DEPARTMENT OF EDUCATION
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATION – 2005

BIOLOGY P1

STANDARD GRADE

FEBRUARY/MARCH 2005

Marks: 150

2 Hours

This question paper consists of 16 pages.

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 use diagrams and 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 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 During inhalation in mammals, the …

A diaphragm becomes more curved.
B rib cage expands.
C volume of the thoracic cavity decreases.
D pressure in the thoracic cavity increases.

1.1.2 Anorexia nervosa refers to a…

A deficiency disease resulting from daily intake of fat.
B nervous breakdown as a result of lack of vitamins in the diet.
C psychological condition when a person refuses to eat a balanced diet even when food is available.
D deficiency disease as a result of lack of protein in the diet.

1.1.3 Which of the following is the correct order in which stored food substances in humans are utilised by the body during starvation?

A Carbohydrates, proteins, fats
B Fats, carbohydrates, proteins
C Fats, proteins, carbohydrates
D Carbohydrates, fats, proteins

1.1.4 Which ONE of the following is the site of photosynthesis in plant cells? The ...

A mitochondrion.
B chloroplast.
C nucleus.
D cytoplasm.

1.1.5 The process of respiration in green plants occurs …

A mainly during the day.
B mainly during the night.
C during day and night.
D only during high humidity.

1.1.6 Which ONE of the following carbohydrates is stored in the mammalian muscle and liver?

A Glycerol
B Glycogen
C Cellulose
D Starch

1.1.7 Vitamins in humans are required …

A to prevent goitre.
B as a source of energy for cellular respiration.
C to assist enzyme activity.
D as a building material for body cells. (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 A protective membrane surrounding the lungs

1.2.2 The chemical element in haemoglobin essential for the transport of oxygen

1.2.3 The type of epithelium on the inside of the trachea

1.2.4 The process of breaking up of fat into tiny fat droplets

1.2.5 The process by which digested food becomes part of the body of an organism

1.2.6 The process in plants during which radiant energy is converted into chemical energy

1.2.7 The green pigment in leaves which absorbs radiant energy **(7)**

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 The site of respiration	A Larynx
1.3.2 Warms, moistens and filters air	B Cilia
1.3.3 Produces sound	C Hepatic portal vein
1.3.4 Transports absorbed glucose to the liver	D Nasal cavity
1.3.5 An organic compound that is temporarily bound to an enzyme	E Hydrolysis
1.3.6 Simple sugars formed during photosynthesis in green plants	F Mitochondrion
1.3.7 The chemical break down of large molecules into simpler ones with the addition of water	G Co-enzyme
	H Glucose
	I Condensation

(7 x 2) **(14)**

1.4 The table below shows the results of an investigation that was carried out to determine the rate of an enzyme-controlled reaction at different pH values.

pH	1	2	3	4	5	6
Rate of reaction in arbitrary units	9	12	7	4	2	0

1.4.1 State the pH at which the enzyme:

(a) Worked the best (2)

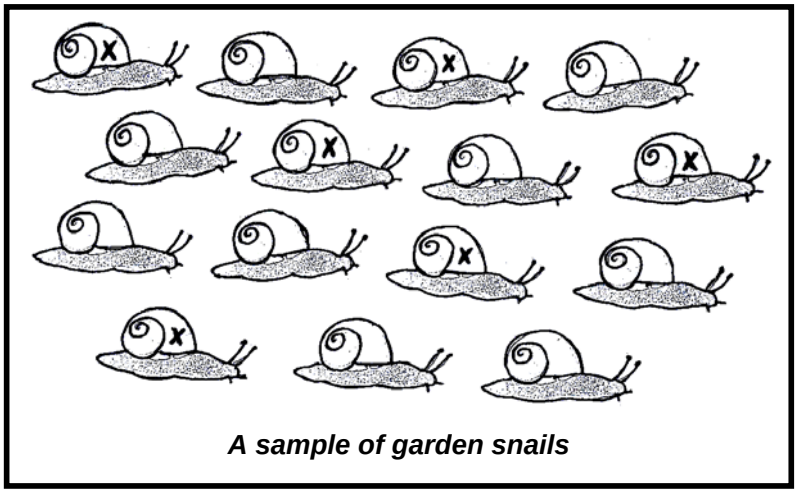
(b) Did not work at all (2)

