



General Certificate of Secondary Education  
2017–2018

Centre Number

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Candidate Number

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# Double Award Science: Biology

Unit B1  
Higher Tier



[GSD12]

WEDNESDAY 8 NOVEMBER 2017, MORNING

## TIME

1 hour, plus your additional time allowance.

## 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 nine** questions.

## INFORMATION FOR CANDIDATES

The total mark for this paper is 70.

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 **3(b)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

<b>Total Marks</b>	
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2 (a) Protease is an enzyme which breaks down protein.

(i) Complete the sentence below.

Protease breaks down protein into \_\_\_\_\_ [1]

(ii) Where is protein broken down in the digestive system?

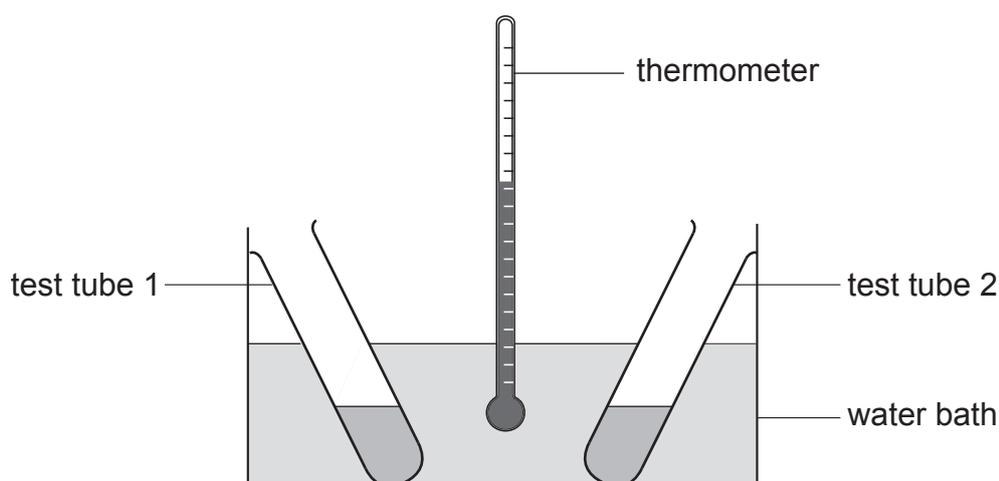
1. \_\_\_\_\_

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

(b) Rory carried out an experiment to investigate how temperature affects the rate of breakdown of protein in milk by protease.

When all the protein in the milk is broken down by protease, the milk turns colourless.

The diagram below shows some of the apparatus Rory used in his experiment.



Source: Principal Examiner

The diagram shows the test tubes at the start of the experiment.

The reaction occurred in test tube 1.

Test tube 2 was a control.

(i) Give **one** difference in the contents of test tubes 1 and 2 at the start of the experiment.

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

Examiner Only	
Marks	Remark
○	○

Rory carried out the experiment at five different temperatures.

The table shows his results.

Temperature/°C	Time for completion of the reaction/min
20	25
30	15
40	5
50	10
80	still not completed after 60 minutes

- (ii) Name **one** other piece of apparatus that Rory used to obtain his results. This piece of apparatus is not shown in the diagram opposite.

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

- (iii) Give **one** factor Rory should have kept constant in the experiment.

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

- (iv) How could Rory tell when the reaction was complete?

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

- (v) At what temperature did the protease work best?

\_\_\_\_\_ °C [1]

- (vi) How could Rory improve the experiment to find a more accurate value for the temperature protease works best at?  
Suggest how.

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

Examiner Only

Marks Remark

(c) Use your knowledge of enzymes to explain the result at 80 °C.

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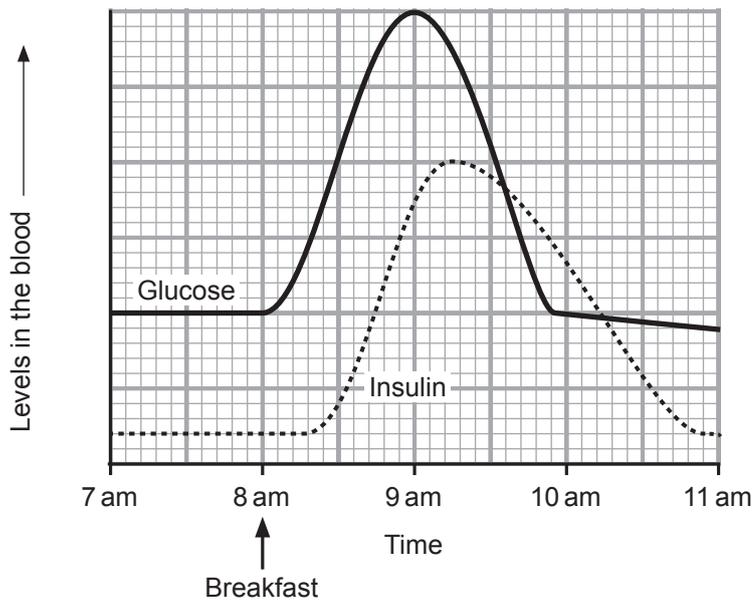
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[3]

