Name	Index Number	Class

WOODGROVE SECONDARY SCHOOL

A COMMUNITY OF FUTURE-READY LEARNERS AND THOUGHTFUL LEADERS

O LEVEL PRELIMINARY EXAMINATION 2023

LEVEL & STREAM : **Four (Express)**

SUBJECT (CODE) : **Biology** (6093)

PAPER NO : **2**

DATE (DAY) : **12 September 2023** (Tuesday)

DURATION : **1 h 45 mins**

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Section A
Answer **all** questions in the spaces provided.

Section B
Answer **all** the questions, the last question is in the form either/or.
Write your answers in the spaces provided on the Question Paper.

The use of an approved scientific calculator is expected, where appropriate.
You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
Section	**Marks**
A	**/50**
B	**/30**
Total	**/80**

Student's Signature		**Parent's Signature**	
Date		**Date**	

This document consists of **20** printed pages including this cover page
Setter : Miss Ng Shuwen

Section A

Answer **all** questions. Write your answers in the spaces provided on the question paper.

1 Fig. 1.1 shows a section through part of a dicotyledonous a leaf when viewed using a light microscope.

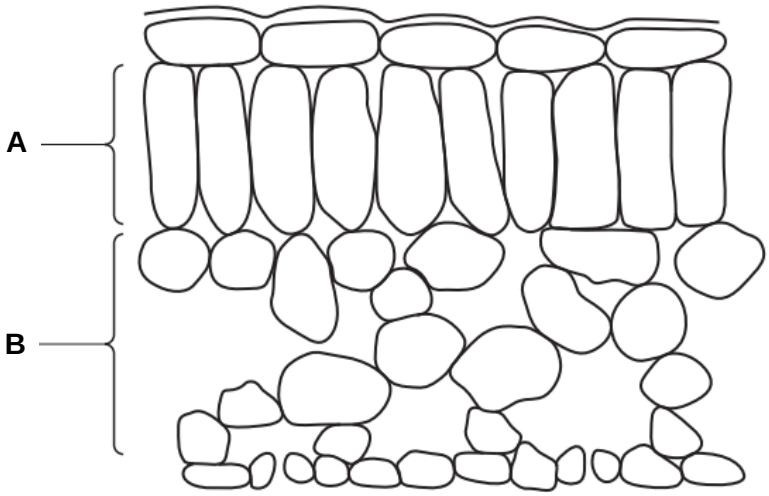


Fig. 1.1

(a) **(i)** State the term used to describe a group of cells, such as those in part A or part B of the leaf cross-section.

_____ [1]

(ii) Fig. 1.2 shows an enlargement of one cell from part A of the leaf section.

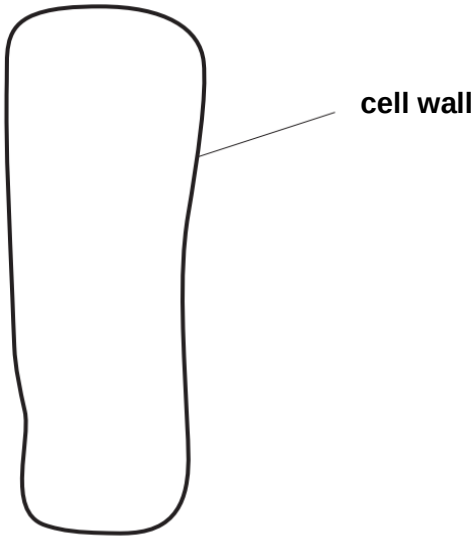


Fig. 1.2

Complete Fig.1.2 by drawing and labelling to show the position of

- one chloroplast
- three other types of named cell component that will be visible. [4]

(iii) On Fig.1.1, label and name one cell in the lower epidermis that would also contain chloroplasts. [1]

(b) Explain how Part B is adapted to facilitate transpiration in this leaf.

[4]

2 Microorganisms such as bacteria are used in the production of yogurt.
Under anaerobic conditions, bacteria will break down lactose in milk to release energy, with carbon dioxide and lactic acid produced as by-products.

Fig. 2.1 shows how the concentration of lactose changes during the formation of yoghurt from milk over a period of 48 hours.