1.4.2 In which part of the human alimentary canal will this enzyme work best? (1)

1.4.3 Name the substance that gives this part named in QUESTION 1.4.2, this pH. (1)

1.4.4 Name TWO other factors that could have affected the activity of this enzyme. (2)
(8)

1.5 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 random selection of snails was collected.
The diagram below shows the snails that were caught during the second selection.



A sample of garden snails

1.5.1 Name the indirect technique that was used to estimate the population of snails in this investigation. (1)

1.5.2 Suggest ONE way in which they were marked. (1)

1.5.3 How many snails were marked in the above sample? (1)

1.5.4 Which of the following precautions should always be taken whenever the indirect technique mentioned in QUESTION 1.5.1 is used? Write only the letter(s) of your choice.

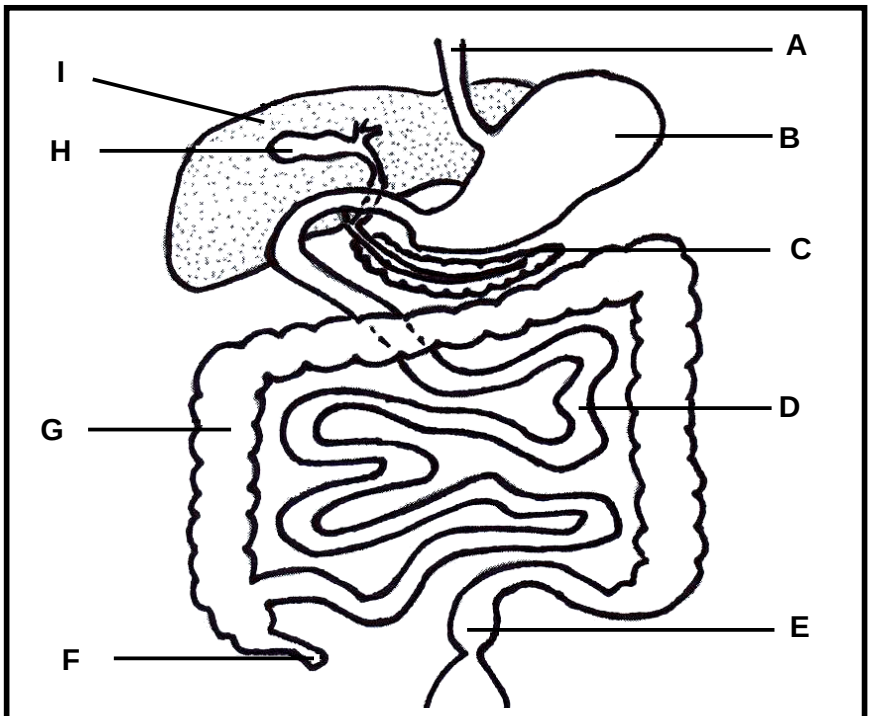
A The snails should be allowed to mix with each other after marking.
B The average of several samples should not be calculated.
C Emigration and migration should be allowed to occur.
D The mark should last for the entire period of investigation.
E The mark should affect the animal's movement. (4)
(7)

Total Question 1: 50
TOTAL SECTION A: 50

SECTION B

QUESTION 2

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



Part of the human digestive system

2.1.1 Label parts A, E, F and H. (4)

2.1.2 State THREE functions of organ I in nutrition. (3)

2.1.3 Write the **letter** of the part:

(a) That represents both an endocrine and exocrine gland (1)

