



General Certificate of Secondary Education  
2024–2025

Centre Number

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Candidate Number

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# Single Award Science: Biology

Unit 1

Higher Tier



[GSA12]

\*GSA12\*

**TUESDAY 13 MAY 2025, AFTERNOON**

## 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 questions in black ink and use a dark HB pencil for drawings and graphs.

**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.

You may use a scientific calculator.

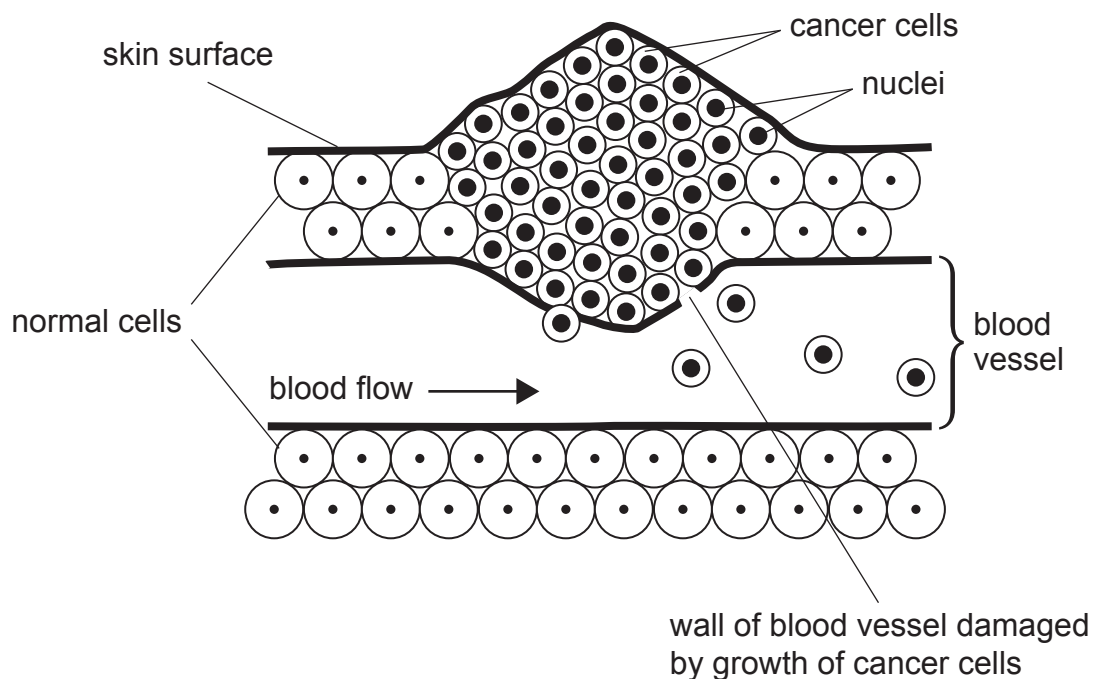
Quality of written communication will be assessed in Question **3(b)**.

14855



\*20GSA1201\*

- 1 The diagram below shows cancer cells growing at the surface of the skin.



- (a) How are cancer cells produced?

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

- (b) Use the diagram above to give **two** differences between cancer cells and normal cells.

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

\_\_\_\_\_

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

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



A tumour is a clump of cells.  
There are two types of tumour, benign and malignant.  
Benign tumours do not spread.  
Malignant tumours can spread throughout the body.

- (c) Suggest which type of tumour is shown in the diagram opposite.  
Explain your answer.

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[1]

- (d) Name the environmental factor which can cause skin cancer.

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[1]

[Turn over



- 2 A scientist investigated the effect of planting density (number of seeds planted per square metre) on the average number of tomatoes on each plant.

Table 1 shows her results.

**Table 1**

| <b>Planting density<br/>/number of seeds per square metre</b> | <b>Average number of tomatoes<br/>on each plant</b> |
|---------------------------------------------------------------|-----------------------------------------------------|
| 16                                                            | 120                                                 |
| 20                                                            | 76                                                  |
| 24                                                            | 40                                                  |

- (a) Describe and explain how the planting density affected the average number of tomatoes on each plant.

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[3]

- (b) The scientist carried out another investigation using a different type of tomato seed which produced plants with larger leaves.

