



General Certificate of Secondary Education

Centre Number

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Candidate Number

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Double Award Science: Biology

Unit B1
Higher Tier

ML

[GDW12] Assessment

Assessment Level of Control Tick the relevant box (✓)

TIME

Controlled Conditions	
Other	

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.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

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 **2(a)**.

1 Four features of respiratory surfaces and their role in increasing gas exchange in animals are shown below.

(a) Draw a straight line to link each feature of a respiratory surface to its role in increasing gas exchange.

Feature	Role in increasing gas exchange
permeable cell membrane	maintains a diffusion gradient
good blood supply	allows gases to pass through
thin cells	increases the surface area
rounded shape of air sac	short diffusion distance

[3]

(b) (i) Name the small pores on the surface of a **leaf** that allow gases to enter.

[1]

(ii) What is the function of the intercellular air spaces in a leaf?

[1]

(c) Spongy mesophyll cells have fewer chloroplasts than palisade mesophyll cells.

(i) Suggest why.

[1]

(ii) Write down **one** difference between the shape of spongy mesophyll cells and palisade mesophyll cells.

[1]

[Turn over

(b) What are **two** factors that affect the rate of enzyme activity?

1. _____

2. _____ [2]

[Turn over

- 3 Scotland has several national parks. These parks have habitats that have some rare species. Some rare species of animals are capercaillie and pine martens. There are also rare plants such as blaeberry.

The photographs below show a capercaillie and a pine marten.



© Andy Trowbridge / Nature Picture Library / Science Photo library

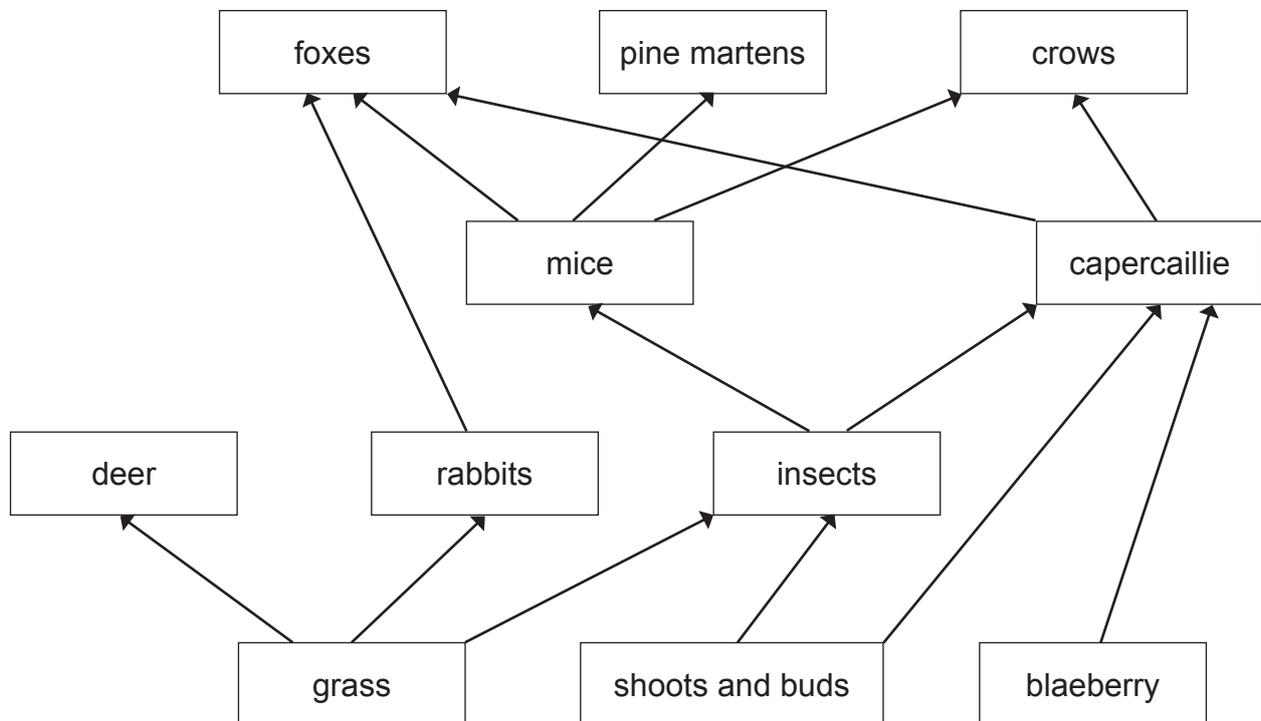
capercaillie



© Scotland The Big Picture / Nature Picture Library / Science photo Library

pine marten

- (a) The diagram below shows part of a food web from a habitat in one of the national parks in Scotland.



