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answer to each question at the top of a new page.
4. Number the answers exactly as the questions are numbered.
5. Write neatly and legibly.
6. If answers are not presented according to the instructions of each question candidates will lose marks.
7. All drawings should be done in pencil and labelled in ink.
8. **Only** draw diagrams or flow charts when requested to do so.
9. The diagrams in the question paper may not necessarily be drawn to scale.
10. The use of graph paper is NOT permitted.
11. Non-programmable calculators, protractors and compasses may be used.

**SECTION A****QUESTION 1**

1.1 Various possible answers are provided for each question. Indicate the correct answer by writing only the **letter** of your choice next to the relevant question number.

1.1.1 Which of the following carbohydrates gives a red-brown precipitate when heated with Fehling's/Benedict's solution only?

- A Glucose
- B Starch
- C Sucrose
- D Glycogen

1.1.2 The stomach is protected against bacterial invasion by ...

- A hydrochloric acid.
- B mucus.
- C enzymes.
- D white blood cells.

1.1.3 Deamination occurs in the ...

- A stomach.
- B jejunum.
- C liver.
- D ileum.

1.1.4 Which of the following factors will have little or no effect on the rate of photosynthesis?

- A Decrease in the oxygen content of the atmosphere
- B Decrease in environmental temperature
- C Decrease in light intensity
- D Decrease in the number of chloroplasts

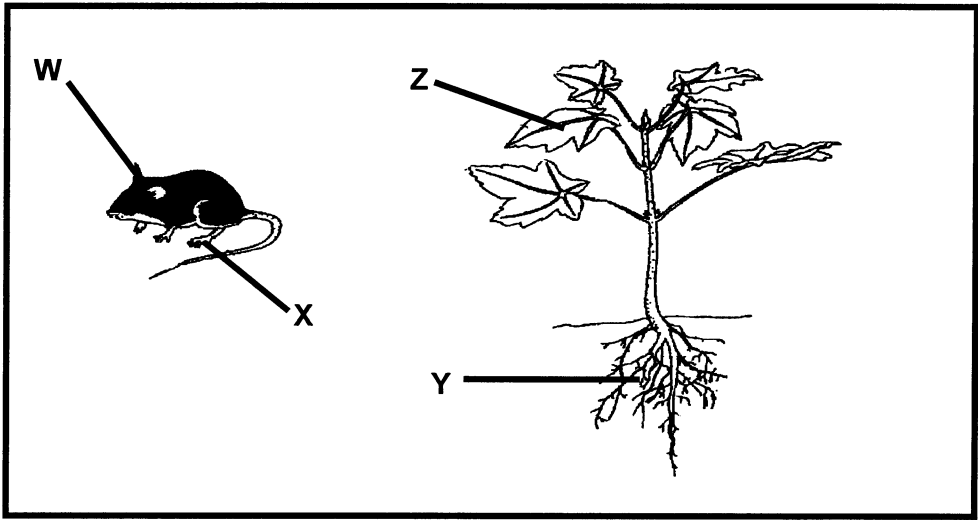
1.1.5 Listed below are some stages in the test for starch in green leaves.

- (i) Rinse the leaves thoroughly with water
- (ii) Boil the leaves in water for 2 minutes
- (iii) Immerse the leaves in iodine solution
- (iv) Boil the leaves in alcohol

The correct sequence in which these stages should be carried out, is ...

- A (i) → (iii) → (iv) → (ii)
- B (iii) → (ii) → (iv) → (i)
- C (i) → (iv) → (iii) → (ii)
- D (ii) → (iv) → (i) → (iii)

1.1.6 Where does respiration occur in the animal and the plant shown in the diagram below?



- A W only
- B W and X only
- C W, X and Y only
- D W, X, Y and Z

1.1.7 The pleural membranes ...

- A separate the thoracic and abdominal cavities from each other.
- B line the thoracic cavity and enclose the lungs.
- C enclose the liver.
- D enclose the oesophagus.

(7 x 2) (14)

1.2 Give the correct **biological term** for each of the following descriptions. Write only the **term** next to the relevant question number.

- 1.2.1 The main photosynthesizing cells in the mesophyll of a leaf
- 1.2.2 Structure in a leaf through which gaseous exchange with the environment takes place
- 1.2.3 A carbohydrate that forms the main constituent of plant cell walls
- 1.2.4 Essential inorganic nutrients which plants and animals need in small quantities
- 1.2.5 An organic nutrient which can serve as an insulating material against cold
- 1.2.6 Organic compounds used for growth and repair of body cells

(6)

- 1.3 Match the statements in COLUMN I with the items in COLUMN II. Write only the **letter** of the correct answer next to the relevant question number.

