Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2022–2023

Single Award Science: Biology

Unit 1

Higher Tier

[GSA12]

GSA12

MONDAY 21 NOVEMBER 2022, 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 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.
Quality of written communication will be assessed in Question **3(b)**.

13878

20GSA1201

1 Tom carried out an investigation to find out if the number of lettuce plants in a pot affected the growth of the plants.

(a) Give **two** variables that needed to be controlled to make this investigation valid (fair test).

1. _____

2. _____ [2]

His results are shown below.

Number of lettuce plants in the pot	Average mass of each lettuce plant/g	Total mass of all plants in each pot/g
5	23	115
10	19	190
15	14	210
20	10	200
25	5	

(b) Calculate the total mass when there were 25 plants in the pot.

_____ g [1]

(c) Describe the effect of changing the number of plants in the pot on the average mass of each plant.

_____

_____ [1]

(d) Tom wants to produce and sell bags of lettuce. He can sell them for 1p per gram.

Using the information in the table, suggest how many lettuce plants Tom should have in each pot to make the most money.

_____ [1]

2 **(a)** Smoking is very harmful to the body because cigarette smoke contains a number of chemicals including nicotine and carbon monoxide.

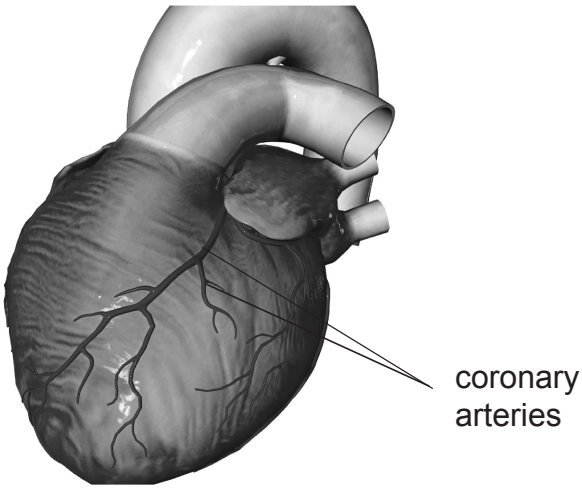
(i) Name **one** other harmful chemical found in cigarette smoke.

_____ [1]

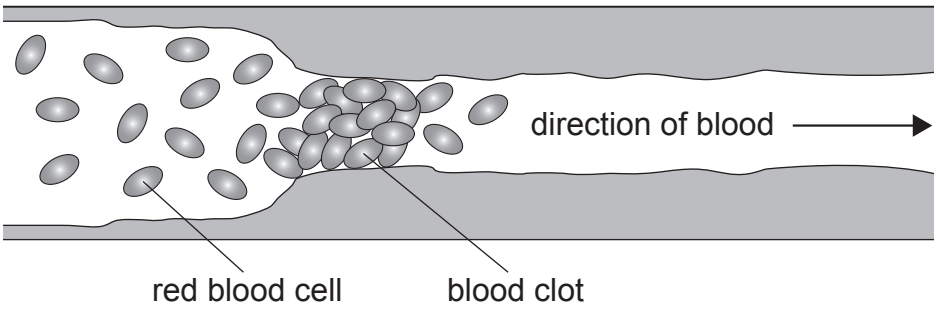
(ii) Nicotine is addictive and affects the brain. Name **one** other part of the body that is affected by nicotine.

_____ [1]

(b) The diagram below shows a heart and the coronary arteries that supply the heart muscle with blood.



The diagram below shows a smoker's coronary artery, where a blood clot has formed.



Respiration takes place in the cells of the heart muscle.

(i) Explain fully why a blood clot prevents the heart muscle cells from respiring.

_____

_____

_____ [2]

(ii) Suggest the effect that reduced respiration has on the heart muscle.

