Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2014–2015

# Double Award Science: Biology

Unit B1
Higher Tier

ML

## [GSD12]

## TUESDAY 24 FEBRUARY 2015, 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 Questions **4** and **7**.

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

**1** The drawing shows a corncrake.



Read the following passage.

Line

The world population of corncrakes has been estimated to be between 2 and 3 million **pairs**. 1

Corncrakes spend the winter in Africa. They migrate northwards to arrive at their breeding grounds in Europe from early April onwards. 3
They live and lay their eggs in long grass in open fields. 5

Adults and young birds return to Africa in August and September.

The bird was once common in Ireland, but in 2005 only 164 singing males were heard in the country. The fall in corncrake numbers in Ireland is mainly due to the earlier cutting of grass fields by farmers. 7 9
Grass fields are now often cut for the first time in May. Large machines attached to tractors are used to cut the grass. 11

Grass fields are usually cut from the outer edges towards the centre of the field. In some areas in Ireland where corncrakes nest, 13
government grants have been given to farmers to cut their fields starting from the centre going to the outer edges. 15

| Examiner Only | |
|---|---|
| Marks | Remark |
| | |

Use the information in the passage and your knowledge to answer the following questions.

| Examiner Only | |
|---|---|
| Marks | Remark |

**(a)** What is the **maximum** estimated number of **individual** corncrakes in the world? (lines 1–2)

_____ million birds [1]

**(b)** Explain why the corncrake is a bird that is rarely seen (line 5).

_____ [1]

**(c)** Give two reasons why the earlier cutting of grass fields leads to a fall in corncrake numbers (lines 7–11).

1. _____

2. _____ [2]

**(d)** Why do the numbers of corncrakes increase if farmers cut their grass fields from the centre outwards (lines 12–15)?