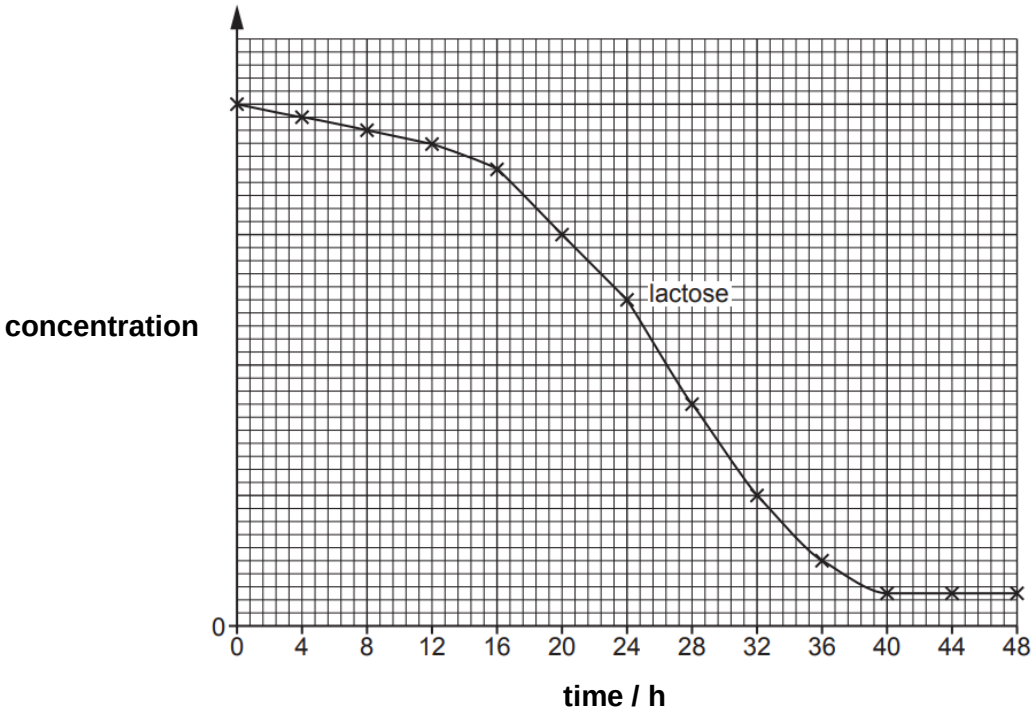


Fig. 2.1

(a) State one similarity and one difference between the anaerobic respiration process in bacteria and in muscle cell in human.

Similarity _____

_____

Difference _____

_____ [2]

(b) Describe the graph shown in Fig. 2.1.

[2]

(c) Describe how you could test for the presence of lactose at t = 0.

[2]

(d) Lactose intolerance is a medical condition that results from a genetic change. A person with the condition is unable to produce molecules of the correct enzyme to digest lactose.

(i) Name this type of genetic change and explain how it can result in a person being unable to produce molecules of the correct enzyme and to digest lactose.

[3]

(ii) Using Fig. 2.1, suggest and explain if yoghurt makes it a better food than milk for a person with lactose intolerance.

_____

_____

_____ [2]

3 The human liver contains a high concentration of enzymes called transaminases. These enzymes are important in the metabolism of amino acids.

Amino acids are absorbed into the villi in the small intestine and carried to the liver by a blood vessel.

Fig. 3.1 shows a villus.

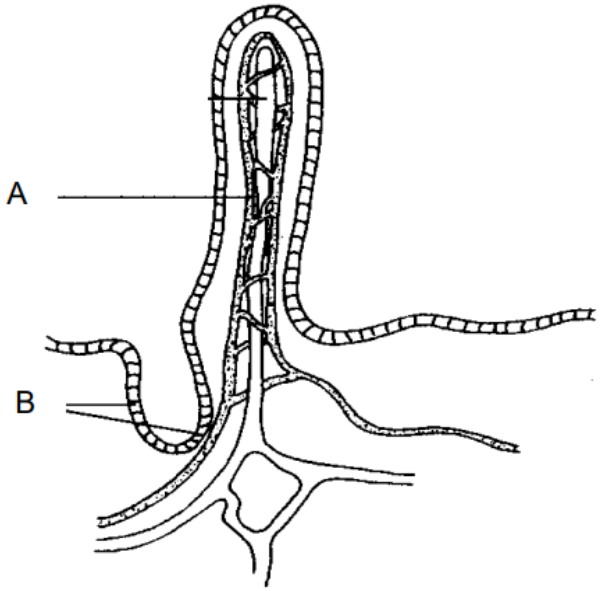


Fig. 3.1

(a) **(i)** Identify structure A and B, and explain how they are adapted to absorption of digested food substances:

Structure A : _____

_____

_____

_____

_____

Structure B : _____

_____

_____

_____

_____ [4]

(ii) Name a tissue that has similar structural adaptations as villus.

