



General Certificate of Secondary Education  
2023–2024

Centre Number

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Candidate Number

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# Single Award Science: Biology

Unit 1  
Higher Tier

<b>ML</b>
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[GSA12]

**WEDNESDAY 21 FEBRUARY 2024, 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.

**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

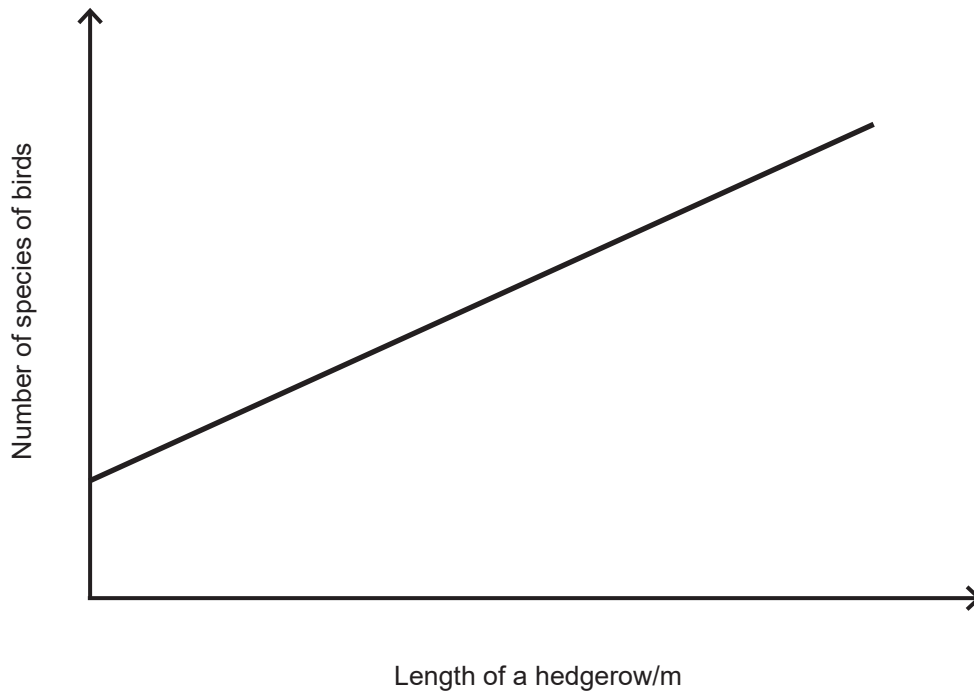
The total mark for this paper is 60.

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)**.

1 (a) Hedgerows provide an important wildlife habitat for mammals, birds and insects.

The graph below shows the relationship between the length of a hedgerow and the number of species of birds in an area.



(i) Describe the trend shown by this graph.

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[1]

(ii) Suggest what effect, if any, a longer hedgerow will have on the biodiversity in an area. Explain your answer.

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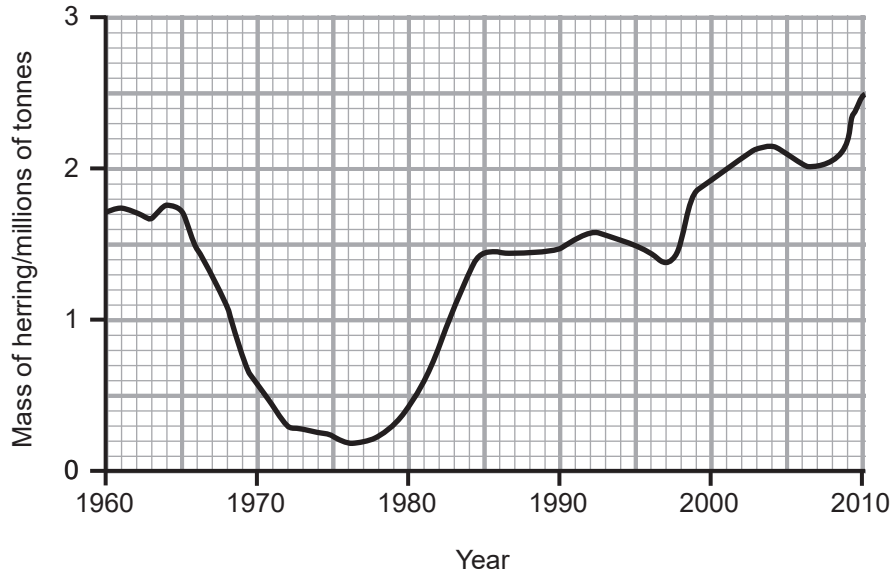
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[2]

(b) Herring is a species of fish found in the North Sea.