She planted the seeds at a planting density of 16 seeds per square metre.

Table 2 shows her results.

**Table 2**

| <b>Planting density<br/>/number of seeds per square metre</b> | <b>Average number of tomatoes<br/>on each plant</b> |
|---------------------------------------------------------------|-----------------------------------------------------|
| 16                                                            | 160                                                 |



- (i) Use Table 1 and Table 2 to calculate the **percentage increase** in the average number of tomatoes on each plant at a planting density of 16 seeds per square metre.

**Show your working out.**

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

- (ii) The scientist noticed that each tomato was larger on the plant with the larger leaves. Suggest why.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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

[Turn over



**3 (a)** Insulin is an example of a hormone. What is a hormone?

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[2]

[2]

**(b)** Describe and explain the effect of insulin on blood glucose levels in the body.

Your answer should include:

- the name of the organ that produces insulin;
- the name of the target organ for insulin;
- an explanation of the effects of insulin; and
- the condition that occurs when this blood glucose control mechanism fails.

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

[illegible]



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[6]

[Turn over

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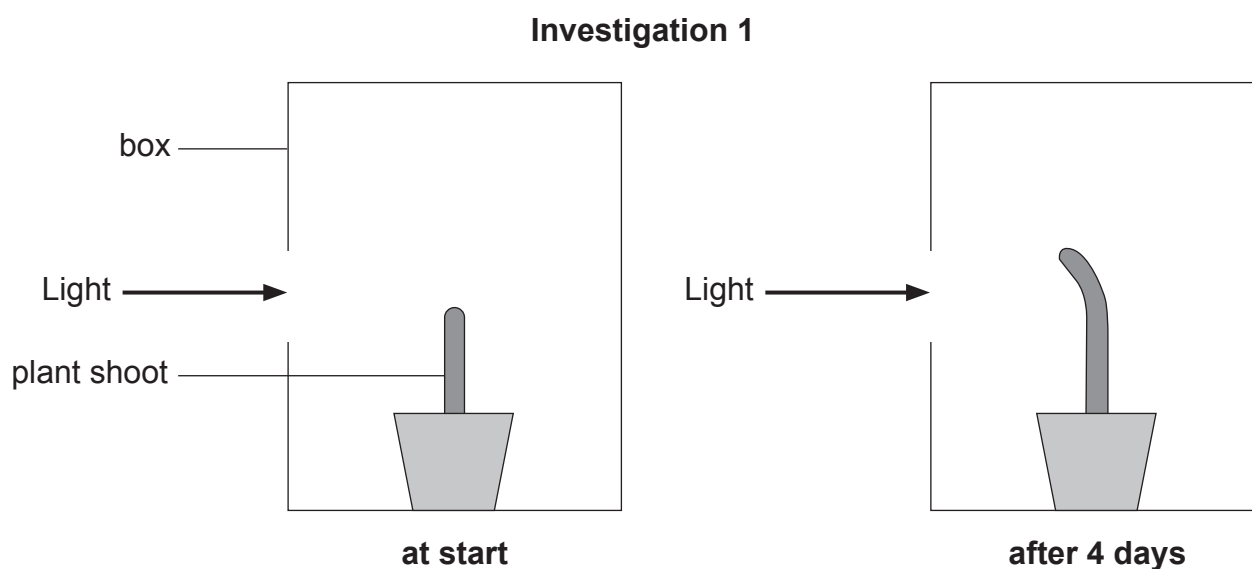


\*20GSA1207\*

- 4 (a) Phototropism is a growth response of plants to light.  
A student carried out two investigations into phototropism.

In investigation 1 he placed a plant shoot in a black box with a hole in one side to allow light to enter. He left the light shining on the plant shoot for four days.

The diagram below shows this investigation.



- (i) Describe the growth response of the plant shoot after four days.

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

- (ii) Name the hormone that controls phototropism and explain how it brings about the response to light shown in investigation 1.