_____ [1]

(b) **(i)** Describe how excess amino acids are metabolised and excreted.

_____

_____

_____

_____

_____

_____

_____ [3]

(ii) State one other role of the liver.

_____ [1]

(c) There are different types of transaminase. Each type has a specific active site. Explain why this means that each type catalyses a specific reaction.

_____

_____

_____

_____ [2]

4 Fig. 4.1 shows a human heart.

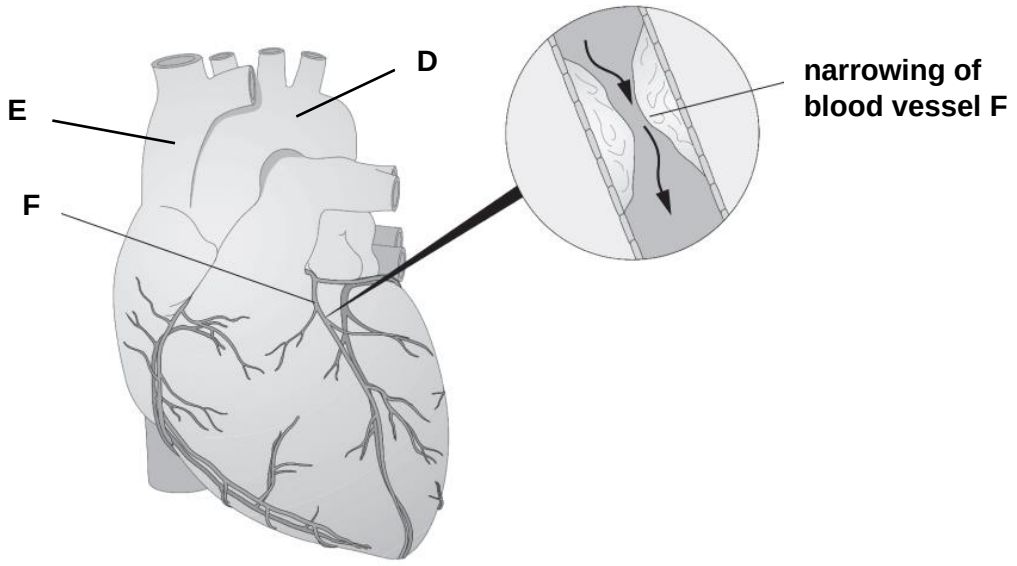


Fig. 4.1

(a) **(i)** Identify blood vessel D and E.

D _____ E _____ [2]

(ii) State two differences between the blood vessel D and E.

Difference 1 _____

_____

Difference 2 _____

_____ [2]

(b) **(i)** The blood vessel labelled F may become narrowed as shown.
Describe how blood vessel F may become narrowed and eventually blocked off completely.

_____

_____

_____

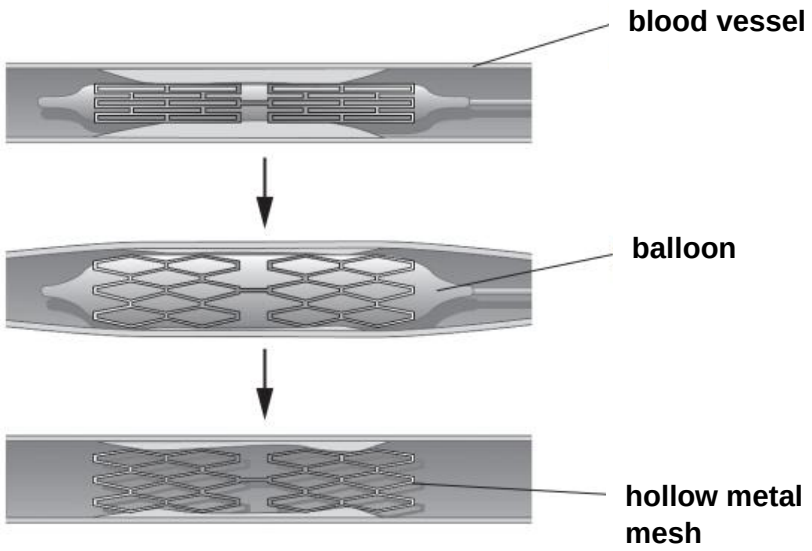
_____

_____ [3]

(ii) It is possible to treat the disease caused by the narrowing of blood vessel F, by carrying out an operation.

