Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2022–2023

Single Award Science: Biology

Unit 1

Higher Tier

[GSA12]

GSA12

TUESDAY 16 MAY 2023, 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 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 **2(a)**.

14006

20GSA1201

1 **(a)** The photograph below shows redwood trees in a forest in California.

The height of the trees is an example of continuous variation.

(i) What is meant by the term **continuous variation**?

_____

_____ [1]

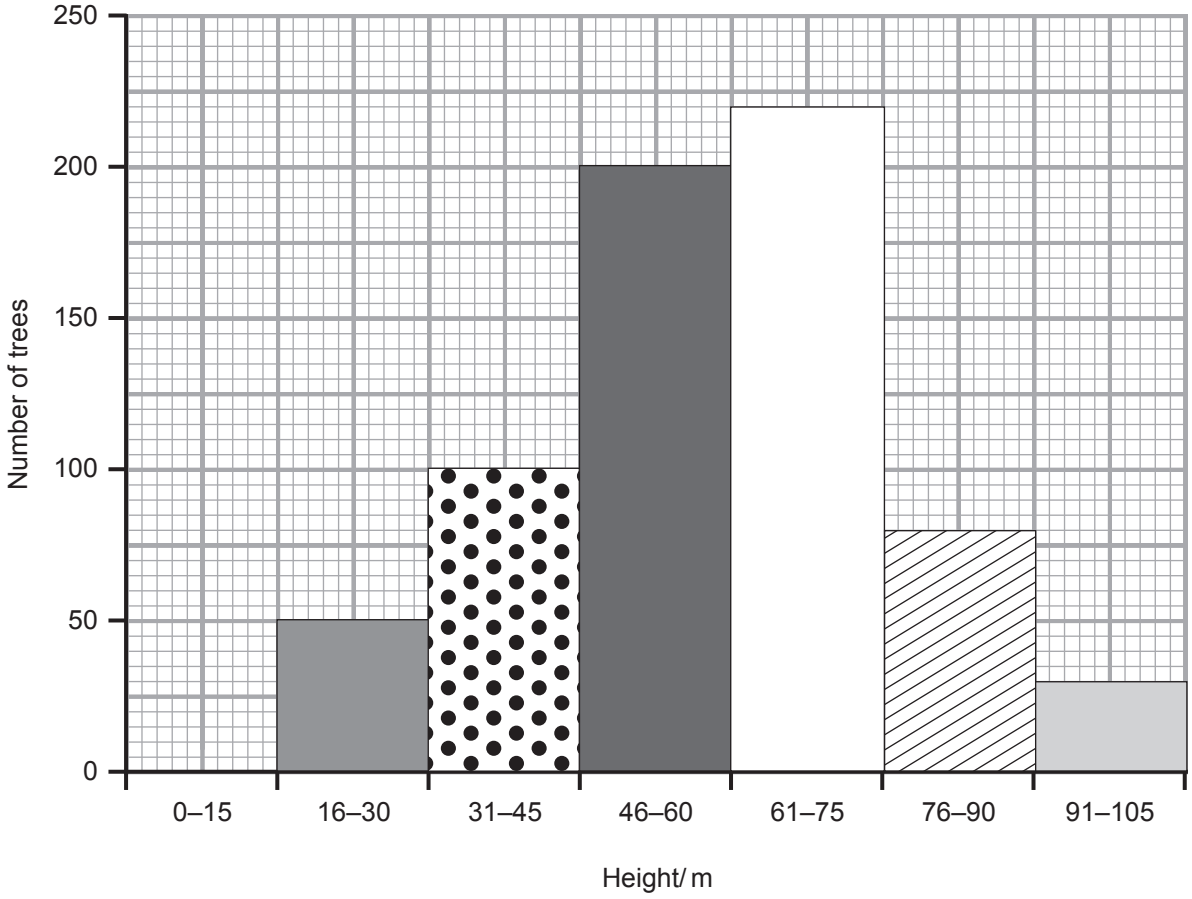
(ii) Apart from height, give **one** other example of continuous variation.

_____ [1]

(b) Continuous and discontinuous are two types of variation.
Give **one** cause of these types of variation.

_____ [1]

(c) The graph below shows the variation in heights of all the redwood trees in a forest.



(i) Name the type of graph shown above.

_____ [1]

(ii) Complete the following sentence.

