education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

LIFE SCIENCES P1

NOVEMBER 2006

MARKS: 150

TIME: 2 hours

This question paper consists of 18 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions 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 correctly according to the numbering system used in this question paper.
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 blue or black ink.
8. Only draw diagrams or flow charts when requested to do so.
9. The diagrams in this question paper are NOT necessarily drawn to scale.
10. The use of graph paper is NOT permitted.
11. Non-programmable calculators, protractors/compasses may be used.

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SECTION A

QUESTION 1

1.1 Various possible options are provided as answers to the following questions. Choose the correct answer and write only the letter (A - D) next to the question number (1.1.1 - 1.1.6) in the answer book, for example 1.1.7 D.

1.1.1 Which ONE of the following performs a function OPPOSITE to that of a chloroplast?

A Leucoplast
B Nucleolus
C Chromosome
D Mitochondrion

1.1.2 The function of the nucleolus is also related to the functioning of the …

A chloroplast.
B plasmalemma.
C mitochondrion.
D ribosome.

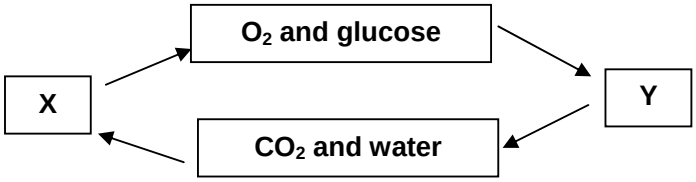
1.1.3 In which of the following cells would you expect mitochondria to be most numerous?

A Bone cells
B Fat storage cells
C Muscle cells
D Nerve cells

1.1.4 Which of the following shows the correct path of air movement during inhalation?

A Trachea → bronchus → bronchioli → alveoli
B Alveoli → bronchioli → trachea → bronchus
C Alveoli → bronchioli → bronchus → trachea
D Bronchus → bronchioli → trachea → alveoli

QUESTIONS 1.1.5 and 1.1.6 refer to the flow chart below.



1.1.5 Which process is represented by X and Y respectively?

	X	Y
A	Respiration	Photosynthesis
B	Photosynthesis	Respiration
C	Transpiration	Photosynthesis
D	Photosynthesis	Transpiration

1.1.6 Radiant energy is…

A not involved in these processes.
B needed by both X and Y.
C needed by Y and released by X.
D needed by X only. **(6 x 2)** **(12)**

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).

1.2.1 The fluid matrix found in the chloroplast

1.2.2 Tubes that are part of the extensive system of membranes found throughout the cytoplasm

1.2.3 The platform on which a slide is placed in the microscope

1.2.4 The structure in a microscope which controls the amount of light passing through a slide

1.2.5 A group of similar cells with the same origin and function

1.2.6 The membrane that covers the surface of the lungs

1.2.7 The light-trapping pigment found in the leaves

1.2.8 The process by which carbon dioxide moves out of the stomata in a leaf **(8 x 1)** **(8)**

1.3 Match the items in COLUMN B with the statements in COLUMN A. Write only the letter (A - K) next to the question number (1.3.1 - 1.3.7), for example 1.3.8 A.

COLUMN A		COLUMN B	
1.3.1	The energy-rich carbohydrate that is formed during photosynthesis	A	nasal cavity
1.3.2	The substance in blood essential for the transport of oxygen	B	chlorophyll
1.3.3	Warms, moistens and filters air in humans	C	cilia
1.3.4	The movement of water molecules through a differentially permeable membrane	D	haemoglobin
1.3.5	Many tissues grouped together to make a structure with a special function	E	starch
1.3.6	Structures found within a cell which performs a particular function	F	organ
1.3.7	Structures that carry the genetic characteristics of an organism	G	organelles
		H	diffusion
		I	osmosis
		J	centromere
		K	chromosomes

(7 x 1) (7)

1.4 The table below shows the composition of the blood of three different people. Study it and answer the questions that follow.

