Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2024–2025

Single Award Science: Biology

Unit 1

Higher Tier

[GSA12]

GSA12

MONDAY 11 NOVEMBER 2024, 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 nine** questions.

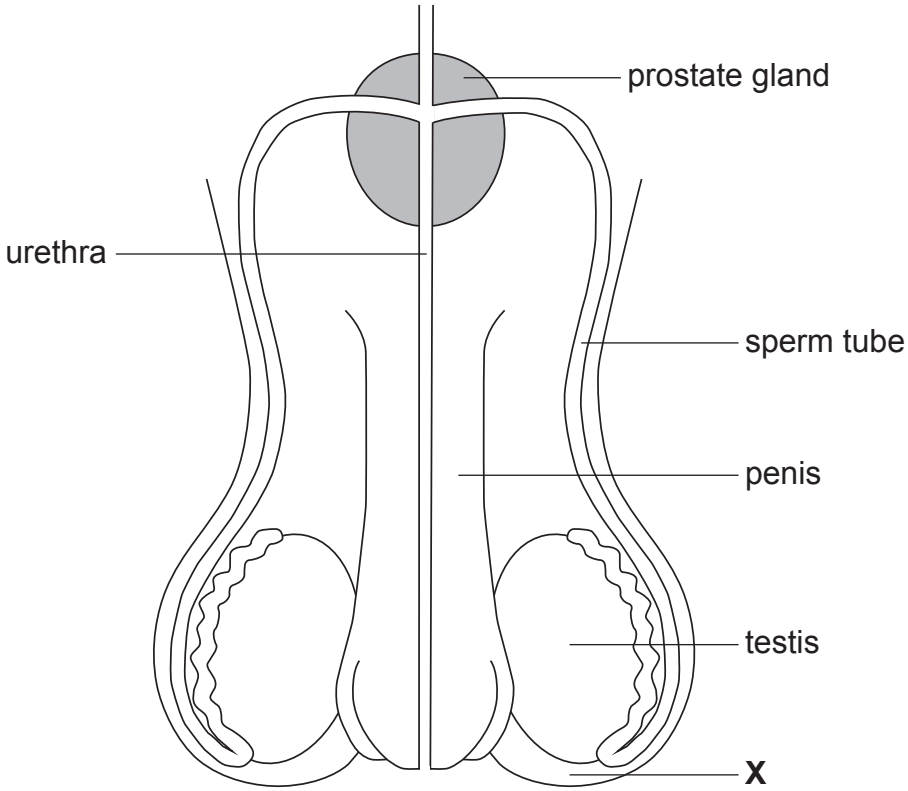
INFORMATION FOR CANDIDATES

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)**.

14842

24GSA1201

1 **(a)** The diagram below shows the male reproductive system.



(i) Name the part labelled **X**.

_____ [1]

(ii) Give the function of the

sperm tube. _____

_____

prostate gland. _____

_____ [2]

(iii) Name the part of the male reproductive system that places sperm into the vagina of a female.

_____ [1]

(b) The nucleus of a sperm cell contains genetic structures.

(i) Name these genetic structures.

_____ [1]

These genetic structures are made of a chemical with a double helix shape.

(ii) Name this chemical.

_____ [1]

(c) When a sperm cell reaches an egg cell, their nuclei may fuse.

(i) What term is used to describe the process of the nuclei of a sperm cell and an egg cell fusing?

_____ [1]

(ii) Name the part of the female reproductive system where this process takes place.

_____ [1]

2 **(a)** **(i)** Explain how cancer cells are produced.

_____

_____ [1]

Skin cancer can be triggered by an environmental factor.

(ii) Name this environmental factor.

_____ [1]

(b) The table below gives some information about cancer cases in Northern Ireland from 2016 to 2020.

Average number of cancer cases per year	13 684
Average number of deaths from cancer per year	
Average number of survivors of cancer per year	9183

(i) Use information from the table above to calculate the average number of deaths from cancer per year, from 2016 to 2020.
Write your answer in the empty box in the table above. [1]

The equation below shows how to calculate the average **percentage of survivors** of cancer per year.

$$\text{average percentage of survivors} = \frac{\text{average number of survivors}}{\text{average number of cancer cases}} \times 100$$

(ii) Use information from the table and the equation above to calculate the average percentage of survivors per year.

Give your answer to **one decimal place**.