_____

_____ [1]

**(e)** The corncrake is a chordate.
Give **one** feature of chordates.

_____ [1]

Examiner Only

| Marks | Remark |
|---|---|
| | |

**2** The digestive enzyme amylase is present in the mouth and small intestine.

**(a) (i)** Name the large food molecule that amylase breaks down to glucose.

_____ [1]

**(ii)** The small intestine is adapted to absorb glucose.
Give two ways it is adapted.

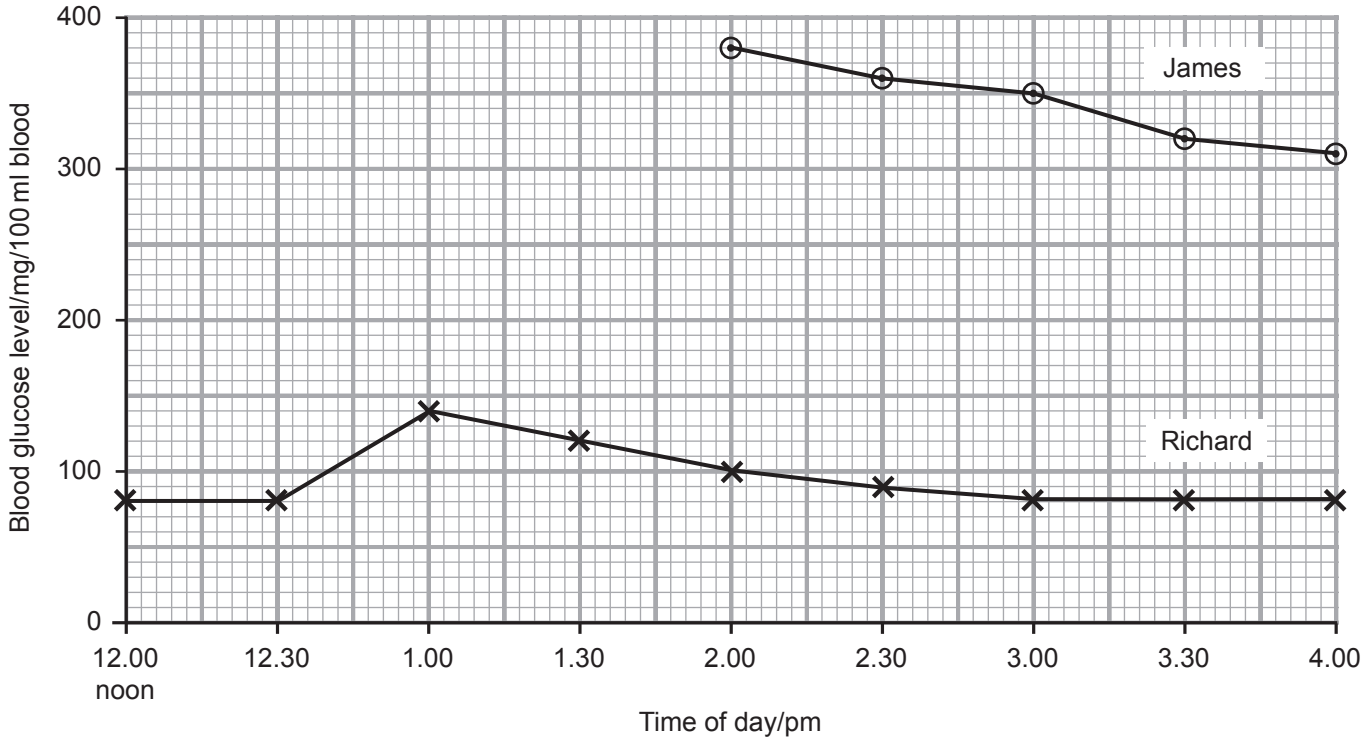
1. _____

2. _____ [2]

The table shows the blood glucose levels for James and Richard before and after eating a meal containing mostly carbohydrates.
The meal was eaten at 12.30 pm.

| Time of day/pm | Blood glucose level/mg/100 ml blood | |
|---|---|---|
| | James | Richard |
| 12.00 (noon) | 190 | 80 |
| 12.30 (meal eaten) | 180 | 80 |
| 1.00 | 250 | 140 |
| 1.30 | 390 | 120 |
| 2.00 | 380 | 100 |
| 2.30 | 360 | 90 |
| 3.00 | 350 | 80 |
| 3.30 | 320 | 80 |
| 4.00 | 310 | 80 |

**(b) (i)** Use the information in the table to complete the line graph for James on the grid below.




[2]

| Examiner Only | |
|---|---|
| Marks | Remark |
| | |

**(ii)** Look at the graphs. Give two ways that the trend for James is different from the trend for Richard.

1. _____

2. _____ [2]

**(iii)** Explain how Richard's blood glucose returns to its normal level.

_____

_____

_____

_____ [3]

**(iv)** James has diabetes.
Give two possible long term effects of diabetes.

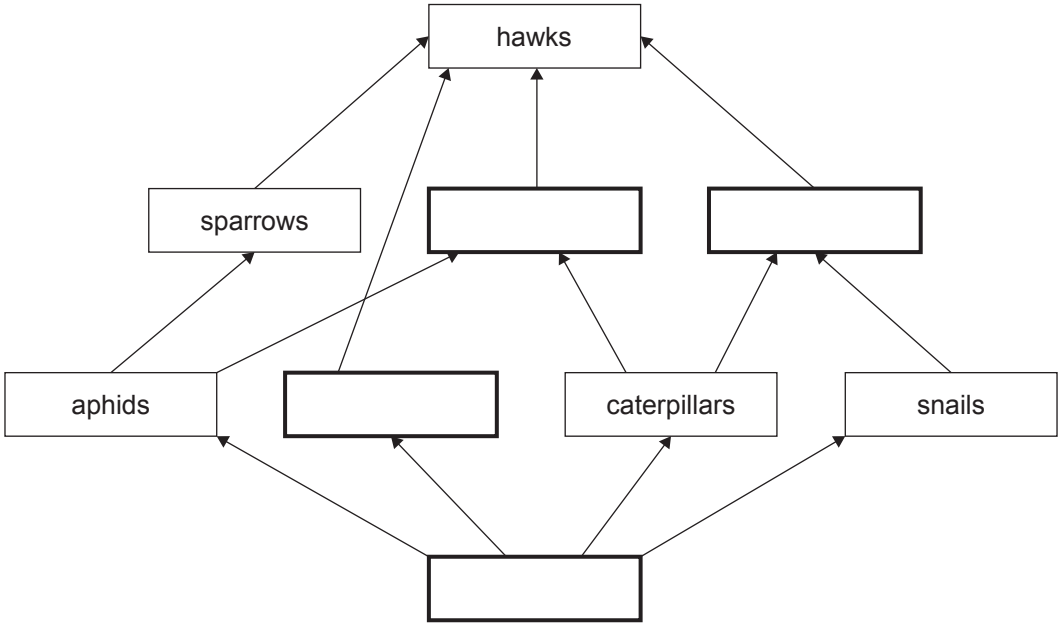
1. _____

2. _____ [2]