Source: Principal Examiner

(i) What is the number of trophic levels in this food web?

[1]

(ii) Use the food web to name the **three** species that feed on the same secondary consumer. Name this secondary consumer.

Secondary consumer _____

Species 1 _____

Species 2 _____

Species 3 _____ [2]

(iii) Use the food web to describe and explain what you would expect to happen to the number of pine martens if the numbers of shoots and buds decreased.

Description _____

Explanation _____

_____ [3]

(iv) Use the food web to give **one** predator of the capercaillie.

[1]

[Turn over

(b) In 2011, the population of capercaillie in Scotland was 1285.
In 2017, the population of capercaillie in Scotland was 1114.

- (i) Calculate the percentage (%) decrease in the capercaillie population over this period.

Show your working.

Give your answer to **two** decimal places.

_____ % [3]

- (ii) Write down **two** reasons for the decrease in the capercaillie population.

1. _____

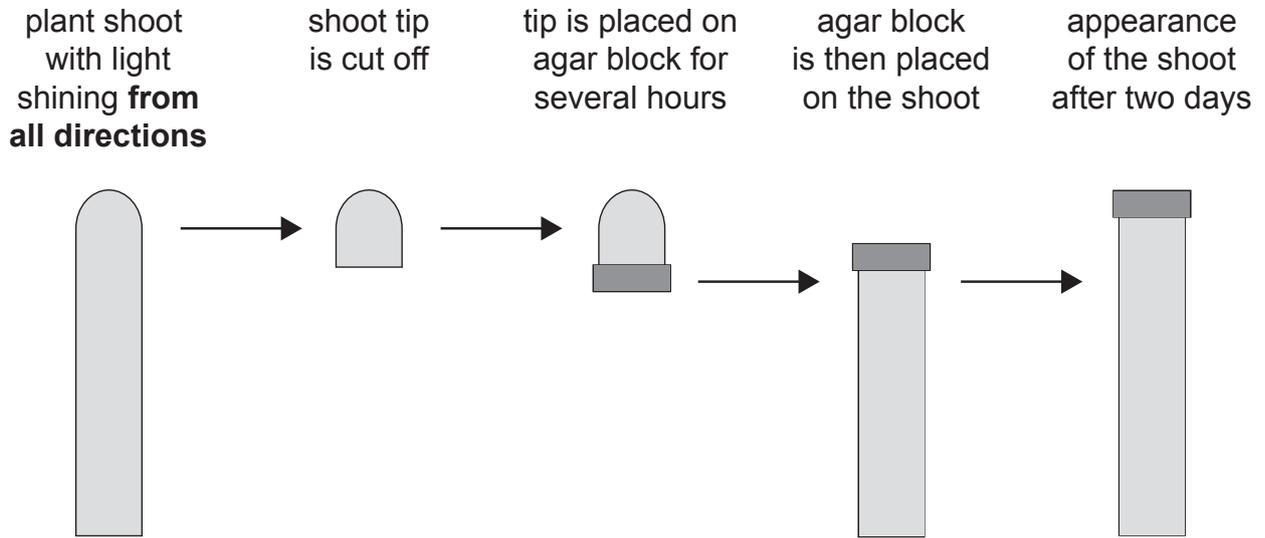
2. _____ [2]



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(Questions continue overleaf)

- 4 (a) Look at the diagram below. It shows an experiment to investigate a plant shoot's response to light shining **from all directions**.

The agar shown in the diagram is a jelly-like substance. It allows plant hormones to pass through it.



Source: Principal Examiner

- (i) Name the plant hormone that causes this response to light.