	COLUMN I	COLUMN II
1.3.1	Movement of air into and out of the lungs	A Chemical
1.3.2	Form of energy released by the sun	B Grana
1.3.3	The type of anaerobic respiration in yeast cells	C Emigration
1.3.4	An inorganic substance which serves as a solvent for nutrients	D Stroma
1.3.5	Part of the chloroplast where the light phase of photosynthesis takes place	E Water
1.3.6	An outward movement of individuals of a population from a defined area	F Radiant
		G Ventilation
		H Fermentation
		I Diffusion
		J Anorexia nervosa

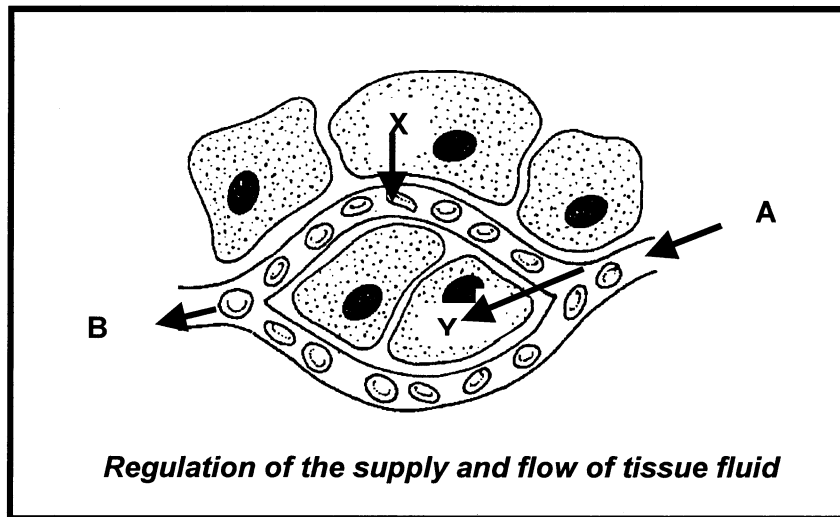
(6 x 2) (12)

- 1.4 Study the list of nutrients and then match the statements below with the relevant nutrient. Write the question numbers 1.4.1 to 1.4.5 and next to each the relevant nutrient. Nutrients may be used once, more than once or not at all.

*Retinol (vitamin A), Tocopherol (vitamin E), Thiamin (vitamin B<sub>1</sub>), Niacin (vitamin B<sub>3</sub>), Ascorbic acid (vitamin C), Iron, Iodine, Magnesium, Calcium, Sodium, Nitrogen*

- 1.4.1 Deficiency results in night blindness and drying-out of the cornea. (2)
- 1.4.2 Important constituent of thyroxin. (2)
- 1.4.3 Component of chlorophyll molecules. (2)
- 1.4.4 Lemons and oranges are good sources of this nutrient. (2)
- 1.4.5 Deficiency results in rickets. (2)
- (10)**

- 1.5 The diagram below illustrates a physiological process that takes place in humans. Study the diagram and answer questions that follow.



- 1.5.1 Identify the process that X and Y illustrate. (2)
- 1.5.2 Name the gas represented by:
- (i) X (1)
- (ii) Y (1)
- 1.5.3 Explain the cause of the direction of movement of gas X. (2)
- 1.5.4 State ONE form in which gas Y is transported. (1)
- 1.5.5 Give ONE adaptation of red blood corpuscles for their function. (1)
- (8)**

