

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				

Pearson Edexcel International GCSE (9–1)

Monday 9 June 2025

Morning (Time: 1 hour 40 minutes)

Paper reference **4WBI2/1B**

Biology (Modular)

UNIT 2: 4WBI2

PAPER: 1B

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Show all the steps in the calculations and state the units where required.

Information

- The total mark for this paper is 90.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL questions.

Some questions must be answered with a cross ☐. If you change your mind about an answer, put a line through the box ☐ and then mark your new answer with a cross ☐.

- 1 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Scientists race to save the rainforest.

Tropical rainforests are some of the most biodiverse ecosystems on Earth. However, rainforests are rapidly disappearing and scientists are working to make sure we do not lose the many species of plants and animals that make rainforests their home.

- 5 Large-scale deforestation is caused by the logging industry. Farmers also cause deforestation when making space for grazing animals or growing crops. Deforestation has many environmental effects and scientists are working to reduce its impact.

- 10 One example of a technique that helps reduce the effects of deforestation is rainforest regeneration. If rainforests are destroyed, they can quickly regrow but only if there is no human intervention. Although this is an important process for restoring lost sections of rainforest, there are still many plant species at risk of extinction.

- 15 A seed vault can store seeds from rainforest plant species to prevent them from becoming extinct. The Svalbard Global Seed Vault is a secure seed bank located on a remote island in Norway.

The photograph shows the entrance to the Svalbard Global Seed Vault.



(Source: © Angela N Perryman/Shutterstock)

- 20 The Svalbard vault was built to store seeds from food crops but now accepts tree seeds, particularly seeds needed for reforestation. The vault relies on a layer of permanently frozen soil to maintain optimal storage conditions for the seeds.



The cold, stable temperature of the frozen soil slow down the metabolic processes in dormant seeds allowing them to remain viable for hundreds of years. However, with climate change threatening to melt the frozen soil, scientists are now investigating alternative methods of long-term seed storage, such as artificial freezing methods.

25

Micropropagation is used to increase the number of rainforest plants, particularly those at risk due to deforestation. Micropropagation is especially helpful for the rare and endangered rainforest species that struggle to regenerate naturally.

The surface of the Earth has a land area of 150 million km². Of this area, only 6.0% is covered by tropical rainforests. It is thought that these rainforests are home to over half of the world's species. As technologies such as seed storage and micropropagation are developed, scientists continue to play an important role in ensuring the future of the world's rainforests.

30

- (a) State what is meant by the term **ecosystem** (line 1).

(1)

- (b) Give two environmental effects of deforestation (lines 7 to 8).

(2)

1

2

- (c) When the seeds stored in frozen soil are raised to a warmer temperature they will begin to germinate.

Describe what happens during seed germination.

(3)

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- (d) Climate change can be caused by an increase in greenhouse gases in the atmosphere (line 23).

Give two greenhouse gases.

(2)

1

2

- (e) Describe the process of micropropagation (lines 26 to 27).

(3)

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- (f) Calculate the area of tropical rainforest on Earth (lines 29 to 30).

Give your answer in standard form.

(2)

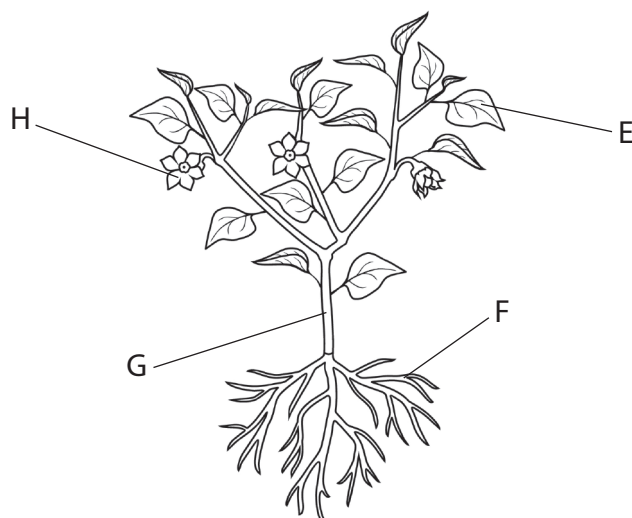
area = km².