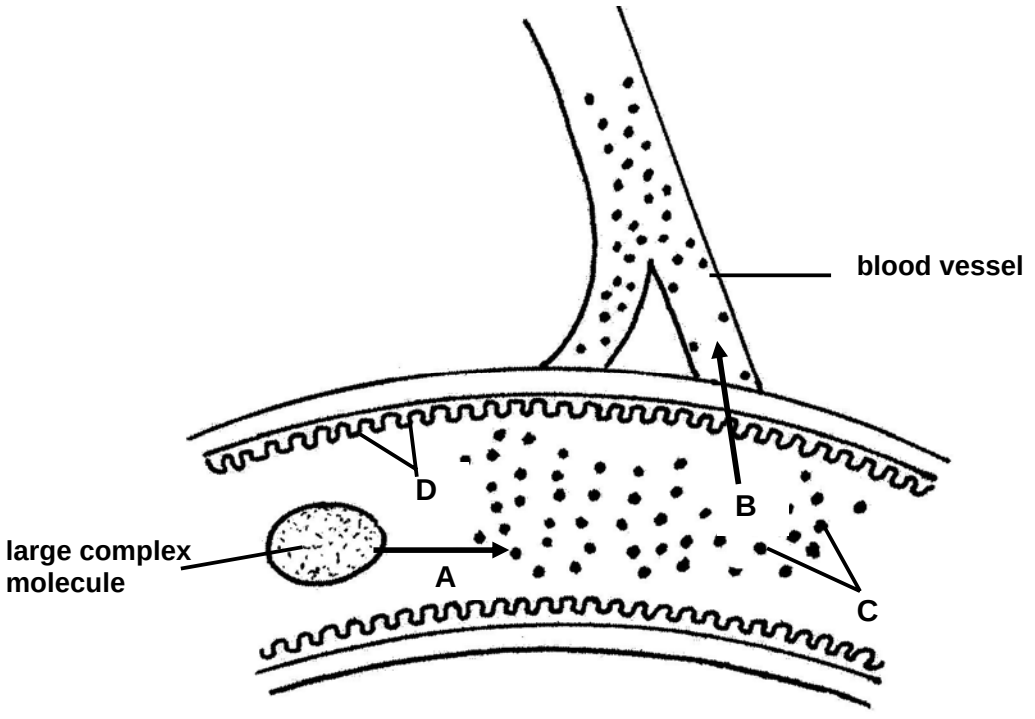
(b) Where protein digestion begins (1)

(c) Where most water and mineral salts are absorbed (1)

(d) That stores bile (1)

2.1.4 Explain THREE ways in which part D is suited for its function. (6)
(17)

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



Diagrammatic representation of a portion of the digestive system

2.2.1 Name the processes represented by arrows:

(a) A (1)

(b) B (1)