**TOTAL QUESTION 1: 50**  
**TOTAL SECTION A: 50**

**SECTION B****QUESTION 2**

2.1 Read the passage below and then answer the questions that follow.

**CHOLESTEROL KILLS**

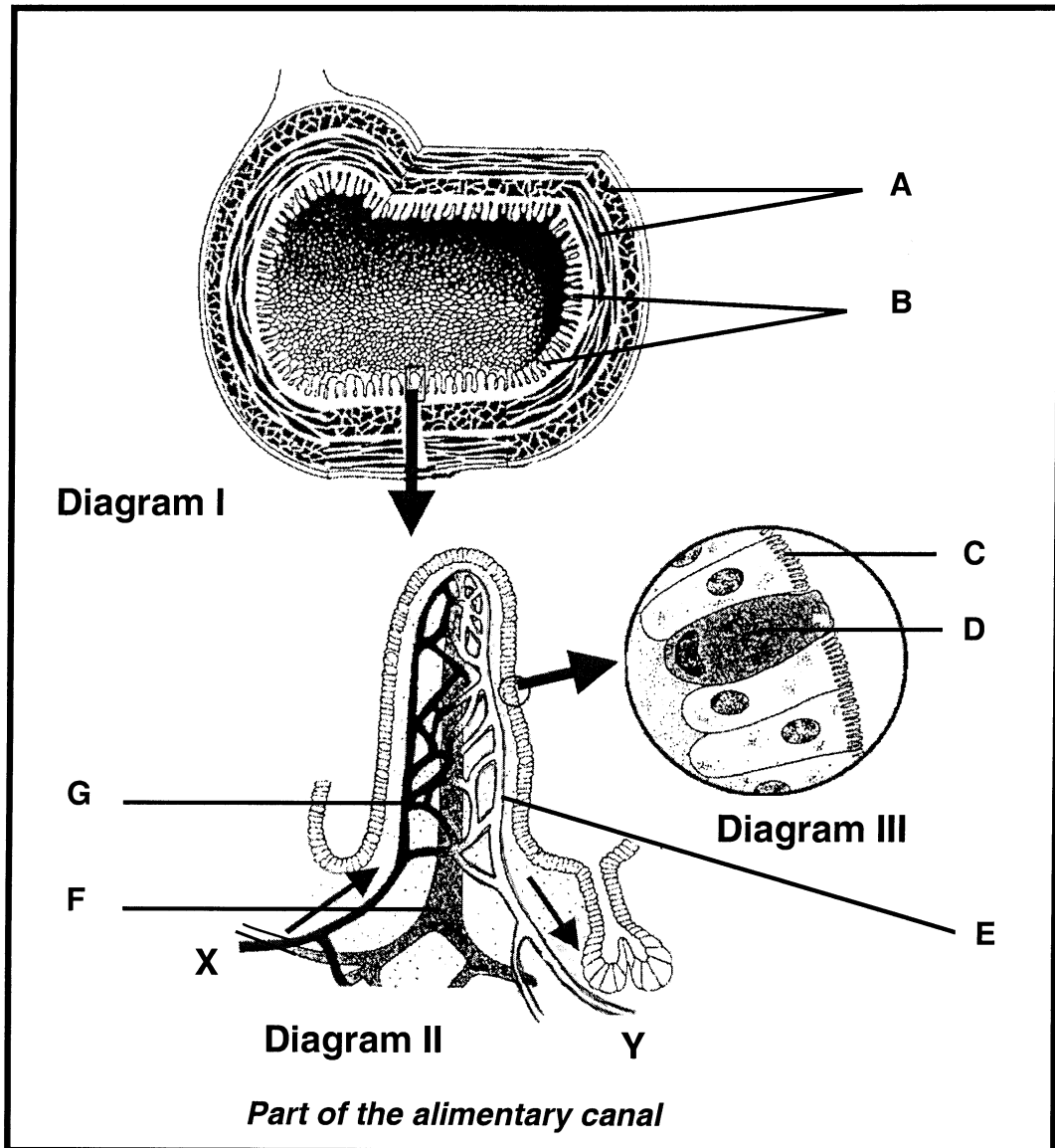
*Cholesterol is a 'fat-like' substance, which is produced in the bodies of all animals, including humans. Although cholesterol is important for our bodies, we produce enough for our own purposes and so, strictly speaking, we do not need to eat any at all to stay healthy. However, as cholesterol is a normal animal product, all animal foods will contain some.*

*Egg yolk is a very rich source, but offal such as liver and kidney, shellfish such as shrimps and prawns, and dairy products such as cream and butter, also contain a large amount of cholesterol.*

*In some countries, many people have fatty deposits on the inside walls of their arteries. These deposits build up over a period of many years and make the lumen of the artery narrower and narrower. This interferes with the blood supply to the heart, and leads to heart attacks. A high level of cholesterol in the blood stream encourages the build up of these deposits, thereby increasing the risk of a heart attack.*

- 2.1.1 Name TWO food types (from the text) which are sources of cholesterol. (2)
- 2.1.2 Explain, with a reason, the fact that although cholesterol is important for our health it is not required in our diet. (3)
- 2.1.3 Describe how high levels of cholesterol in the blood increase the risk of heart attacks. (5)
- 2.1.4 List TWO factors that have the greatest effect on the blood cholesterol level. (2)
- (12)