(Total for Question 1 = 13 marks)



2 This question is about transport systems in plants.

The diagram shows a plant with some structures labelled.



(Source: © Kazakova Maryia/Shutterstock)

(a) Which label shows where water enters the plant?

(1)

- ☐ A E
☐ B F
☐ C G
☐ D H

(b) In a plant, most water is transported in the xylem.

Some water is also transported in the phloem.

State one other substance that is transported in the phloem.

(1)

(c) State two differences between the structure of the xylem and the structure of the phloem.

(2)

1

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- (d) A cut celery stalk will take up a salt solution and transport the solution through the xylem to the leaves.

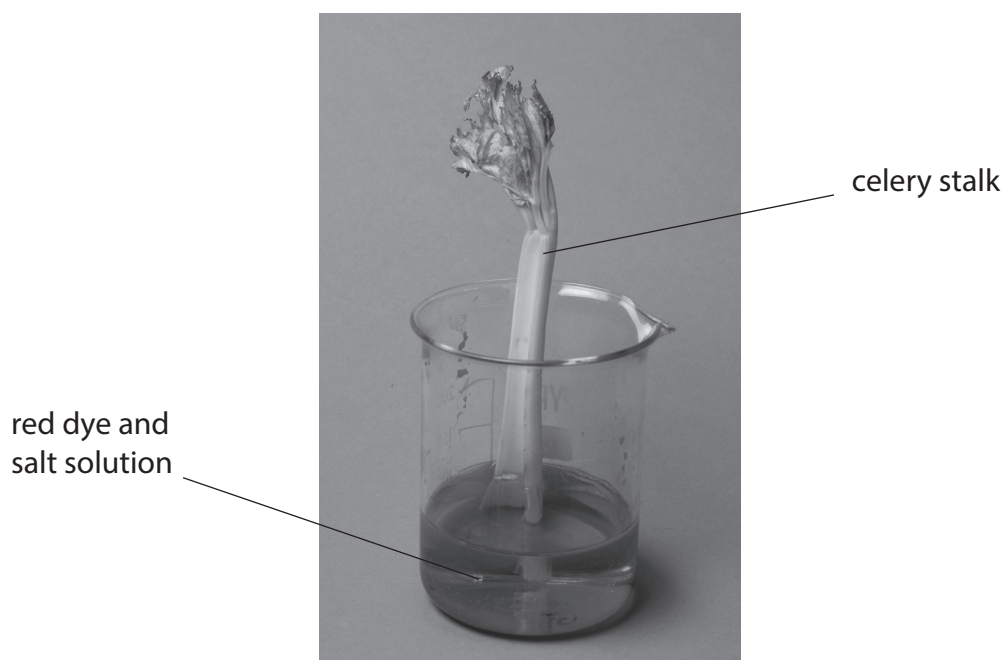
A student investigates if the concentration of salt affects the rate of transport through the xylem.

This is the student's method.

- place a cut stalk of celery in a beaker containing salt solution
- add red dye to the salt solution
- place the beaker containing the celery near a window
- measure the time taken for the red colour to reach the leaves of the celery

Repeat this method using different concentrations of salt solution.

The photograph shows the student's equipment.



(Source: © Pearson Asset Library)

- (i) State the independent variable in this investigation.

(1)

(ii) Give three variables the student should control to obtain valid results.

