



General Certificate of Secondary Education  
2010

## Science: Double Award (Non-Modular)

Paper 1  
Higher Tier

[G8404]



FRIDAY 21 MAY, MORNING

Centre Number

71

Candidate Number

### TIME

1 hour 45 minutes.

### INSTRUCTIONS TO CANDIDATES

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

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

### INFORMATION FOR CANDIDATES

The total mark for this paper is 120.

Quality of written communication will be assessed in question **1(a)**.  
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Details of calculations should be shown.

Units must be stated in numerical answers where appropriate.

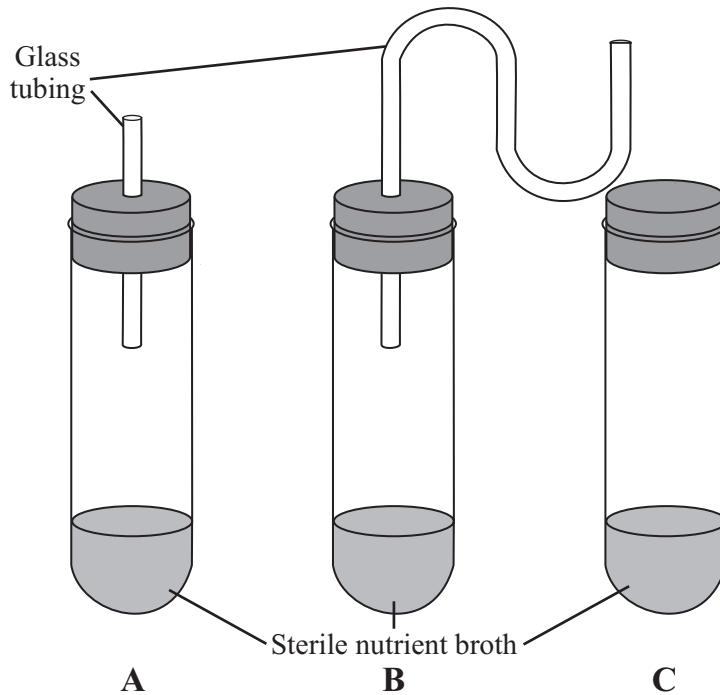
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use only

Question Number	Marks
1	
2	
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12	

Total  
Marks



2. An investigation into bacterial growth was set up as shown in the diagram. The broth had been boiled for several minutes to make it sterile.



- (a) Why was the broth sterilised? \_\_\_\_\_ [1]

The broth remains clear if there is no bacterial growth but turns cloudy if bacteria grow.

- (b) Complete the table to show the appearance of the broth (cloudy or clear) after two days.

Tube	A	B	C
Appearance			

[3]

- (c) Explain the result for tube B. \_\_\_\_\_ [1]

- (d) Name the scientist who first carried out a similar investigation. \_\_\_\_\_ [1]

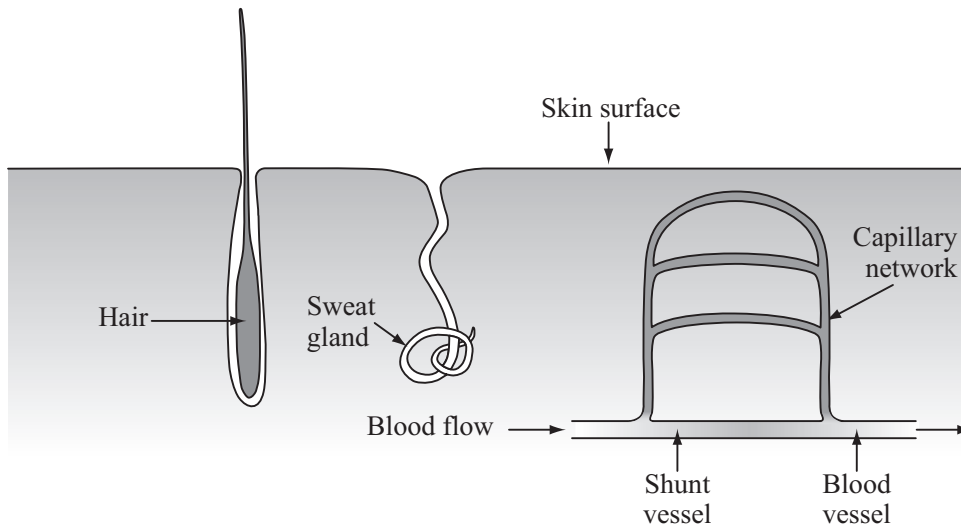
- (e) What theory did this investigation disprove? \_\_\_\_\_ [1]

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Marks	Remark





5 The diagram shows the skin in cool conditions.



Complete the table to describe and explain the response of the labelled parts of the skin in **hot** conditions.