In the operation:

- a balloon surrounded by a metal mesh is inserted into the blood vessel and inflated,
- the balloon is then deflated and removed, leaving the metal mesh in place



Suggest the purpose of each of the following:

inflating the balloon,

_____

_____ [1]

leaving the hollow metal mesh in the blood vessel.

_____

_____ [1]

5 Fig. 5.1 shows part of the food web in a forest.

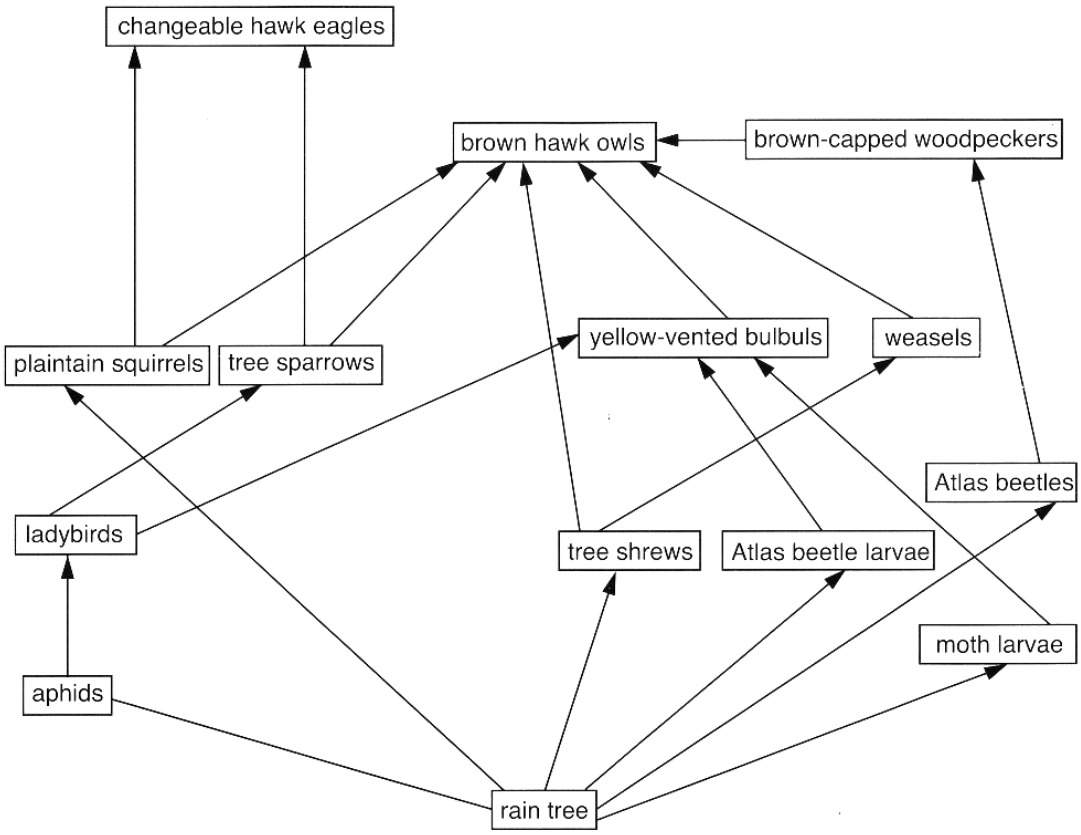


Fig. 5.1

(a) Using an example from Fig. 5.1, explain what is meant by 'consumer'.

_____

_____ [1]

(b) Based on Fig. 5.1, explain why there is no food chain that has more than five links.

_____

_____

_____

_____ [2]

(c) Large amount of chemicals were sprayed on the rain tree to remove moth larvae. The chemical does not affect the other organisms on the tree.
Explain how this may affect the population of brown hawk owls in the forest.

_____

_____

_____

_____

_____

_____

_____

_____

_____ [4]

(d) Fig. 5.2 shows one food chain from the food web with the relative numbers of organisms at each level.