The most common tree height in this forest is between _____

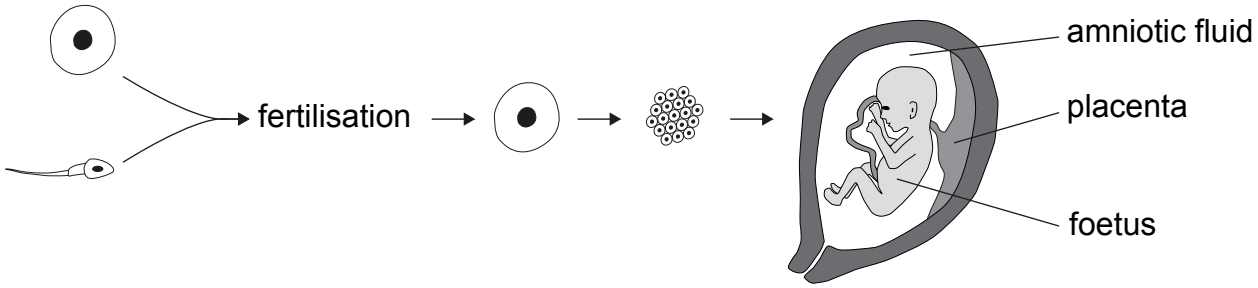
and _____ m. [1]

(iii) Suggest a height for the tallest tree in this forest.

_____ m [1]

[Turn over

2 The diagram below shows some of the stages in the development of a foetus.



(a) Describe the stages in the development of a foetus.

Your answer should include a description of:
- the process of fertilisation and where it occurs;
- the stages after fertilisation; and
- the function of the placenta and amniotic fluid.

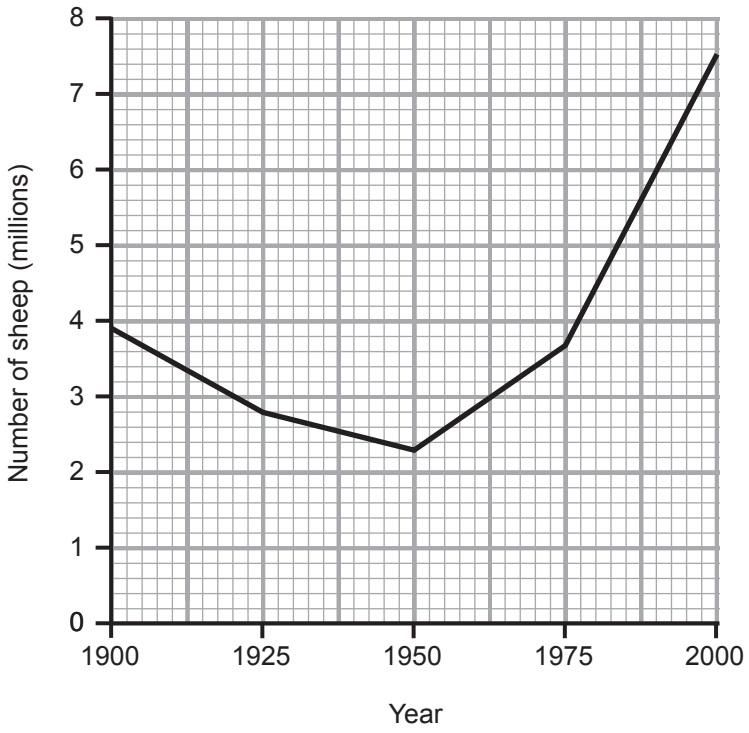
In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

[6]

(b) Why do doctors advise pregnant women to avoid drinking alcohol?

[1]

3 The graph below shows the number of sheep grazing in the west of Ireland from 1900–2000.



(a) Describe fully the trend shown in this graph.

_____

_____

_____ [2]

(b) Sheep can cause a decrease in biodiversity in the area where they graze.

(i) Explain fully what is meant by the term **biodiversity**.

_____

_____ [2]

(ii) Suggest **two** actions farmers could take to increase biodiversity on their land while still allowing sheep to graze.

1. _____

_____

2. _____

_____ [2]

Competitive invasive species such as Japanese knotweed can also decrease biodiversity in the west of Ireland.

(iii) Suggest **two** ways Japanese knotweed can decrease biodiversity.

1. _____

_____

2. _____

_____ [2]

4 Photosynthesis occurs in green plants.

(a) Complete the balanced symbol equation below for photosynthesis.

$$6CO_2 + \boxed{} \longrightarrow \boxed{} + 6O_2$$

[2]

(b) Green plants contain chlorophyll.

(i) Name the structure in plant cells that contains chlorophyll.

_____ [1]

(ii) What is the function of chlorophyll in photosynthesis?

_____ [1]

5 The production of chlorophyll in a tomato plant is controlled by a gene.
The dominant allele, **G**, produces green leaves containing chlorophyll.
The recessive allele, **g**, produces white leaves with no chlorophyll.

