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GRADE 11

NOVEMBER 2019

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 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. ALL drawings must be done in pencil and labelled in blue or black ink.
7. Draw diagrams, flow charts or tables 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.

SECTION A**QUESTION 1**

1.1 Various options are provided as possible answers to the following questions. Write down the question number (1.1.1–1.1.10), choose the answer (A–D) and write the answer of your choice in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 The blood vessel that transports blood with oxygen and nutrients into the kidneys is the ...

- A renal vein.
- B inferior vena cava.
- C renal artery.
- D aorta.

1.1.2 The form in which excess glucose is stored as in the body.

- A Starch
- B Fat
- C Proteins
- D Glucagon

QUESTIONS 1.1.3 AND 1.1.4 ARE BASED ON THE TABLE BELOW.

Gas	Concentration in inhaled air (%)	Concentration in exhaled air (%)
Oxygen	21	16
Carbon dioxide	0,04	4
Nitrogen	78	78
Water vapour	0,96	2

1.1.3 The reason for the amount of nitrogen being the same in inhaled and exhaled air is that:

- A Nitrogen is taken into the bloodstream and the same amount diffuses back to the alveoli to be breathed out
- B Nitrogen gas does not reach the alveoli but remains in the bronchiole until exhalation occurs
- C Nitrogen gas is used in the body but the same amount is produced in the body as a waste product, which is then exhaled
- D Nitrogen cannot be absorbed by the body in its gaseous form, so the amount inhaled is the same as the amount exhaled

- 1.1.4 Why is the amount of water in the exhaled air more than in the inhaled air?
- A Water from the cells is excreted as water vapour
 - B Blood plasma leaks into the alveoli, which is then excreted as water vapour
 - C A small amount of water produced during cellular respiration is excreted
 - D The respiratory surface must be kept moist at all times and some of this moisture evaporates and is exhaled
- 1.1.5 Which ONE of the following factors will cause optimal growth in greenhouses?
- A Carbon dioxide enrichment
 - B Temperatures between 10 °C and 15 °C
 - C Dim lighting in the greenhouse
 - D Only irrigating once a week
- 1.1.6 The characteristics listed below are all applicable to chloroplasts.
- (i) Contain a double membrane
 - (ii) Contain a fluid matrix with enzymes
 - (iii) Contain parallel sacs called lamellae
 - (iv) Contain a green pigment called chlorophyll
 - (v) Contain starch granules
- Which combination of characteristics make the chloroplast suitable to perform its function?
- A (i), (ii), (iv) and (v)
 - B (ii), (iii) and (iv)
 - C (ii), (iii), (iv) and (v)
 - D (i), (ii), (iii) and (v)
- 1.1.7 A deficiency disease caused by a lack of all food groups and an energy deficiency is called ...
- A kwashiorkor.
 - B bulimia.
 - C anorexia.
 - D marasmus.
- 1.1.8 Which ONE of the following characteristics make the leaf suitable for photosynthesis to take place?
- A The spongy mesophyll is elongated
 - B The leaf has many stoma for gaseous exchange in the lower epidermis
 - C The upper epidermis has a white cuticle
 - D Xylem is present to the products of photosynthesis

- 1.1.9 A certain person is overweight and suffers from narrowing arteries because of over-nutrition.

Which ONE of the following conditions could result from this?

- A Anorexia nervosa
- B Low blood pressure
- C High blood pressure
- D Low blood sugar

- 1.1.10 Why does a teenage boy need more protein in his diet than an adult male?

- A Teenage boys need more protein in their diets to prevent a deficiency disease like rickets
- B The boy is still growing and needs the amino acids for muscle development
- C Adult males need only a small amount of proteins for cellular respiration, while boys need a large amount of proteins for cellular respiration as proteins are the main fuel for the process
- D Teenage boys need more proteins in their diet to prevent bone damage

(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 (1.2.1–1.2.9) in the ANSWER BOOK.