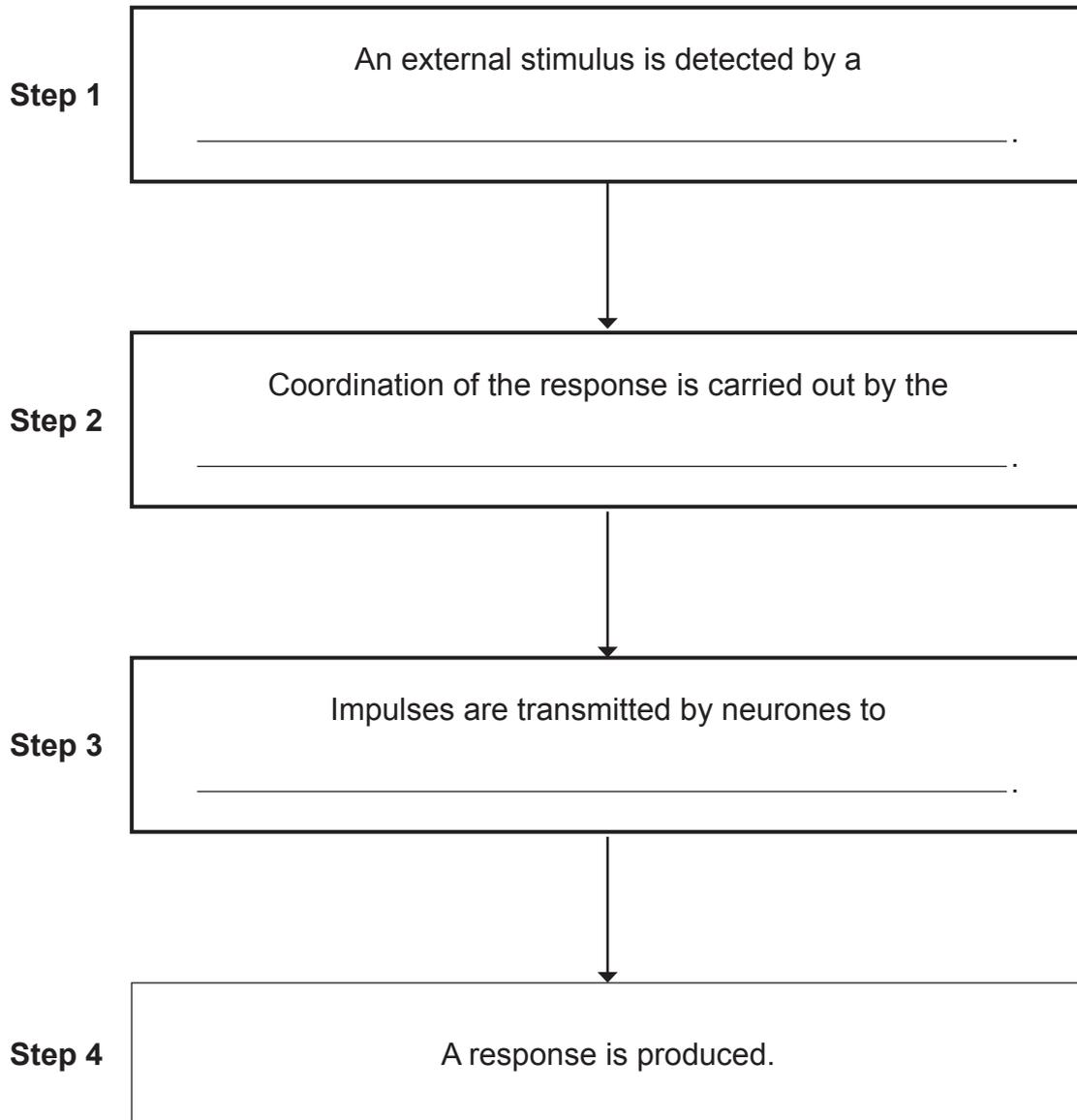
[1]

- (ii) Where is this plant hormone produced?

[1]

5 (a) The diagram below shows some steps in nervous coordination in the body.

(i) Complete the sentences in steps 1, 2 and 3. Write in the blank spaces.



[3]

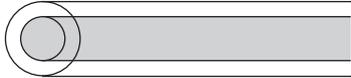
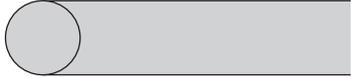
(ii) Name the type of neurone that transmits impulses in **step 3**.

[1]

(b) Name the gap between neurones.

[1]

The table below shows sections of three different neurones. It also shows the speed of nerve impulses that travel along them.

Neurone	Speed of nerve impulse/ m/s
Thin neurone with no covering 	1.5
Thin neurone with covering 	30
Thick neurone with no covering 	10

Source: Principal Examiner

(c) Use the information in the table to give **two** features of neurones that cause an increase in the speed of the nerve impulses that travel along them.