	Red blood corpuscles per mm^3	**White blood cells per mm^3**	**Platelets per mm^3**
Person A	7 500 000	560	250 000
Person B	5 100 000	6 100	260 000
Person C	2 200 000	5 000	500

1.4.1 State ONE function of each of the following:

(a) Red blood corpuscles (1)
(b) White blood cells (1)

1.4.2 Which person (A, B or C) most likely has a deficiency of iron in his/her diet? (1)

1.4.3 Explain your answer in QUESTION 1.4.2 above. (2)

1.4.4 Which person (A, B or C) is most likely to be HIV positive? (1)

1.4.5 Explain your answer in QUESTION 1.4.4 above. (2)

1.4.6 Explain why person C should be extra careful not to cut or scrape his/her skin. (2)

1.4.7 Which person (A or B) most likely lives along the coast (that is at low altitude)? (1)

1.4.8 Explain your answer in QUESTION 1.4.7 above. (2)
(13)

1.5 Read the passage below and then answer the questions based on it:

Mike had a piece of food stuck in his throat. John noticed that Mike could not cough, talk or breathe. He appeared to be losing consciousness.

John had just learnt the Heimlich Manoeuvre (a procedure that is used to help someone who is choking). He thought this was his chance to save his friend's life. He quickly stood behind Mike, wrapped his hands around Mike's waist and with all his strength pulled hard and quickly upwards and inwards into Mike's stomach. Within a few seconds the piece of food flew out of Mike's mouth and Mike slumped to the ground and screamed.

John was delighted to see his friend alive but he did not understand why he still seemed to be in pain. He then observed that Mike was grabbing his side and complaining of pain. Mike was taken to the school clinic where it was discovered that John had accidentally broken two of Mike's ribs during the procedure. When Mike's parents found out about the incident, they were very unhappy and threatened to sue John for assault.

1.5.1 Was John right to perform the procedure on his friend?
Give a reason for your answer. (3)

1.5.2 Should John be held accountable by Mike's parents for injuring Mike? Give a reason for your answer. (3)

1.5.3 Suggest TWO ways in which the school can ensure that learners know what to do in any emergency. (4)
(10)

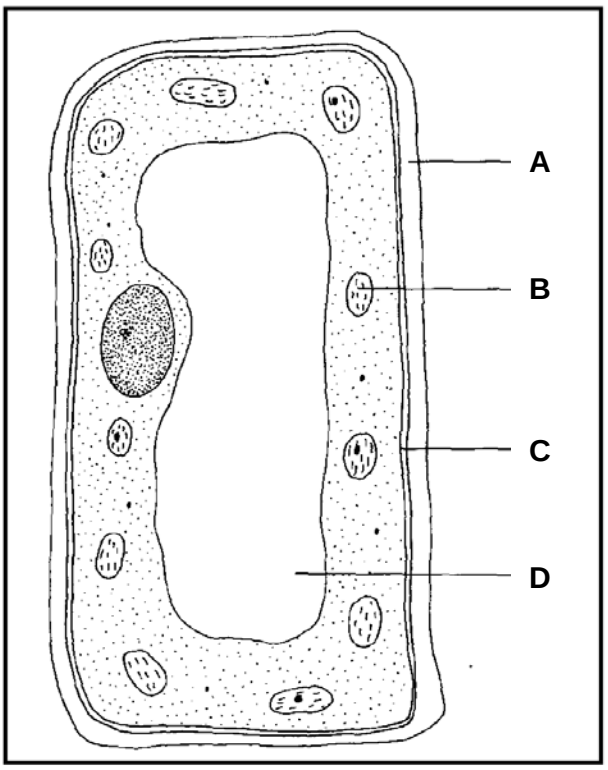
TOTAL SECTION 1: 50

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 The diagram below represents the structure of a cell. Study the diagram and answer the questions that follow:

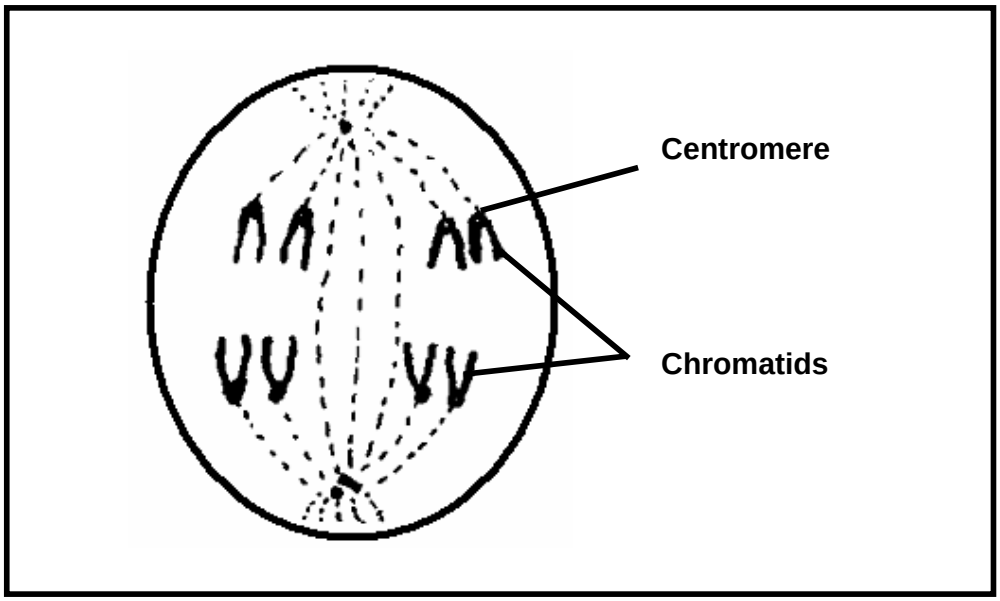


2.1.1 Write down the names of the parts labelled A and C. (2)

2.1.2 State whether the cell drawn is a plant or animal cell. (1)

2.1.3 Give THREE visible reasons for your answer in QUESTION 2.1.2 above. (3)
(6)

2.2 The diagram below shows a cell undergoing mitosis.



2.2.1 How many chromosomes are shown in the diagram above? (1)

2.2.2 How many chromosomes would be found in the daughter cells at the end of mitosis of the above cell? (1)

2.2.3 Describe the appearance/characteristics of the daughter cells formed at the end of mitosis of the cell above. (2)

2.2.4 Explain TWO ways in which mitosis is biologically significant. (2)
(6)

2.3 Read the following passage and answer the questions based on it:

Cancers are a result of uncontrolled mitosis of body cells. A cancerous cell divides continuously to form a group of simple cells which cannot carry out its proper function. This results in a mass of tissue called a GROWTH or a TUMOUR.

A common misconception is that cancer is incurable. With early diagnosis and proper treatment, the chances of survival can be good. However, once cancer spreads to other parts of the body, it is difficult to treat and to cure. Nowadays, the treatment used to destroy cancer cells could be radiation therapy, which is the use of high-energy rays to destroy cancer cells, or chemotherapy, which is the use of drugs/chemicals to destroy cancer cells. Some side-effects of these treatments may be loss of hair and nausea.

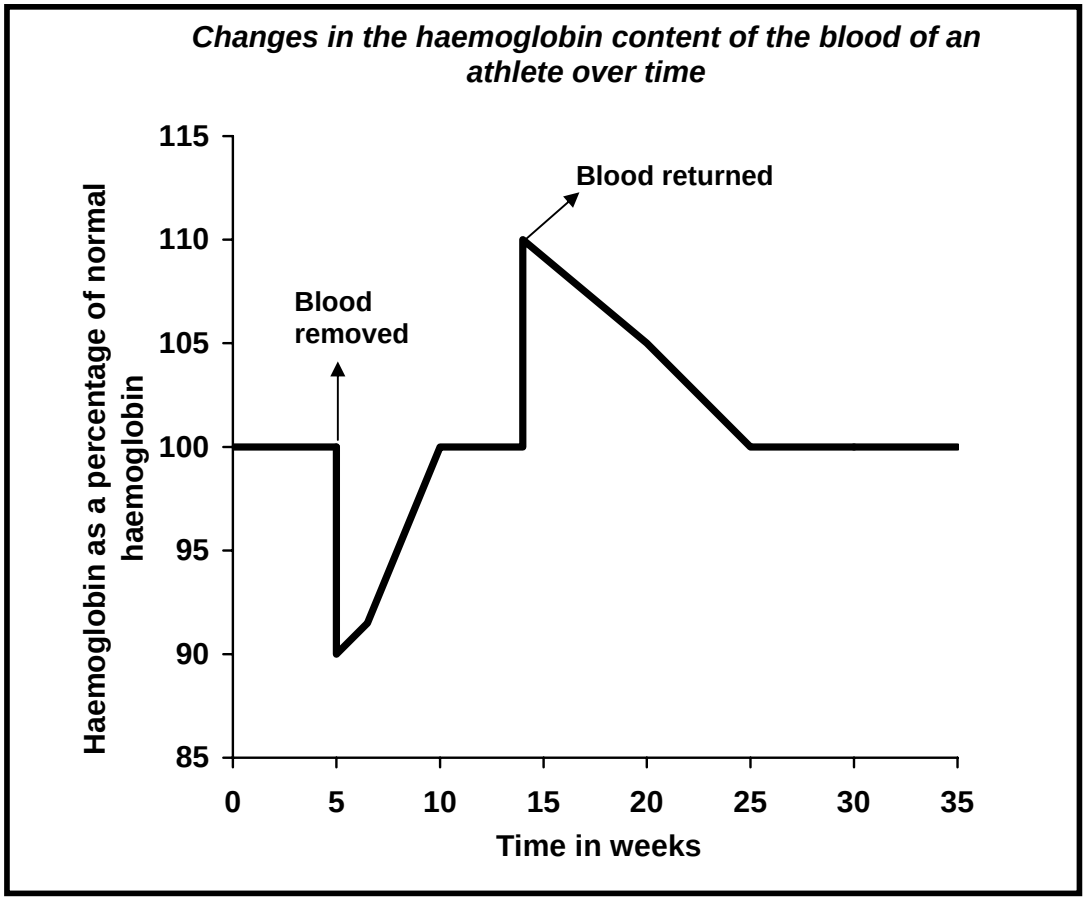
2.3.1 Why do you think many people believe that cancer is incurable? (2)