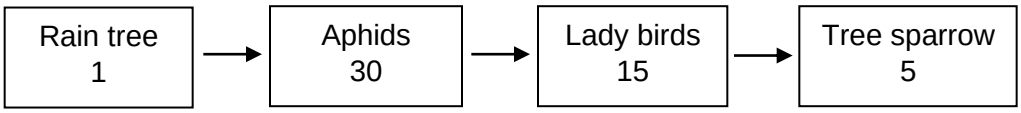
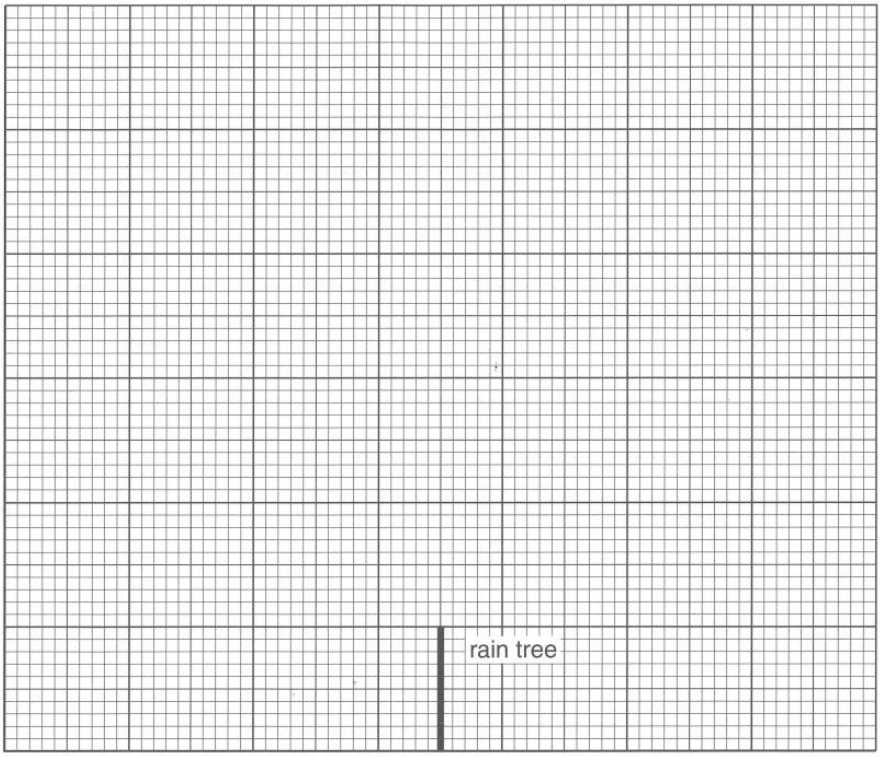


Fig. 5.2

Complete the pyramid of number on Fig. 5.3.



[2]

Fig. 5.3

Section B

Answer **three** questions.

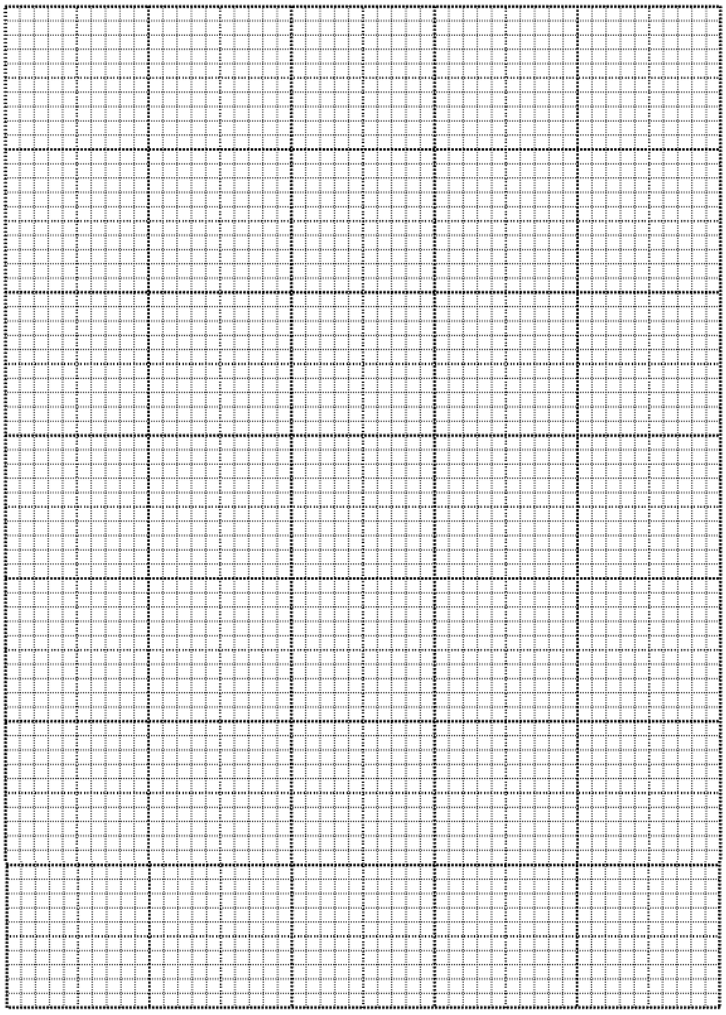
Question 8 is in the form of an **Either**/**Or** question. Only one part should be answered.