**3** The table shows the diets of some animals in a grassland.

| |
|---|
| Aphids, rabbits, caterpillars and snails **eat** plants |
| Sparrows **eat** aphids |
| Thrushes **eat** caterpillars and snails |
| Blue tits **eat** aphids and caterpillars |
| Hawks **eat** sparrows, rabbits, blue tits and thrushes |

**(a)** Use the information in the table to fill in the boxes in the food web.




[3]

**(b) (i)** Name a producer.

_____ [1]

**(ii)** Name an animal that is feeding at two trophic levels.

_____ [1]

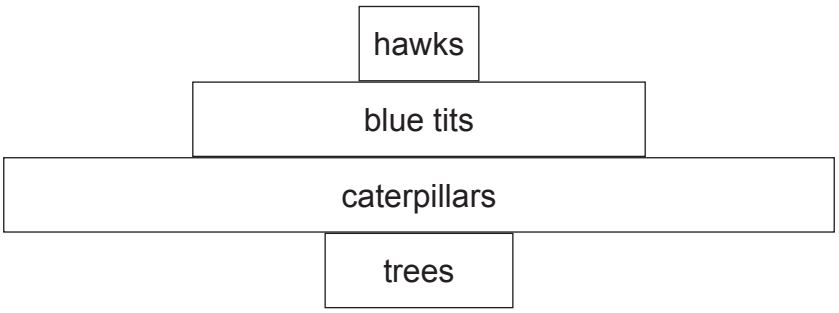
Examiner Only

| Marks | Remark |
|---|---|
| | |

**(c)** Give **one** way that energy is lost between the sparrows and the hawks.

_____ [1]

**(d)** A pyramid of numbers for a woodland is shown.




Use this information to draw and label the pyramid of biomass for this woodland in the space below.

[2]

Examiner Only

| Marks | Remark |
|---|---|
| | |

| Examiner Only | |
|---|---|
| Marks | Remark |
| | |

**4** Benedict's reagent is used to test for the presence of sugar (glucose) in food.

The intensity (strength) of the colour of Benedict's reagent at the end of the test indicates the amount of sugar (glucose) present.

Paula planned an investigation to compare the **amount** of sugar (glucose) in two types of biscuit.

- Describe the method Paula used to carry out her investigation.
- State two variables she would have controlled.
- Describe the results she would expect if one biscuit contained more sugar (glucose) than the other biscuit.

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

[6]

Examiner Only

| Marks | Remark |
|---|---|
| | |

**5** In 1990, carbon dioxide emissions in Britain were 770 million tonnes.

In 2013, carbon dioxide emissions in Britain were 572 million tonnes.

**(a)** Use the information given to calculate the percentage reduction in carbon dioxide emissions from 1990 to 2013.

Show your working out.

_____ % [3]

**(b)** Britain has reduced its carbon dioxide emissions, but global levels of this gas continue to rise.

Why do the levels continue to rise?

_____

_____ [1]

The government set a target to reduce carbon dioxide emissions by 50% by the year 2030.

**(c)** For Britain to reach this target, there must be more ways of producing electricity that reduce carbon dioxide emissions.

Give two ways of producing electricity that reduce carbon dioxide emissions.

1. _____

2. _____ [2]

**(d)** State two effects of high levels of carbon dioxide on the environment.

1. _____

2. _____ [2]