Part of the skin	Response in hot conditions	
Hair	Description	
	Explanation	
Capillary network	Description	
	Explanation	
Sweat gland	Description	Sweat produced
	Explanation	

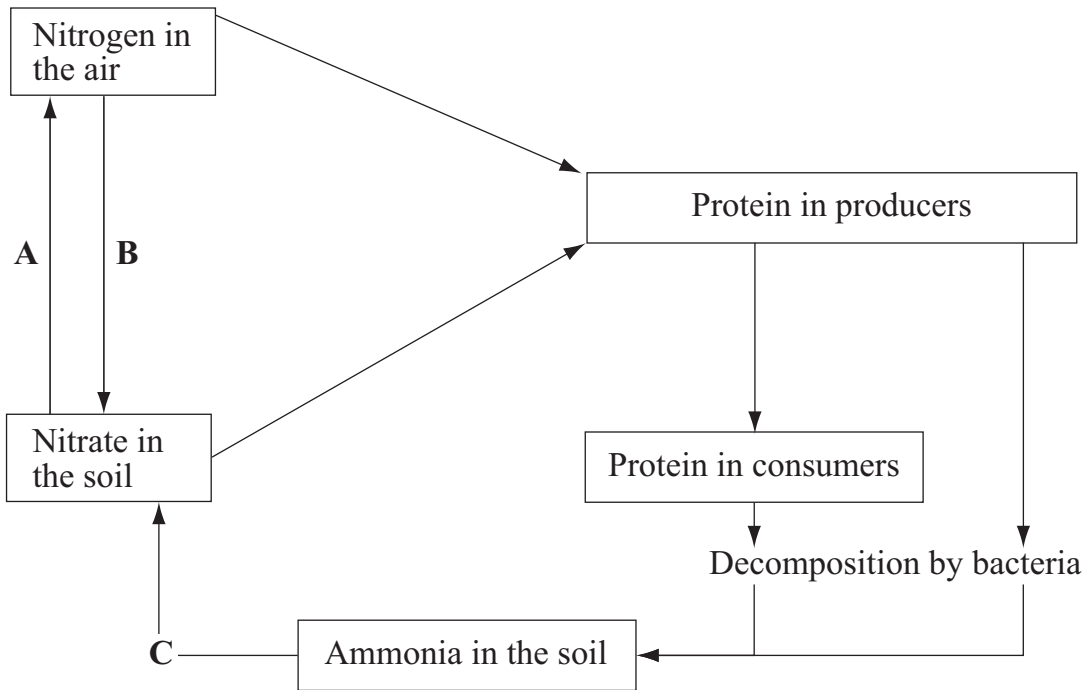
[2]

[2]

[2]

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Marks	Remark

6 The diagram shows the nitrogen cycle.  
A, B and C are processes carried out by bacteria.



Use the diagram and your knowledge to answer the following questions.

(a) Bacteria are decomposers. Name another type of decomposer.

\_\_\_\_\_ [1]

(b) Name the types of bacteria that carry out the following processes.

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

[3]

(c) If a farmer is growing a crop, which of these types of bacteria is not helpful?

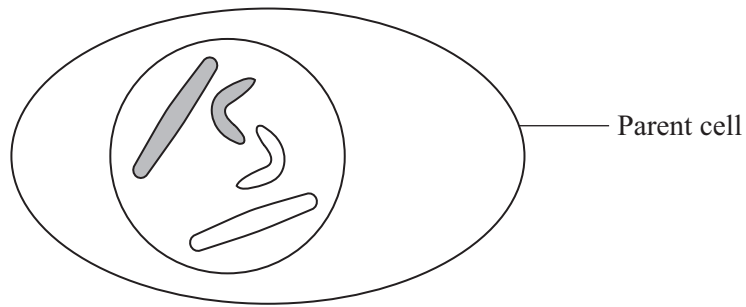
\_\_\_\_\_ [1]

(d) Planting clover increases the number of type B bacteria as these bacteria are found in swellings in clover roots. Suggest the benefit to the soil of planting clover.