2.2 Study the diagrams below and then answer the questions that follow.



- 2.2.1 Through which part of the alimentary canal is the cross-section represented by Diagram I made? (1)
- 2.2.2 Provide labels for A, C and D. (3)
- 2.2.3 Explain THREE ways, visible in the diagram, in which the part represented by Diagram II is structurally suited for its function. (6)
- 2.2.4 Which **letter** represents the vessel that transports the end products of fat digestion? (1)
- 2.2.5 Where will there be a higher concentration of glucose, at X or Y? Give a reason for the answer. (2)

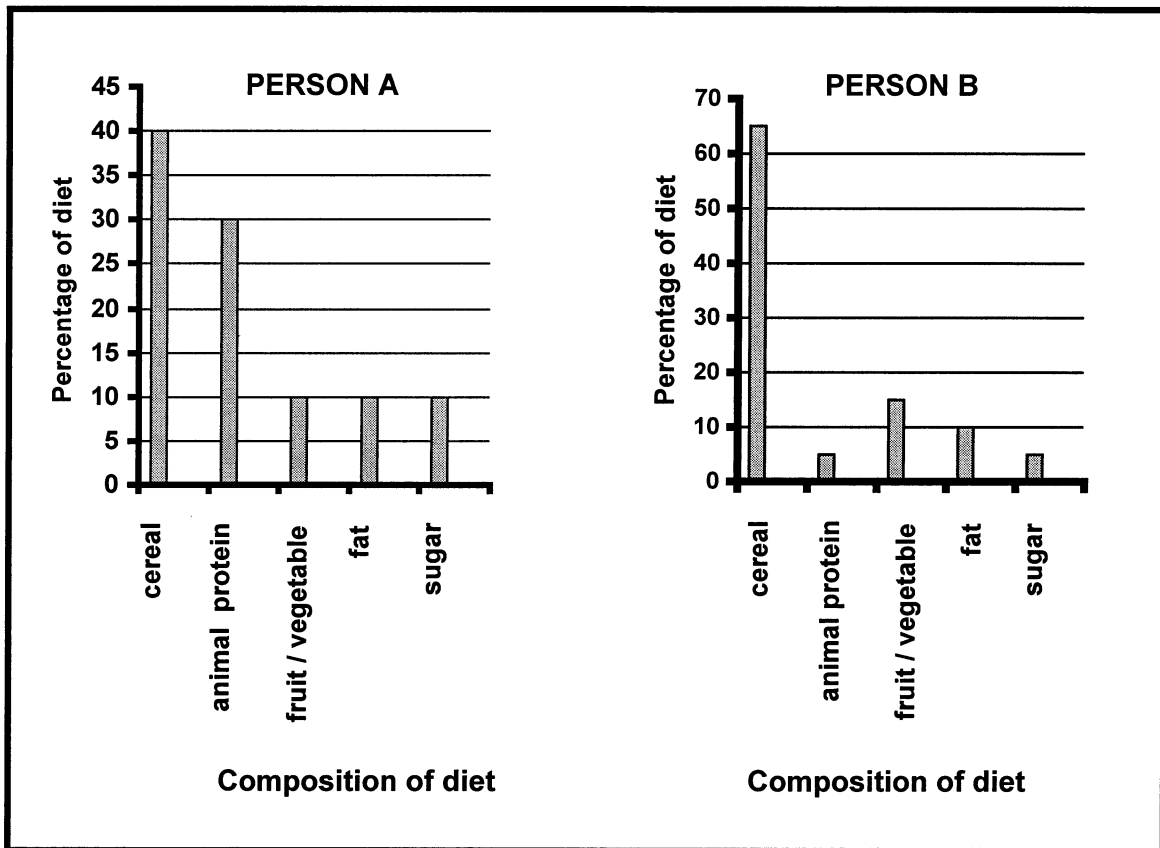
(13)