(3)

1

2

3

(Total for Question 2 = 8 marks)

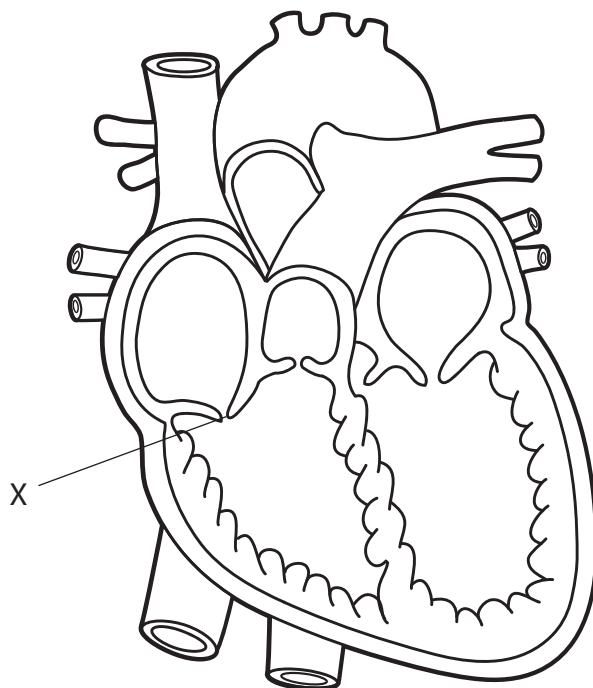
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3 The diagram shows the structure of a heart.



(Source: © Pearson Asset Library)

(a) (i) State the function of structure X.

(1)

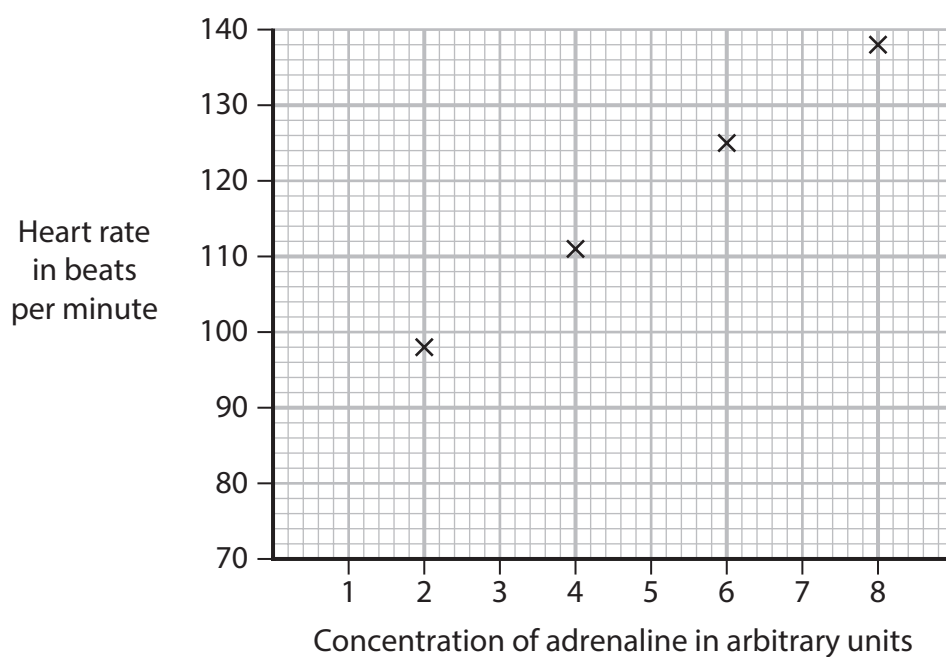
(ii) Which is the correct order of chambers the blood passes through after entering the heart from the vena cava?

(1)

- ☐ **A** left atrium → left ventricle → right atrium → right ventricle
- ☐ **B** left atrium → right atrium → right ventricle → left ventricle
- ☐ **C** right atrium → left atrium → left ventricle → right ventricle
- ☐ **D** right atrium → right ventricle → left atrium → left ventricle

(b) Adrenaline is a hormone released into the blood to prepare the body for action.

The graph shows how the concentration of adrenaline in the blood affects a person's heart rate.



(i) Draw a line of best fit.

(1)

(ii) Using the graph, determine the heart rate at 5 arbitrary units of adrenaline.

(1)

heart rate = beats per minute

(c) Adrenaline also affects the blood glucose level.

(i) Explain how adrenaline affects the blood glucose level.

(3)

(ii) Explain how this change in blood glucose level helps to prepare the body for action.