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

- 7 (a) The diagram shows an example of a cell. This cell divides to produce gametes. Complete the diagram to show the result of such cell division.



[3]

- (b) Name the type of cell division that produces gametes.

\_\_\_\_\_ [1]

- (c) The parent cell has a diploid number of chromosomes. What term describes the number of chromosomes in the gamete?

\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark



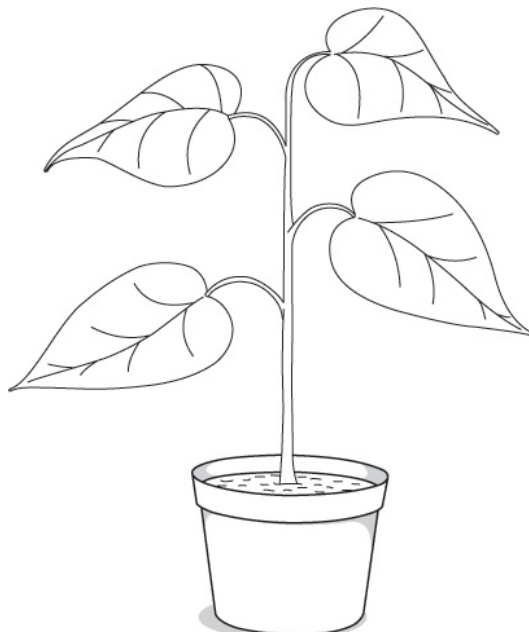




- (b) Another experiment was carried out on a tomato plant to investigate where sugar was transported to after it was made in the plant leaves. The results are shown below.

Part of tomato plant	Percentage of the sugar transported to each part of the plant
Roots	52
Stem	45
Youngest leaf	2
2nd youngest leaf	1

- (i) Draw an arrow to show the direction in which **most** sugar was transported in the plant. [1]



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- (ii) Name the type of cells through which sugars are transported. [1]
- \_\_\_\_\_

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Marks	Remark

(iii) Give three ways sugars, made by photosynthesis, are used by plants.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_ [3]

Examiner Only	
Marks	Remark



**(b)** Proteins are digested to amino acids in the small intestine.

**(i)** Name the process by which amino acids pass into the blood in the small intestine.

\_\_\_\_\_ [1]

**(ii)** Name the blood vessel that transports amino acids from the small intestine to the liver.

\_\_\_\_\_ [1]

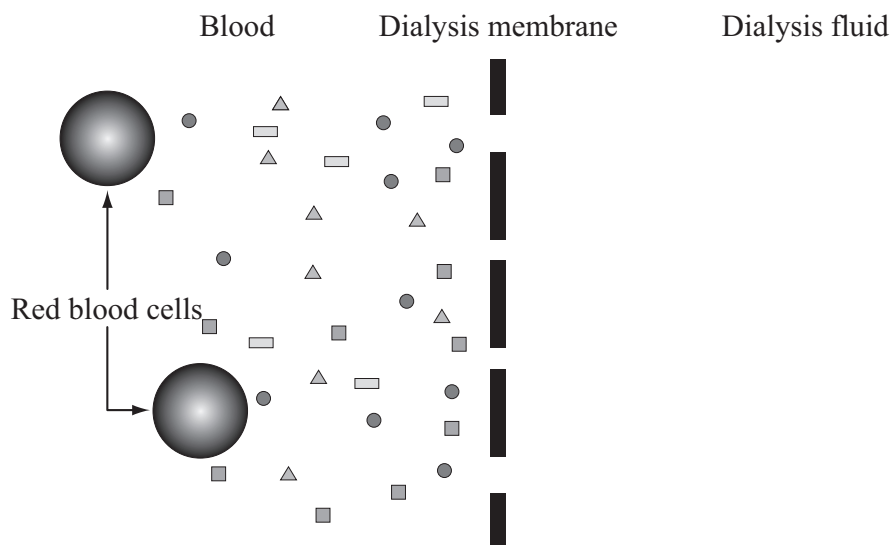
**(iii)** Describe how amino acids are used by cells.

\_\_\_\_\_  
\_\_\_\_\_ [2]

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Marks	Remark

- (c) Excess amino acids are broken down to urea by the liver and then transported to the kidneys. Anne's kidneys failed and so she had to undergo dialysis.