| Examiner Only | |
|---|---|
| Marks | Remark |
| | |

**6** Plants take up nitrates from the soil using root hair cells.

**(a)** Give **one** use of nitrates in plants.

_____ [1]

**(b)** Describe and explain how the structure of a root hair cell is adapted for the uptake of nitrates.

_____

_____

_____ [2]

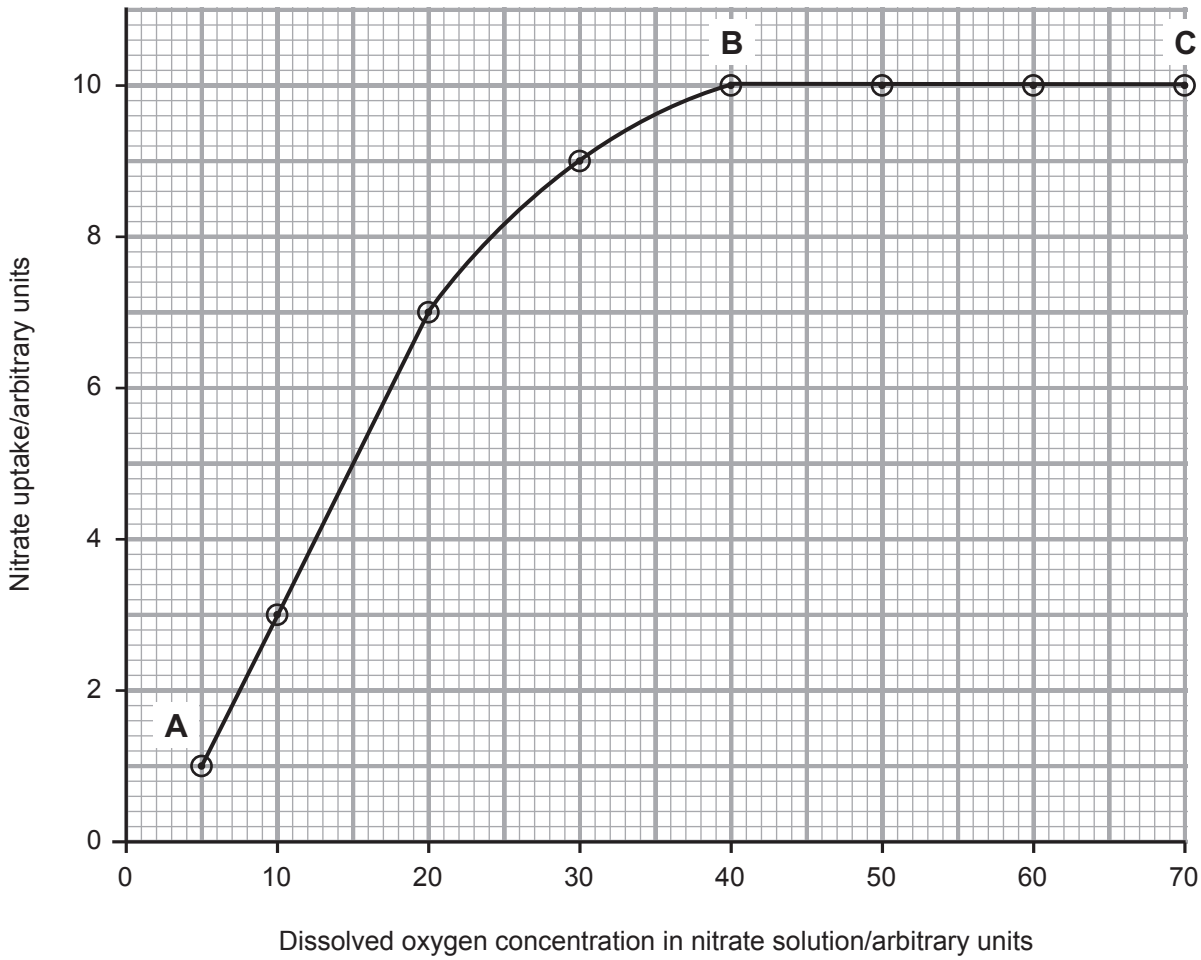
Barley seedlings were grown in test tubes containing nitrate solution.

**(c)** An experiment was set up to investigate the effect of dissolved oxygen on the uptake of nitrates by these seedlings.

Oxygen was bubbled through the nitrate solution.

The amount of nitrate taken up by the barley seedlings was measured.

The results of the investigation are shown in the graph.



**(i)** State two variables that should be controlled in the experiment.

1. _____

2. _____ [2]

**(ii)** Describe and explain the change in nitrate uptake between points **A** and **B**.

_____

_____

_____

_____

_____

_____

_____ [4]

**(iii)** Explain why the nitrate uptake levels off between points **B** and **C**.

_____

_____ [1]

| Examiner Only | |
|---|---|
| Marks | Remark |
| | |

| Examiner Only | |
|---|---|
| Marks | Remark |
| | |

**7** Earthworms burrow through the soil creating air spaces. They eat leaves and farmyard manure. They pass out undigested material into the soil. This forms humus which is broken down by decomposers into ammonium compounds.

Use this information and your knowledge of the nitrogen cycle to explain how earthworms increase nitrate levels in the soil.

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

[6]

Examiner Only

| Marks | Remark |
|---|---|
| | |

**8** A farmer set up an experiment to find the effect of increasing the number of carrot seedlings/$m^2$ on carrot growth.