- 1.2.1 The condition when the kidneys stop functioning
- 1.2.2 An organism that hunts, catches and kills its prey
- 1.2.3 The simple sugar formed during photosynthesis in green plants
- 1.2.4 The hormone released by the pancreas that decreases the blood glucose concentration
- 1.2.5 The permanent movement of organisms out of a specific area
- 1.2.6 The process of breaking large fat molecules into small droplets
- 1.2.7 The structure in the human respiratory system that closes the larynx
- 1.2.8 The chewing process that breaks food molecules up mechanically
- 1.2.9 The final hydrogen acceptor during cellular respiration

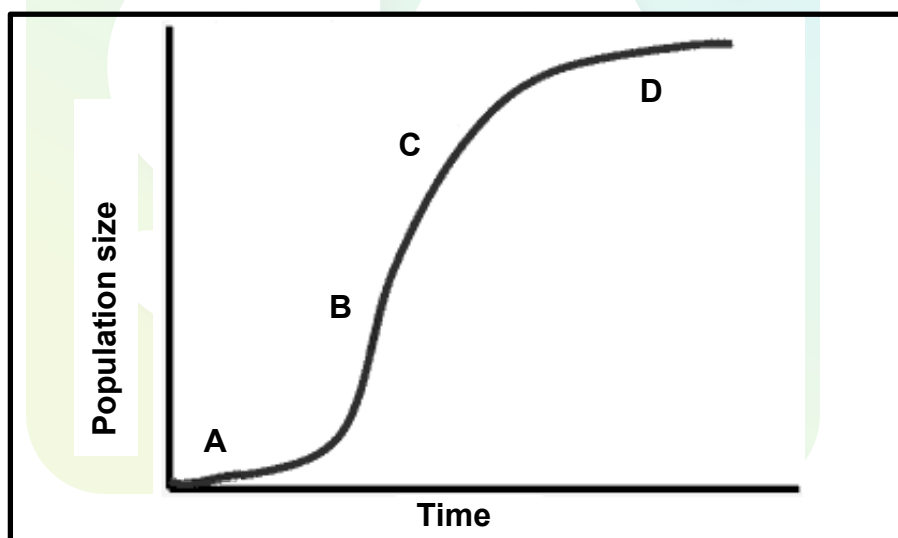
(9 x 1) (9)

- 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 (1.3.1–1.3.4) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 The lung disease where the alveoli gets damaged by forming large uneven sacs	A: Lung cancer B: Emphysema
1.3.2 The place in the human digestive system where the most absorption of digested food takes place	A: The stomach B: The large intestine
1.3.3 The type of energy stored in food molecules during photosynthesis	A: Chemical energy B: Potential energy
1.3.4 Ways in which oxygen is transported in the blood	A: Dissolved in the blood plasma B: Forms a compound with haemoglobin