Examiner Only	
Marks	Remark

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**(Questions continue overleaf)**

3 The graph shows the levels of glucose and insulin in a person's blood between 7 am and 11 am.



Source: Principal Examiner

(a) Using the graph, explain the change in the **level of insulin** between 8 am and 11 am.

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[2]

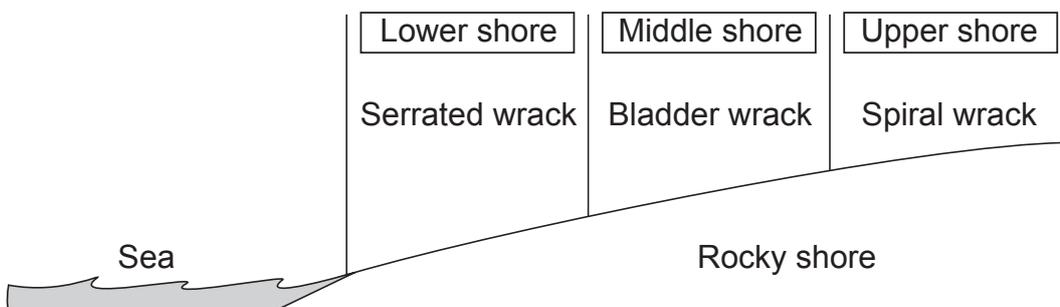
Examiner Only	
Marks	Remark
○	○



- 4 Seaweeds are adapted to living on different parts of a rocky shore. As seaweeds (wracks) dry out they lose water, causing their mass to decrease.

The upper shore is covered by sea water for a shorter time each day than the lower shore.

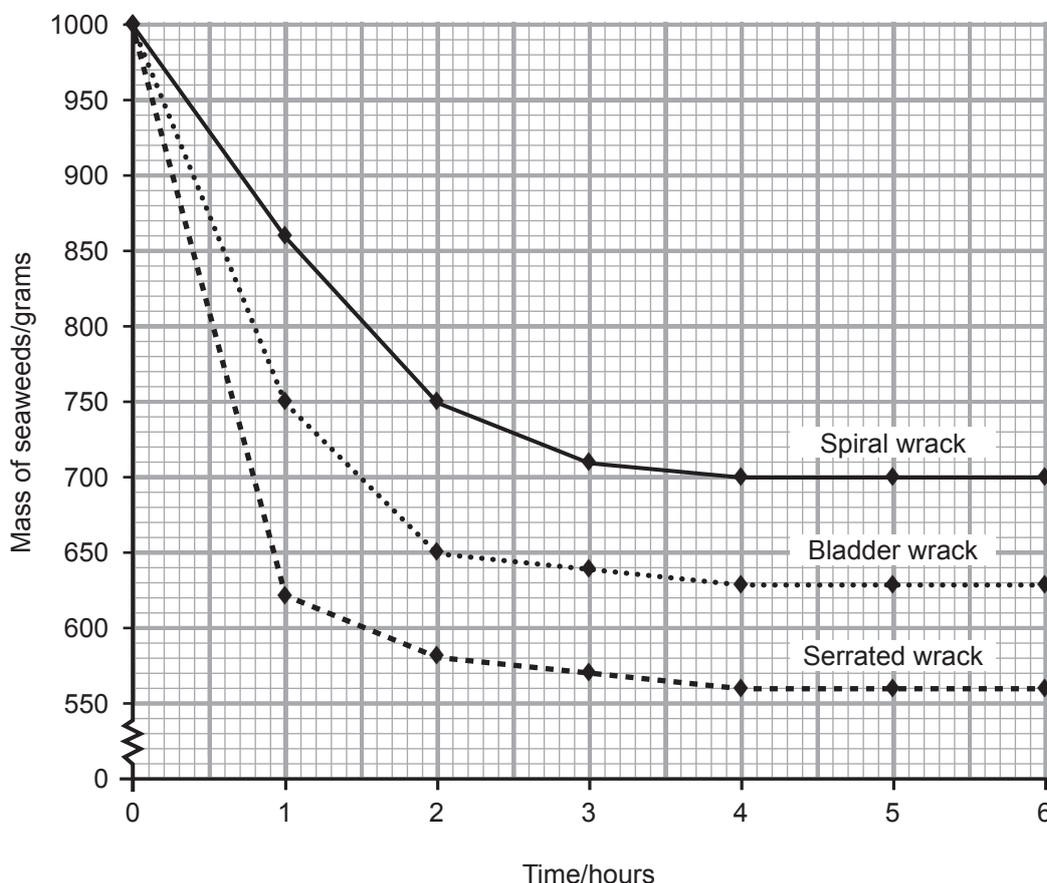
The diagram shows the areas of a rocky shore where three different seaweeds are found growing.