(a) Explain what is meant by the term **allele**.

_____ [1]

(b) **(i)** Complete the genetic diagram below to show the offspring produced from a cross between **two heterozygous** tomato plants.

[2]

(ii) What is the percentage probability of these tomato plants producing a plant with white leaves?

_____ % [1]

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

_____ [1]

The allele, **g**, that can produce white leaves in a tomato plant is caused by a mutation.

(c) What is meant by the term **mutation**?

_____

_____ [2]

[Turn over

(d) Skin cancer is also caused by a mutation.

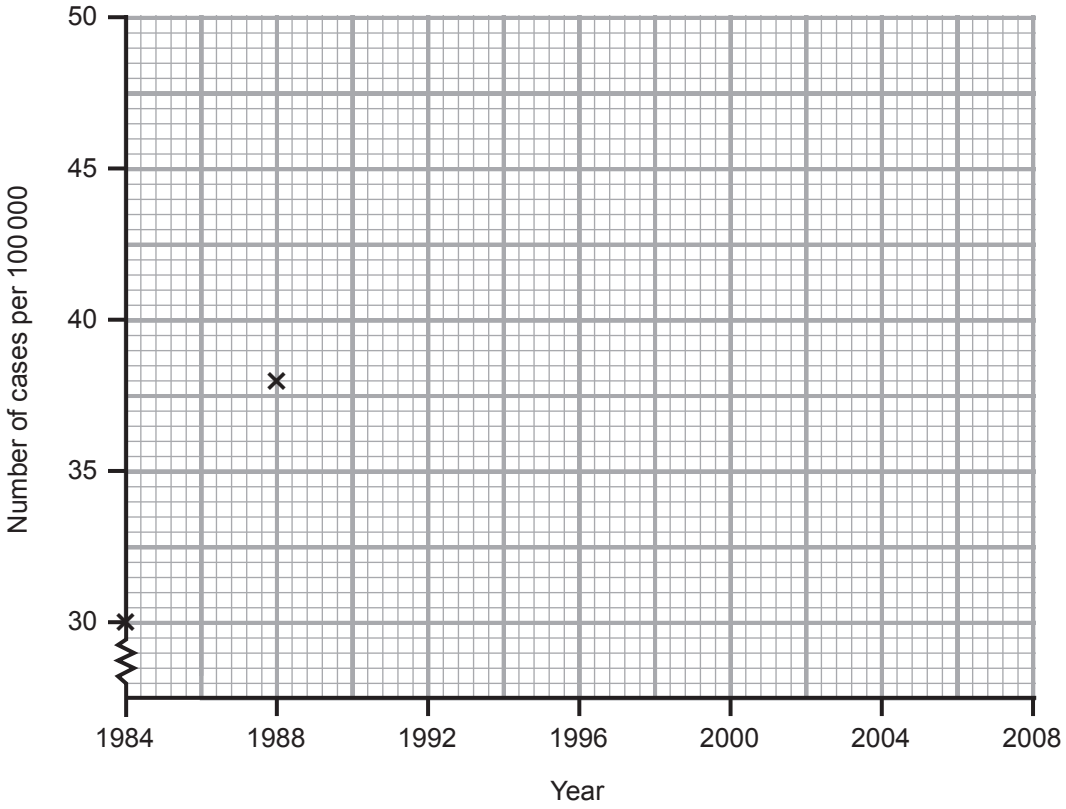
(i) Name the environmental factor that can cause the mutation leading to skin cancer.

_____ [1]

The table below shows the number of cases of skin cancer per 100 000 people from 1984 to 2008.

Year	Number of cases per 100 000
1984	30
1988	38
1992	40
1996	45
2000	46
2004	48
2008	50

(ii) On the grid below draw a line graph for the information in the table opposite.
The first two points have been plotted for you.



[3]

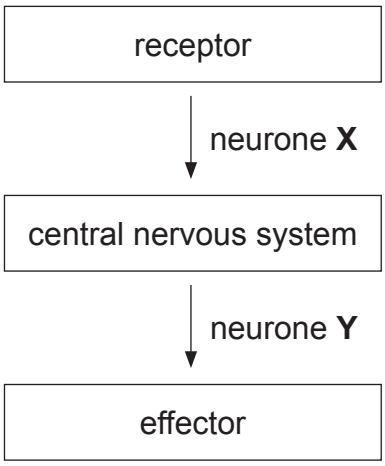
(iii) Calculate the percentage increase in the number of cases of skin cancer from 1984 to 2008.
Give your answer to **1 decimal place**.

