Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						7	0	4	0	/	0	2	Signature	

Paper Reference(s)

7040/02

Examiner's use only

Team Leader's use only

London Examinations GCE

Biology

Ordinary Level

Paper 2

Tuesday 18 January 2011 – Afternoon

Time: 2 hours

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total	

Materials required for examination
Nil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
The paper is arranged in THREE sections, A, B and C.
In Section A, answer ALL questions.
In Section B, answer any TWO questions.
In Section C, answer any TWO questions.
Write your answers in the spaces provided in this question paper.
Do not use pencil. Use blue or black ink.
In Sections B and C, indicate which question you are answering by marking the box with a cross (☒).
If you change your mind, put a line through the box (☒) and then indicate your new question with a cross (☒).

Information for Candidates

Calculators may be used.
The total mark for this paper is 100.
The marks for parts of questions are shown in round brackets: e.g. **(2)**.
This paper has 12 questions.
There are 28 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and in good English.
In calculations, show **all** the steps in your working.

Printer's Log. No.
N36639A
W850/U7040/57570 5/5/4/2/

Turn over

edexcel
advancing learning, changing lives

SECTION A

Answer ALL questions in this section.

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

Giant water lily

The giant lily plant grows in the river Amazon in South America. The photograph shows a leaf of the plant floating on the surface of the water. The leaf has a diameter of up to 2 metres.

The leaf has adaptations that help the plant survive. For example, the surface area of the leaf is very large and the edge of the leaf is raised. This prevents the leaves from one plant overlapping other leaves. The stomata of the giant lily leaf are found only on the upper surface. The underside of the giant lily leaf is covered with sharp spines, 2 to 3 cm long, which protect it from herbivorous fishes. The spines are apparently toxic and being pricked by one is said to be extremely painful.

The flower of the giant lily is also enormous. The petals open as pure white blooms in the evening. A chemical reaction heats the inside of the flower to as much as 12 °C above the air temperature, helping to disperse the flower's sweet-smelling scent by diffusion. This attracts scarab beetles which burrow into the flower between the petals, delivering pollen they have received from a previous visit to another giant lily flower. The flower closes the next morning and the beetles are trapped inside, getting dusted with more pollen as they struggle to escape. At dusk, the flower opens for a second time. As the petals open and allow the pollen-covered beetles to escape and find a fresh white flower, they reveal a deep purple colour and are no longer attractive to scarab beetles.

Leave blank

(a) The leaf has many adaptations that help the plant survive.

Describe **two** ways in which the leaf is adapted to obtain light for photosynthesis.

1 .....

.....

2 .....

.....

(2)

(b) Suggest an advantage to the giant lily of having the stomata only on the upper surface of the leaf (lines 6 and 7).

.....

.....

.....

.....

(2)

(c) What is meant by the term 'herbivorous' (line 8)?

.....

.....

(1)

(d) (i) What is meant by the term 'diffusion' (line 13)?

.....

.....

.....

(2)

(ii) Explain why raising the temperature inside the flower 12 °C above the air temperature helps to disperse the scent (lines 11 and 12).

.....

.....

.....

(2)

BLANK PAGE

Leave blank

(e) The giant lily produces offspring by sexual reproduction.

(i) Name **two** structures included in the passage that show the giant lily reproduces sexually.

1 .....

2 .....

(2)

(ii) Give **one** advantage of reproducing sexually rather than asexually.

.....

.....