Students carried out an investigation to find out which of the three seaweeds dried out the least. They collected 1000 grams of each seaweed and dried them over six hours.

They weighed the seaweeds every hour.

The graph shows the results.



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Marks	Remark
○	○

(a) Use the information given and the graph opposite to answer the following questions.

(i) Name the seaweed which has dried out the least after six hours.

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

(ii) Use data to support your answer.

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

(iii) Suggest **two** reasons why the seaweed **needs** to be adapted so that it dries out the least of the three seaweeds.

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

\_\_\_\_\_

2. \_\_\_\_\_

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

Seaweeds produce a substance called mucus. This covers their surface and helps prevent the seaweeds drying out when not covered with sea water.

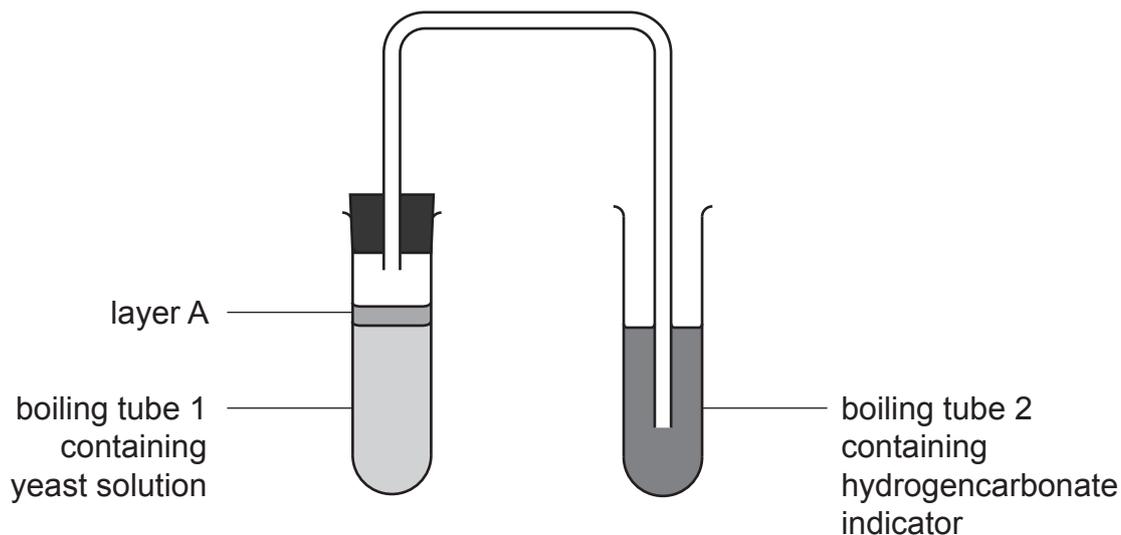
Serrated wrack produces the least amount of mucus.

(b) Use the diagram and the information on the rocky shore opposite to suggest why serrated wrack produces the least amount of mucus.

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

Examiner Only	
Marks	Remark

- 5 (a) The diagram shows an experiment set up to investigate anaerobic respiration in yeast.



© Barking Dog Art

- (i) What is the substance in layer A?

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

- (ii) What is the purpose of layer A?

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

Boiling tube 1 contains a yeast solution.

- (b) What other substance needs to be present for the yeast to carry out anaerobic respiration?

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

- (c) What **two** changes occur in the contents of boiling tube 1 during the experiment?

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

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

- (d) (i) What colour change occurs in the hydrogencarbonate indicator in boiling tube 2 after one hour?

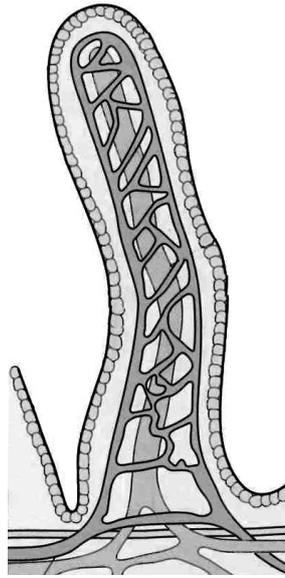
\_\_\_\_\_ to \_\_\_\_\_ [1]

- (ii) What caused the colour change in the hydrogencarbonate indicator?