Show your working out.

_____ % [3]

[Turn over

3 Using contraception helps to prevent pregnancy by stopping sperm from reaching an egg.

(a) Suggest why some people are against the use of contraception.

_____

_____ [1]

(b) Explain how the condom, the contraceptive pill and male sterilisation each prevent the sperm from reaching an egg.

Which of these methods of contraception helps to prevent the spread of sexually transmitted infections (STIs)?

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

Condom

_____

_____

_____

_____

_____

Contraceptive pill

_____

_____

_____

_____

_____

Male sterilisation

_____

_____

_____

_____

_____

Method that helps prevent the spread of STIs

_____ [6]

4 **(a)** Microorganisms can cause disease in plants and animals.

(i) Name the **type** of microorganism that causes

potato blight. _____

flu. _____ [2]

Microorganisms can also be used to produce medicines.

(ii) Name the **type** of microorganism that is used to produce antibiotics.

_____ [1]

(b) Immunity is when the body has enough antibodies in the blood to defend against microorganisms that cause disease.

Immunity may be **active** or **passive**.

White blood cells produce antibodies in active immunity.

(i) Name the **type** of white blood cell that produces antibodies.

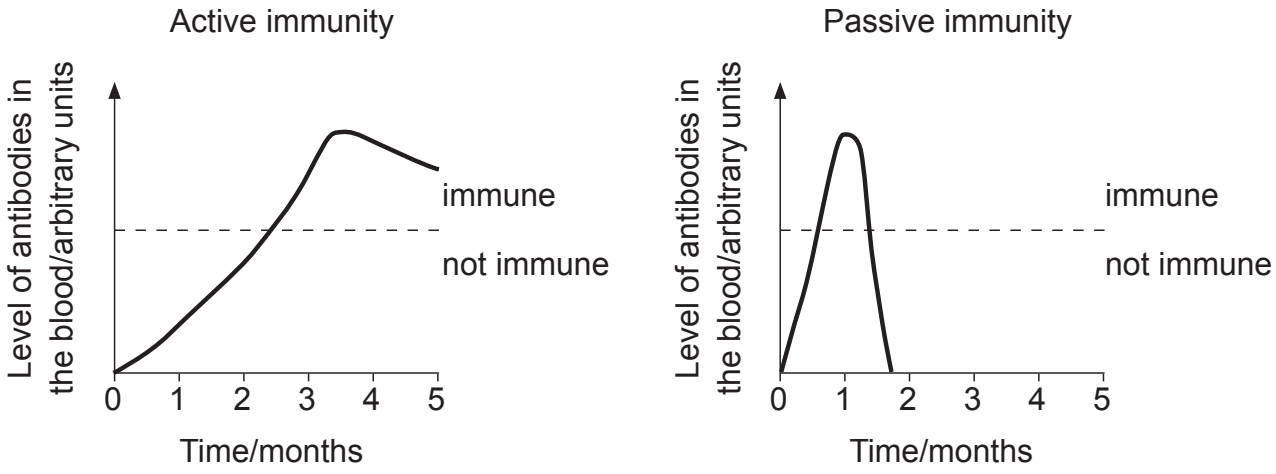
_____ [1]

In passive immunity a person is given ready-made antibodies.

(ii) Suggest how the ready-made antibodies are given to the person.

_____ [1]

The graphs below show the level of antibodies in the blood for active and passive immunity over a five month period.



(iii) Use the graphs to describe **two** differences in the level of antibodies in the blood for active and passive immunity over the five month period.