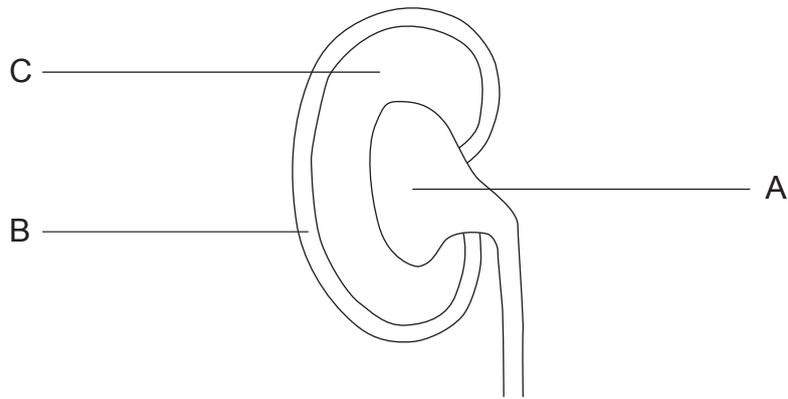
1. _____
2. _____ [2]

(d) Compare the speed of response in the hormonal system to the speed of response in the nervous system.

 _____ [1]

[Turn over

- 6 (a) The kidney is part of the excretory system.
The diagram below shows a kidney.



Source: Principal Examiner

- (i) Name the regions labelled A, B and C.

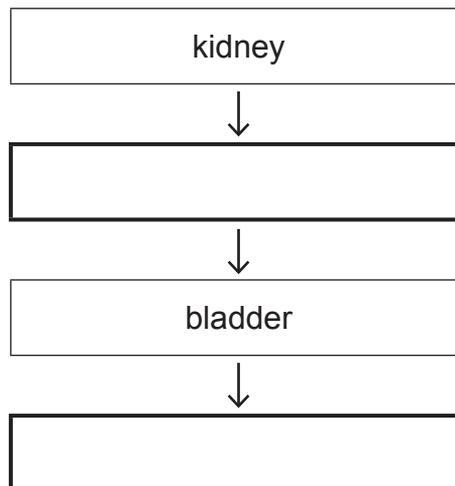
A _____

B _____

C _____

[3]

The flow diagram below shows the pathway taken through the structures of the excretory system to produce urine.



- (ii) Complete the flow diagram by writing the names of the missing structures in the empty boxes.

[2]

(b) The kidney has a role in osmoregulation.

Use the words in the box to complete the sentences below when there is a **decrease** in concentration of the hormone ADH in the kidney.

decreases	stays the same	increases
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The volume of water reabsorbed by the kidneys