Name of hormone \_\_\_\_\_

Explanation \_\_\_\_\_

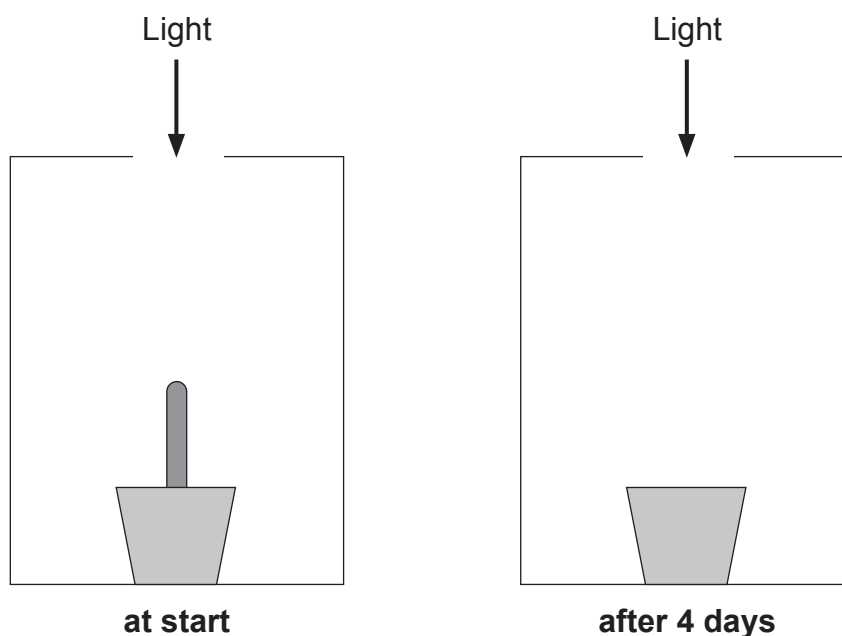
\_\_\_\_\_  
\_\_\_\_\_ [3]



In investigation 2 the student placed the black box with the hole at the top so the light entered from above.

The diagram below shows this investigation.

### Investigation 2



- (b) Complete the diagram for investigation 2 by drawing, in the box, how the plant shoot would appear **after four days**. [2]

[Turn over



- 5 The photograph below shows an octopus.



An octopus can change its colour to match its surroundings.  
The ability to change its colour is controlled by genes.

- (a) Use your knowledge of **natural selection** to complete the sentences below.

The octopus changes its colour to help \_\_\_\_\_ itself in its  
surroundings. This helps prevent it being eaten by predators.

This means the octopus can survive to \_\_\_\_\_ and  
pass on its \_\_\_\_\_ to the next generation. [3]

- (b) Name the scientist who developed the theory of natural selection.

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

The theory of natural selection helps explain the process of evolution.

- (c) What is meant by evolution?

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



- 6 Two students used pulse meters to record their pulse rates.

Photograph 1 shows a pulse meter being used.

**Photograph 1**



The students could have recorded their pulse rates using the method shown in photograph 2.

**Photograph 2**



- (a) Suggest **one** advantage of using pulse meters to record pulse rates.

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[1]

**[Turn over**



- (b) The students measured their pulse rates at the start and every 5 minutes for 25 minutes.  
They started exercising at 5 minutes and stopped exercising at 15 minutes.