_____

_____

_____

_____

_____ [2]

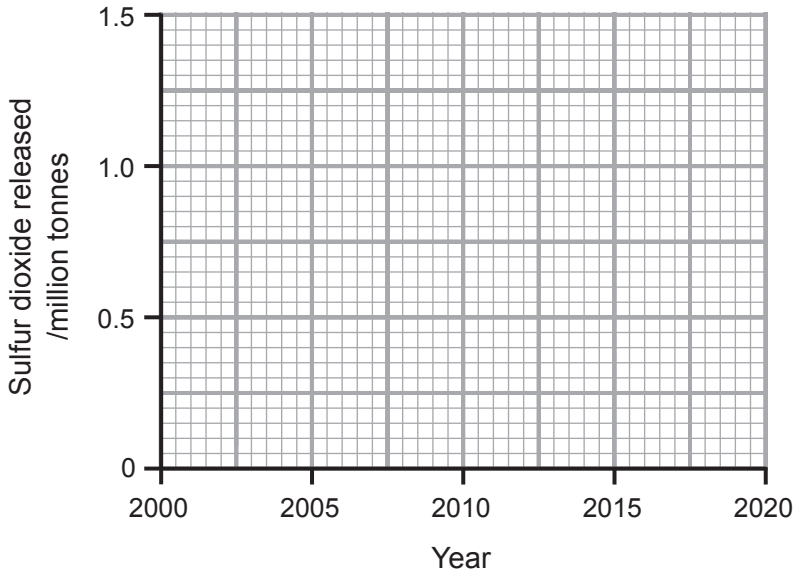
[Turn over

5 **(a)** Sulfur dioxide is one cause of air pollution.

The table below shows the mass of sulfur dioxide released in the UK from 2000 to 2020.

Year	Mass of sulfur dioxide released /million tonnes
2000	1.3
2005	0.8
2010	0.5
2015	0.3
2020	0.1

(i) On the grid below, plot and draw a line graph showing the mass of sulfur dioxide released from 2000 to 2020.



[3]

(ii) Describe the trend shown by this graph.

_____

_____ [1]

14842

BLANK PAGE

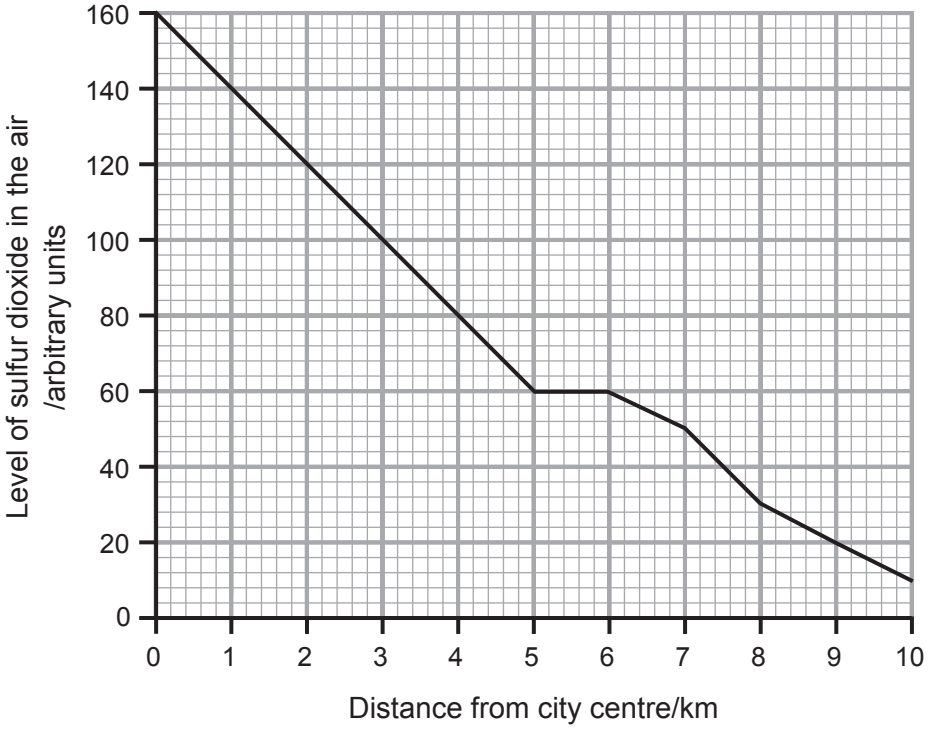
DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)

(b) Lichens can be found growing on trees. They can be used to monitor pollution caused by sulfur dioxide in the air.

The photograph below shows one type of lichen growing on a tree.

The graph below shows the level of sulfur dioxide in the air at different distances from a city centre.



14842

(i) Use the graph opposite to give the level of sulfur dioxide **8 km** from the city centre.

_____ arbitrary units [1]

Some types of lichen are very sensitive to air pollution and do not grow well where there is a high level of sulfur dioxide in the air.

The table below shows how sensitive different types of lichen are to sulfur dioxide in the air.

