



Rewarding Learning

General Certificate of Secondary Education
2020–2021

Centre Number

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Candidate Number

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Single Award Science: Biology

Unit 1

Higher Tier



[GSA12]

GSA12

WEDNESDAY 11 NOVEMBER 2020, 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.

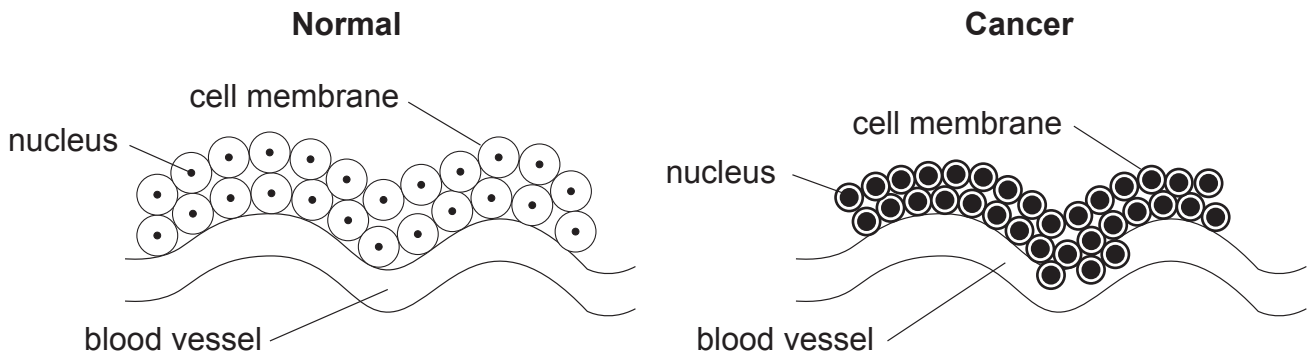
Quality of written communication will be assessed in Question 3.

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20GSA1201

1 (a) The diagram below shows normal cells and cancer cells.



Source: Principal Examiner

Use the diagram to answer the questions below.

(i) Describe **two** differences between normal cells and cancer cells.

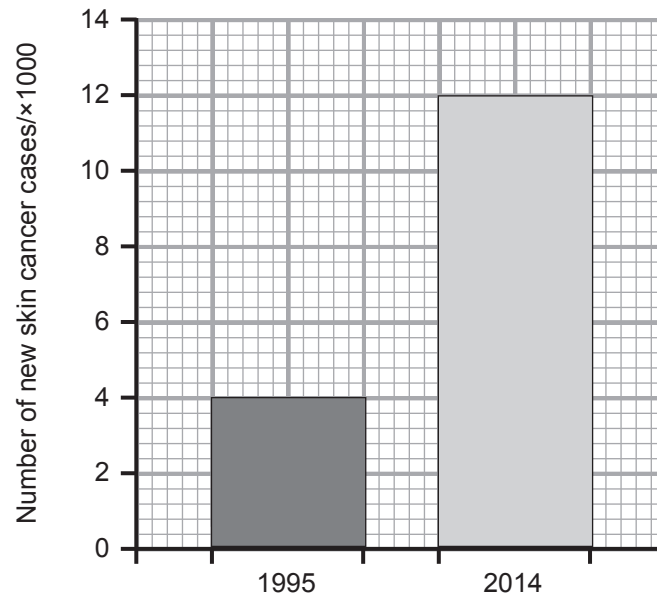
1. _____
2. _____ [2]

(ii) Suggest how some cancer cells could be spread to other parts of the body.

- _____
- _____ [1]



(b) The graph below shows the number of new cases of skin cancer in 1995 and 2014.



(i) Name the environmental factor that causes skin cancer.

_____ [1]

(ii) Calculate the percentage increase in new cases between the two years.
(Show your working out.)

_____ % [2]

(iii) Suggest **one** reason why the number of skin cancer cases is increasing.

_____ [1]

[Turn over



2 Oxford Island is a nature reserve located on the shores of Lough Neagh. There are many different habitats including woodland, scrub, meadow, wetlands and a wildlife garden.

Each type of habitat supports a wide variety of flowering plants, animals and other living things such as fungi and lichen.

The wildlife garden has a species-rich hedgerow of native trees and a wildlife pond surrounded by willow and insect friendly bushes which provide food and shelter for invertebrates.

(a) Using the information above answer the following questions.

(i) Explain fully why this nature reserve has a high biodiversity.

[2]

(ii) Why are lichen described as a **biotic** factor?

[1]

(iii) Suggest how the number of lichen in Oxford Island would compare to the number of lichen in a city centre. Explain your answer.

[2]

(b) One way biodiversity has been increased in Lough Neagh is through the protection of fish stocks.

Apart from setting quotas suggest two other ways in which fish stocks could be protected in Lough Neagh.

1. _____

2. _____

[2]