2.2.2 Explain the role of water in process B. (2)

2.2.3 Identify the finger-like projections found on D. (1)

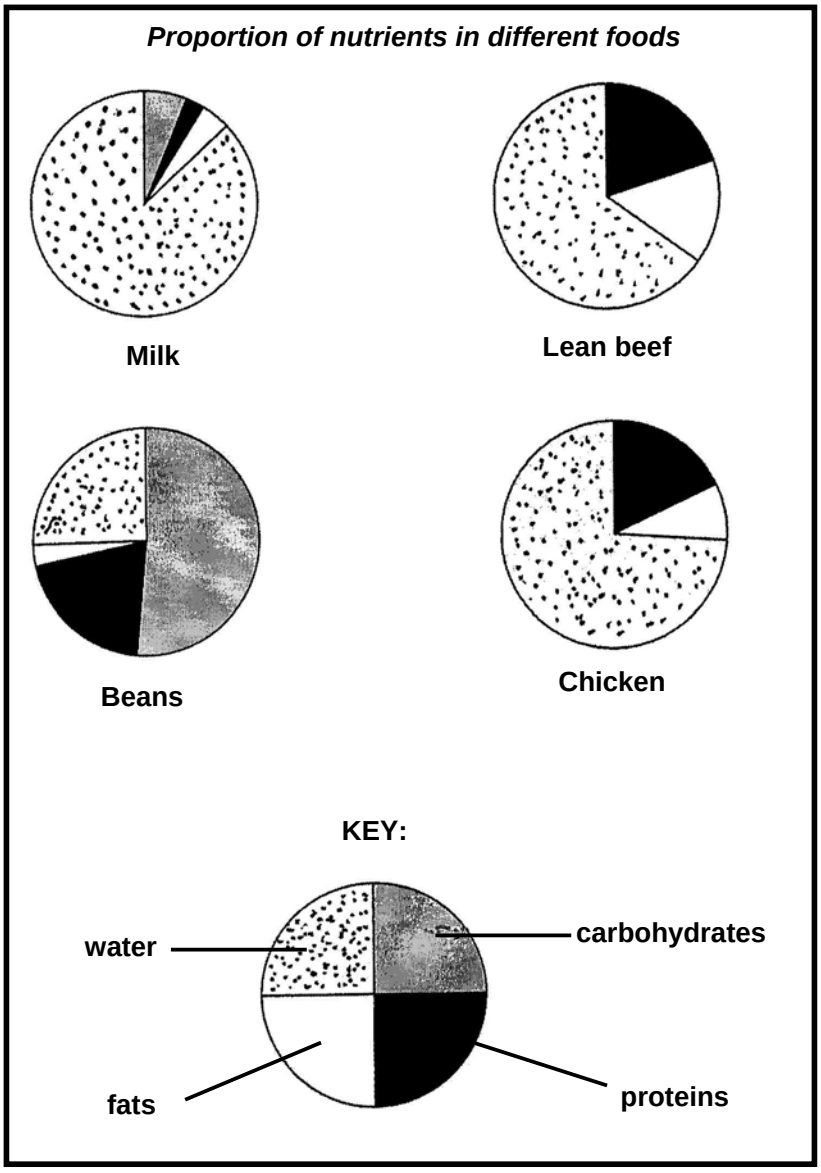
2.2.4 If the large, complex molecule is a protein, name molecules C. (1)

2.2.5 Explain what happens to the excess of molecules C in the body. (2)
(8)

Total Question 2: 25

QUESTION 3

3.1 Study the pie charts below and then answer the questions that follow.



3.1.1 Name:

(a) TWO foods, which will be **most** suitable for the formation of cell membranes (2)

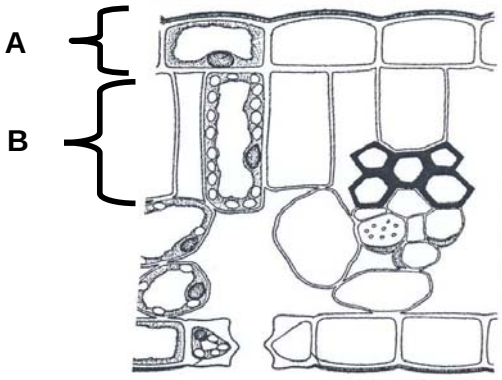
(b) ONE food, which is the **least** suitable source of energy rich reserve fuel (1)

(c) TWO foods, which are **least** suitable for the prevention of constipation (2)

(d) TWO foods, which are most likely to cause gout (an accumulation of uric acid in the joints) in humans (2)

3.1.2 Explain why beans have a very high carbohydrate content when compared with the other foods. (2)
(9)

3.2 Study the following diagram and answer the questions that follow.



Transverse section through a leaf

3.2.1 Name TWO inorganic substances that plants require for the process of photosynthesis. Next to each, also indicate where each of the substances comes from. (4)

3.2.2 Explain ONE way in which each of the following tissues is structurally suited for the process of photosynthesis:

(a) A (2)

(b) B (2)

3.2.3 Explain the reason for each of the following steps in the procedure to test for starch in a leaf:

(a) Boiling the leaf in water (2)