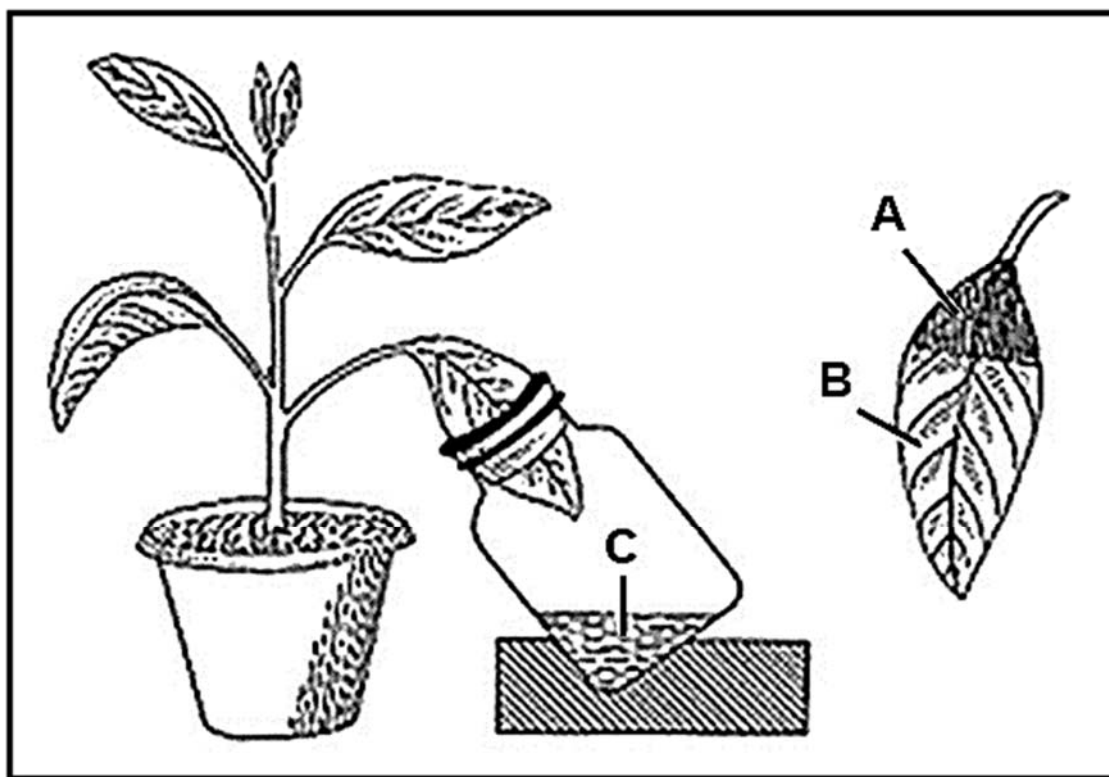
(8 x 1) (8)

- 1.4 The graph below shows the population growth of a colony of bacteria.



- 1.4.1 What type of growth curve is shown in the graph? (1)
- 1.4.2 Which phase (**A**, **B**, **C** or **D**) has the following characteristics? (1)
- (a) Population growth slows down (1)
 - (b) The population grows slowly because of the new environment (1)
 - (c) The phase where environmental resistance starts to increase (1)
 - (d) The phase where growth takes place rapidly because there are no limiting factors (1)

- 1.5 The diagram below shows the set-up of an experiment to investigate whether carbon dioxide is necessary for photosynthesis to take place. The plant was destarched before the apparatus was set up as in the diagram and placed in a sunny room.