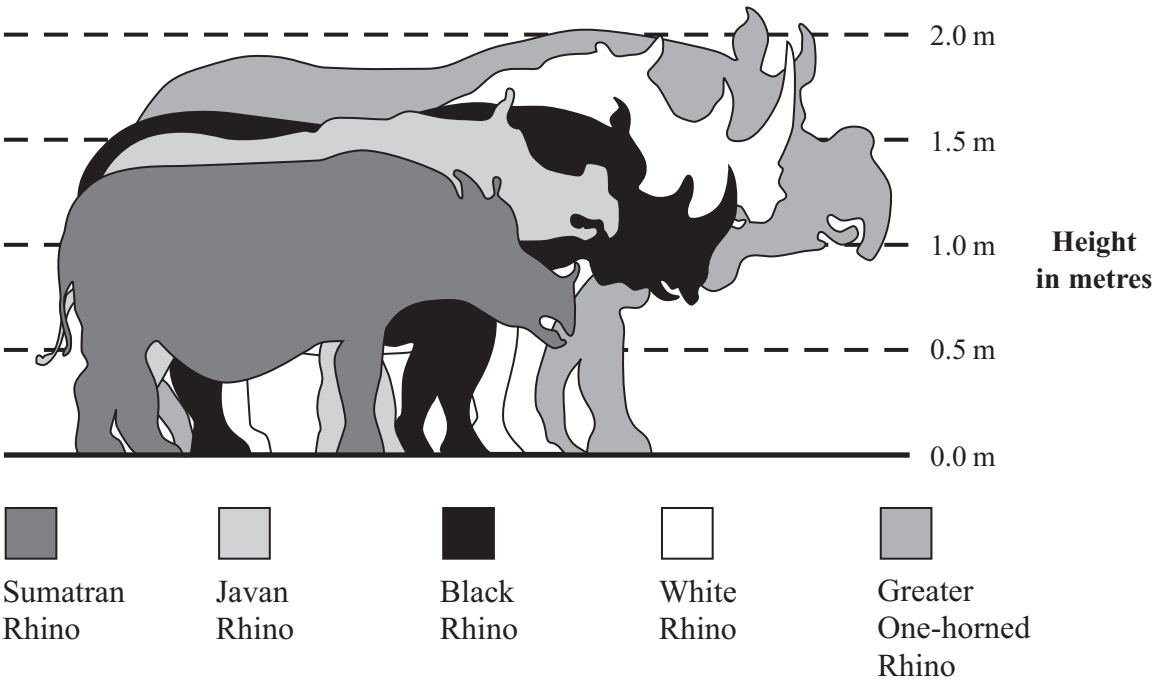
(1)

Q1

(Total 12 marks)

Leave blank

2. The diagram below shows the heights of five different species of rhino.



(a) What is the height in metres of the shortest rhino?

.....

(1)

(b) The table shows the mass of each rhino in kg.

Species of rhino	Mass of rhino in kg
Sumatran	1000
Javan	?
Black	1300
One-horned	2200
White	2250

(i) What mass in kg is the Javan rhino likely to have?

.....

(1)

Leave blank

(ii) Suggest why the masses of the rhinos are not in the same order as their heights.

.....

.....

.....

.....

(2)

(c) Rhinos feed on plants. Their skin is well supplied with blood vessels which attract blood-sucking insects. Birds are often found on the back of rhinos feeding on the blood-sucking insects.

(i) Use this information to draw a food chain in the space below.

(2)

(ii) Name **two** substances in rhino blood that would give energy to the insects.

1 .....

2 .....

(2)

(d) The Javan rhino lives in tropical rainforest and has become an endangered species. There are only about 60 left in the world.

Suggest **two** reasons why the Javan rhino has become an endangered species.

1 .....

2 .....

(2)