(b) Boiling the leaf in alcohol or methylated spirits (2)

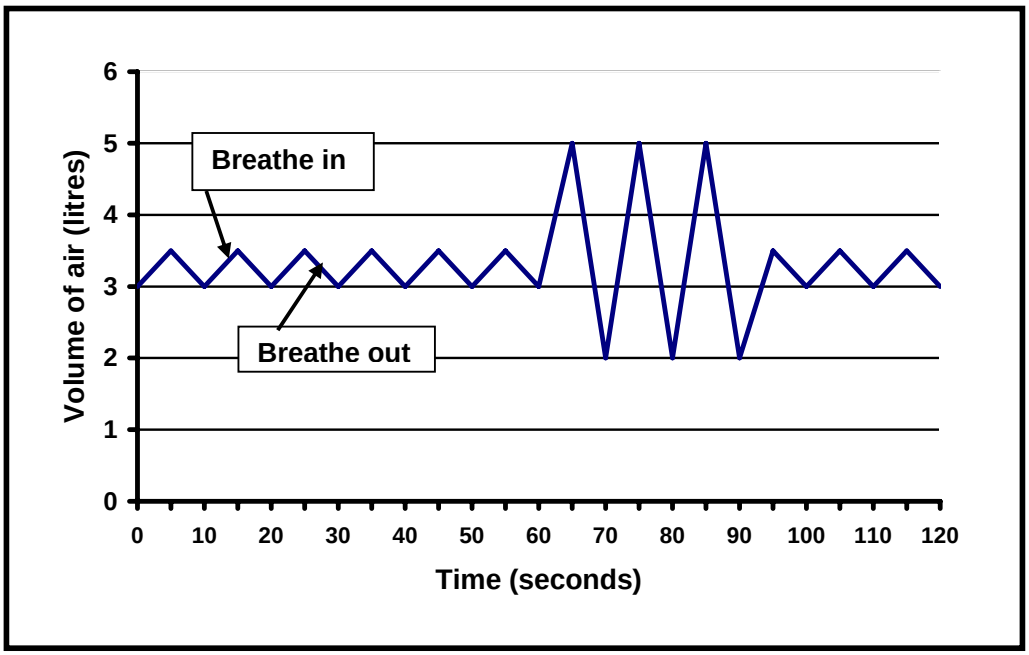
(c) Rinsing the leaf in water after it has been boiled in alcohol or methylated spirits (2)

(d) Heating the alcohol or methylated spirits in a container placed in a water bath rather than directly over the flame (2)
(16)

Total Question 3: 25

QUESTION 4

4.1 The graph below represents the results of an investigation using a spirometer. A spirometer is an instrument used to measure the amount of air that enters and leaves the lungs during breathing.