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

Examiner Only	
Marks	Remark
○	○

6 The diagram shows a villus from the small intestine.



© Barking Dog Art

The villus is adapted for the efficient absorption of digested food molecules.

The large surface area adapts the villus for absorption.

Give **two** other features which adapt the villus for absorption.

Explain how each of these features helps absorption.

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

Explanation \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. Feature \_\_\_\_\_

Explanation \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[4]

Examiner Only	
Marks	Remark
○	○

- 7 A scientist used the following method to estimate the fish population in a lake.  
She caught 100 fish and marked the fin of each fish before returning them to the lake. This was her first sample.  
One week later she caught a second sample of fish which contained 40 **marked** fish and 120 **unmarked** fish.

- (a) Use the equation below to work out the estimated fish population in the lake.

$$\text{Estimated fish population} = \frac{\text{number of fish in the first sample} \times \text{total number of fish in the second sample}}{\text{number of marked fish in the second sample}}$$

Show your working out.

\_\_\_\_\_ [3]

- (b) Eutrophication occurred in this lake the following year, due to fertiliser run off.

- (i) What caused the aquatic plants in the lake to die after an initial increase in their numbers?

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

- (ii) Name a type of organism that decomposes the dead aquatic plants.

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

- (iii) Explain why the fish in this lake would die as a result of the decomposition of the dead aquatic plants.

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

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Marks	Remark
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(c) Suggest **two** reasons, other than pollution, for the death of fish in a lake.

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

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

Examiner Only	
Marks	Remark

8 A peat bog is a wetland habitat.

In a peat bog there is little decomposition of dead animals and plants in the soil.

(a) Use your knowledge of the nitrogen cycle to explain why this lack of decomposition leads to less nitrates in the soil.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

(b) (i) The soil in a peat bog is waterlogged and contains little oxygen. Name the type of nitrogen bacteria that would **increase** in the soil in these conditions.

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

(ii) Explain how an increase in these bacteria reduces the nitrate content of the soil.

\_\_\_\_\_

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

(c) Name the substance formed from nitrates that plants need for healthy growth.

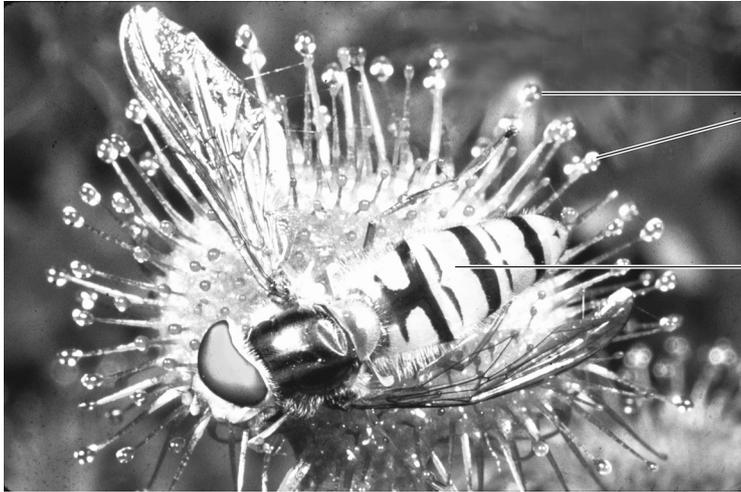
\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark
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Sundew plants are carnivorous plants that can obtain nutrients from insects.

They have adaptations that allow them to grow in peat bogs where the nitrate levels are low.

The photograph shows the leaf of a sundew plant with an insect.



© Claude Nuridsany & Marie Perennou / Science Photo Library

sticky hairs on  
the plant leaf

insect

Sundew plants have sticky hairs on their leaves.  
The leaves produce enzymes.

(d) Suggest how these **two** adaptations help the sundew plants to survive in peat bogs.