TOTAL QUESTION 2: 25



**QUESTION 3**

3.1 The bar graphs below show the composition of the diets of two people, A and B.



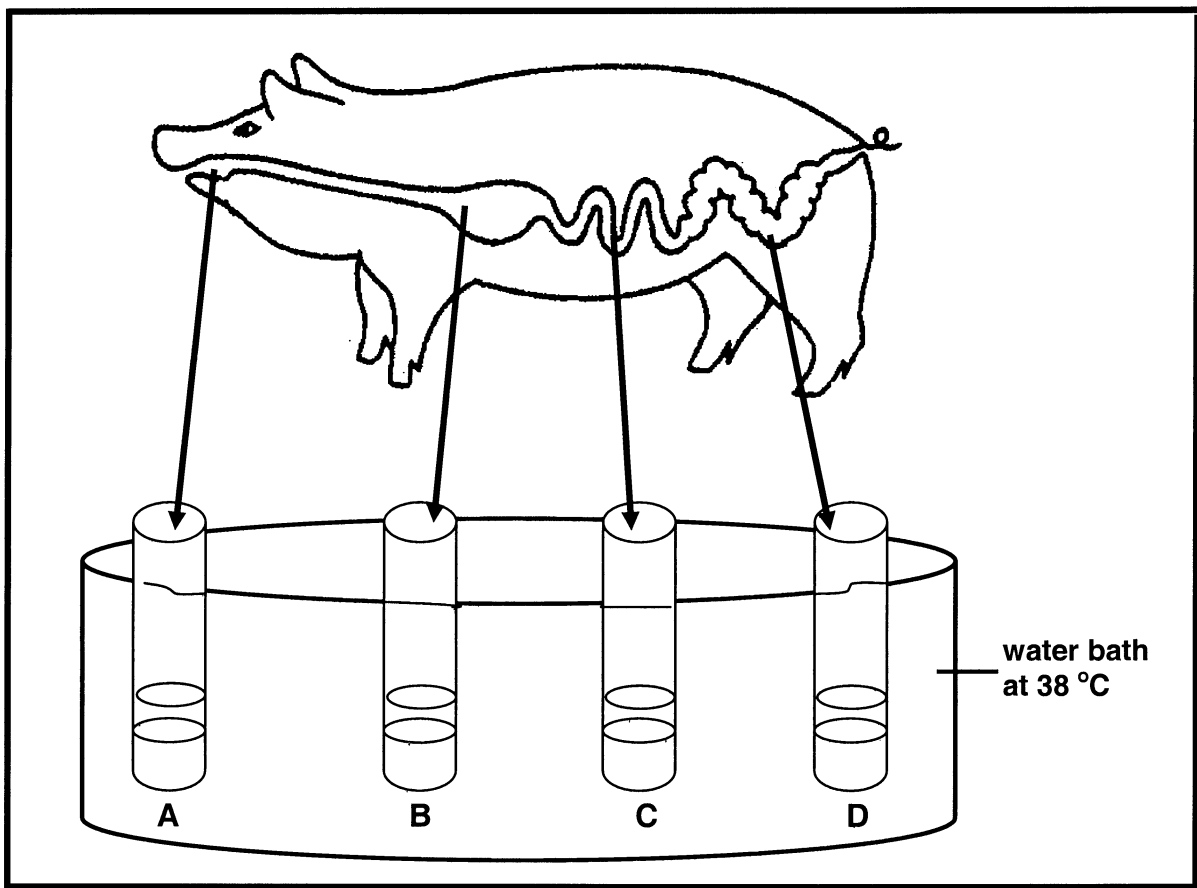
- 3.1.1 Calculate the difference in the percentage of animal protein between the diets of person A and person B. Show all workings. (2)
  - 3.1.2 Name ONE component of the diets of A and B which shows the greatest similarities in terms of percentage. (2)
  - 3.1.3 Both cereal and fruit contain fibre. List THREE reasons why fibre is an important part of the diet. (6)
- (10)**

3.2 The diagram below represents a mammal showing the different parts of the alimentary canal.

In an investigation, liquid from four different parts of the alimentary canal namely, the mouth, the stomach, the small intestine and the large intestine was removed and placed in four test tubes A, B, C and D, respectively. Each test tube contained an equal amount of starch solution.

Five drops of a test reagent / chemical was added to each test tube. The test tubes were then placed in a water bath for several hours.

The results are indicated in the table below.



**Results of starch test**

Test tubes	A	B	C	D
Observation	Contents turn yellow brown	Contents turn blue-black	Contents turn yellow brown	Contents turn blue-black