The table shows the results after four months growth.

| Number of carrot seedlings/$m^2$ | Average carrot mass/g |
|---|---|
| 100 | 40 |
| 200 | 21 |
| 300 | 13 |

**(a)** Describe the effect of increasing the number of carrot seedlings/$m^2$ on average carrot mass.

_____

_____ [1]

**(b)** Explain the results of this experiment.

_____

_____

_____

_____ [3]

| Examiner Only | |
|---|---|
| Marks | Remark |
| | |

**9** **(a)** A plant shoot bends towards the light when light shines on it from one side only.

This response is called phototropism.

Explain how this response occurs.

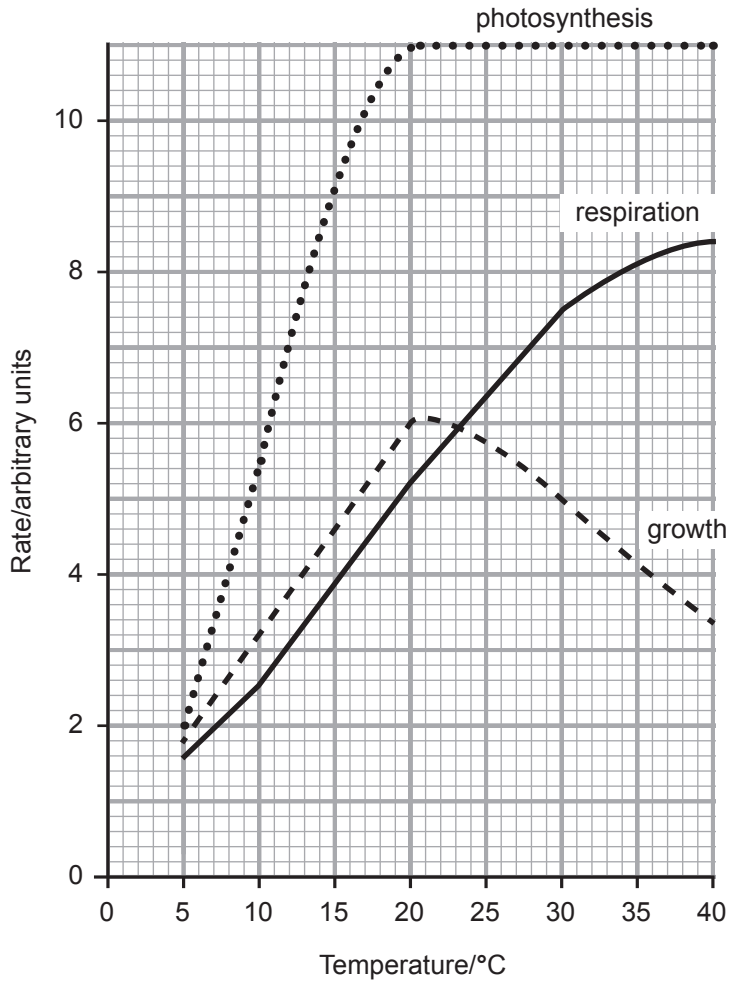
_____

_____

_____

_____ [3]

The graph shows the effect of temperature on the rates of photosynthesis, respiration and growth in plants.



**(b)** Use the graph and your knowledge of photosynthesis and respiration to explain why the rate of growth decreases above 20 °C.

