



General Certificate of Secondary Education
2023–2024

Centre Number

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Candidate Number

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Double Award Science: Biology

Unit B1
Foundation Tier



[GDW11]

GDW11

WEDNESDAY 21 FEBRUARY 2024, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question 7.



1 Cells contain structures that carry out different functions.

(a) Use a ruler to draw a straight line to link each cell structure with its correct function.

Cell structure	Function
	contains chromosomes
cell membrane	where photosynthesis takes place
chloroplast	where chemical reactions take place
nucleus	allows substances to enter and leave the cell
	limits the entry of water

[3]

(b) Name a structure found in a **plant** cell that provides support.

[1]

(c) Circle the structure in the list below found only in a **bacterial** cell.

nucleus	chloroplast	plasmid
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[1]



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(Questions continue overleaf)

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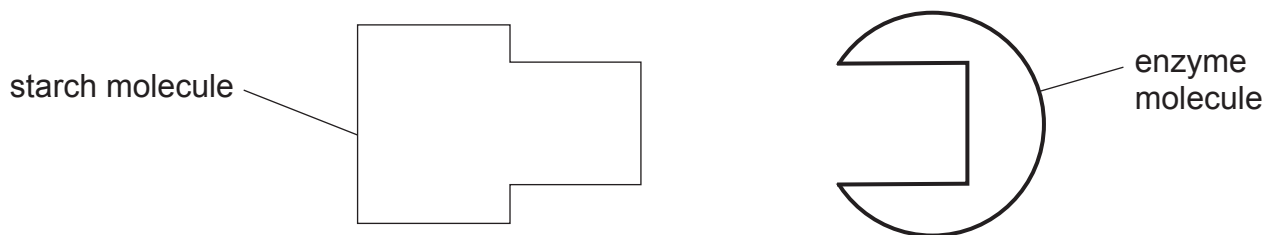
2 Complete the sentences about enzymes by writing in the blank spaces.

(a) (i) Enzymes are _____ catalysts that speed up the rate of reactions in cells.

_____ is the name of the enzyme that breaks down starch into smaller molecules called _____. [3]

The diagram shows a starch molecule and an enzyme molecule.

(ii) Label the active site on this diagram.



[1]

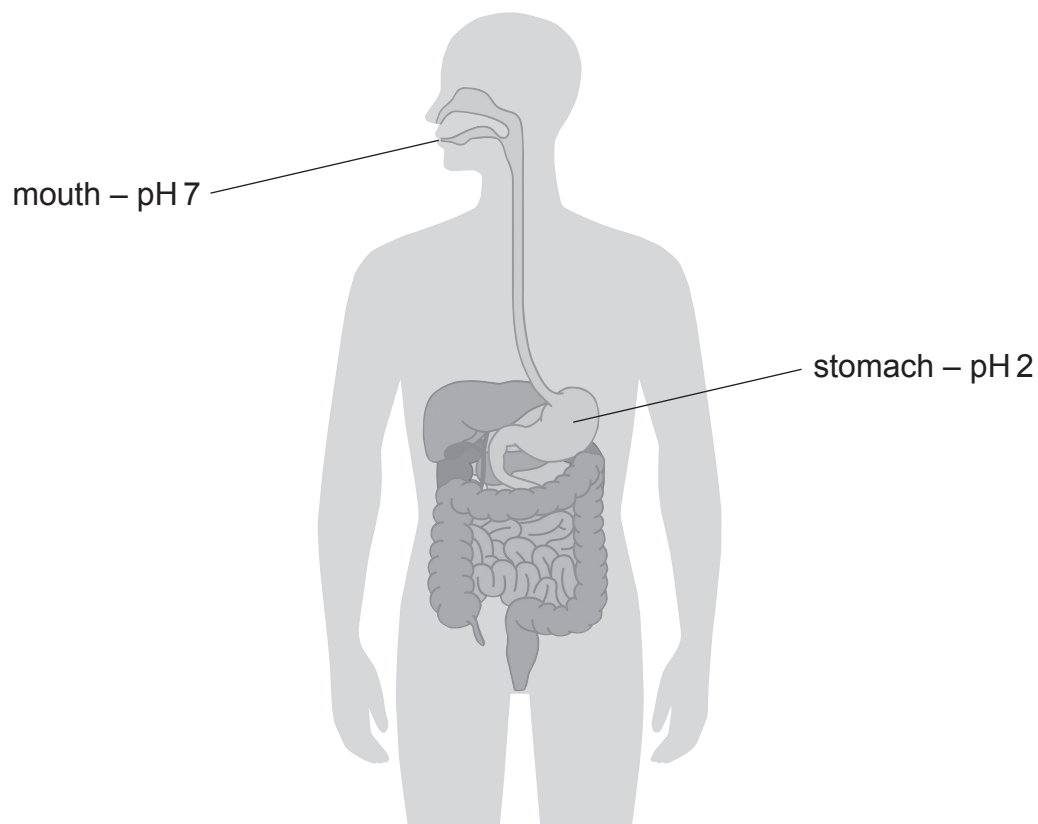
(iii) Draw, in the box, the structure formed when these molecules join.