2.3.2 Give TWO reasons why you think that there are more people that suffer from cancer nowadays compared to 30 years ago. (4)

2.3.3 The cost of treating cancer is expensive. How do you think this treatment can be made available to the poor? (2)
(8)

2.4 In the Olympic Games held in Athens in 2004, a long-distance athlete had 500 mℓ of his own blood removed, stored and returned to his body a few days before he competed in the marathon. This increases the haemoglobin content in the blood. This practice, known as blood doping, has been banned by athletics officials.

Study the graph below showing the haemoglobin content of the blood in the athlete's body over a period of 35 weeks and answer the questions that follow:



2.4.1 In which week was the blood removed from the athlete's body? (1)

2.4.2 How many weeks did it take for the athlete's haemoglobin level to return to normal after the blood had been removed? (2)

2.4.3 Explain what advantage this athlete would have, compared to an athlete who did not undergo blood doping. (2)

2.4.4 Why do you think that officials would find it difficult to detect this form of blood doping? (2)

2.4.5 Do you consider this act of blood doping to be acceptable or not? (1)

2.4.6 Explain your answer in QUESTION 2.4.5 above. (2)
(10)

TOTAL QUESTION 2: 30

QUESTION 3

3.1 Read the following passage, study the table and then answer the questions that follow:

When running a short race, the body gains most of its energy by breaking down glucose to lactic acid and carbon dioxide. This increases the concentration of lactic acid in the blood. Extra oxygen must be supplied to the body to burn off this lactic acid as the body cannot handle high concentrations of lactic acid for long periods.

The concentration of lactic acid in the blood of an athlete was measured at regular intervals. The first reading was taken before the start of the race. The second reading was taken at the end of the race. Thereafter five further readings were taken at ten-minute intervals respectively. The results are shown in the following table.

Time intervals (minutes)	Concentration of lactic acid (arbitrary units)
0	15
10	69
20	87
30	45
40	30
50	15
60	15

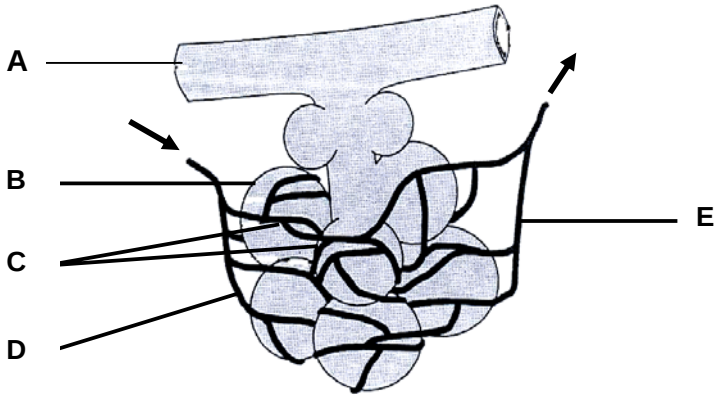
3.1.1 Name the type of respiration referred to in lines 1 and 2 of the passage above. (1)

3.1.2 Suggest TWO ways in which the body can increase the amount of oxygen taken in by the lungs to burn off lactic acid. (2)