The diagram shows the composition of Anne's blood as it enters the dialysis machine.



Key to molecules ● = water ▲ = urea ■ = glucose □ = salt

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- (i) Complete the table to show whether each of the components listed is present in the **dialysis fluid at the start** of dialysis. Place a tick (✓) if the component is present or a cross (X) if it is absent. The first one has been completed for you.

Component in Anne's blood	Present or absent in dialysis fluid at the start of dialysis
Salts	✓
Water	
Urea	
Glucose	
Red blood cells	

[4]

- (ii) At the end of dialysis how would you expect the composition of the dialysis fluid to have changed?

\_\_\_\_\_ [1]

- (iii) Why does the dialysis fluid need to be changed regularly?

\_\_\_\_\_  
 \_\_\_\_\_ [1]

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Marks	Remark

**(d) (i)** The liver and insulin regulate blood glucose levels.

Describe how this regulation occurs after eating a meal with a high glucose content.

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[3]

**(ii)** Name the condition people suffer from if they cannot regulate their blood glucose levels.

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[1]

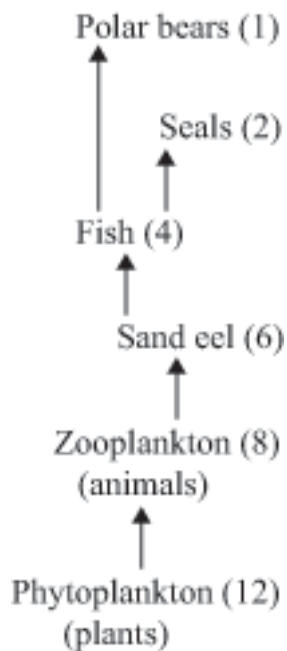
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11 (a) The diagram shows a food web for an island in the Arctic.



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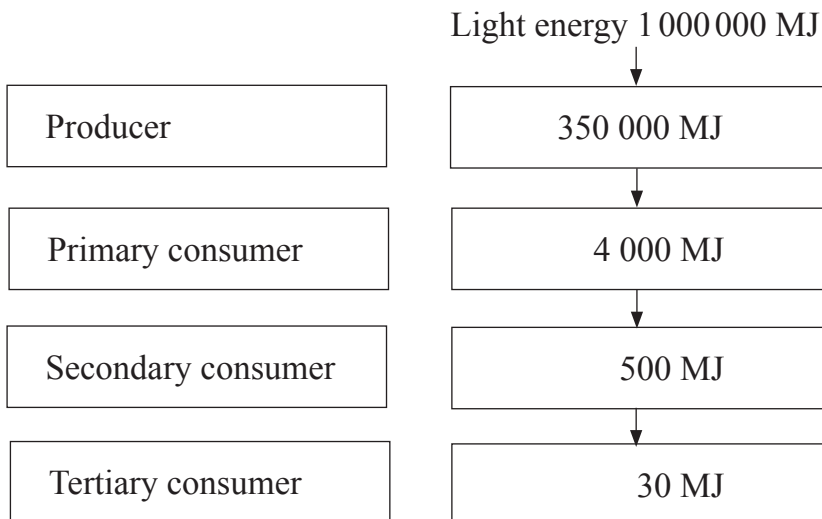
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(vii) Explain why it is an advantage to the polar bear to have more than one food source.

\_\_\_\_\_ [1]

(b) The diagram shows the transfer of energy from one trophic level to the next. Energy is lost between trophic levels.



(i) What percentage of the energy available to primary consumers is transferred to secondary consumers? Show your working.

\_\_\_\_\_ % [2]

(ii) Give **two** ways that energy is lost between trophic levels.

1. \_\_\_\_\_
2. \_\_\_\_\_ [2]

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Marks	Remark

- (c) A scientist wanted to estimate the size of population of fish in a lake. He captured a first sample containing 112 fish from the lake and put a mark on the fin of each one. He released these fish back into the lake. One week later he captured a second sample which contained 140 fish, 16 of which were marked and 124 unmarked.

The formula used to estimate the size of a population is given below.

$$\text{Population} = \frac{\text{Total number of fish in the first sample} \times \text{Total number of fish in the second sample}}{\text{Number of marked fish in the second sample}}$$

- (i) Calculate the size of the fish population using the formula given. Show your working.