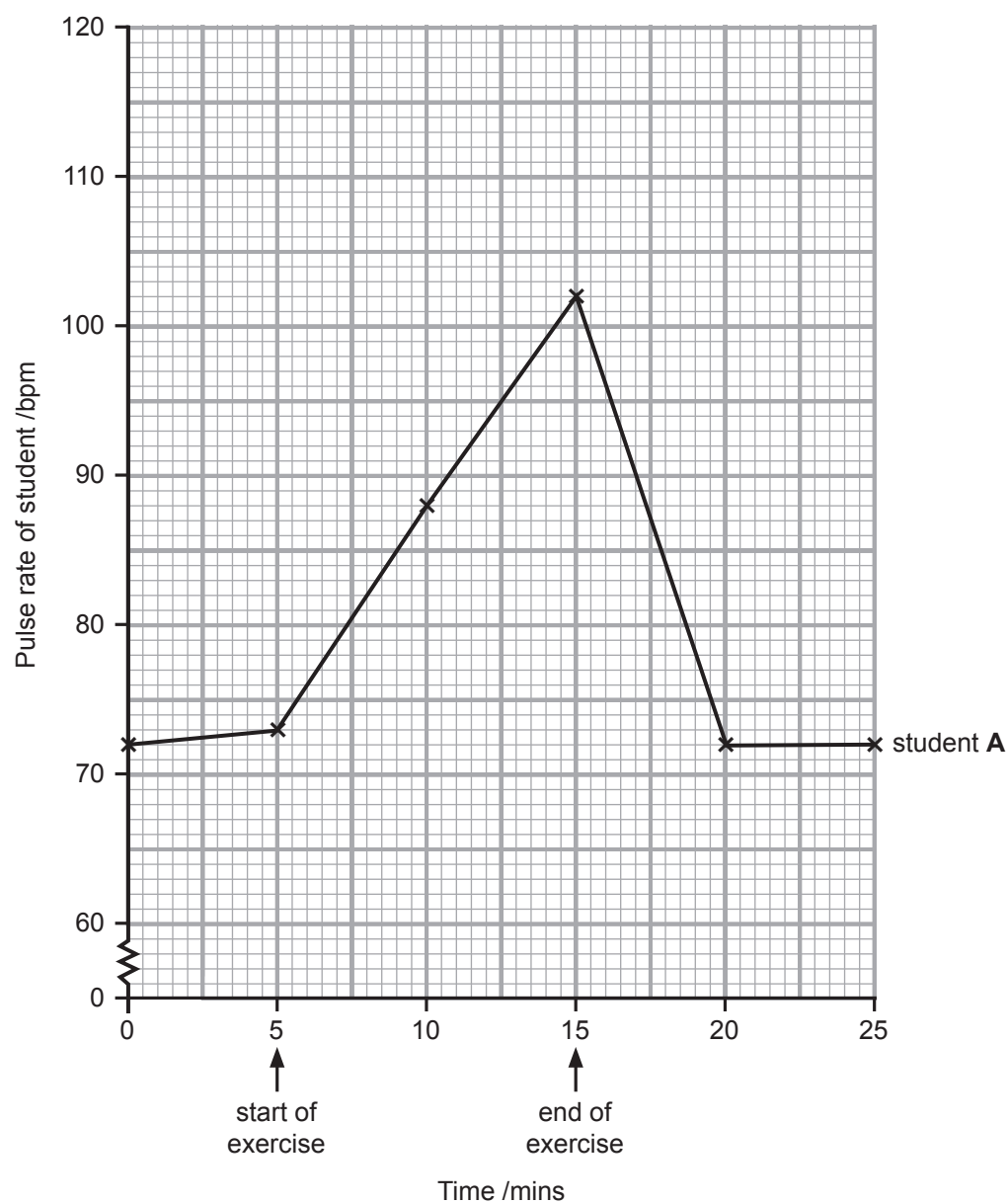
The table below shows their results.

| Time /mins | Pulse rate of student /bpm |     |
|------------|----------------------------|-----|
|            | A                          | B   |
| 0          | 72                         | 80  |
| 5          | 73                         | 82  |
| 10         | 88                         | 106 |
| 15         | 102                        | 120 |
| 20         | 72                         | 90  |
| 25         | 72                         | 86  |



The line graph on the grid below shows the results for student A.

- (i) On the same grid, plot and draw a line graph to show the results for student B.



[3]

[Turn over



Student **A** thinks she is fitter than student **B**.

(ii) Give **two** pieces of evidence from the table on page 12 which support this statement.

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

(c) Student **B** started to exercise regularly.

(i) Suggest **one** change regular exercise may have on student **B**'s pulse rate.

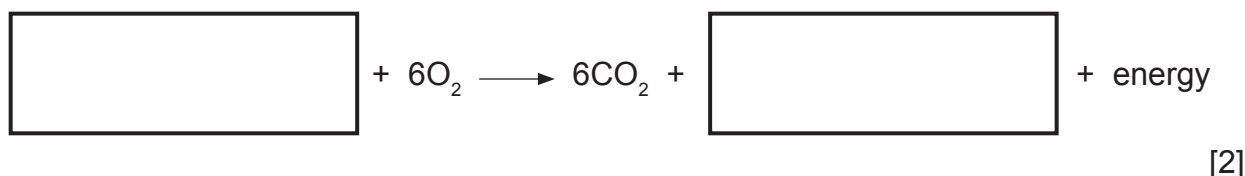
- \_\_\_\_\_  
\_\_\_\_\_ [1]

(ii) Describe **two** ways regular exercise benefits the heart.