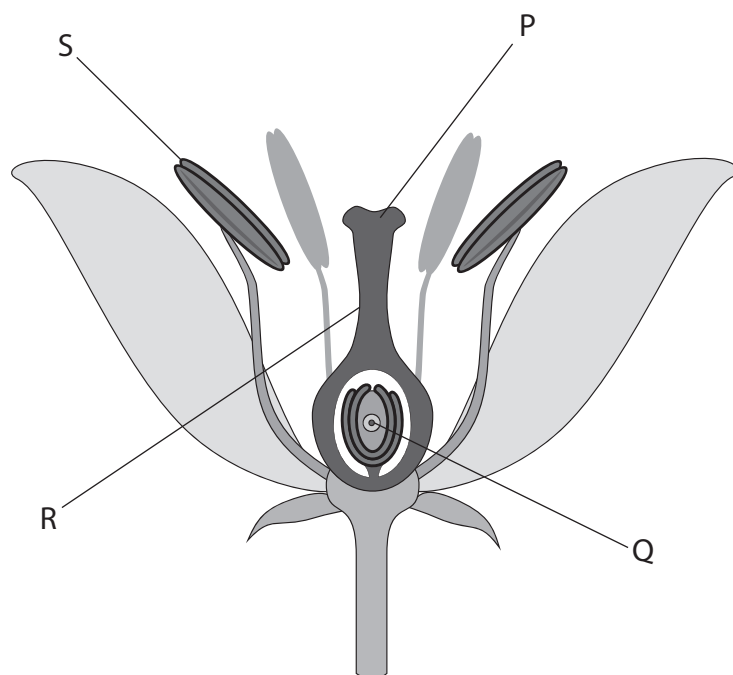
(2)

(Total for Question 3 = 9 marks)



4 Plants can use both sexual and asexual reproduction.

(a) The diagram shows some structures in a flowering plant that uses sexual reproduction.



(Source: © Pearson Asset Library)

(i) Which of these structures contains female sex cells?

(1)

- ☐ A P
- ☐ B Q
- ☐ C R
- ☐ D S

(ii) Name the structure that produces pollen grains.

(1)

(iii) State two ways that the flowers of wind-pollinated plants are different from the flowers of insect-pollinated plants.

(2)

1

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2

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(iv) After pollination, a pollen tube forms.

Explain the function of the pollen tube.

(2)

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(b) Some plants reproduce using asexual reproduction.

(i) State the type of cell division used in asexual reproduction.

(1)

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- (ii) Explain one advantage and one disadvantage of asexual reproduction for a plant.

(4)

advantage

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disadvantage

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(Total for Question 4 = 11 marks)

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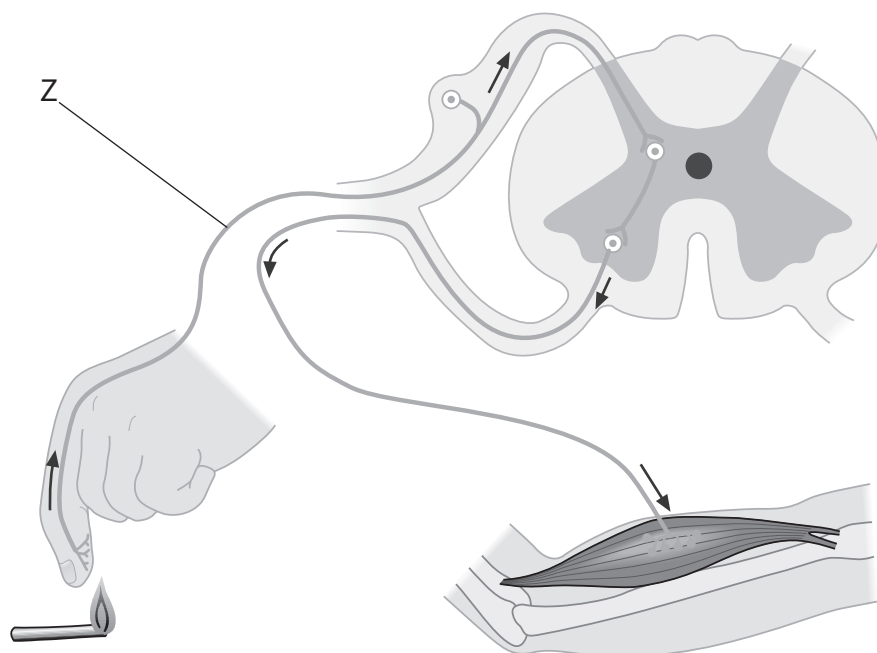
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5 All organisms respond to stimuli.