_____.

The volume of urine produced

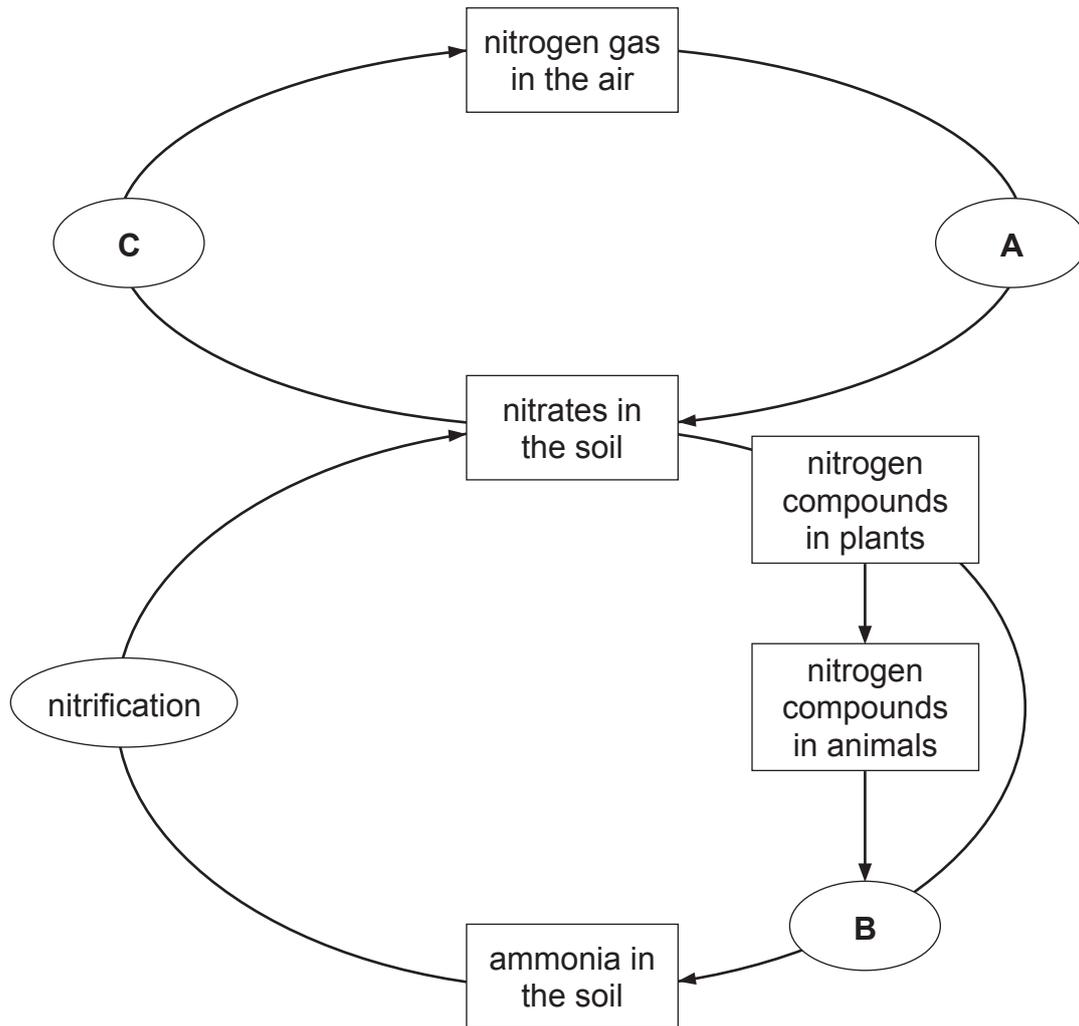
_____.

The concentration of urine produced

_____.

[3]

- 7 The diagram below shows the nitrogen cycle.
Processes **A**, **B** and **C** are carried out by bacteria.



Source: Principal Examiner

- (a) Name the **types of bacteria** that carry out processes **A**, **B** and **C**.

A _____

B _____

C _____

[3]

(b) What is the soil condition that is suitable for the bacteria that carry out process C?

[1]

(c) (i) Name the process by which animals obtain nitrogen compounds from plants.

[1]

(ii) Name the main nitrogen compound found in animals and plants.

[1]

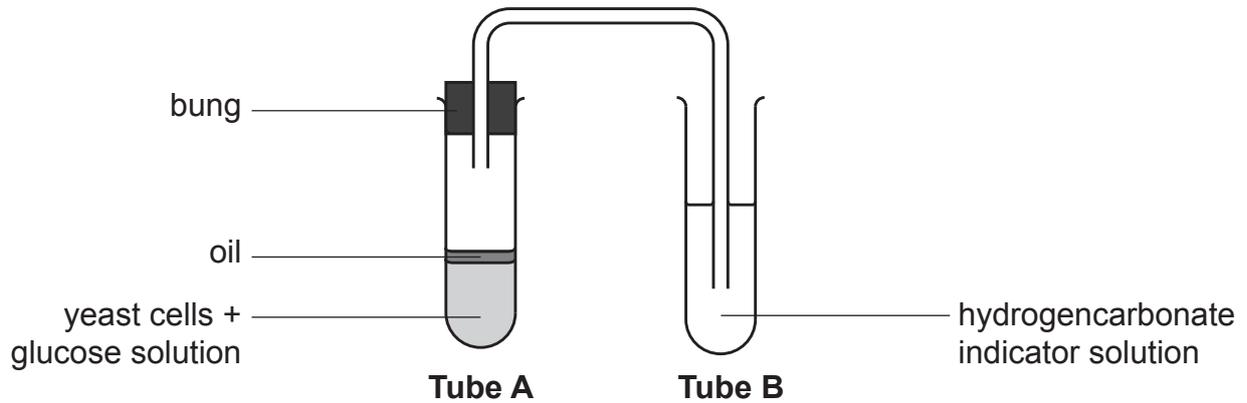
Bacteria B break down animal waste products that contain nitrogen compounds.

(d) Name **one process** in animals that produces these waste products.