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

Respiration increases during exercise.

(d) Complete the **balanced symbol equation** below for respiration.



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14855

**[Turn over**



\*20GSA1215\*

- 7 (a) Huntington's disease is an inherited genetic condition.

The allele for Huntington's disease (**B**) is **dominant** to the normal allele (**b**).

- (i) Complete the Punnett square below to show the possible genotypes of the children of parents who are both **heterozygous** for Huntington's disease.

|  |  |  |
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|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

[2]

- (ii) What is the percentage probability of these two parents having a child who is also heterozygous for Huntington's disease?

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

- (iii) Draw a circle around the genotype of any children in the Punnett square who do **not** have Huntington's disease.

[1]



- (b) Symptoms of Huntington's disease only appear in adults.  
It is possible to test young adults to find out if they have the allele for Huntington's disease but have not yet developed any symptoms.

(i) What term is used to describe this type of testing?

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

(ii) Give **one** reason why people might not want the results of this test being made available to insurance companies.

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

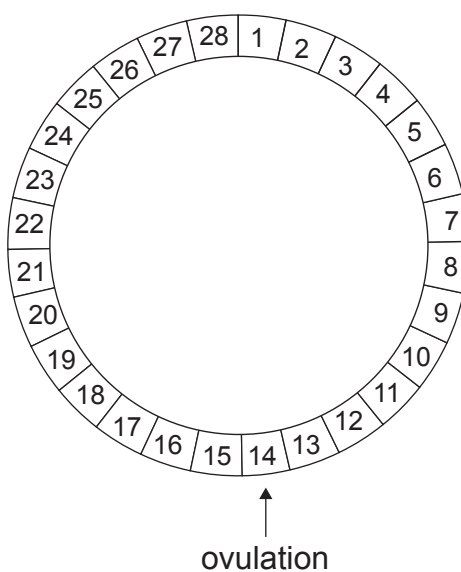
(iii) Name **one** other inherited condition that can be tested for by doctors.

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

[Turn over]



- 8 (a) The diagram below shows a 28-day menstrual cycle.



In this cycle, menstruation lasts for five days.

- (i) On the diagram above **shade the five days** when menstruation takes place. [1]

- (ii) Name the hormone that causes ovulation and describe what happens during ovulation.

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

- (iii) Name the hormone that maintains the thickness of the uterus lining during pregnancy.

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

- (b) (i) Name **one** method of contraception which prevents ovulation.

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



- (ii) Name the process which may occur **after** ovulation that results in the formation of a zygote.

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

- (c) The table below shows the total number of babies born in Northern Ireland from 2017 to 2021. It also shows the number of babies who were born male and the number who were born female.

| Year | Total number of babies born | Number of babies born male | Number of babies born female |
|------|-----------------------------|----------------------------|------------------------------|
| 2017 | 23 075                      | 11 898                     | 11 177                       |
| 2018 | 22 829                      | 11 613                     | 11 216                       |
| 2019 | 22 447                      | 11 666                     | 10 781                       |
| 2020 | 20 815                      | 10 772                     | 10 043                       |
| 2021 | 22 071                      | 11 340                     |                              |

- (i) Describe fully the trend shown by the **total** number of babies born from 2017 to 2021.

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

- (ii) Calculate the number of babies born female in **2021**.

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

- (iii) Describe **one** difference between the number of babies born male and the number born female from 2017 to 2020.

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



Sources:  
Question 1 . . . . . Principal Examiner .  
Question 4(a) . . . Principal Examiner .  
Question 4(b) . . . Principal Examiner .  
Question 5 . . . . . © Gettyimages  
Question 6 . . . . . © Gettyimages × 2  
Question 6(b)(i). . . Principal Examiner  
Question 8(a) . . . Principal Examiner  
Question 8(c) . . . Crown copyright NISRA Contains public sector information licensed under the Open Government Licence v3.0.

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|-------------------------|-------|
| Question Number         | Marks |
| 1                       |       |
| 2                       |       |
| 3                       |       |
| 4                       |       |
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| 6                       |       |
| 7                       |       |
| 8                       |       |

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| Total Marks |  |
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Examiner Number

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