(a) The diagram shows a reflex arc.



(Source: © Pearson Asset Library)

Which of these is labelled Z in the reflex arc?

(1)

- ☐ A effector
- ☐ B motor neurone
- ☐ C receptor
- ☐ D sensory neurone

(b) Describe how an impulse passes from one neurone to another.

(3)



(c) The eye contains light receptors.

(i) The pupil of the eye becomes smaller in response to bright light.

This is an example of a reflex action.

Explain why it is an advantage for this response to happen as a reflex.

(2)

(ii) Describe the changes that occur in the eye when focusing on a more distant object.

(4)

(Total for Question 5 = 10 marks)

- 6 The photograph shows Prometea, the first cloned horse.



(Source: © MAURO FERMARIELLO / SCIENCE PHOTO LIBRARY)

Prometea was produced by cloning, using the nucleus of a skin cell from a horse called Stella Cometa.

- (a) Complete the passage about cloning by writing a suitable word or words in each blank space.

(5)

A nucleus was taken from a skin cell from Stella Cometa.

This nucleus was inserted into an enucleated that had been taken from a donor horse. An was used to start the type of cell division called, eventually producing an embryo. The embryo was then placed into the of the mother.



(b) Until recently, most cloning has been attempted with farm animals.

The table shows some information about the success rates of cloning different farm animals during a four-year period.

Animal	Number in four-year period		
	embryos made	live births	surviving at least two years
cattle	7500	75	55
sheep	3500	50	15
goat	500	25	5

Some people now want to use cloning to replace their pets. The cost of cloning a pet cat can be as much as 50 000 United States dollars.

Comment on the use of cloning to replace pets.

Use the information in the table and your own knowledge about variation to support your answer.

(5)

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(Total for Question 6 = 10 marks)

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7 Sewage in rivers can affect aquatic life.

Diagram 1 shows the location of a sewage outlet in a section of river.

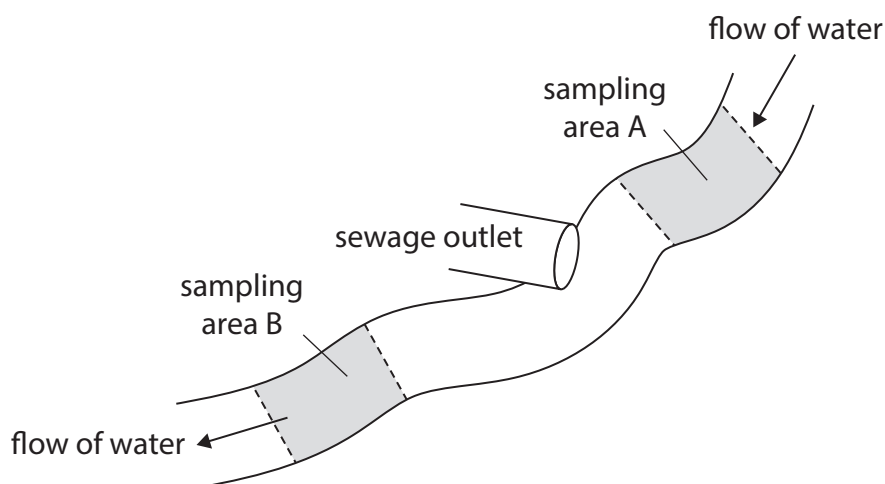


Diagram 1

A student investigates the effect of sewage on three different organisms living in the river.