[1]

[Turn over

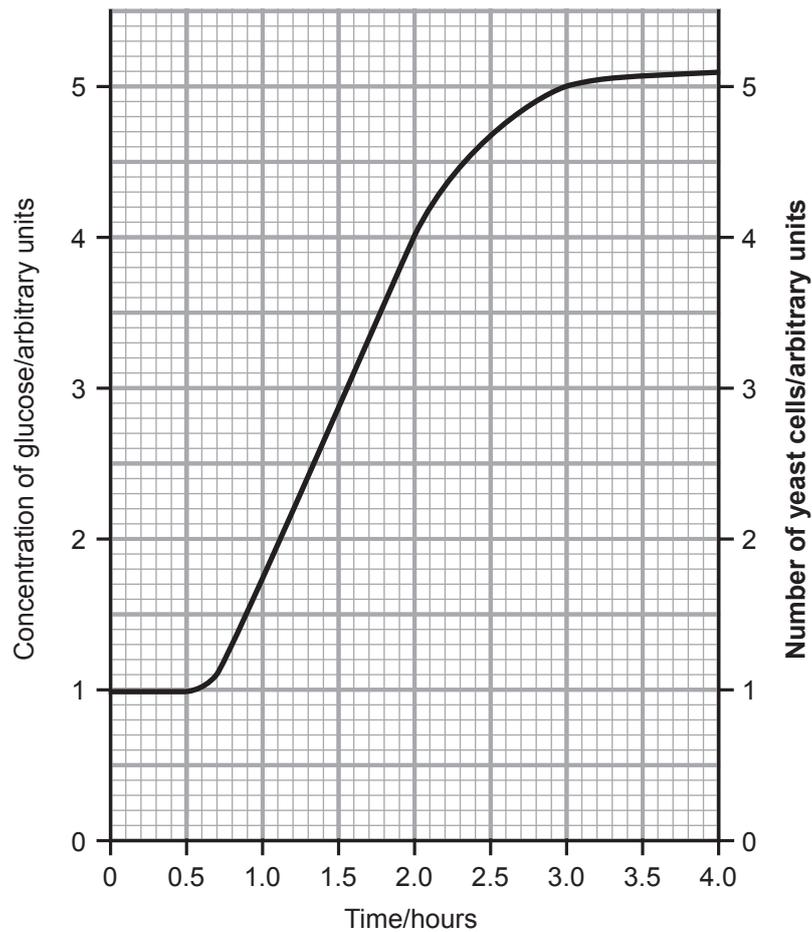
- 8 A scientist carried out an experiment on anaerobic respiration in yeast. The diagram below shows the scientist's set-up.



The scientist recorded the number of yeast cells in tube A over four hours.

The graph below shows the **number of yeast cells** over the four hours.

The scale for the number of yeast cells is shown on the **right hand side** of the graph.



- (a) Describe and explain the change in the number of yeast cells between 0.5 and 3.5 hours.

[2]

At 0 hours, the glucose concentration was 5 arbitrary units.

- (b) Draw a line on the graph to show the trend you would expect for the **glucose concentration** during the four hours.
The scale for the glucose concentration is shown on the **left hand side** of the graph.

[3]

- (c) What is the colour of the hydrogencarbonate indicator solution?

At 0 hours _____

After 4 hours _____

[2]

- (d) Name **one** substance produced by anaerobic respiration in muscle.

Muscle _____

Name **one** substance produced by anaerobic respiration in yeast.

Yeast _____

[2]

[Turn over

- 9 Students carried out an experiment to investigate photosynthesis and respiration in a plant.

The students measured the amount of carbon dioxide taken in from the air by the plant during daytime and released into the air by the plant at night-time.

They repeated the experiment at different temperatures.

The table below shows their results.

Temperature/°C	Amount of carbon dioxide/arbitrary units	
	Taken in from the air during daytime	Released into the air at night-time
5	1.1	0.2
10	2.2	0.5
15	2.8	0.8
20	3.4	1.1
25	2.8	1.6

- (a) Name the process or processes that take place in the plant during the daytime and at night-time.

Daytime _____

Night-time _____ [2]

Over a 24 hour period the rate of respiration remains constant at each temperature.

(b) Calculate the **total** amount of carbon dioxide **used by the plant** at 25 °C.

Show your working.

_____ arbitrary units [2]

(c) (i) Use the information in the table to give the temperature at which this plant grows best.

Temperature _____ °C [1]

(ii) Suggest a reason for your answer.

_____ [1]

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

Total Marks	
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Examiner Number

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