Answer \_\_\_\_\_ [2]

- (ii) Suggest **two** reasons why the fish population in a lake may decrease.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

- (iii) Why is it more difficult to estimate fish populations in the sea rather than in a lake?

\_\_\_\_\_ [1]

- (iv) Give **one** reason why it is important to monitor fish populations in the sea.

\_\_\_\_\_ [1]

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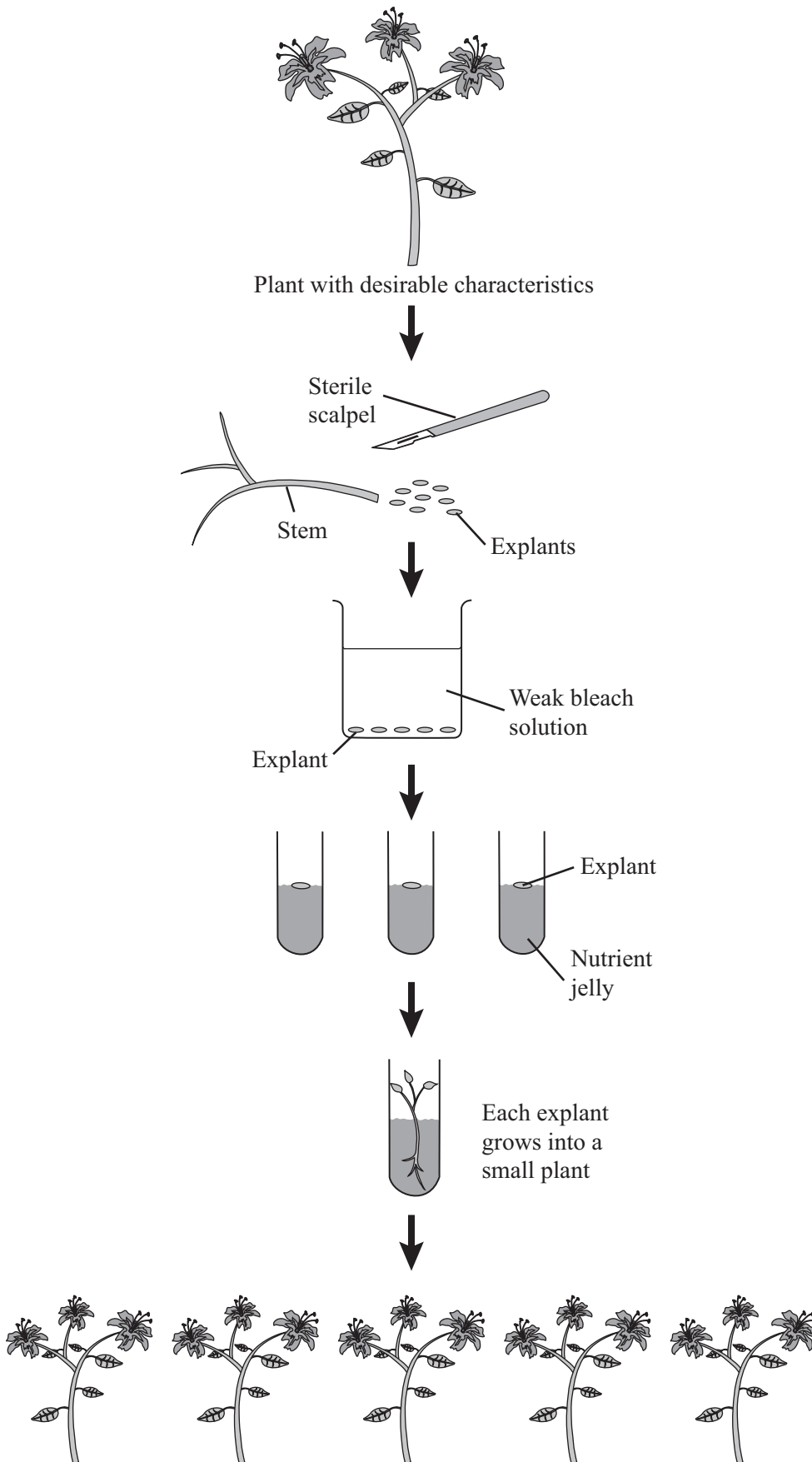


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(c) The diagram shows how plants can be produced by the process of tissue culture.

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