6 Table 6.1 shows the volume of water lost per day by a person living in a tropical climate.

Excretory substance	Volume of water lost / cm^3
Urine	740
Faeces	220
Sweat	1560
Expired air	540

Table 6.1

(a) Plot a bar chart of these data on the grid. [3]



(b) Calculate the total volume of water lost per day and the percentage of this which is lost in faeces.

_____ [1]

(c) Suggest and explain two ways in which the figures in the bar chart would change in a cold climate.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [4]

(d) Approximately 190 dm^3 of water is filtered through the kidneys each day. Use this information and the figures in the bar chart to explain what happens to this water in the kidney.

_____

_____

_____

_____

_____ [2]

7 Fig. 7.1 shows stages in the formation of a human fetus.

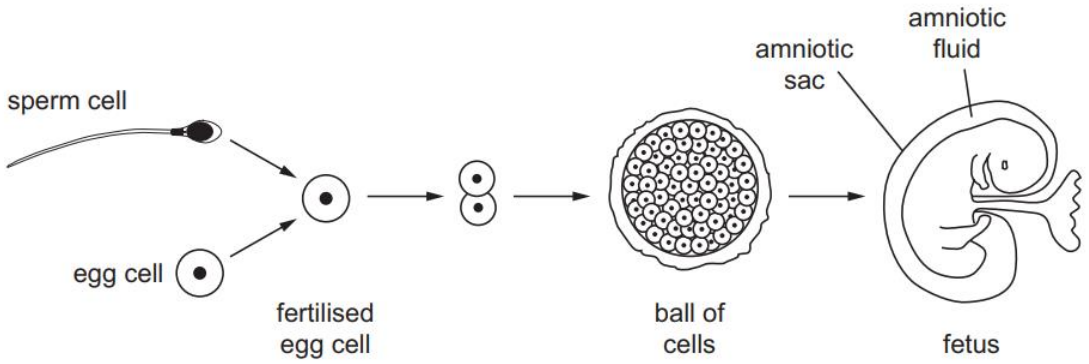


Fig. 7.1

(a) Using Fig. 7.1, describe the process of fertilization and explain the role of meiosis in the process.

[5]

(b) Describe the functions of the amniotic sac and amniotic fluid.

[3]

(c) Compare asexual and sexual reproduction.

[2]

Either

8 Having an inactive lifestyle and being overweight may lead to development of diabetes.

(a) Describe how blood glucose concentration is regulated in the body.

[5]

(b) Diabetics can control their blood glucose levels artificially by injecting insulin or swallowed as tablets. Describe, how, a human gene can be inserted into bacteria to produce insulin.

[3]

(c) An alternative treatment to injecting insulin is being developed. The insulin is inhaled into the lungs as a spray. It is then absorbed into the bloodstream.
Suggest how the spray can travel from the mouth to enter the bloodstream.

[2]

8 Or

(a) A young, growing plant was planted in a pot of soil. The parts of the plant that were above the soil were placed in a sealed transparent bag containing radioactive carbon dioxide. It was then left in the light.
After six hours radioactive carbon was found in the leaves, roots and the soil.
Explain the presence of the radioactive carbon in the roots.

[5]

(b) Explain the role of chlorophyll in photosynthesis.

[2]

(c) Suggest how the radioactive carbon in the plant could become part of the tissues of a herbivore, such as a cow.

[3]

~ End of paper ~