

New  
Specification

Rewarding Learning

General Certificate of Secondary Education  
2018–2019

Centre Number

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Candidate Number

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# Double Award Science: Biology

Unit B1

Higher Tier



[GDW12]

\*GDW12\*

**WEDNESDAY 27 FEBRUARY 2019, MORNING**

## TIME

1 hour.

## 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 eight** 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.

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\*20GDW1201\*

1 The photograph shows an orange that is decomposing.



© nito100 / iStock / Thinkstock

Some types of bacteria and fungi are decomposers that secrete enzymes for extracellular digestion.

(a) Give the term used to describe these types of bacteria and fungi.

\_\_\_\_\_

[1]



(b) The rate of decomposition of the orange by decomposers is affected by the level of oxygen and the temperature.

Increasing the **level of oxygen** increases the rate of decomposition of the orange.

(i) Explain why.

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[2]

Increasing the **temperature** from 10 °C to 20 °C increases the rate of decomposition of the orange.

(ii) Use your knowledge of enzymes to explain why.

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[2]

(c) Give **one** other environmental factor that would affect the rate of decomposition.

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[1]

[Turn over



- 2 (a) Read the passage below and answer the questions that follow.

In Tanzania, many farmers grow maize plants.

At harvest time the farmers often stay in their fields at night to chase away bush pigs that come to eat the maize plants.

Lions come to the fields to hunt the bush pigs.

Source: National Geographic Vol. 224 No. 2 Aug 2013

The photographs below show maize plants and a bush pig.



© Ingram Publishing / Thinkstock



© Tom Brakefield / Stockbyte / Thinkstock

- (i) In the space below, draw a food chain for three organisms given in the passage above.

[2]

- (ii) Name the secondary consumer in this food chain.

\_\_\_\_\_

[1]



A study recorded 421 attacks by lions on farmers in Tanzania.  
The lions killed 282 farmers.  
The rest of the attacked farmers escaped with injuries and survived.

- (b) Use the information given above to calculate the percentage (%) of lion attacks where the attacked farmers escaped with injuries and survived.  
Give your answer to **two** decimal places.

**Show your working.**

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

[Turn over







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**(Questions continue overleaf)**

12271

[Turn over



- 4 (a) A student investigated the effect of temperature on the enzyme amylase.

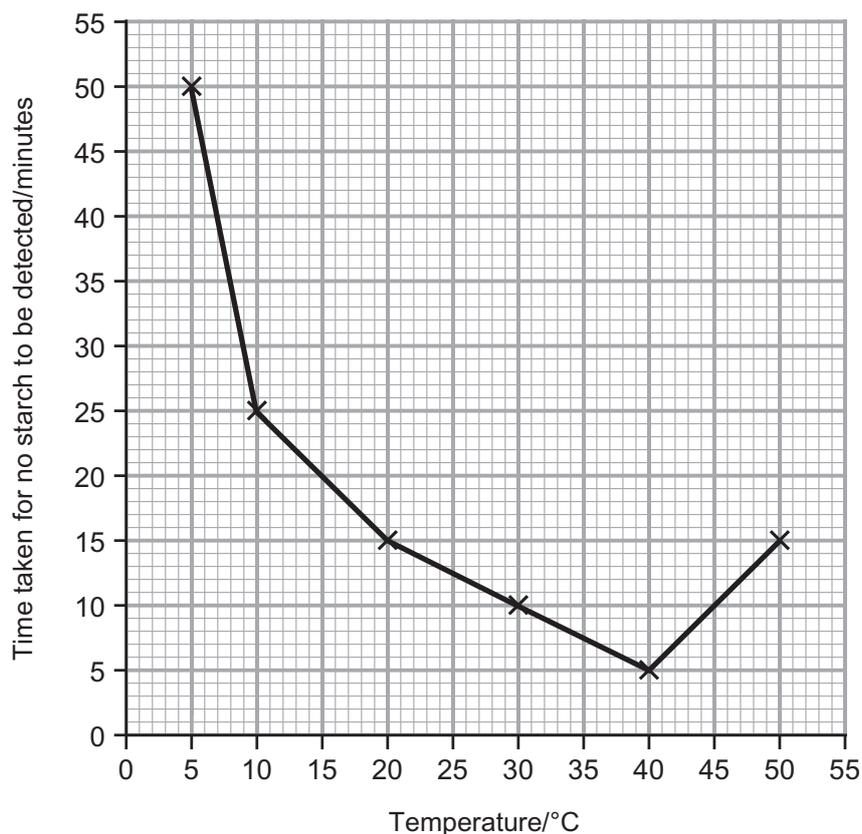
She set up six test tubes containing the same volumes of amylase and starch. She incubated each test tube at a different temperature.