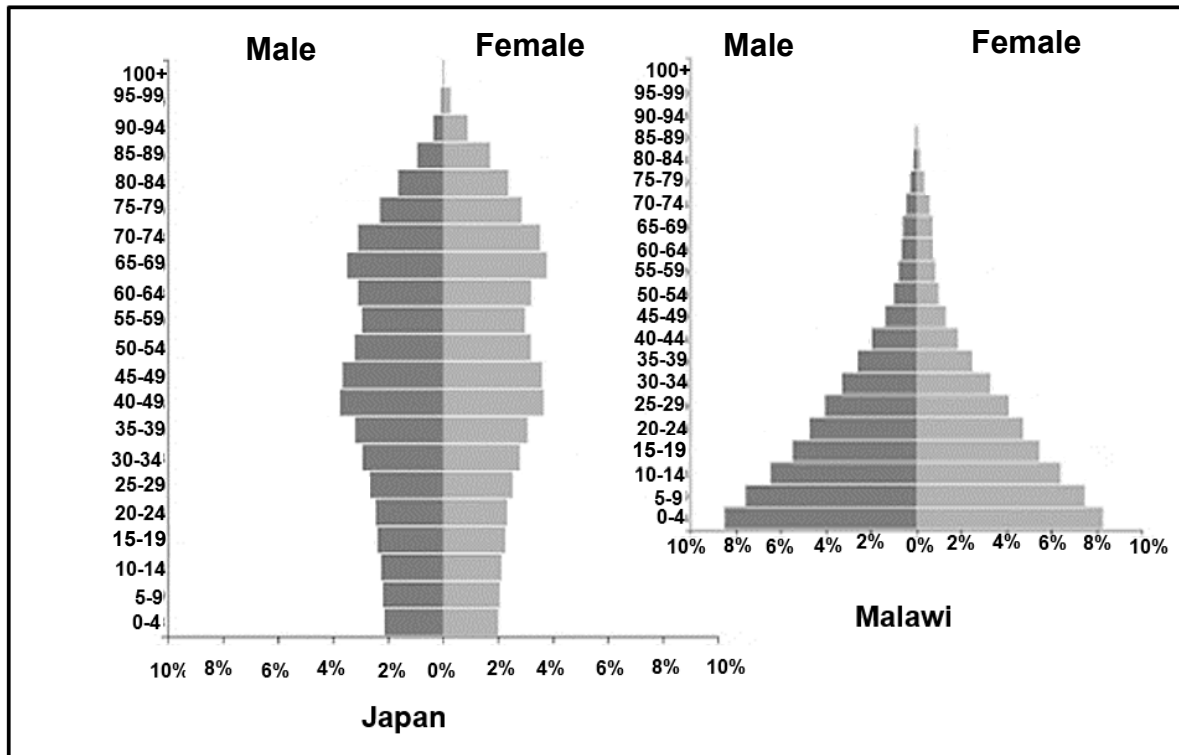


- 1.5.1 Name liquid **C**. (1)
- 1.5.2 Give the function of liquid **C**. (1)
- 1.5.3 What result can be seen at **A**? (1)
- 1.5.4 Explain ONE reason for the result at **B**. (2)
- 1.5.5 In which phase of photosynthesis will carbon dioxide be used? (1)
- 1.5.6 Where in the cell will the phase named in QUESTION 1.5.5 take place? (1)
- 1.5.7 Why was the plant destarched before the experiment was conducted? (1)

TOTAL SECTION A: 50

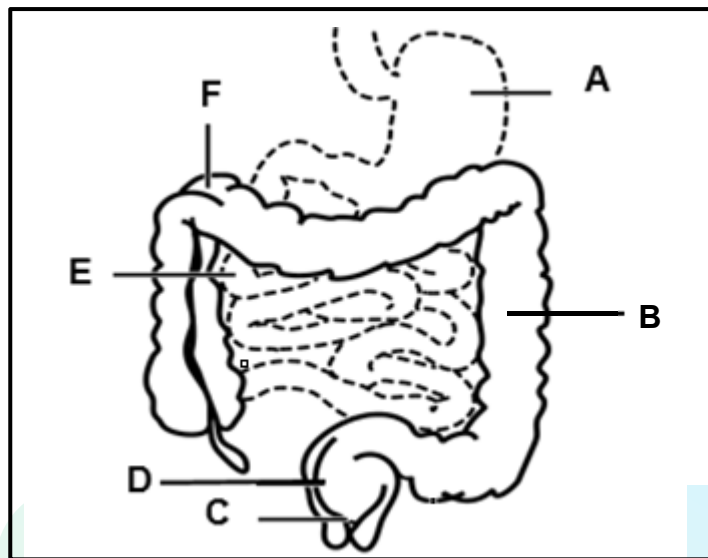
SECTION B**QUESTION 2**

2.1 Study the diagrams below showing the population pyramids of Malawi and Japan taken in 2017.



- 2.1.1 Which of the countries represented in the population pyramids above, is a developed country? (1)
- 2.1.2 Give ONE visible reason for your answer in QUESTION 2.1.1. (1)
- 2.1.3 From the graph, what can you conclude about the age group 0–19 years in Malawi? (2)
- 2.1.4 Name THREE factors which can cause the composition of the size of a population to change. (3)
- 2.1.5 Explain why it is important for the government of a country to have access to population pyramids. (3)