The graph below shows the total mass of herring in the North Sea from 1960 to 2010.



(i) Use the graph to suggest why fishing for herring in the North Sea was banned in 1977.

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

(ii) In 1997 fishing quotas were introduced to protect the herring. Give **one** piece of evidence from the graph that shows this was successful.

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

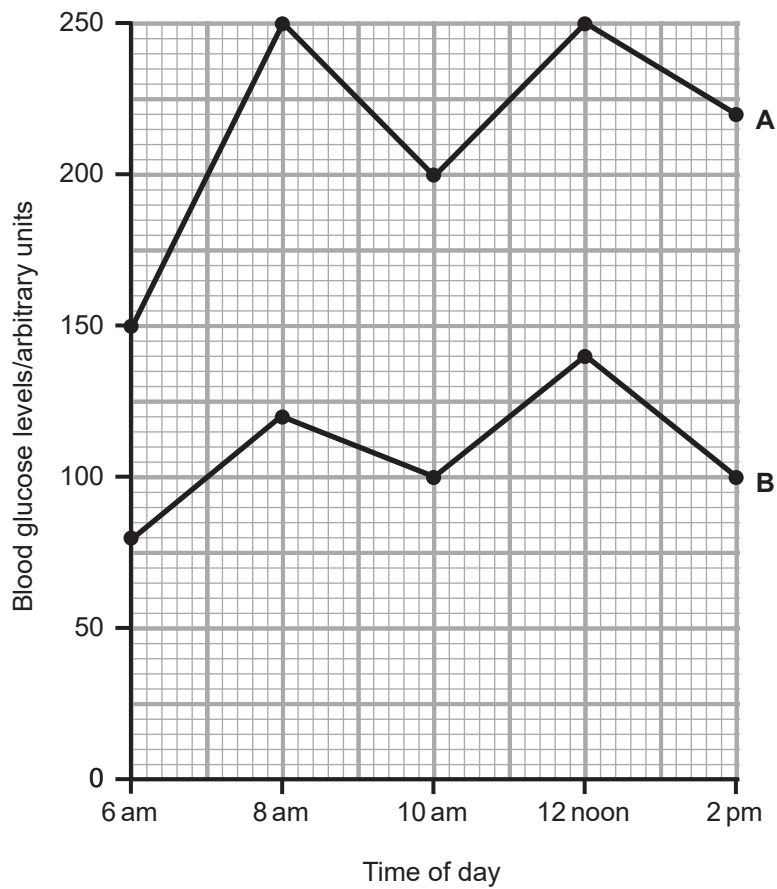
[Turn over

2 Diabetes is a condition in which the blood glucose control mechanism fails.

(a) Give **two** symptoms of diabetes.

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

(b) The graph below shows how the blood glucose levels for two people, **A** and **B**, changed over an eight-hour period. One of these people has diabetes.



(i) Use the graph and your knowledge to give **two** reasons which suggest that person **A** has diabetes.

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

\_\_\_\_\_

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

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

(ii) Suggest **one** reason why the blood glucose levels for both persons **A** and **B** are lowest at 6 am.

\_\_\_\_\_

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

(iii) Calculate the percentage increase in blood glucose levels for person **B** between 6 am and 8 am.

(Show your working out.)

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

Both persons **A** and **B** ate the same snack at 10 am.

(iv) Suggest what food type was in the snack.

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

[Turn over

3 Covid-19 is caused by a virus and is passed from person to person in the same way as colds and flu. During the Covid-19 pandemic, people were advised to avoid close contact with each other.