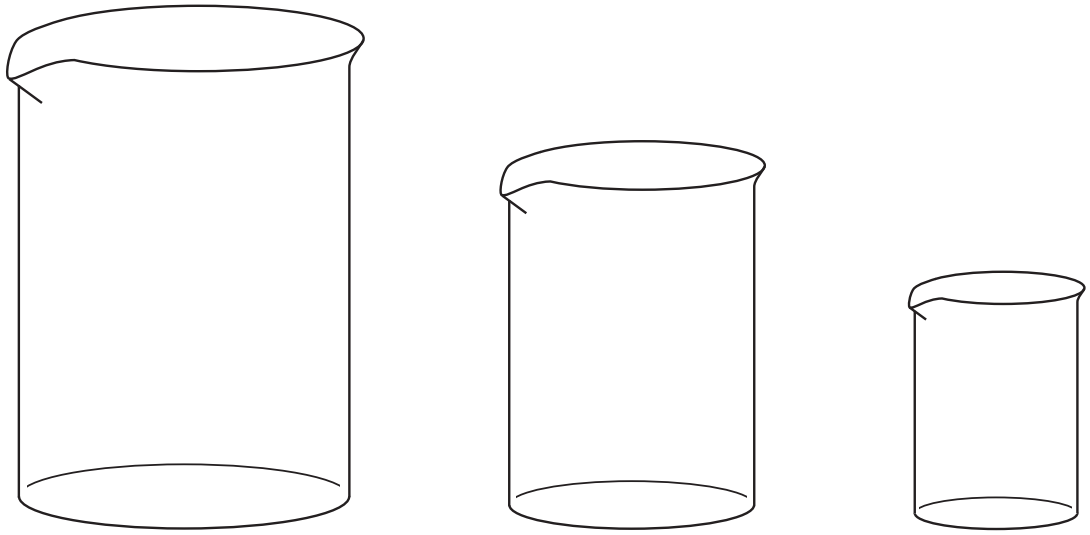
Q2

(Total 10 marks)

Leave blank

3. Gerard carried out an experiment to look at the effect of size on the rate of cooling.

He set up three beakers containing water at the same starting temperature. One beaker held 500 cm^3, another 300 cm^3 and a third 100 cm^3.



500 cm^3 300 cm^3 100 cm^3

He used a thermometer to measure the temperature in each beaker every 4 minutes for 20 minutes and recorded his results in the table below.

Time in minutes	**Temperature of beaker in °C**		
	500 cm^3	**300 cm^3**	**100 cm^3**
0	40	40	40
4	38	37	36
8	37	34	33
12	36	32	31
16	34	31	28
20	33	29	26

(a) Suggest **one** precaution Gerard should take to ensure his results are as accurate as possible.

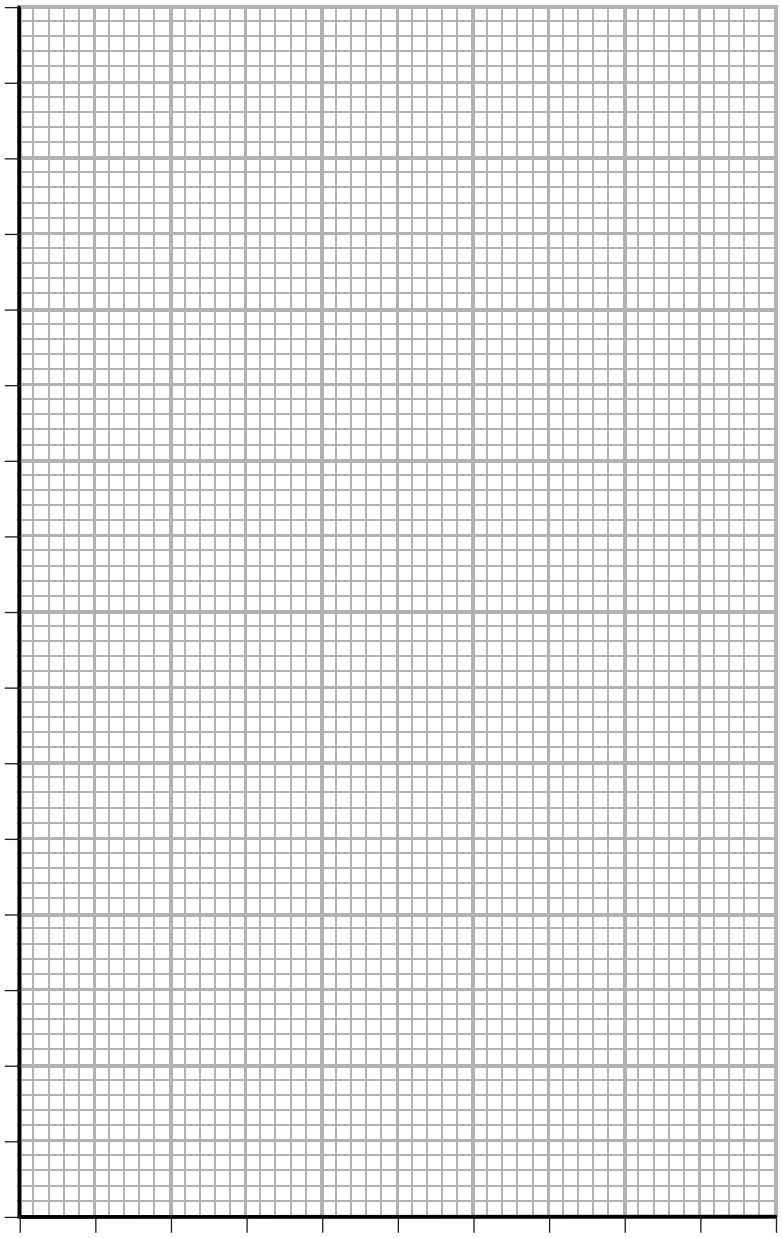
.....