Examiner Only

| Marks | Remark |
|---|---|
| | |

_____

_____

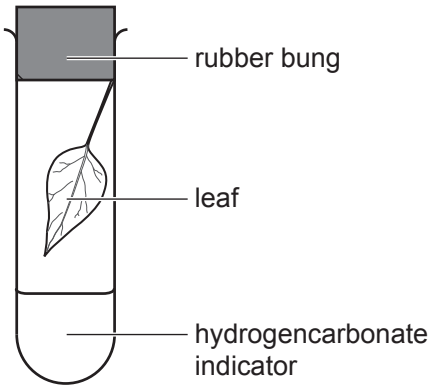
_____

_____

_____

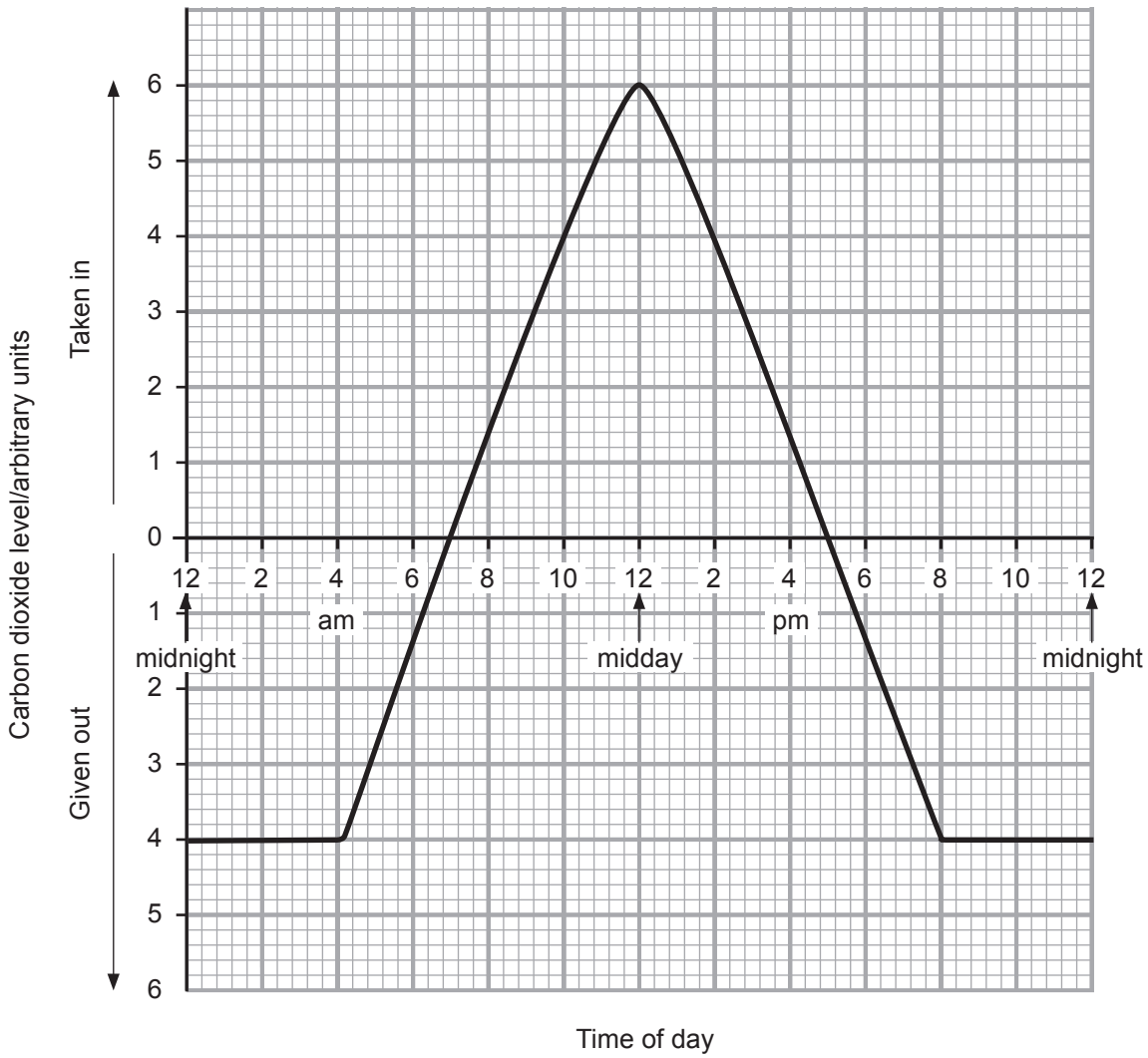
_____ [3]

**(c)** The diagram shows a leaf placed in a sealed test tube containing hydrogencarbonate indicator.




*Source: Chief Examiner*

The graph shows the carbon dioxide taken in and given out by this leaf during a summer's day.




Examiner Only

| Marks | Remark |
|---|---|
| | |

Use the graph and your knowledge of photosynthesis and respiration to complete the table.

- Give the colour of the hydrogencarbonate indicator at midday
- Give a reason to explain the colour of the indicator at each time.

| Time | Colour of hydrogen carbonate indicator | Reason to explain colour of hydrogencarbonate indicator |
|---|---|---|
| 2 am | Yellow | |
| 12 midday | | |
| 5 pm | Red | |

[4]

Examiner Only

| Marks | Remark |
|---|---|
| | |

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