(Show your working out.)

_____ % [3]

[Turn over

6 **(a)** The diagram below shows the pathway of nerve impulses in a reflex arc.



(i) Name the neurones labelled **X** and **Y**.

X _____

Y _____ [2]

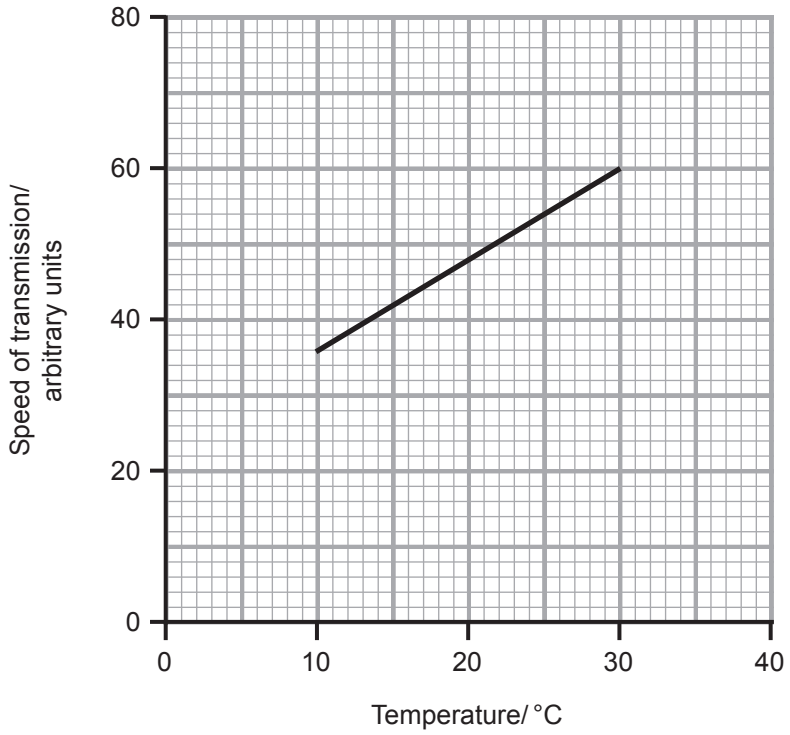
(ii) Name the part of the central nervous system that is involved in a reflex arc.

_____ [1]

(iii) What name is given to the connection between two neurones?

_____ [1]

(b) The graph below shows the speed of nerve impulse transmission in a lizard over a range of temperatures.



(i) Use the graph to find the speed of transmission of this nerve impulse at 25 °C.

_____ arbitrary units [1]

This trend continues up to 40 °C.

(ii) Draw a line on the grid above to show the trend between 30 °C and 40 °C. [1]

[Turn over

(c) The central nervous system controls and co-ordinates the body together with the hormonal system.

(i) Complete the table below to show the differences between the nervous and hormonal systems.

	Nervous system	**Hormonal system**
Type of message	electrical	
How message travels	neurone	

[2]

(ii) Hormones are also found in plants. Name a plant hormone.

_____ [1]

7 There are many different species of mushrooms.

Some mushrooms are poisonous to eat and evolution has caused some of these mushrooms to become brightly coloured. The bright colours warn animals that they are poisonous.

(a) Explain what is meant by the term **evolution**.

_____

_____ [2]

(b) Name the scientist who developed the theory of evolution.

_____ [1]

(c) Explain, in terms of natural selection, the evolution of brightly coloured poisonous mushrooms.

_____

_____

_____

_____

_____ [3]

(d) Explain how fossils can be used to provide evidence for evolution.

_____

_____ [1]

8 Crops, such as wheat, are grown by farmers. These can be genetically engineered to be resistant to disease.

(a) Explain what is meant by the term **genetic engineering**.

_____

_____ [2]

Genetic engineering can increase the amount of crops that survive. However, some people are against this process.

(b) Suggest **two** reasons why some people are against genetic engineering of crops.

1. _____

_____

2. _____

_____ [2]

Genetic engineering of bacterial cells is now used to provide insulin for people with diabetes. Before this, insulin was obtained from animals.

(c) Suggest **one** advantage, to people with diabetes, of producing insulin by genetic engineering.

_____

_____ [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

BLANK PAGE

DO NOT WRITE ON THIS PAGE

Sources:
Question 1(a) . . . . © Getty Images
Question 2 . . . . . Principal Examiner
Question 3 . . . . . © Crown copyright. Office of National Statistics

DO NOT WRITE ON THIS PAGE

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