.....

(1)

Leave blank

(b) On the grid below plot a graph to show these results. Join the points using straight lines.



(6)

Leave blank

(c) Describe and explain the relationship between size of beaker and its rate of heat loss.

.....

.....

.....

.....

(2)

(d) Use your results to explain why smaller mammals need a greater supply of food per gram of body mass compared with larger mammals.

.....

.....

.....

.....

(2)

(e) Gerard's teacher suggested he extend his investigation to find out if insulation affects heat loss. Suggest how he could modify his experiment to study the effect of insulation on heat loss.

.....

.....

.....

.....

.....

.....

(3)

Q3

(Total 14 marks)

Leave blank

4. Describe an investigation you could carry out to discover the effect of soil water content on the growth of a cereal crop.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

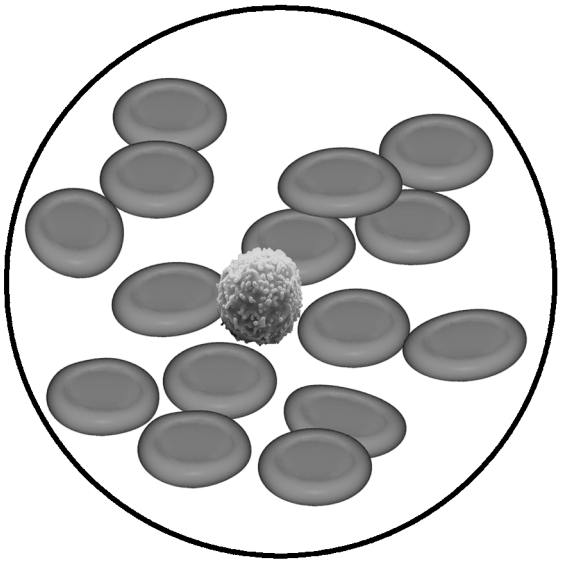
Q4

(Total 6 marks)

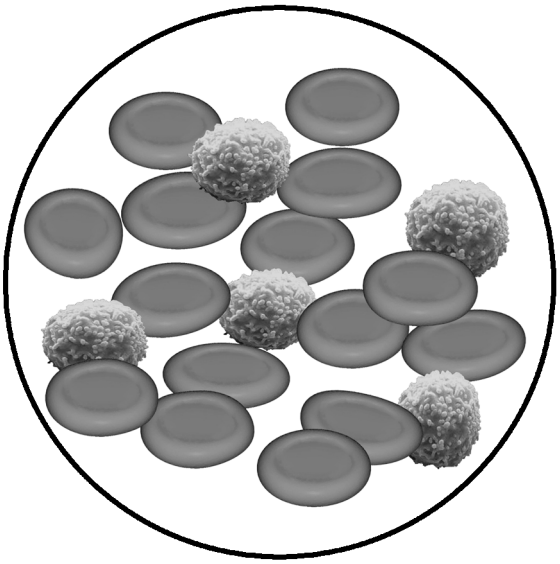
Leave blank

5. The diagram below shows samples of blood, **A** and **B**, seen using a microscope. One sample is from a healthy man. The other sample is from the same man when he has a disease caused by bacteria.

Sample A



Sample B



(a) (i) How many red blood cells can be seen in Sample A?

.....

(1)

Leave blank

(ii) Put a cross in a box (☒) to show the correct percentage of cells in Sample B that are white blood cells.

Percentage of white blood cells	
5	☒
15	☒
25	☒
50	☒

(1)

(iii) Which blood sample is most likely to be from the man when he was healthy? Explain your answer.

.....