2.2 Study the following diagram about a part of the human digestive system.



2.2.1 Give labels to the following parts:

- (a) **A** (1)
- (b) **B** (1)
- (c) **C** (1)
- (d) **E** (1)

2.2.2 Give the LETTER of the part with the following function or characteristic:

- (a) Responsible for the absorption of most water (1)
- (b) Responsible for breaking down of food molecules by mechanical and chemical digestion (1)
- (c) Contains the sphincter muscle responsible for controlling defecation (1)

2.2.3 Draw a labelled diagram of the structures in **E** responsible for the absorption of digested molecules. (4)

2.2.4 Bulimia is a condition where a person eats large amounts of food, followed by a feeling of guilt and then tries to eliminate the food by inducing vomiting or the use of laxatives.

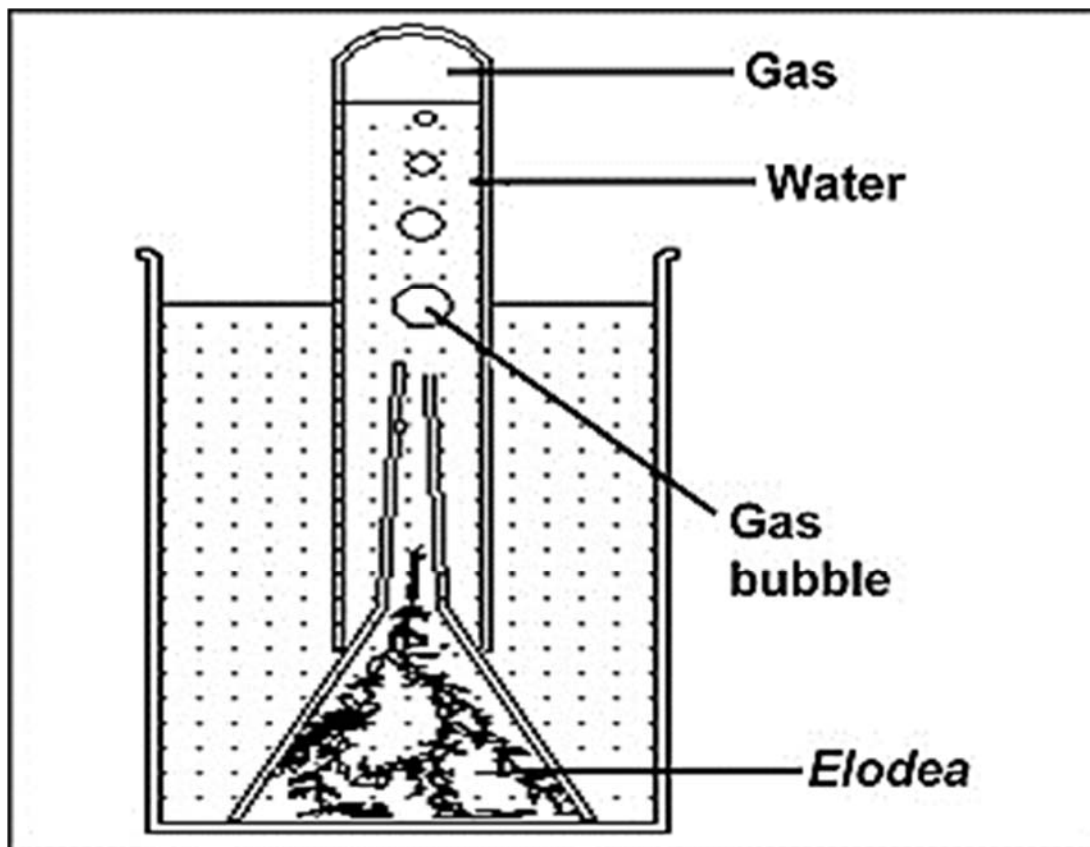
Explain the consequences of this condition on structure **A**. (3)

- 2.3 The photograph below shows a corpse flower from a corpse flowering plant. This flowering plant has no leaves and it uses other plant hosts to get food.