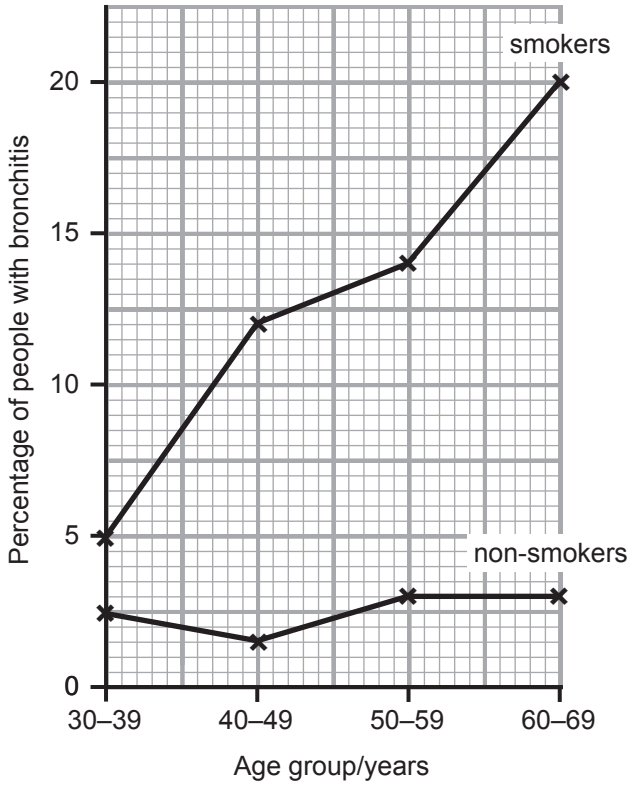
_____

_____ [1]

[Turn over

(c) Smoking can also cause bronchitis.

The graph below shows the percentage of smokers and non-smokers who suffer from bronchitis in different age groups.



(i) State the trend shown for smokers.

_____

_____ [1]

(ii) Calculate the difference between the percentage of smokers with bronchitis and the percentage of non-smokers with bronchitis **aged 60–69**.

(Show your working out.)

_____ % [2]

(iii) A student suggests that smoking increases the chance of bronchitis. Explain fully how the information in this graph supports his conclusion.

_____

_____

_____ [2]

3 In 2014 a virus called Ebola killed almost 8000 people in Africa.

Antibiotics could not be used to treat Ebola, so drug companies developed a new drug to treat it.

(a) Why could antibiotics **not** be used to treat Ebola?

_____

_____ [1]

(b) All new drugs must be tested before they can be used on patients. In vitro testing is the first stage in this process.

Describe in vitro testing and all the other stages involved in the production of a new drug.

Your answer should include:

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

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

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

[6]

4 **(a)** A student recorded some characteristics of pupils in their class.
The results are shown in the table below.
(Y = yes and N = no)

Gender	Height/cm	Tongue rolling	Mass/kg	Scars
male	148	Y	54	Y
female	152	Y	48	N
female	171	N	57	Y
male	164	Y	60	N
female	140	N	42	N

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

_____

_____ [1]

(ii) Give **one** characteristic in the table that shows discontinuous variation.

_____ [1]

(iii) What type of graph is best for displaying the information for discontinuous variation?

_____ [1]

(b) Calculate the percentage of pupils who have a mass over 50 kg.

(Show your working out.)

_____ % [2]

[Turn over

5 **(a)** In pea plants the allele for tall plants (T) is dominant to the allele for short plants (t).

(i) Complete the Punnett square below to show how two tall pea plants could produce a short pea plant.

[2]

(ii) State the ratio of tall plants to short plants.

_____ [1]

(b) What is meant by the terms **allele** and **dominant**?