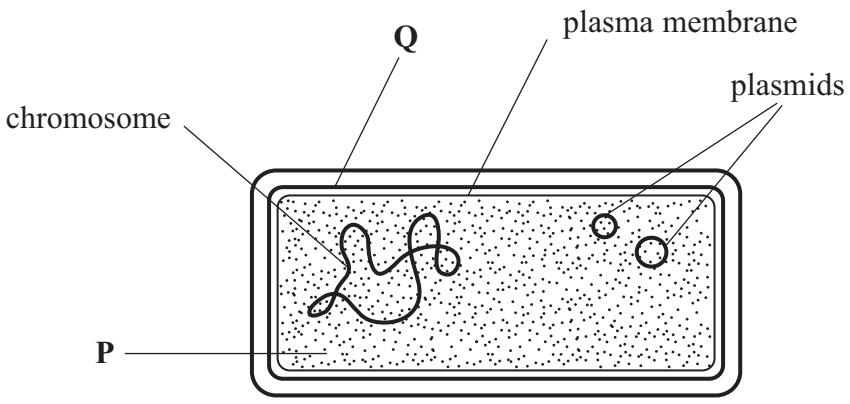
.....

.....

.....

(2)

(b) The diagram below shows one of the bacteria that gave the man the disease.



(i) Name the parts labelled **P** and **Q**.

P .....

Q .....

(2)

(ii) What term is used to describe all disease-causing micro-organisms?

.....

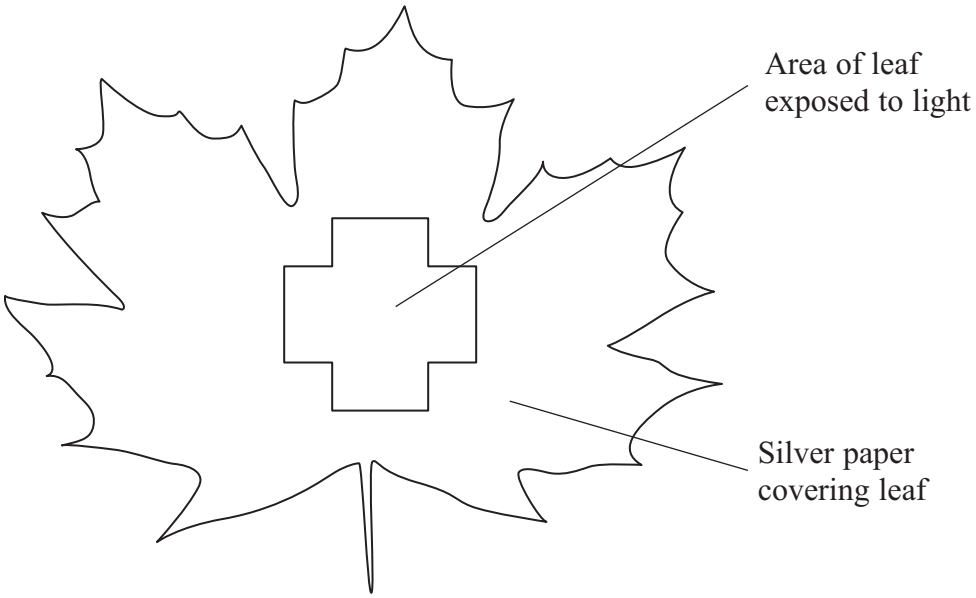
(1)

Q5

(Total 7 marks)

6. Bethany decided to carry out an experiment to see if light is required for photosynthesis to occur. She placed a potted plant in a dark cupboard for 48 hours. She covered one of the leaves of the plant with silver paper from which a shape had been cut out. She then placed the plant near a window receiving direct sunlight for 6 hours.

The diagram below shows the leaf with its silver paper covering.



After 6 hours she removed the leaf from the plant, removed the silver paper and tested it for starch. She carried out the following steps.

1. Dipped the leaf in boiling water for 30 seconds

2. Placed the leaf in a test tube containing ethanol

3. Put the test tube in a hot water bath and allowed the ethanol to boil for 5 minutes

4. Removed the leaf and placed it on a Petri dish, then covered it with iodine solution for 1 minute

5. Rinsed it with cold water

6. Drew its appearance

Leave blank

(a) Explain why the plant was kept in the dark for 48 hours at the start of the experiment.

.....

.....

.....

.....

(2)

(b) Give the purpose of each of the following steps in testing the leaf for starch.