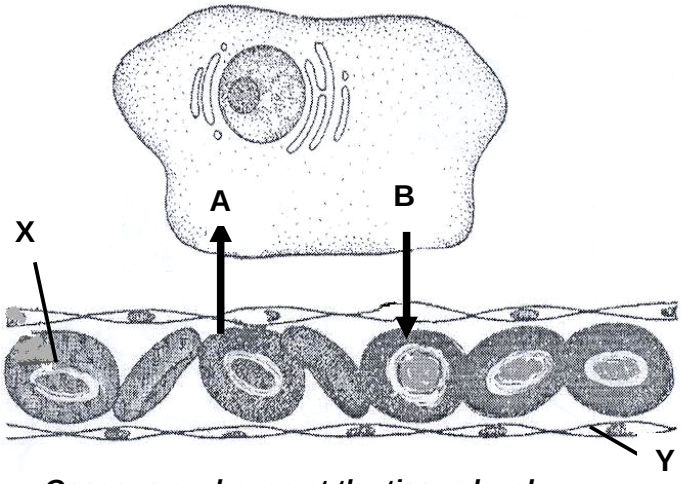


4.1.1 How much air is taken into the lungs in one breath during deep breathing? (2)

4.1.2 Provide an explanation for the change in the pattern of the graph between 65 seconds and 95 seconds. (3)

4.1.3 How many breaths did the person take in the first 60 seconds? (1)
(6)

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



Gaseous exchange at the tissue level

4.2.1 List TWO ways in which gas B is transported in the blood. (2)

4.2.2 Name tissue Y. (1)

4.2.3 Explain ONE way in which cell X is structurally suited for its function. (2)
(5)

4.3 Answer the questions based on the information in the table below.

Composition of gases in inhaled and exhaled air

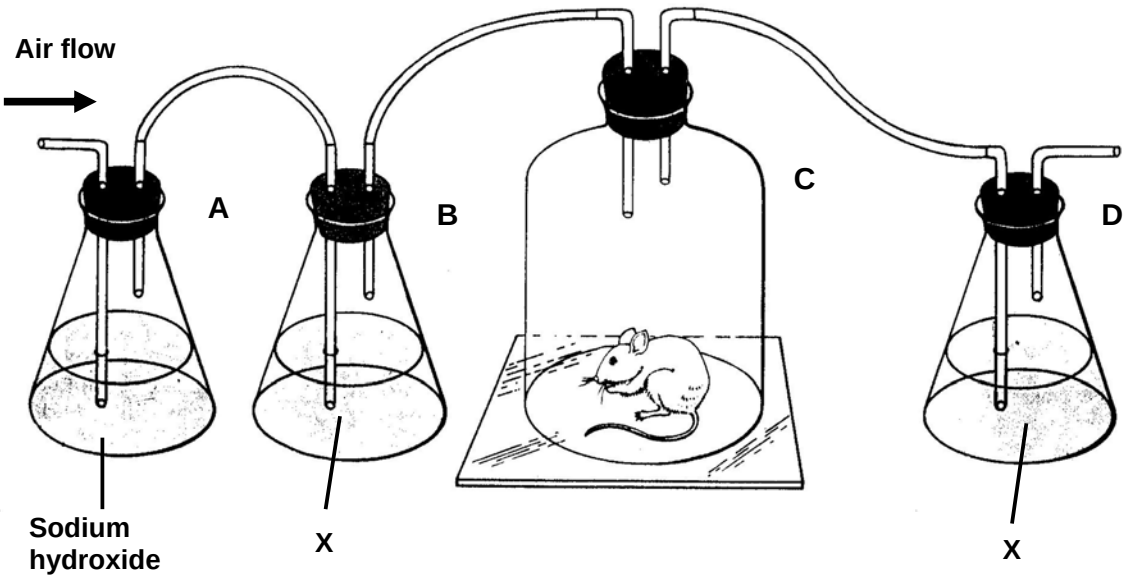
Gases	Inhaled air	Exhaled air
Nitrogen	79,00%	78,8%
Oxygen	20,87%	16,4%
Carbon dioxide	0,03%	4,1%

4.3.1 Name ONE other gas not listed in the table which is also inhaled and exhaled. (1)

4.3.2 Calculate the percentage of nitrogen trapped in the lungs during breathing. Show ALL calculations. (2)

4.3.3 Explain why 0,03% carbon dioxide was inhaled and yet 4,1% was exhaled. (2)
(5)

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



Apparatus used to investigate a biochemical process in a rat

4.4.1 Which biochemical process is being investigated in this experiment? (1)

4.4.2 Name the indicator that is represented by X in flask B. (1)

4.4.3 State the purpose of the:

(a) Sodium hydroxide in flask A (2)

(b) Indicator X in flask B (2)

4.4.4 Describe a control for this investigation. (3)
(9)

Total Question 4: 25

QUESTION 5

5.1 Read the following passage and then answer the questions.

Cellular Respiration

Adenosine triphosphate (ATP) is the immediate source of energy used by muscles. When glucose is broken down during cellular respiration to release energy, this energy is transferred to ATP molecules.
The first step in the breakdown of glucose molecules takes place in the absence of oxygen. This is known as the anaerobic phase. One of the substances produced here is lactic acid which accumulates in the muscle cells.
If plenty of oxygen is available then aerobic respiration takes place. This results in the formation of carbon dioxide and water instead of lactic acid.