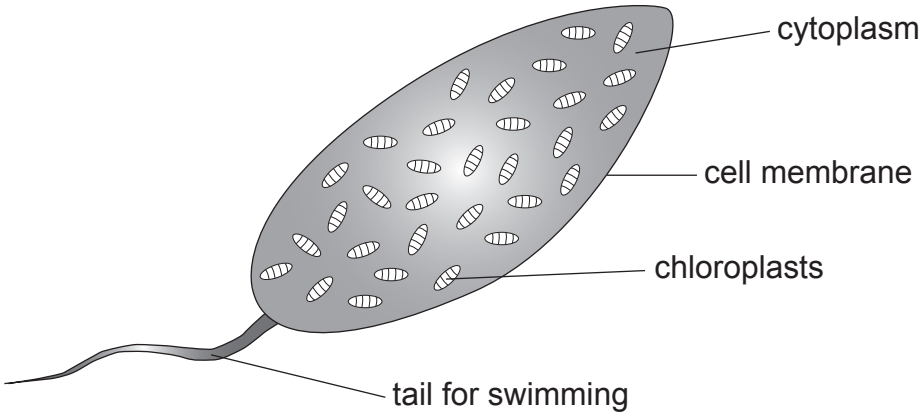
Allele _____

_____ [1]

Dominant _____

_____ [1]

6 **(a)** The diagram below shows a single-celled organism called *Euglena* that lives in rivers and ponds.



Using information in the diagram and your knowledge answer the following questions.

(i) Give **one** reason why *Euglena* could be described as an animal cell.

_____

_____ [1]

(ii) Give **one** feature of this organism that allows it to carry out photosynthesis.

_____ [1]

(iii) Suggest **one** reason why *Euglena* will live near the surface of a pond.

_____

_____ [1]

(b) Complete and balance the symbol equation below for photosynthesis.

$$CO_2 + \boxed{} \longrightarrow C_6H_{12}O_6 + \boxed{}$$

[3]

[Turn over

7 The table below gives the blood glucose levels for two people between 6 am and 2 pm.

	Blood glucose level/mg/dm^3	
Time	**Person A**	**Person B**
6 am	132	80
8 am	240	180
10 am	220	130
12 noon	300	190
2 pm	240	124

(a) Use information in the table to suggest what both people did between 6 am and 8 am to cause a change in their blood glucose level.

_____

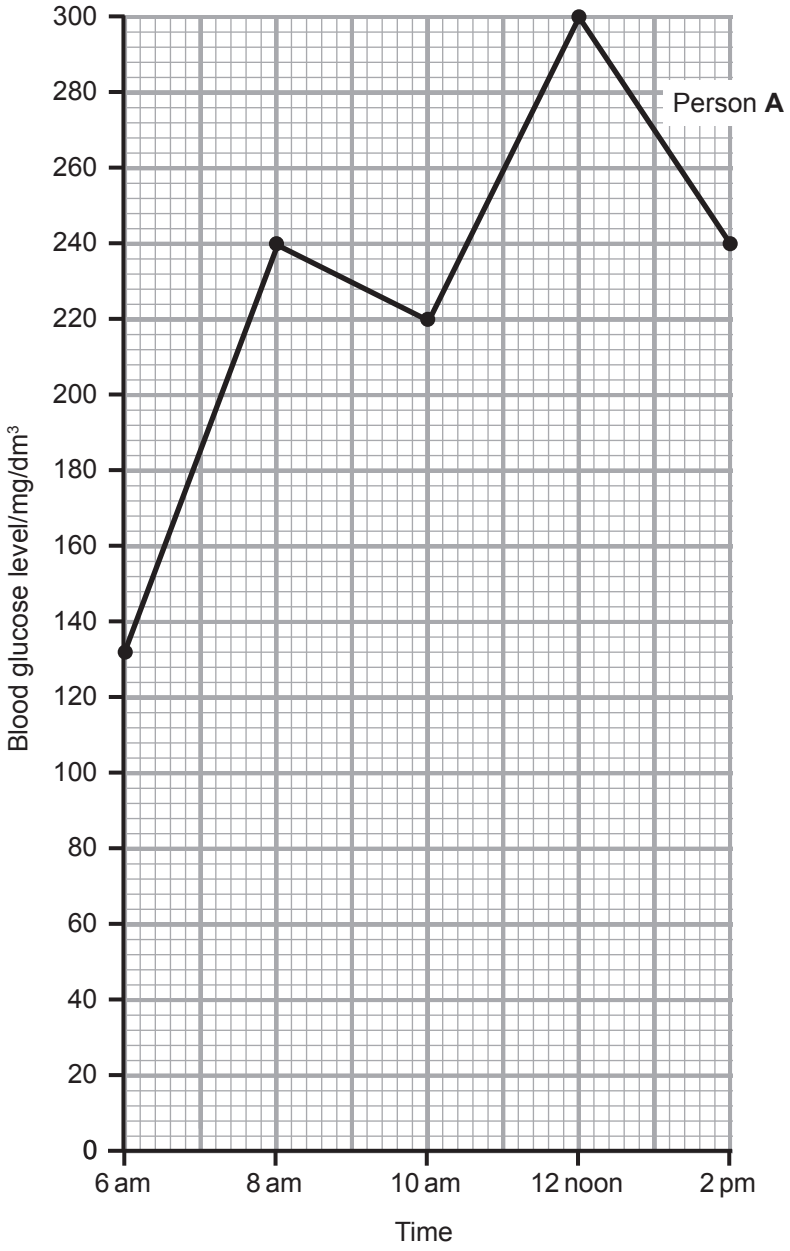
_____ [1]