3.2.1 Name the test reagent / chemical that is used to test for the presence of starch. (1)

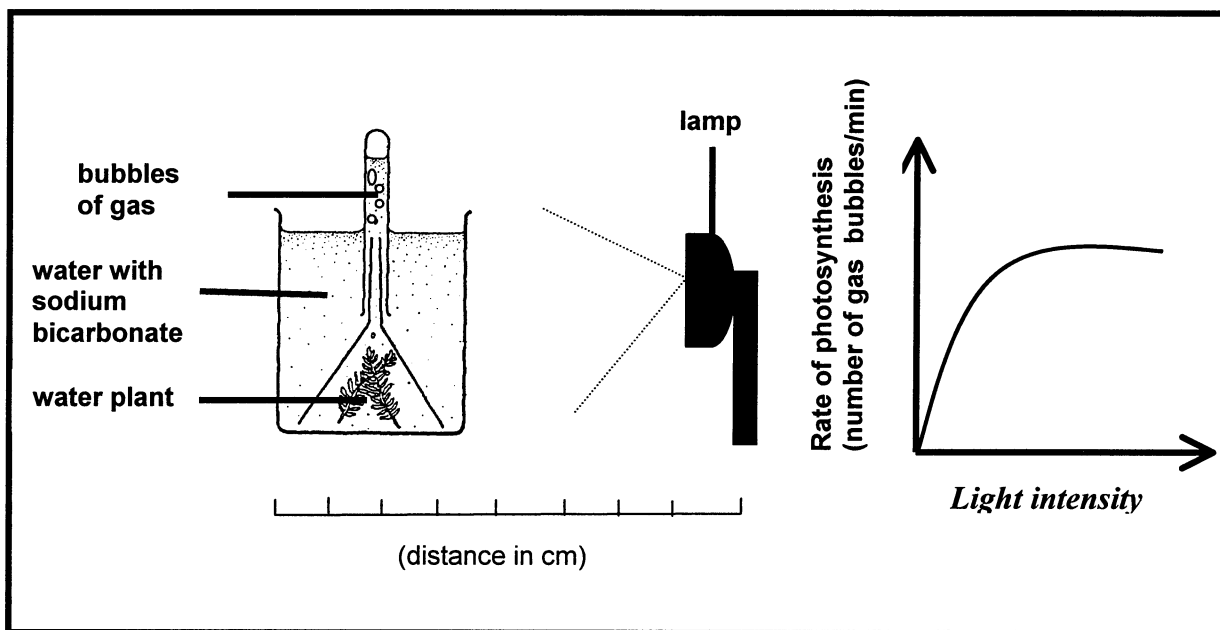
3.2.2 Provide an explanation for the results obtained in test tubes B and D. (2)

3.2.3 Describe what you can conclude from the results, about the digestion of starch in the alimentary canal of a mammal.

(3)  
 (6)

3.3 The diagram below represents the apparatus that was set up to investigate some aspects of photosynthesis.  
 The light intensity was increased at regular intervals and the number of gas bubbles released per minute was recorded on a graph.  
 The gas collected causes a glowing splint to burst into flames.

Study the diagram and then answer the questions that follow.



3.3.1 State ONE aim that can be achieved with this set up.

(2)

3.3.2 Name the gas which is being released into the test tube.

(1)

3.3.3 Name TWO other environmental factors apart from light, that can influence the rate at which the gas bubbles are produced.

(2)

3.3.4 Why was sodium bicarbonate added to the water?

(2)

3.3.5 State TWO reasons why the process of photosynthesis is biologically important.

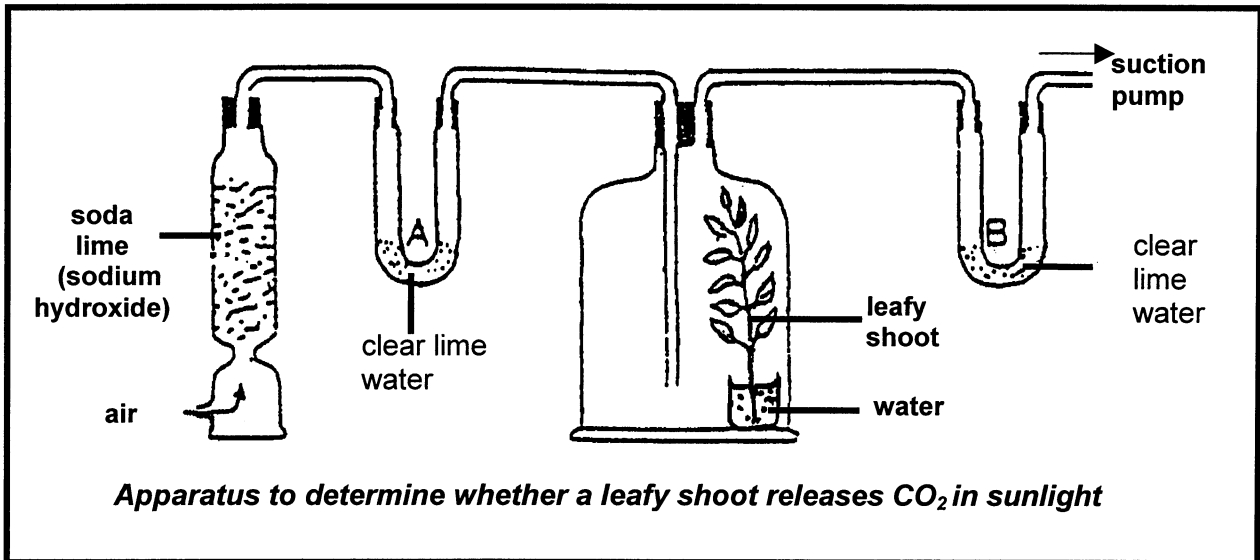
(2)