This is the student's method.

- select a shallow section of river in sampling area A
- place a net in the water
- kick the riverbed in front of the net to dislodge sediment
- count the number of each type of organism caught in the net

The student repeats this method in sampling area B.

The table shows the student's results.

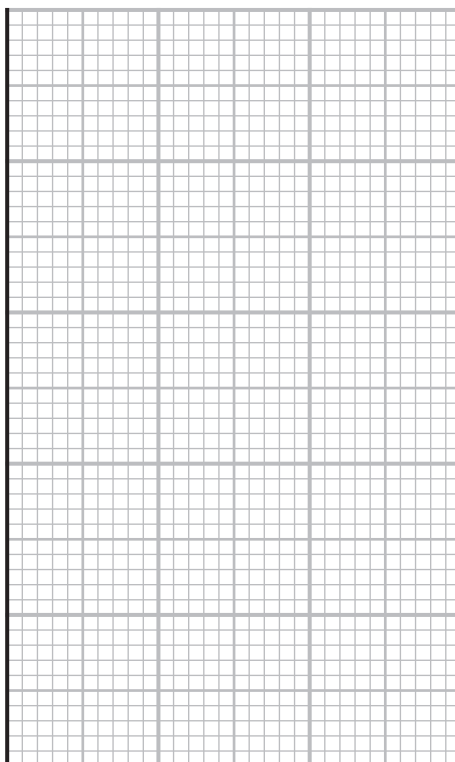
Organism name	Number of organisms counted	
	sampling area A	sampling area B
mayfly nymphs	29	0
water striders	19	18
bloodworms	7	49

(a) State one safety precaution the student should take when sampling the river.

(1)

- (b) (i) Plot a bar chart to show the student's results.

(4)



- (ii) Calculate the percentage increase in the total number of organisms counted in sampling area B compared with sampling area A.

(2)

percentage increase = %

(c) Diagram 2 shows some information about the organisms that were sampled.



Mayfly nymphs survive best in freshwater with a high-oxygen level. They live in the sediment at the bottom of rivers.

(Source: © ZawarM356/
Shutterstock)



Water striders are sensitive to toxic metals in water.
Water striders live on the surface of rivers.

(Source: © Maximillian
cabinet/Shutterstock)



Bloodworms can survive in low-oxygen environments.
Bloodworms live in the sediment at the bottom of rivers.

(Source: © schankz/
Shutterstock)

Diagram 2



The student concludes that the sewage outlet causes the difference between the populations of each of the three organisms in sampling areas A and B.

Comment on the student's conclusion.

Use information from the student's investigation and diagram 2 to support your answer.

(5)

(Total for Question 7 = 12 marks)



8 DNA contains the instructions for all proteins made by the human body.

(a) The box lists four structures.

cell	chromosome	gene	nucleus
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Give the four structures in order of size from the smallest to the largest.

(1)

smallest
↓
.....
largest

(b) In a section of DNA, 17% of the bases are thymine.

Calculate the percentage of bases that are guanine in this section of DNA.

(2)

guanine = %



- (c) Explain how changing a single base in a section of DNA could result in the formation of a different protein.

(3)

(Total for Question 8 = 6 marks)



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- 9 Aphids are common pests found all over the world.

Photograph 1 shows a colony of aphids on a plant.



(Source: © LFRabanedo/Shutterstock)

Photograph 1

Pests can affect crop yields.

- (a) Explain one way animal pests can reduce crop yields.

(2)

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(b) Ladybirds are insects that are predators of aphids.

Photograph 2 shows a ladybird feeding on aphids.



(Source: © mehmetkrc/Shutterstock)

Photograph 2

Predatory species such as ladybirds can be used as a form of biological pest control.

Discuss the use of biological pest control using predatory species rather than chemical pesticides.

(6)

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Question 9 continues on the next page.



- (c) Explain how genetic modification could be used to make the cells of a crop plant produce pesticide.

(3)

(Total for Question 9 = 11 marks)

TOTAL FOR PAPER = 90 MARKS