[1]



The enzyme that breaks down starch works best in a neutral pH.
This enzyme works best in the mouth.



- (b) Use the diagram and your knowledge to explain why this enzyme will **not** work in the stomach.

[3]

[Turn over



3 (a) A student carried out an investigation into the energy value of three foods.

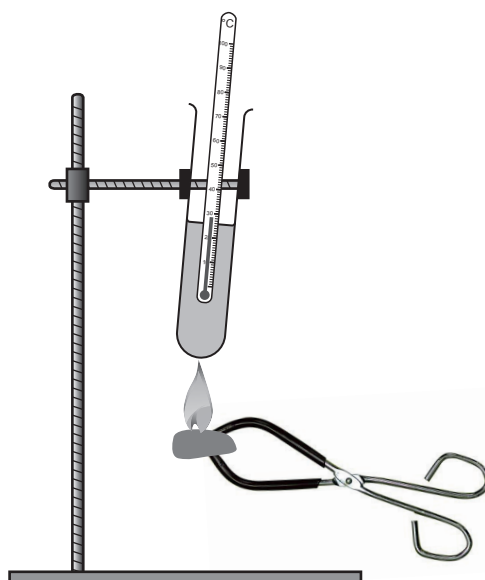
She measured 20 cm³ of water into a boiling tube and recorded the initial temperature of the water.

She weighed 5 g of pasta and lit it using a Bunsen burner. She then held it under the boiling tube until it stopped burning.

She recorded the final temperature of the water and calculated the rise in temperature of the water.

She repeated the experiment with 5 g of solid egg white and 5 g of streaky bacon.

The diagram shows the student's experiment.



Some of the student's results are shown in the table.

Food	Initial temperature /°C	Final temperature /°C	Rise in temperature /°C
pasta	19	61	42
solid egg white	21		35
streaky bacon		98	78



- (i) Complete the table on the opposite page by calculating the missing values and writing them in the empty boxes.

Show your working.

[2]

- (ii) Use the table to name the food that contains the most energy.
Explain your answer.

Food _____

Explanation _____

[2]

The burning of food in this investigation releases energy.
The body releases energy by respiration and uses it in different ways.

- (b) In the list circle **two** ways the body uses energy released by respiration.

movement

diffusion

photosynthesis

decomposition

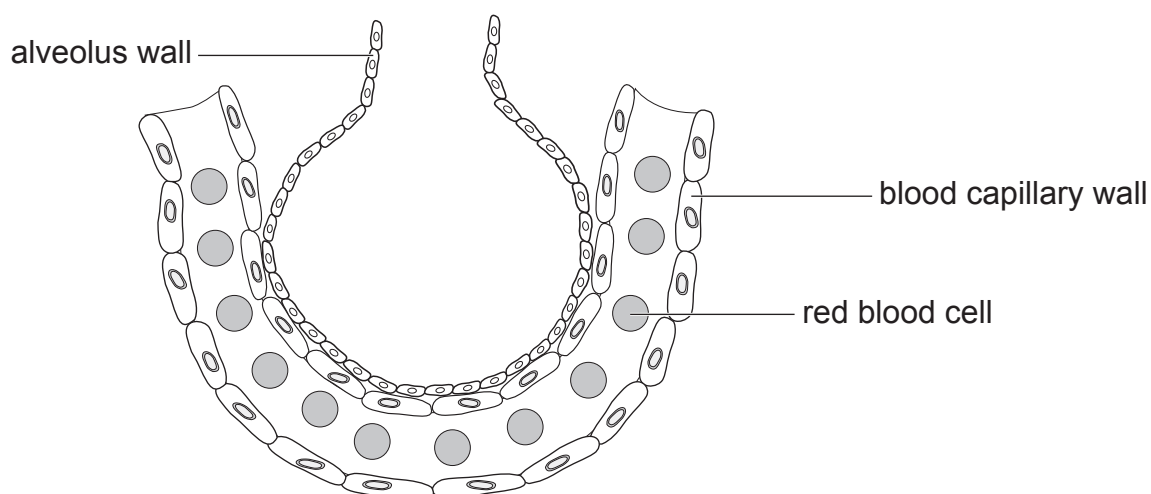
reproduction

[2]

[Turn over



- 4 (a) Gas exchange occurs at respiratory surfaces.
In humans, gas exchange occurs between alveoli (air sacs) and blood capillaries in the lungs.
The diagram shows an alveolus (air sac) and a blood capillary.