- 2.3.1 What type of nutritional relationship exists between the corpse flower and its hosts? (2)
- 2.3.2 Explain why this plant would have to use this type of nutrition. (1)
- 2.3.3 The hosts of the corpse flowering plant are mainly grape vines of many countries.
Explain how this could influence the economy of these countries. (3)

- 2.4 The diagram below shows a photosynthesis experiment done to investigate if a gas is produced during the process. A small amount of sodium carbonate was added to the water before the experiment was started.



- 2.4.1 Name the gas produced by the plant. (1)
- 2.4.2 Describe a test for the gas mentioned in QUESTION 2.4.1. (2)
- 2.4.3 Explain why sodium carbonate was added to the water. (2)
- 2.4.4 Why was this experiment done under water? (1)
- 2.4.5 Explain TWO ways in which the rate of this experiment could be increased. (4)

[40]

QUESTION 3

3.1 An experiment was performed in a laboratory to investigate the effect of the concentration of sucrose on the rate of cellular respiration in yeast cells. The following steps were followed:

- Four test tubes were used, each with a different concentration of sucrose.
- Test tube **A** had 100 ml water and no sucrose was added, test tube **B** had 0,5 g sucrose dissolved in 100 ml water, test tube **C** had 1 g sucrose in 100 ml water and test tube **D** had 1,5 g sucrose in 100 ml water.
- The same species of yeast was added to each test tube.
- A small amount of salt was added to each test tube to slow down the rate of cellular respiration.
- Each apparatus was allowed to stand for 10 minutes.
- The volume of gas produced by the yeast cells in each test tube was measured and the results were tabulated as shown below.

Volume of gas produced by the yeast cells (ml)				
Time (min)	0 g sucrose per 100 ml	0,5 g sucrose per 100 ml	1 g sucrose per 100 ml	1,5 g sucrose per 100 ml
0	2,0	2,0	2,0	2,0
1	2,0	2,1	2,2	2,8
2	2,0	2,2	2,4	3,0
3	2,0	2,4	2,6	3,1
4	2,0	2,6	2,9	3,4
5	2,0	2,8	3,0	3,7
6	2,0	3,0	3,6	4,6
7	2,0	3,5	4,0	5,5
8	2,0	3,8	4,6	6,7
9	2,0	4,3	5,2	8,2
10	2,0	5,0	6,2	9,4

[Information adapted from <http://ngss.ntsas.org>]

3.1.1 Identify the:

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

3.1.2 Name the gas produced by the yeast cells. (1)

3.1.3 Explain how the investigators could test to verify the gas named in QUESTION 3.1.2. (2)

3.1.4 Name TWO ways in which the investigators could have increased the validity of this investigation. (2)

3.1.5 Explain the significance of the inclusion of test tube **A** in the experiment. (2)

3.1.6 What conclusion can be made based on the information in the table? (2)

3.1.7 Explain how this process in yeast cells can be used to produce alcoholic beverages like beer. (3)

3.2 The following table shows the volume of air inhaled by a person over a timeframe of 120 seconds.

Time (sec)	Volume of air inhaled (litres)
10	3,5
20	3,5
30	3,5
40	3,5
50	3,5
60	5,0
70	5,0
80	5,0
90	4,5
100	4,0
110	3,5

3.2.1 Use the information in the table to draw a line graph for 30 to 100 seconds. (7)

3.2.2 For how long did this person exercise? (2)

3.2.3 Explain your answer in QUESTION 3.2.2. (2)

3.2.4 Explain how the information in the table would be different if this person suffered from asthma. (2)

3.3 Read the following extract about resource partitioning amongst predators.

A study from the late 1990s in the Serengeti showed that both lions and hyenas out-compete cheetahs. Both lions and hyenas catch more Thomson's gazelles, which is the common prey of all three species.