3.1.3 Use the information in the table to draw a line graph. Also indicate on your graph the time when the race started and when it ended. (13)

3.1.4 Calculate how long it took, after the race had stopped, for the lactic acid concentration in the blood of the athlete to return to normal. Show ALL calculations. (3)
(19)

3.2 Study the diagram of part of the human gaseous exchange surface and answer the questions that follow.



Part of the human gaseous exchange surface

3.2.1 Provide labels for parts A and C respectively. (2)

3.2.2 List TWO features that are visible on the diagram above that make it efficient for gaseous exchange in humans. (2)

3.2.3 State ONE major difference between the composition of the blood in vessel D and vessel E. (2)

3.2.4 Study the passage below and answer the questions that follow:

Emphysema is a disease caused by toxic substances in the air, smoking and complications from bronchitis and asthma. Emphysema causes part B to become less lobed, lose their elasticity and part of their blood supply. This reduces its efficiency.

Recently a large number of workers in a factory in your area have been diagnosed with emphysema, which has been attributed to the toxic fumes being released from the factory.

The municipality has proposed that the factory be closed.

(a) Will you support the closure of the factory? (1)
(b) Give a reason for your answer in QUESTION 3.2.4(a) (2)
(c) Explain how the efficiency of part B can be affected by emphysema. (2)
(11)

TOTAL QUESTION 3: 30

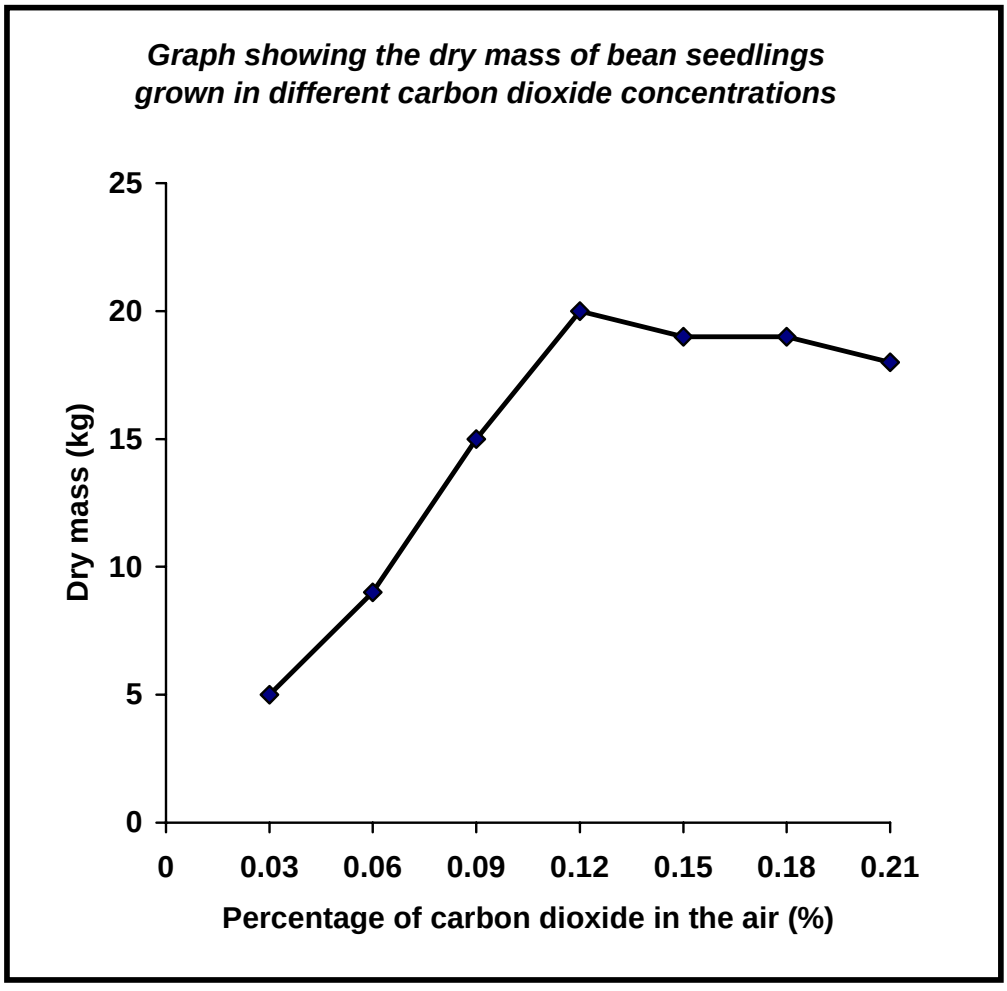
TOTAL SECTION B: 60

SECTION C

QUESTION 4

4.1 A learner carried out an experiment to find out the effect of the concentration of carbon dioxide on food production. The learner planted the same number of bean seedlings in seven greenhouses. The bean seedlings were the same age and size. They were also given the same amount of water, grown in the same kind of soil and kept at the same temperature.