5.1.1 Name:

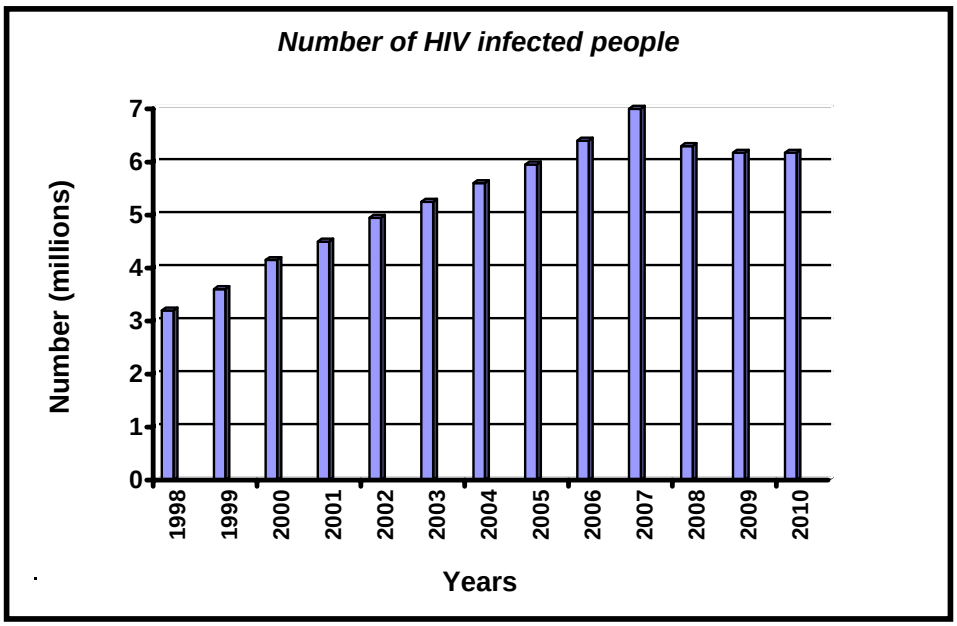
(a) The main fuel molecule for cellular respiration (1)

(b) TWO products of aerobic respiration (2)

(c) ONE product of anaerobic respiration in muscles (1)

5.1.2 State ONE difference between anaerobic respiration in plant cells and in animal cells. (2)
(6)

5.2 The South African population has experienced one of the fastest growth rates of HIV/AIDS in the world. The graph below shows actual measurements taken up to 2003 and projected thereafter. The rapid rate of spread of HIV/AIDS in both urban and rural areas is due partly to a good transport infrastructure and a mobile population.



5.2.1 Define the term population. (3)

5.2.2 In which year is it projected that the number of HIV infected South Africans would be the highest? (1)

5.2.3 In which year is it projected that there will be a drop in numbers, for the first time, of people being infected with HIV? (1)

5.2.4 State ONE reason why there might be a drop in numbers of those infected with HIV. (2)

5.2.5 Which year shows a total of approximately 4,5 million HIV infections? (1)

5.2.6 What direct technique can be used to determine the size of the population? (1)

5.2.7 Explain why this disease can be classified as a density-dependent factor. (3)

5.2.8 In many African countries, the rate of infection is slower in the rural areas than in the urban areas. Suggest why this is not the case in South Africa. (2)
(14)

5.3 Differentiate between the following terms:

(a) Interspecific competition and intraspecific competition (3)

(b) Predator and prey (2)
(5)

Total Question 5: 25
TOTAL SECTION B: 100
GRAND TOTAL: 150