Every five minutes she took a sample of the contents of each test tube and tested it for the presence of starch using iodine solution.

The reaction between amylase and starch was complete when **no starch** was detected in the sample.

She recorded the time taken for no starch to be detected at each temperature.

The graph shows her results.



Use the graph to help answer the following questions.

- (i) Give the optimum temperature for this enzyme.

\_\_\_\_\_ °C

[1]

- (ii) Explain why you chose this temperature using information from the graph.

\_\_\_\_\_  
\_\_\_\_\_

[1]



(iii) Describe and explain the student's result at 5 °C.

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[3]

- (b) Use the results shown in the graph opposite at 20 °C to complete the table below by writing in the empty boxes.  
For each time, 10 and 20 minutes, write a tick (✓) if starch was present or a cross (X) if starch was absent if samples were tested at these times.  
Give the colour of iodine solution at each of these times.

Time/mins	Starch present (✓) or absent (X)	Colour of iodine solution
10		
20		

[3]

At high temperatures amylase is denatured.

(c) What does the term denatured mean?

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[2]

In another investigation, the student left a sample of starch and **denatured** amylase for one hour at 30 °C.

(d) Give the colour of iodine solution in this sample and explain the result.

Colour \_\_\_\_\_

Explanation \_\_\_\_\_

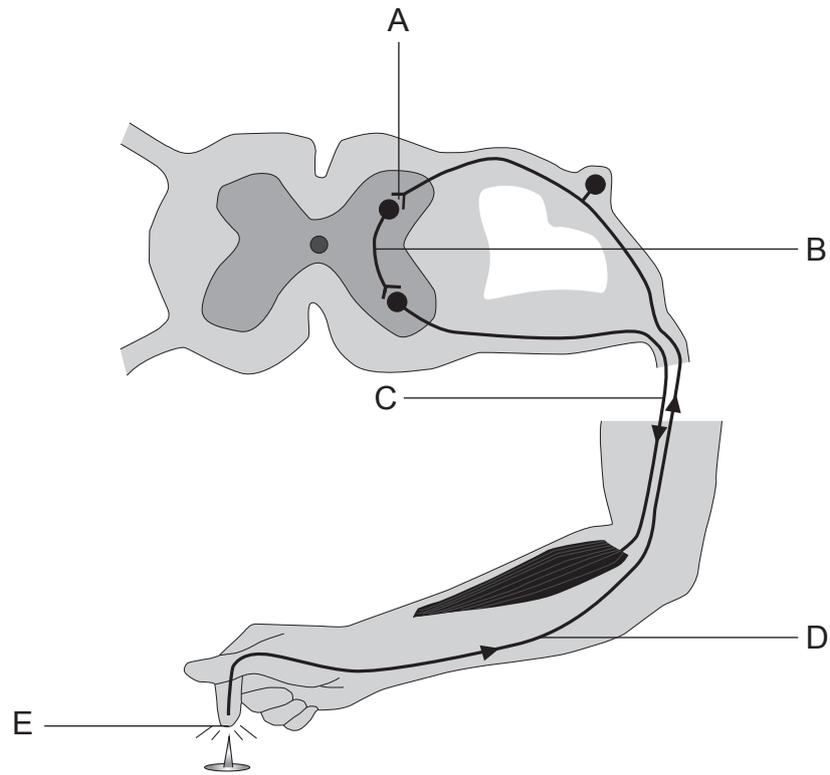
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[2]

[Turn over



5 (a) The diagram shows a reflex arc.



© Barking Dog Art. Used with permission

(i) Give the letter which labels a receptor.

\_\_\_\_\_

[1]

(ii) Describe the function of receptors in a reflex arc.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

[2]

(b) Name C.

\_\_\_\_\_

[1]



(c) (i) Give the letter which labels a synapse.

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

(ii) What is a synapse?

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

(d) Name the type of effector shown in this reflex arc.

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

[Turn over



- 6 (a) (i) Complete the table about hormones in the body by writing in the empty boxes.

The site of ADH production has been given.

Hormone	Site of hormone production	Where the hormone acts
ADH	Brain	
Insulin		

[3]

- (ii) How do these hormones travel from the site of production to where they act?