(9)

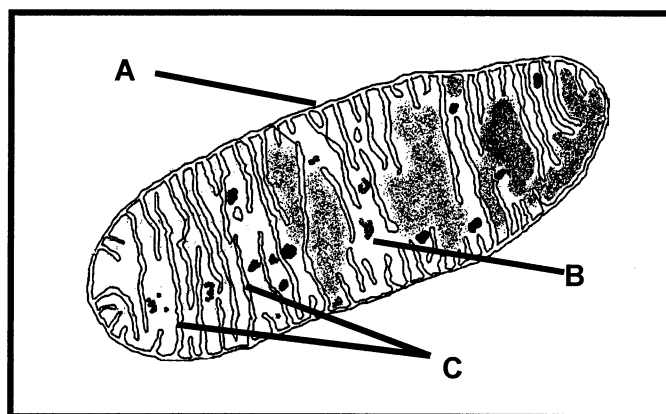
**TOTAL QUESTION 3: 25**

**QUESTION 4**

4.1 A learner wanted to find out if a leafy shoot releases CO<sub>2</sub>. He/she set up an apparatus as illustrated below and placed it in the sunlight.

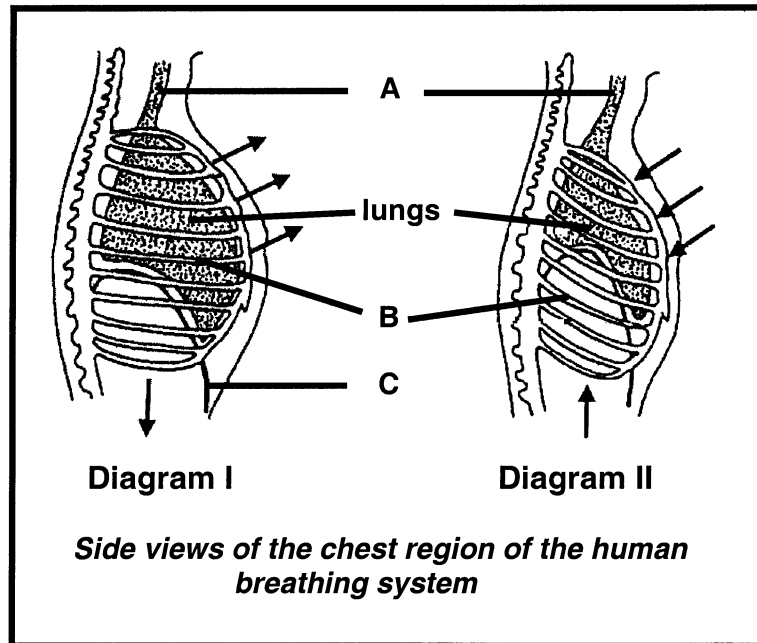


- 4.1.1 Briefly explain why the lime water in A remained clear. (2)
- 4.1.2 How would the learner know that the leafy shoot has released CO<sub>2</sub>? (2)
- 4.1.3 After 3 hours of investigation, there was still no indication that CO<sub>2</sub> was released. Explain the experimental error that the learner might have made. (2)
- 4.1.4 The physiological process that the learner was investigating takes place in the following organelle.



- (i) Identify the organelle. (1)
  - (ii) Give labels for parts A, B and C. (3)
  - (iii) Explain the significance of part C. (2)
- (12)**

4.2 Study the diagrams below and answer the questions which follow.



- 4.2.1 Label parts A, B and C. (3)
- 4.2.2 State the function of the part labelled B. (1)
- 4.2.3 Name TWO muscles that are involved during breathing. (2)
- 4.2.4 Which diagram illustrates the process of inhalation? (1)
- 4.2.5 Describe TWO observable features on the diagram to support your answer to QUESTION 4.2.4. (4)
- 4.2.6 Describe the relationship between pressure and volume in Diagram II. (2)

(13)

**TOTAL QUESTION 4: 25**

**QUESTION 5**

5.1 Four pots of the same size were filled with equal amounts of soil. Seeds were planted in each pot as follows:

- Pot A - 25 bean seeds  
 Pot B - 3 pea seeds and 3 bean seeds  
 Pot C - 5 pea seeds and 7 bean seeds  
 Pot D - 9 pea seeds and 9 bean seeds

The seeds were watered well and left in a place with enough sunlight. After two weeks the number of plants in each pot was counted. The average height of the plants above the ground was also measured.