(b) Which person (**A** or **B**) is likely to have diabetes? Explain your answer.

_____

_____ [1]

(c) The graph below shows the blood glucose levels for person **A**.
On the same axes, plot and draw a line graph for person **B**. [3]



(d) **(i)** Name the hormone that reduces blood glucose levels.

_____ [1]

(ii) Where is this hormone produced?

_____ [1]

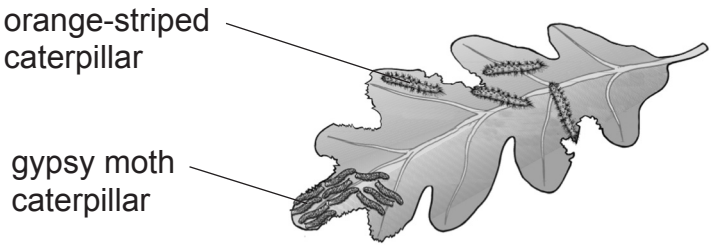
(iii) Name the substance produced when this hormone acts on glucose.

_____ [1]

(e) Suggest why the number of people with diabetes in the population is rising.

_____ [1]

8 The gypsy moth caterpillar and the orange-striped caterpillar are **two** types of caterpillar that feed on the leaves of oak trees. Both types of caterpillar are eaten by blackbirds.



(a) Using this information, complete the **food web** below to show these feeding relationships. The producer is given.

oak leaves

[2]

The gypsy moth caterpillar is slightly darker in colour than the orange-striped caterpillar. The trees in a forest block out sunlight and provide shade. In one forest it was found that the orange-striped caterpillar died out and only the gypsy moth caterpillar survived.

(b) Explain in terms of natural selection why only the gypsy moth caterpillar survived.