Type of lichen	Sensitivity to sulfur dioxide in the air
crusty	not sensitive
shrubby	quite sensitive
leafy	very sensitive

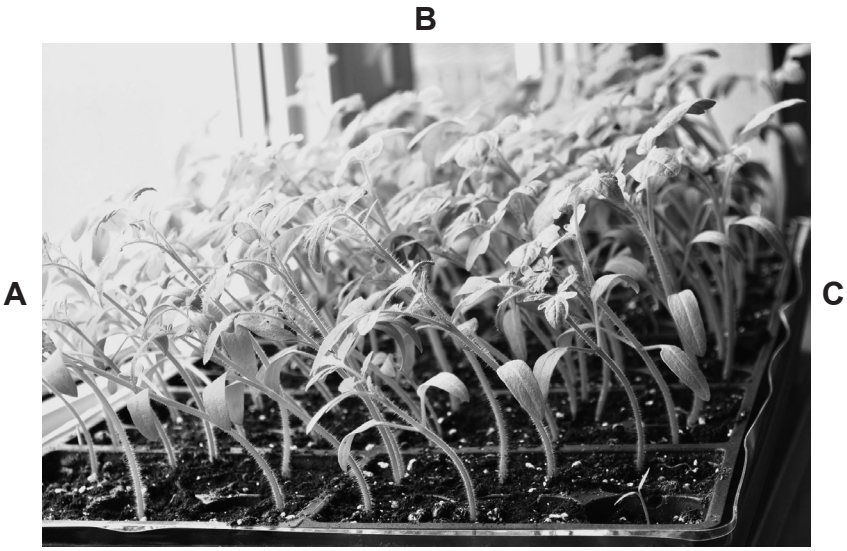
(ii) Suggest which type of lichen would grow best in the city centre (at 0 km). Explain your answer.

Type of lichen _____

Explanation _____

_____ [2]

6 The photograph below shows tomato seedlings and their growth response to light.



(a) Name this growth response to light.

_____ [1]

(b) Which direction, **A**, **B** or **C**, was **most** light coming from to produce this growth response in the tomato seedlings?

_____ [1]

The cells on one side of the tomato seedlings have grown longer than the cells on the other sides.

(c) Which side, **A**, **B** or **C**, of the tomato seedlings had the longest cells?

_____ [1]

A plant hormone causes the growth response of the tomato seedlings shown in the photograph opposite.

(d) Name this hormone and describe how it caused this growth response.

Name of hormone _____

Description _____

_____

_____ [2]

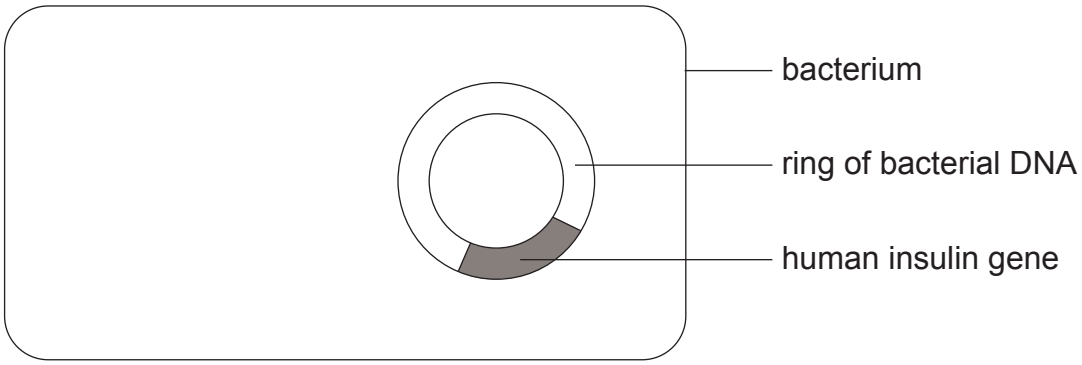
(e) Explain the advantage to the tomato seedlings of this growth response.

_____

_____

_____ [2]

7 The diagram below shows a bacterium that has been genetically engineered.



(a) How does the diagram show that this bacterium has been genetically engineered?

_____

_____ [2]

(b) Give **one** advantage and **one** disadvantage of genetic engineering.

Advantage _____

_____

Disadvantage _____

_____ [2]

BLANK PAGE

DO NOT WRITE ON THIS PAGE

(Questions continue overleaf)

8 Cystic fibrosis is an inherited condition.

The cystic fibrosis allele (**a**) is recessive to the normal allele (**A**).