Step 1

.....

.....

.....

(1)

Step 3

.....

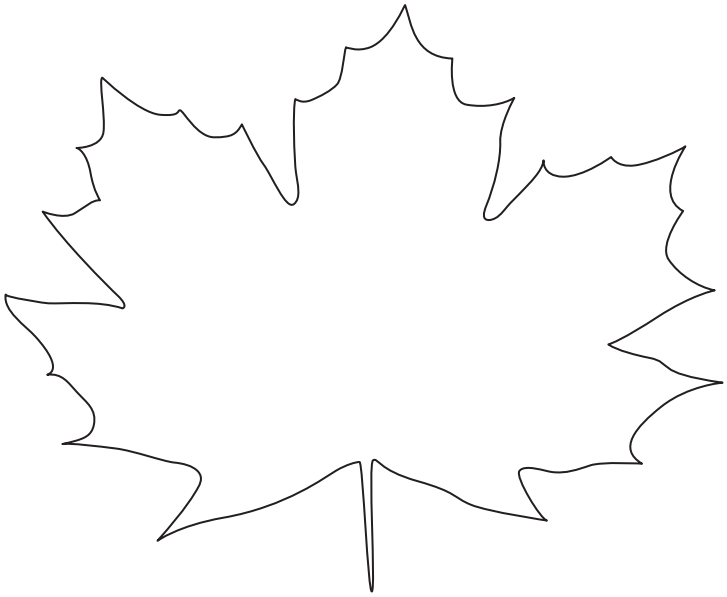
.....

.....

(1)

Leave blank

(c) (i) In the space below draw and label the results Bethany should see in Step 6.



(2)

(ii) What can you conclude from Bethany's results?

.....

.....

.....

.....

.....

(2)

Leave blank

(d) Bethany's teacher said that only leaves that contain chlorophyll can carry out photosynthesis. Explain how Bethany could modify her experiment to test this hypothesis.

.....

.....

.....

.....

.....

.....

(3)

Q6

(Total 11 marks)

TOTAL FOR SECTION A: 60 MARKS

BLANK PAGE

Leave blank

SECTION B

Answer TWO questions in this section. If you change your mind, put a line through the box (☒) and then indicate your new question with a cross (☒).

If you answer Question 7, put a cross in this box ☒ .

7. (a) Explain how the response of a plant shoot to light differs from its response to gravity.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)

(b) How does nervous communication differ from hormonal communication in animals?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4) **Q7**

(Total 8 marks)

Leave blank

If you answer Question 8, put a cross in this box ☒ .

8. An industrial fermenter is a large container used to culture micro-organisms. Suggest and explain why each of the following would result in a reduced yield of the desired product.

(a) A failure in temperature control

.....

.....

.....

.....

.....

.....

.....

(3)

(b) A breakdown of the paddle stirrers

.....

.....

.....

.....

.....

.....

.....

(3)

(c) A lack of aseptic conditions

.....

.....

.....

.....

.....

(2)

Q8

(Total 8 marks)

Leave blank

If you answer Question 9, put a cross in this box ☒ .

9. (a) Explain why digestion must take place before absorption can occur.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)

(b) Explain how digestion in the human stomach and small intestine is related to changes in pH.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4) **Q9**

(Total 8 marks)

TOTAL FOR SECTION B: 16 MARKS

Leave blank

SECTION C

Answer TWO questions in this section. If you change your mind, put a line through the box (☒) and then indicate your new question with a cross (☒).

If you answer Question 10, put a cross in this box ☒ .

10. Describe the processes of micropropagation in plants and cloning in mammals, and explain how each of these processes can be used to benefit humans.

Leave blank

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q10

(Total 12 marks)

Leave blank

If you answer Question 11, put a cross in this box ☒ .

11. Describe and explain how substances enter and are transported around a plant.

Leave blank

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q11

(Total 12 marks)

Leave blank

If you answer Question 12, put a cross in this box ☒ .

12. Describe the methods that can be used by farmers to increase the production of food crops.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Leave blank

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q12

(Total 12 marks)

TOTAL FOR SECTION C: 24 MARKS

TOTAL FOR PAPER: 100 MARKS

END

BLANK PAGE