- (i) On the diagram, draw an arrow to show the direction of movement of **carbon dioxide** between the alveolus (air sac) and the blood capillary during expiration.

[1]

Respiratory surfaces in humans have several adaptations to allow the maximum rate of gas exchange to occur.

- (ii) Use a ruler to draw a straight line to link each adaptation with the correct explanation of how it allows the maximum rate of gas exchange to occur.

Adaptation	Explanation
thin walls	short diffusion distance
many alveoli (air sacs)	allow gases to diffuse through
permeable walls	increase surface area
moist	allow gases to dissolve

[3]



Gases move by diffusion between the alveoli (air sacs) and the blood capillaries.

(b) Write a tick (✓) beside the correct statement about diffusion of gases.

Diffusion of gases occurs when there is no concentration gradient	☐
Diffusion of gases occurs from where a gas is in high concentration to where it is in low concentration	☐
Diffusion of gases occurs from where a gas is in low concentration to where it is in high concentration	☐

[1]

[Turn over



- 5 (a) Decomposition can be carried out by microorganisms.
These microorganisms need water to survive and to carry out decomposition.
A scientist investigated how the water content of food affected the number of microorganisms present in the food.
Some of his results are shown in the table below.

Water content of food /arbitrary units	Number of microorganisms present
0.00	
0.20	very low
0.40	low
0.60	high

- (i) Complete the table above to give the number of microorganisms present when the water content of food was 0.00 arbitrary units. Write your answer in the empty box. [1]

The water content of some foods is shown in the table below.

Food	Water content of food /arbitrary units
jam	0.58
fresh fruit	0.77
crackers	0.20
dried fruit	0.42

- (ii) Put these foods in the order they will decompose, from the fastest to the slowest.

Fastest to decompose _____

Slowest to decompose _____

[2]



The scientist carried out a second investigation with 100 g of fresh fruit. He investigated how changes affected the rate of decomposition of the fresh fruit. The changes the scientist investigated are given in the table.

- (b) Write a tick (✓) in the box that correctly describes the effect, if any, of each change on the rate of decomposition.

Change	Effect on rate of decomposition		
	increase	no effect	decrease
a decrease in temperature			
an increase in extracellular digestion by microorganisms			

[2]

- (c) Fungi are **one** type of microorganism that carry out decomposition.

Name the other type of microorganism that carry out decomposition.

[1]

[Turn over



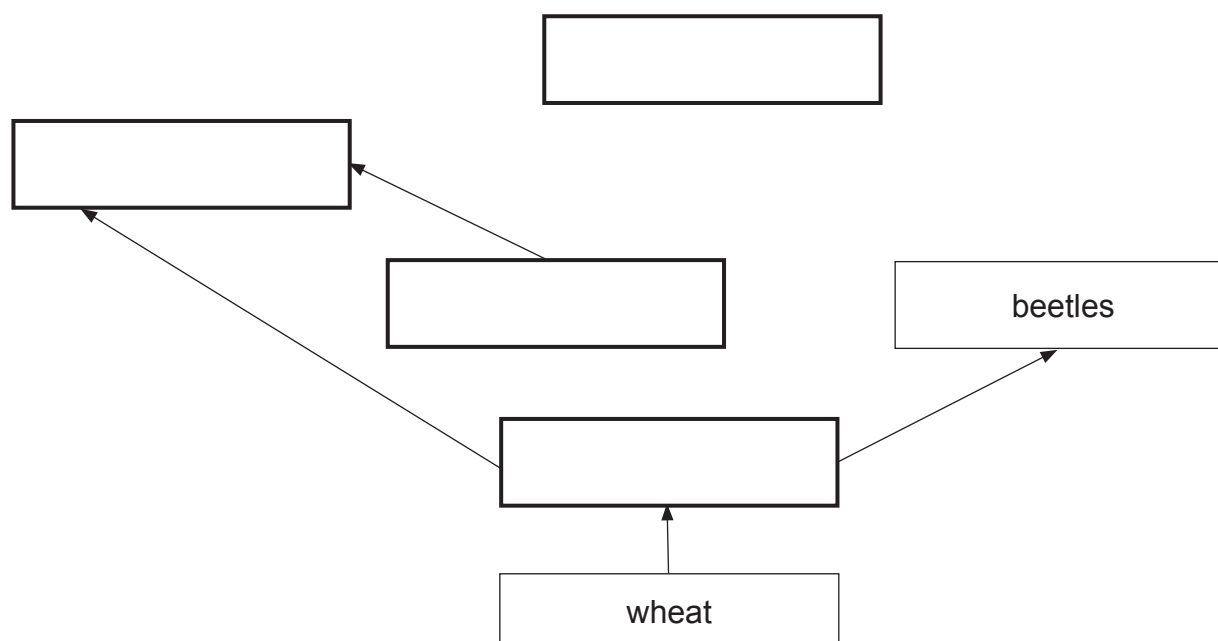
- 6 Wheat is grown in Ireland as a food source.
The photograph shows a wheat field.