The same study showed that cheetahs survive best in areas with a lower concentration of gazelles. These areas attract other predators and the gazelles in these areas are less likely to be alerted by the hunting cheetahs.

[Adapted from *Study & Master*, p25]

3.3.1 Define the term *resource partitioning*. (1)

3.3.2 Name the type of competition between lions, cheetahs and hyenas. (1)

3.3.3 According to the information in the extract, what was the original aim of the investigation? (2)

3.3.4 Explain how plants with different types of roots are also an example of resource partitioning. (3)

- 3.4 A group of students investigated the different types of plants from the shore-line inlands of a certain area.
- Along the shore-line a small plant species named Sand Couch (*Elytrigia juncea*) was found.
 - As they moved inland they found Marram grass which covered more ground with a few patches of bare sand.
 - Afterwards they found flowering plants, with limited space between the vegetation, and later smaller and then larger woody plants like trees.

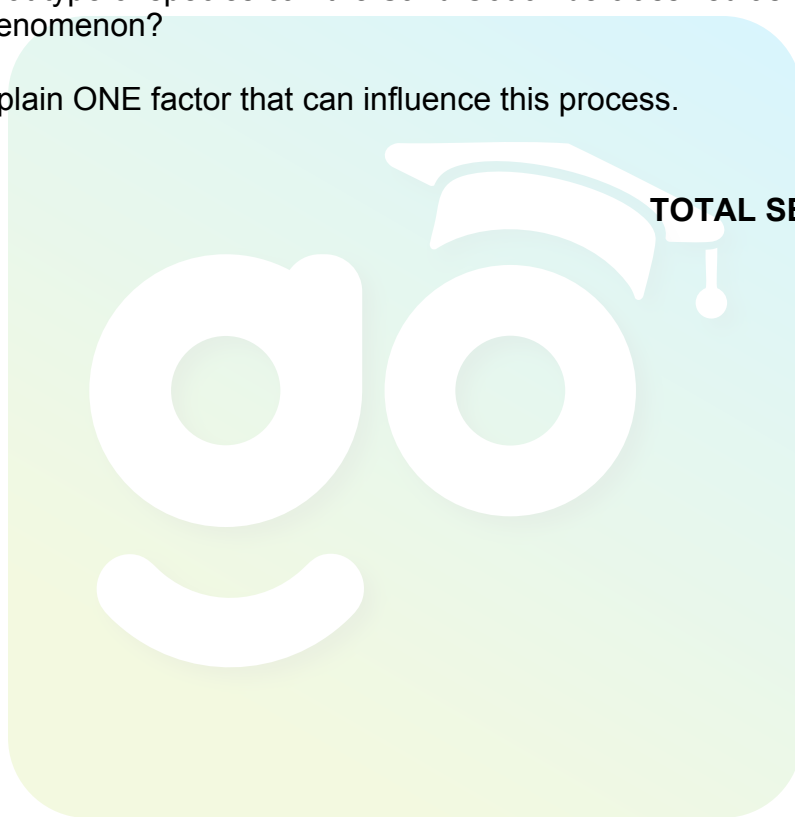
3.4.1 What type of phenomenon is shown in this investigation? (1)

3.4.2 Give ONE reason for your answer in QUESTION 3.4.1. (1)

3.4.3 What type of species can the Sand Couch be classified as in this phenomenon? (1)

3.4.4 Explain ONE factor that can influence this process. (2)
[40]

TOTAL SECTION B: 80



SECTION C

QUESTION 4

Describe how the salt and water levels are maintained in a dehydrated person who consumed high concentrations of salt.

Content: (17)
Synthesis: (3)

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

TOTAL SECTION C: 20
GRAND TOTAL: 150



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