(a) Suggest how Covid-19 is passed from person to person. Explain why not having close contact with people slows down the spread of this disease.

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[2]

Several medicines are now used to treat people with Covid-19. There are a number of stages of development that must take place before a medicine can be made available to the public.

(b) Describe the stages in the development of a new medicine before it is licensed for use by the public.

Your answer should include:

- the name and a brief description of each stage; and
- the reason for each stage.

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

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[6]

4 (a) A student carried out an investigation to test a food sample for starch. The sample was placed on a white tile and a few drops of a reagent were added.

(i) Name the reagent used to test for starch.

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

(ii) Give the end colour of this reagent when starch is present.

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

(b) The student then compared the sugar content of samples of apple and white chocolate. An equal mass of each food was placed in separate boiling tubes containing Benedict's reagent. The boiling tubes were then heated in a water bath.

Benedict's reagent will change colour more slowly when less sugar is present.

(i) Suggest why white chocolate was used instead of dark chocolate when testing with Benedict's reagent.

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

(ii) How would the student know which food contained **more** sugar?

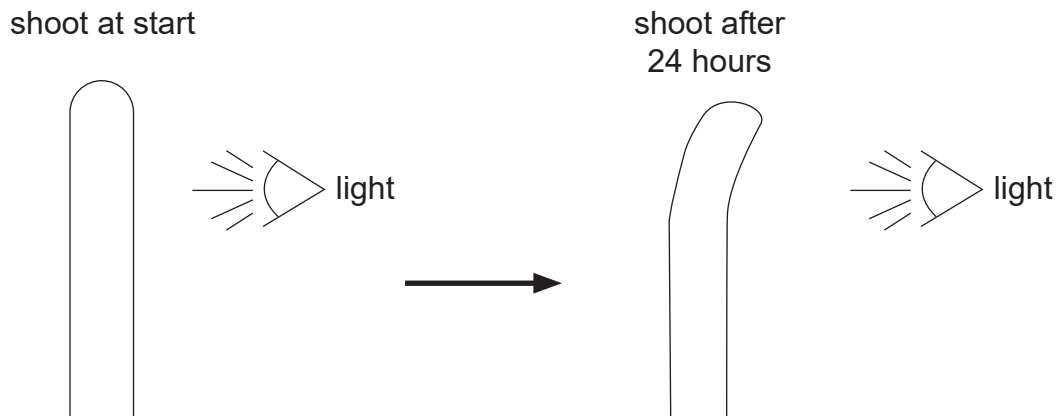
\_\_\_\_\_  
\_\_\_\_\_ [1]





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**(Questions continue overleaf)**

- 5 (a) The diagram below shows an investigation into the effect of light on the growth of a plant shoot.



- (i) What term is used to describe this growth response of plants to light?

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

- (ii) Name the hormone that brings about this response.

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

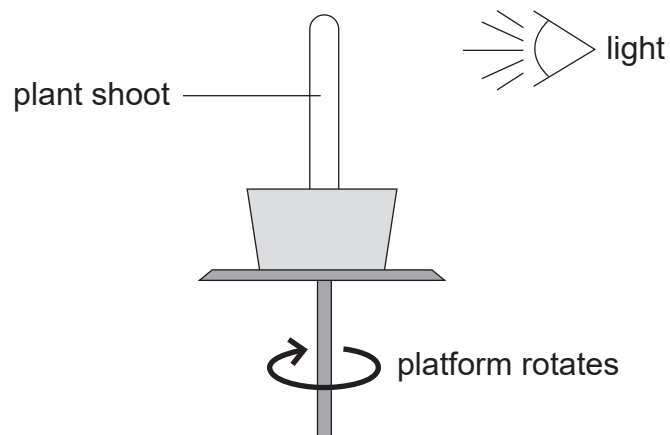
- (iii) Describe and explain how this hormone brings about this response.

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

- (iv) Explain the benefit, to the plant, of this response to light.