The statements give information about some feeding relationships in a wheat field.

Aphids feed on wheat.
Spiders, ladybirds and beetles feed on aphids.
Spiders also feed on ladybirds.
Wasps feed on spiders, ladybirds, beetles and aphids.

- (a) (i) Use the statements to complete the food web.



[4]



(ii) Name the energy source for the food web.

[1]

(iii) What do the arrows represent on the food web?

[1]

(iv) Use the food web to name an organism that is feeding at more than one trophic level.

[1]

The Asian hornet is a predator of wasps, beetles and spiders. It was first found in Ireland in 2021.

(b) Describe and explain the effect the Asian hornet could have on the population of ladybirds in the food web.

Description _____

Explanation _____

_____ [3]

Aphids cause damage to wheat.

Farmers can spray chemicals called insecticides onto the wheat to kill aphids.

(c) Suggest an advantage **to the farmer** of spraying his wheat with an insecticide.

_____ [1]

[Turn over



- 7 The photograph shows a plant's growth response to light.



Describe and explain how the growth response in the photograph occurs. Your answer should include the name of this growth response.

In this question you will be assessed on the quality of your written communication skills, including the use of specialist scientific terms.

Name of growth response _____

Description _____

Explanation _____





[6]

[Turn over

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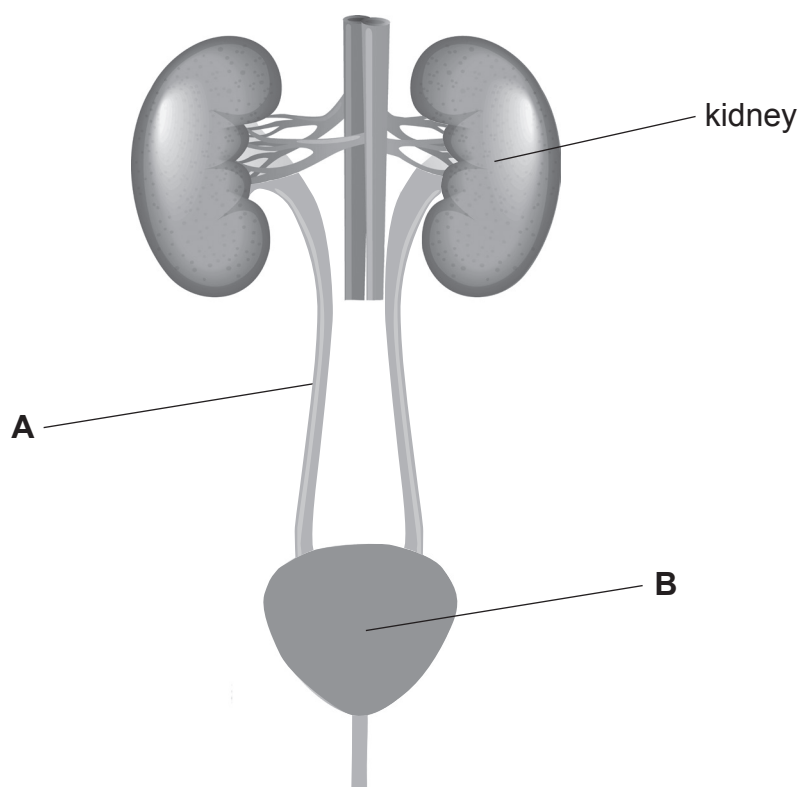
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8 (a) The kidney is the organ responsible for maintaining water balance in the body.

(i) Name the process of maintaining water balance in the body.

[1]

The kidney forms part of the organ system shown in the diagram.