_____

_____

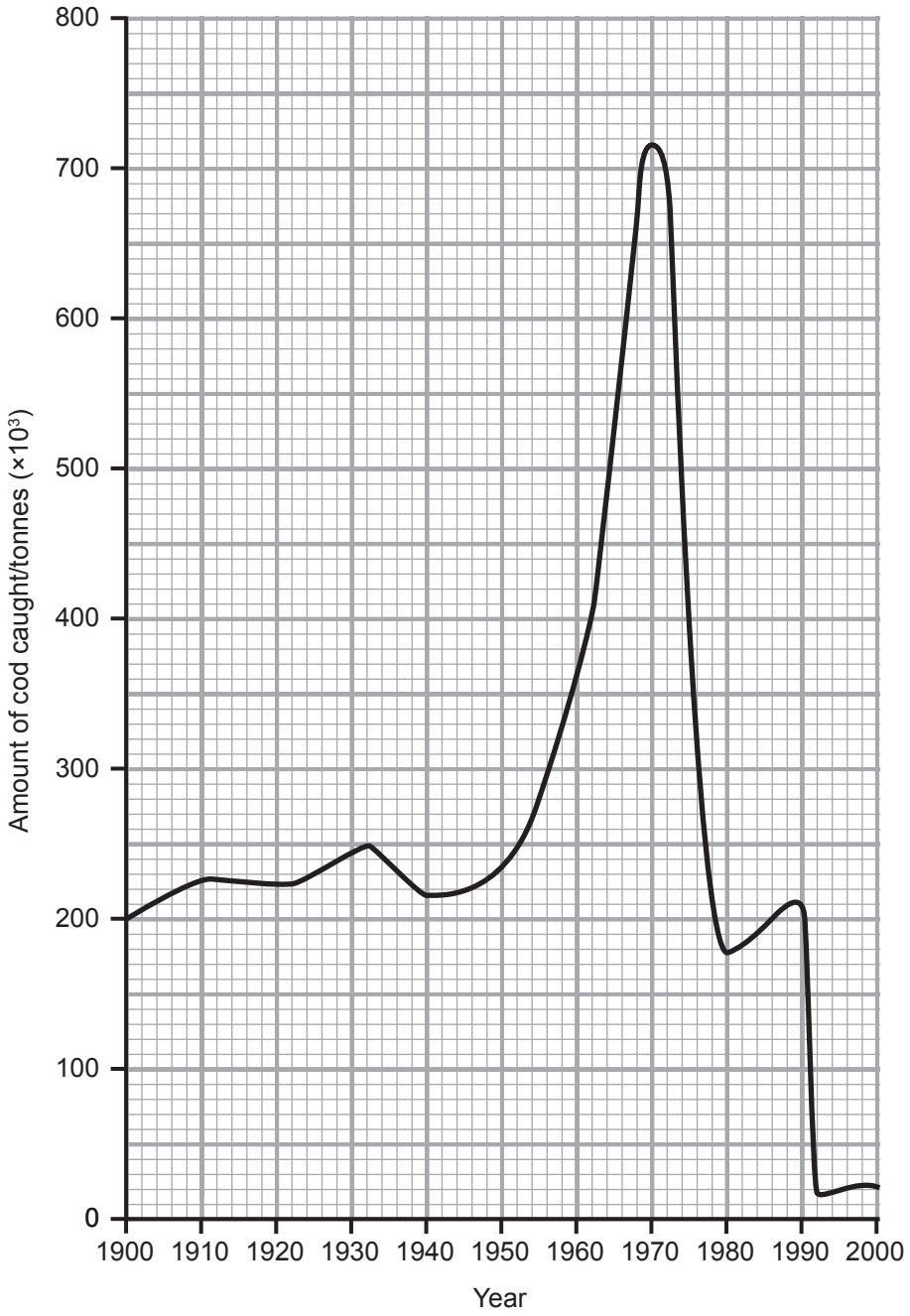
_____

_____

_____ [3]

[Turn over

9 The graph below shows the amount of cod caught off the coast of Canada in the last century.



13878

(a) In the 1950s new technology allowed fishing boats to cover a larger area, fish deeper and stay out at sea for longer. By the 1960s fishing boats were equipped with radar and navigation equipment.

(i) Describe fully the trend shown by the graph from 1940 to 1980.

_____

_____

_____ [2]

(ii) Using the information given and your knowledge explain this trend.

_____

_____

_____ [2]

(b) Explain why a ban on fishing cod in Canadian waters was introduced in 1992.

_____

_____

_____ [2]

(c) What impact, if any, would the amount of cod caught have on other organisms living in the ocean off the coast of Canada? Explain your answer.

_____

_____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

Sources:
Question 2(b) . . . . © Getty Images
Question 6(a) . . . . Principal Examiner
Question 8 . . . . . Principal Examiner

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.