The learner made sure that each greenhouse had a different amount of carbon dioxide in the air. After 30 days the bean seedlings were collected, dried and weighed. The results are represented in the following graph:



4.1.1 Write a hypothesis for the learner's investigation. (2)

4.1.2 Identify the following:

(a) Dependent variable (1)
(b) Independent variable (1)

4.1.3 At what concentration of carbon dioxide was food production the best? (2)

4.1.4 Why did the learner measure the **dry** mass of the plant? (2)

4.1.5 Explain, from the graph, the relationship between the percentage of carbon dioxide and the dry mass of bean seedlings. (3)

4.1.6 Explain how the results of such an investigation are of value to society. (2)

4.1.7 Technologically advanced nations are able to produce more food than they need. Suggest what should be done with the excess food produced by these technologically advanced nations. (2)
(15)

4.2 Read the passage below and answer the questions that follow:

A balanced diet is one that contains sufficient quantities of all the essential food components in the right proportions. It is important that menus for meals are planned to achieve a balanced diet.

The following list contains some types of foods that can be used to form a balanced diet if they are well combined and are in the right proportions:

Eggs	*Milk*	*Meat*	*Beans*	*Peaches*	*Apples*
Bread	*Rice*	*Maize*	*Spinach*	*Cabbage*	*Oranges*

4.2.1 Write down the names of any FOUR foods from the list that could be included in a balanced menu for ONE meal. (4)

4.2.2 Briefly explain why you have included the food substances listed in QUESTION 4.2.1 in your menu. (4)

4.2.3 Explain why there cannot be one specific balanced diet that is suitable for everyone. (2)
(10)

4.3 Read the following passage on obesity:

OBESE PEOPLE WEIGH SURGERY OPTIONS

Obesity is a problem worldwide. A person is considered to be obese if his/her body mass index (BMI) is 30 or more. BMI is based on height and mass/weight. Someone who is 1,63 m is obese at 79 kg; someone who is 1,83 m is obese at 100 kg.

Many obese people are choosing surgery to lose weight. Doctors say that surgery should not be considered unless someone has tried conventional ways to shed kilograms and is at least 45 kg over the ideal weight.

There are three options for those people opting for obesity surgery. All three options have some or other side effects and are very costly.

The first one is the gastric bypass surgery, where a small pouch is stapled off from the rest of the stomach and connected to the small intestine. People eat less because the pouch holds little food, and they absorb fewer calories because much of the intestine is bypassed.

The second option is the adjustable stomach band, in which a ring is placed over the top of the stomach and inflated with saline/salt solution to tighten it and restrict how much food can enter and pass through the stomach. This method is reversible.

The third option is a radical one – cutting away part of the stomach. It is recommended only for severely obese people and gives maximum weight loss but is the riskiest solution.

Write an essay to express your views on why obesity is increasing now compared to 20 years ago. Also include your opinion on the use of surgery as a strategy to lose weight, how you can protect yourself from becoming obese as well as strategies that can be employed to prevent obesity in your school.

NOTE: NO marks will be awarded for answers in the form of flow charts or diagrams. **(15)**

The following rubric will be used to assess your essay:

Marks	1	2	3
Comparison of obesity in the past and present	Comparison with 1 difference only	Comparison with 2 differences	Comparison with 3 or more differences
Use of surgery (opinion with reason)	Opinion only – no reason	Opinion with flimsy/unconvincing reason	Opinion with well thought-out and convincing reason
Personal strategy to prevent obesity	1 strategy described	2 strategies described	3 strategies described
School strategy to prevent obesity	1 - 2 strategies described	3 strategies described	4 strategies described
Synthesis	Significant gaps in the logic and flow of the answer	Minor gaps in the logic and flow of the answer	Well structured - demonstrates insight and understanding of the question

TOTAL QUESTION 4: 40

TOTAL SECTION C: 40

GRAND TOTAL: 150

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