(ii) Name this organ system.

[1]

(iii) Name the parts labelled **A** and **B**.

A _____

B _____

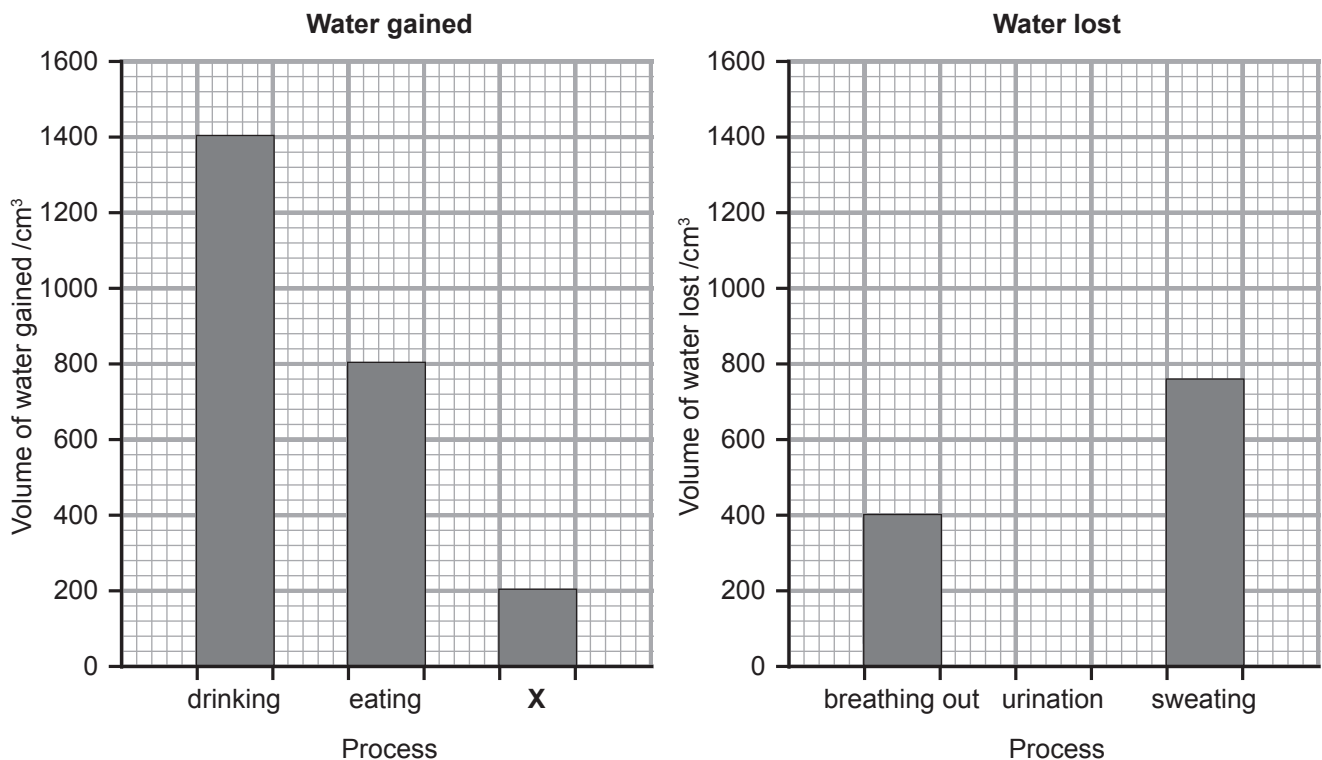
[2]

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- (b) A scientist measured the volume of water gained and lost by a woman over 24 hours.

The bar charts show some of the scientist's results.



- (i) Identify process X.

[1]

To maintain water balance in the body, the total water lost in 24 hours equals the total water gained in the same 24 hours.

- (ii) Calculate the volume of water lost by the woman as urine.

Show your working.

_____ cm³ [4]



- (iii) Plot the value you have calculated for the volume of water lost as urine on the bar chart opposite. Shade the bar you have drawn. [1]

The scientist repeated this investigation with the same woman the next day. This time she exercised vigorously for 45 minutes.

- (iv) Use the words in the list to describe what effect, if any, there was on the volume of water **lost** by sweating, breathing out and urination by the woman.

Each effect may be used once, more than once or not at all.

increased

decreased

no effect

sweating _____

breathing out _____

urination _____

[3]

THIS IS THE END OF THE QUESTION PAPER



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For Examiner's use only	
Question Number	Marks
1	
2	
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Total Marks	
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Examiner Number

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