[1]



(b) Auxin is a hormone produced in shoot tips of seedlings.

The photograph shows a seedling with a lamp shining on it from one side.



© Martin Shields / Science Photo Library

(i) Name the growth response shown by this seedling.

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

(ii) Explain how this growth response is brought about in the seedling.

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

[Turn over



- 7 A student investigated photosynthesis and respiration using a carbon dioxide probe. A carbon dioxide probe can be used to measure the carbon dioxide level in parts per million (ppm) in the air.

Read the passage below that describes her experiment and answer the questions that follow.

A student placed a carbon dioxide probe into a transparent plastic box with the lid on. She left the box in the dark and took a reading.

After **15 minutes**, the probe gave a reading of 420 ppm. This is **sample A**.

The student then placed a small plant into the box along with the probe. She put the lid back on and left the box in the dark.

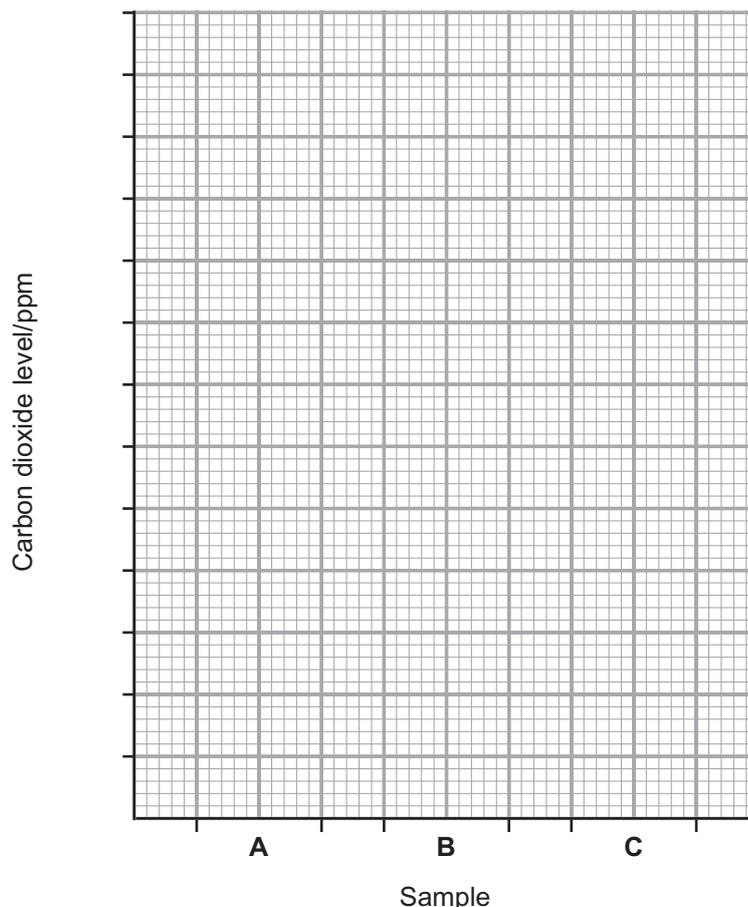
After **15 minutes**, the probe gave a reading of 630 ppm. This is **sample B**.

The student then switched on a lamp beside the box containing the small plant and the probe.

After **15 minutes**, the probe gave a reading of 60 ppm. This is **sample C**.

Source: adapted from [www.saps.org.uk](http://www.saps.org.uk)

- (a) Use the information in the passage to draw a bar chart of the student's results. Add a scale on the y axis. Shade the bars you draw on the grid.



[2]



(b) Explain the increase in the carbon dioxide level between samples **A** and **B**.

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[3]

(c) (i) Calculate the rate of change in the carbon dioxide level (ppm/min) between samples **B** and **C**.

**Show your working.**

\_\_\_\_\_ ppm/min [3]

(ii) Explain the decrease in the carbon dioxide level between samples **B** and **C**.