The results are shown in the table below.

	Number of plants	Average height of plants
<b>Pot A</b>	8	2 cm
<b>Pot B</b>	6	6 cm
<b>Pot C</b>	8	5 cm
<b>Pot D</b>	8	3 cm

5.1.1 In which pot ( A, B, C or D):

- (i) Will intraspecific competition occur? (1)  
 (ii) Will the least competition occur? (1)  
 (iii) Was a single population found? (1)  
 (iv) Will the most interspecific competition occur? (1)

5.1.2 What is the carrying capacity of the pots? (1)

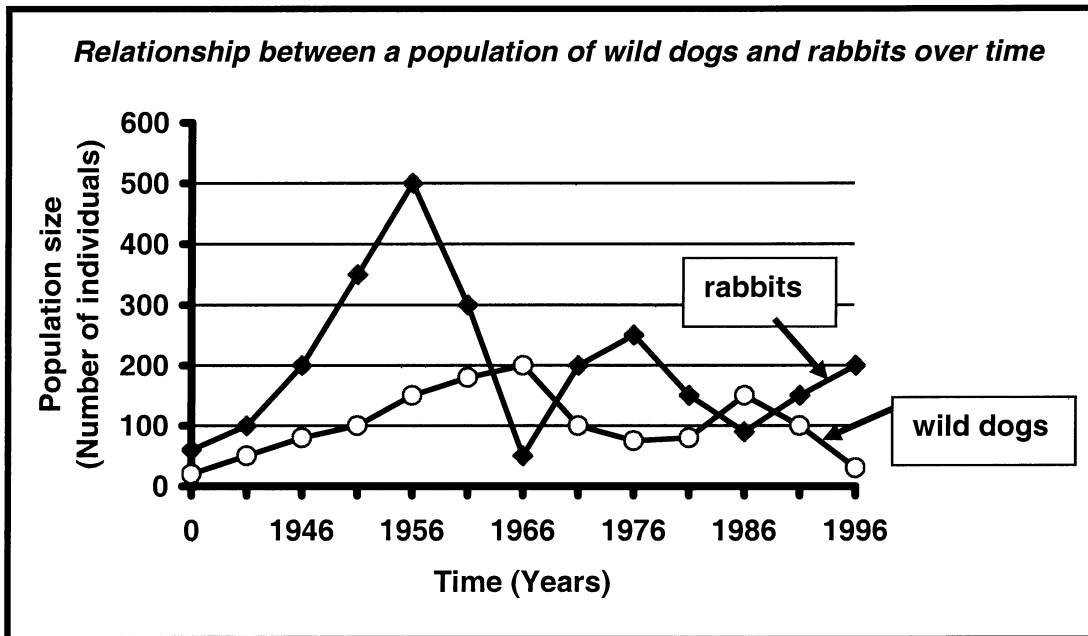
5.1.3 Why was the average height of the plants used instead of a single reading only? (1)  
**(6)**

5.2 The information on the energy flow of a particular organism is as follows:

- R - respiration and heat loss: 452 kJ  
 C - total energy used: 1 400 kJ  
 (E + F) - excretion and defaecation: 864 kJ

Use the formula:  $C = P + R + (E + F)$  to determine the amount of energy in kJ available for growth and secondary production. **(4)**

5.3 Study the graph below and answer the questions that follow.



5.3.1 Which population regulating factor is illustrated by this graph? (1)

5.3.2 Is this regulating factor named in QUESTION 5.3.1 a density-dependent or a density-independent factor? Give a reason for your answer. (3)

5.3.3 How many of the following were there in 1966?

(i) Rabbits (1)

(ii) Wild dogs (1)

5.3.4 What is the maximum number of rabbits that have survived in this environment? (1)

5.3.5 What effect does a small number of wild dogs have on the rabbit population? Explain your answer. (2)

5.3.6 Name ONE technique that can be used to estimate the size of the rabbit population. (1)  
 (10)

5.4 Tabulate TWO differences between a logistic growth form and a geometric growth form. (5)

**TOTAL QUESTION 5: 25**  
**TOTAL SECTION B: 100**  
**GRAND TOTAL: 150**