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

\_\_\_\_\_

2. \_\_\_\_\_

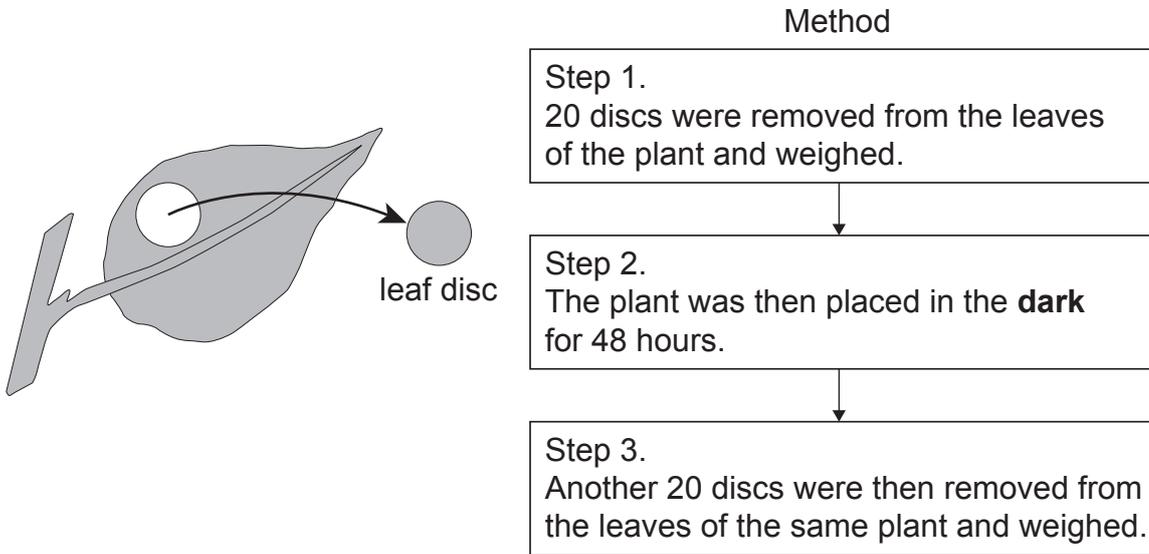
\_\_\_\_\_ [2]

Examiner Only

Marks Remark

9 The diagram below shows the method a scientist used in an experiment on **photosynthesis** and **respiration**.

She placed a plant in **bright light** for 48 hours before the start of this experiment.



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(a) Describe and explain any change in **mass** between the leaf discs in step 1 and the leaf discs in step 3.

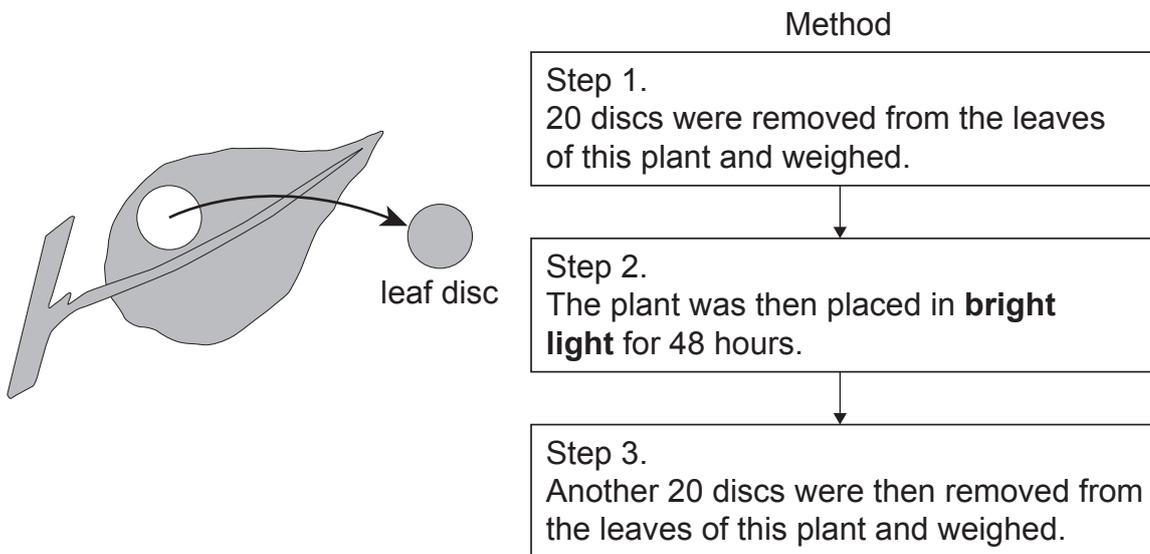
Description \_\_\_\_\_  
 \_\_\_\_\_ [1]

Explanation \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [3]

Examiner Only	
Marks	Remark
○	○

The diagram below shows the method the scientist used in another experiment on **photosynthesis** and **respiration**.

She placed a similar plant in the **dark** for 48 hours before the start of this experiment.



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(b) Describe and explain any change in **mass** between the leaf discs in step 1 and the leaf discs in step 3.

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

Explanation \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [3]

**THIS IS THE END OF THE QUESTION PAPER**

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Marks	Remark

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