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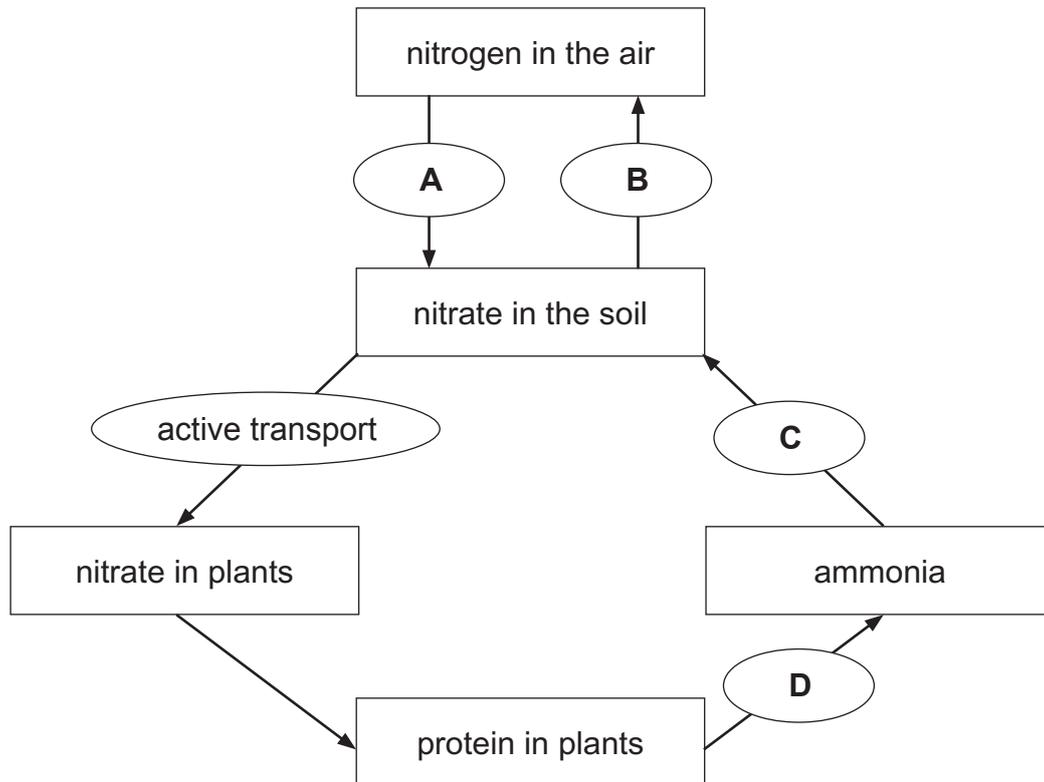
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[2]

[Turn over



- 8 The diagram shows part of the nitrogen cycle.  
The letters **A**, **B**, **C** and **D** represent four processes in the nitrogen cycle.



- (a) Name processes **A** and **B**.

**A** \_\_\_\_\_

**B** \_\_\_\_\_

[2]

- (b) Name the type of nitrogen bacteria that carries out process **C**.

\_\_\_\_\_

[1]



(c) (i) Give the letter of **one** process in the nitrogen cycle opposite that works best in waterlogged soil.

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

(ii) Explain your answer.

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

Plants absorb nitrate from the soil by the process of active transport.

(d) Describe this process.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [4]

[Turn over



- (e) In an investigation, scientists measured the nitrate level in the soil at the start and the end of the growing season in 10 000 wheat fields in one region of North America.  
The scientists repeated their investigation in two other regions of North America. All the fields in each of the three regions had high nitrate levels in the soil at the start of the growing season.

The table below shows the number of fields with low or high nitrate level in the soil **at the end** of the growing season, in Region 1 and Region 2.

Nitrate level in the soil <b>at the end</b> of the growing season	Number of fields in each region		
	Region 1	Region 2	Region 3
low	5400	8100	
high	4600	1900	

Source: adapted from [www.agvise.com/educational-articles/soil-nitrates-early-trends-2016](http://www.agvise.com/educational-articles/soil-nitrates-early-trends-2016)

In Region 3, the **ratio** of fields with low nitrate levels to fields with high nitrate levels was **3:1**.

- (i) Use this information to calculate the number of fields with low and high levels of nitrate in Region 3.  
Write your answers in the blank boxes in the **table above**.

**Show your working out.**

[3]



By the end of the growing season, the fields in Region 2 had produced the most wheat.

- (ii) Explain how the results for the fields in Region 2 in the table opposite support this statement.

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[2]

Storms destroyed the wheat in a number of fields at the start of the growing season.

- (f) Describe and explain how the nitrate level in the soil of these fields would have been affected by the destruction of the wheat.

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[2]

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

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**DO NOT WRITE ON THIS PAGE**

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

<b>Total Marks</b>	
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Examiner Number

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