(a) Explain what is meant by

an allele. _____

_____

recessive. _____

_____ [2]

(b) The pedigree diagram below shows the inheritance of cystic fibrosis in a family.

Key:		
	● female with cystic fibrosis	○ female without cystic fibrosis
	■ male with cystic fibrosis	□ male without cystic fibrosis

(i) Give Derek's **genotype**.

_____ [1]

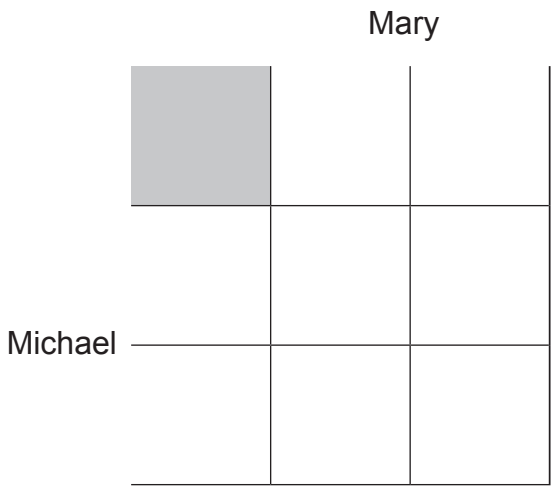
(ii) How many females, in the pedigree diagram opposite, do **not** have cystic fibrosis?

_____ [1]

Emily and Derek have two children, a son and a daughter.

(iii) Use the key to complete the pedigree diagram opposite to show these children. [2]

(c) **(i)** Complete the Punnett square below to show how Jeremy inherited cystic fibrosis from his parents, Mary and Michael.



[2]

Mary and Michael are having another child.

(ii) Use the Punnett square in (i) to give the percentage probability that this child will have cystic fibrosis.

_____ % [1]

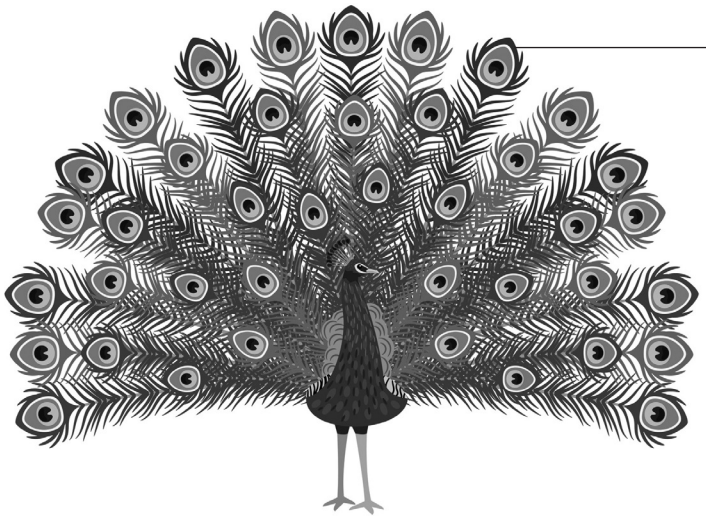
[Turn over

9 Natural selection can lead to evolution.

(a) Name the scientist who developed the theory of evolution as a continuing process of natural selection.

_____ [1]

The picture below shows a male peacock.



The peacock has a large, brightly coloured tail to attract females. Thousands of years ago a peacock's tail was much smaller and not as bright.

(b) Use this information and your knowledge of **natural selection** to suggest how peacocks have changed over time to have larger and more brightly coloured tails.

_____

_____

_____

_____

_____

_____ [3]

(c) Explain what would happen to a species if it failed to adapt to environmental change.

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

BLANK PAGE

DO NOT WRITE ON THIS PAGE

BLANK PAGE

DO NOT WRITE ON THIS PAGE

Sources:
Question 1(a) . . . . Principal Examiner
Question 2(b) . . . . Adapted from Northern Ireland Cancer registry | N. Ireland Cancer Registry
Question 5(a) . . . . Crown copyright All content available under the Open Government licence v3.0, except where otherwise stated
Question 5(b) . ©Gettyimages
Question 6 . . . . . ©Gettyimages
Question 7 . . . . . Principal Examiner
Question 8(b) . Principal Examiner
Question 9(b) . . . . . ©Gettyimages

DO NOT WRITE ON THIS PAGE

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

Examiner Number

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.