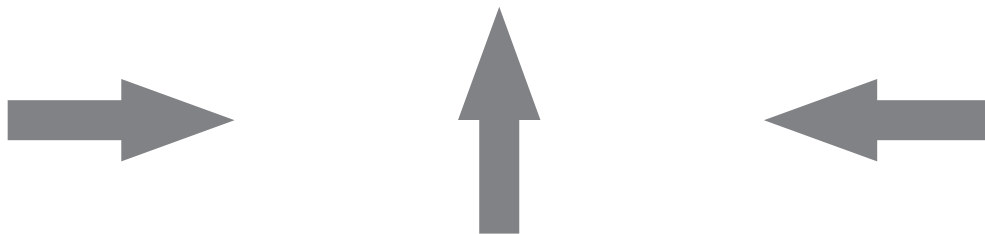
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

In another investigation a plant shoot was placed on a rotating platform beside a light, as shown in the diagram below.



(b) In which direction would the plant shoot grow?

Circle your answer.



[1]

6 (a) Some people are able to taste the chemical PTC. This is controlled by the dominant allele (T). Other people are not able to taste PTC. This is controlled by the recessive allele (t).

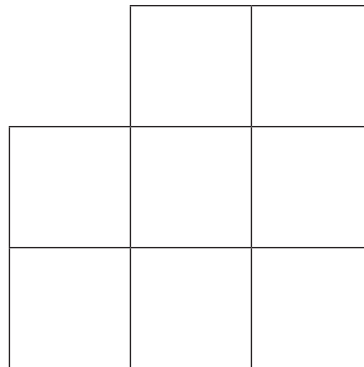
(i) Explain the difference between the terms dominant and recessive.

\_\_\_\_\_

\_\_\_\_\_

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

(ii) Complete the genetic diagram below to show how two parents who are able to taste PTC can have a child who is **not** able to taste PTC.



[2]

(iii) What is the percentage probability of their child **not** being able to taste PTC?

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

(iv) What name is given to this type of genetic diagram?

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

(v) How many **different** genotypes are shown in the completed genetic diagram above?

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

(b) Genes are made from DNA. What term is used to describe the shape of a DNA molecule?

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

(c) Genetic conditions such as Down's syndrome can be identified in a foetus.

(i) Name the type of genetic screening used to test a foetus for Down's syndrome.

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

(ii) Name **one** other genetic condition which can be tested for in a foetus.

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

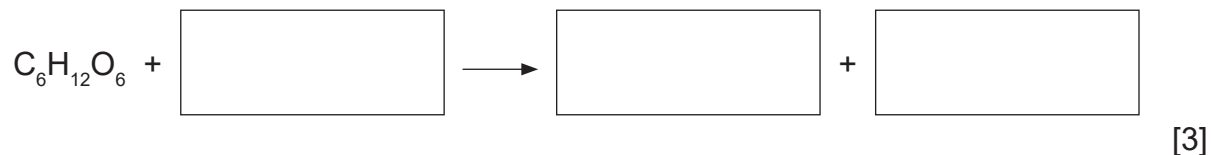
[Turn over

7 (a) Respiration in cells is a chemical reaction that releases energy from food.

(i) What term is used to describe a chemical reaction that releases energy?

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

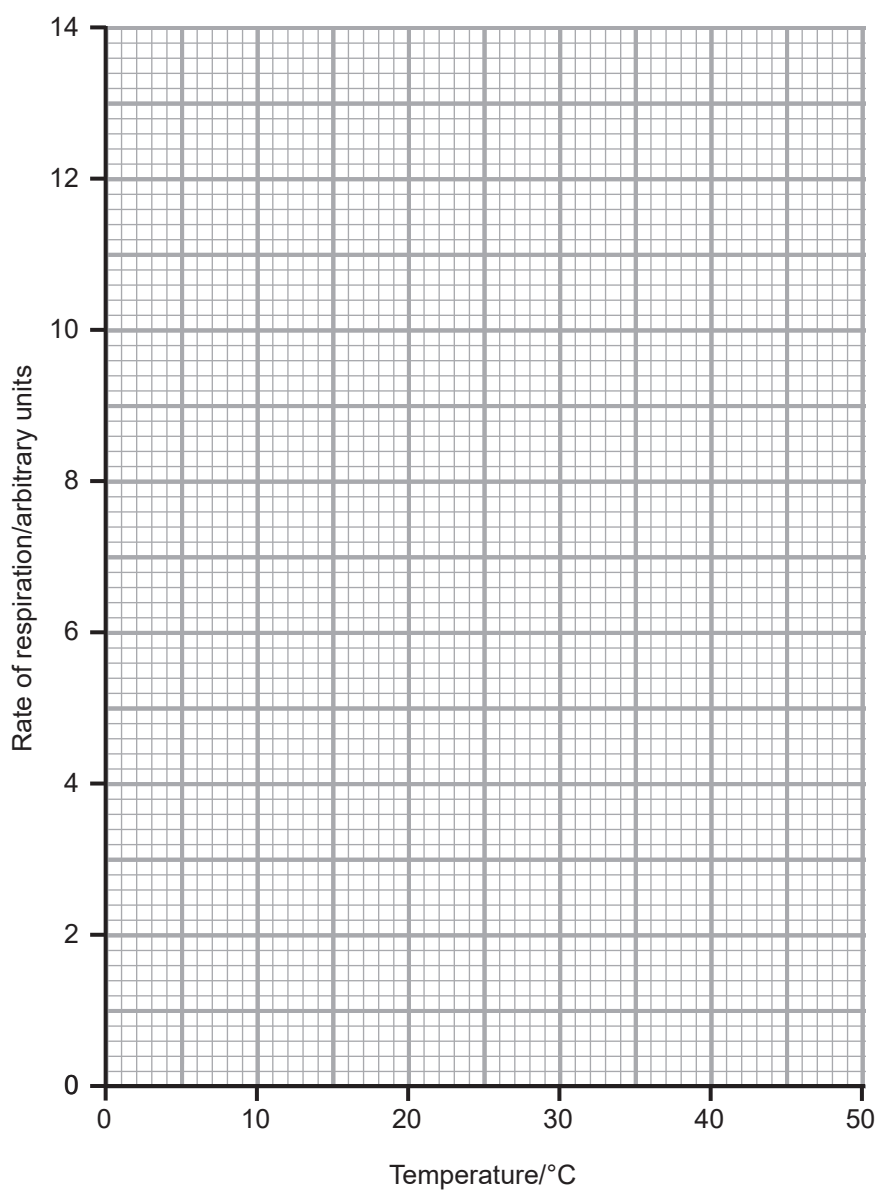
(ii) Complete the balanced symbol equation below for respiration.



(b) The rate of respiration of an organism was measured at different temperatures. The results are shown in the table below.

Temperature/ $^{\circ}C$	Rate of respiration/ arbitrary units
10	3.0
20	5.4
30	12.5
40	14.0
50	0.6

(i) On the grid below, plot and draw a line graph to show these results.



[3]

(ii) Describe fully the trend shown by these results.

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[2]

[Turn over

- 8 About 40 million years ago a species of mammal, related to horses, lived in wet marshes. It was about 0.6 m tall and had three toes on each foot.

Over time the marshes dried out and became firm ground. The mammals that survived this change were those that had one larger middle toe, allowing them to run faster on the firm ground and escape predators. Eventually this became a single hoof which is present in the modern horse.

- (a) Explain how the development of the single hoof is an example of natural selection.

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[3]

- (b) What is the name of the theory that describes how species have changed gradually over time, to form new species?

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[1]

- (c) The species of mammal that lived 40 million years ago is now extinct. What does **extinct** mean?

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[1]

- (d) A lot of the evidence for the development of the single hoof in horses has been provided by fossils. Describe what fossils are and explain how they provide evidence of the changes over 40 million years.

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[3]





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Sources:

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Q5(a) . . . . . Principal Examiner

Q5(b) . . . . . Principal Examiner

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For Examiner's use only	
Question Number	Marks
1	
2	
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5	
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8	

<b>Total Marks</b>	
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Examiner Number

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