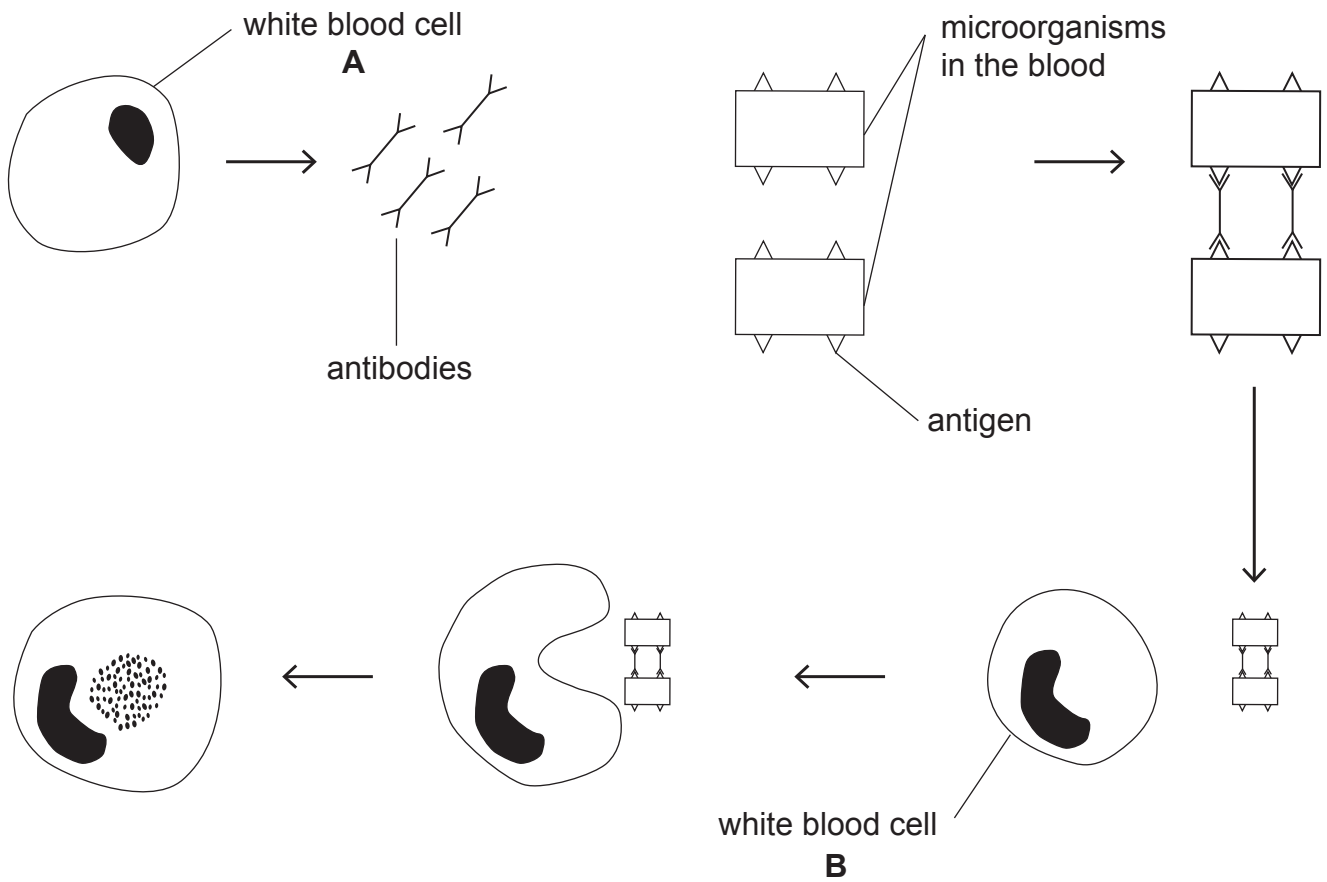




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(Questions continue overleaf)



3 The diagram below shows how white blood cells within the body respond to infection.



Source: Principal Examiner

Using the diagram and your knowledge describe and explain how the two types of white blood cell respond to a microorganism.

Your answer should include:

- the names of the two types of white blood cell, **A** and **B**;
- how each type of white blood cell responds to the microorganism.

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





[6]

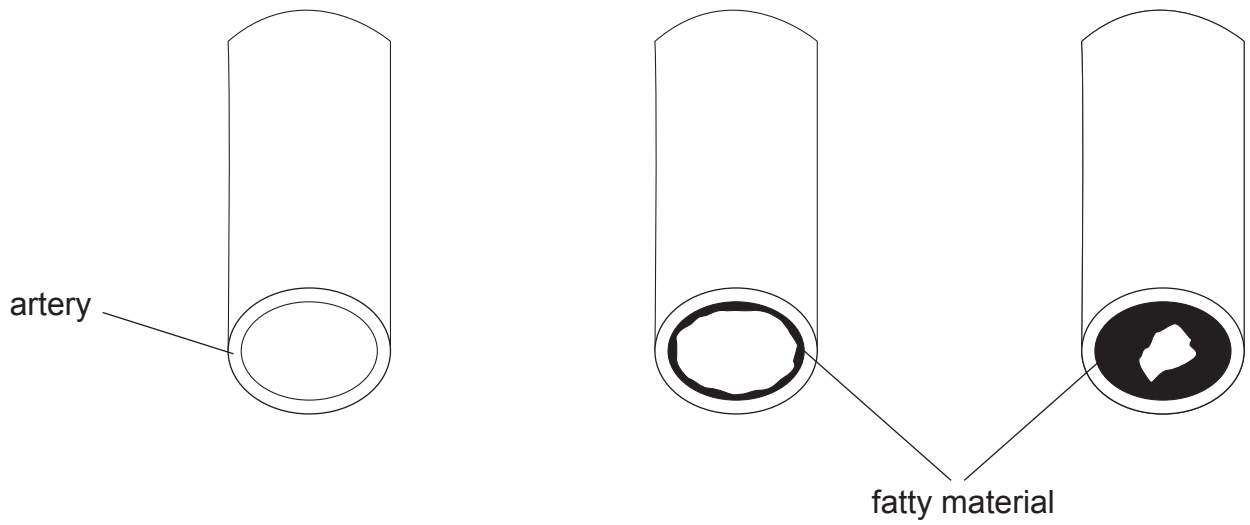
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- 4 The diagram below shows a normal artery as it becomes blocked by a build-up of fatty material over a number of years.



Source: Principal Examiner

- (a) Explain fully how a blocked artery in the heart can cause a heart attack.

[3]



(b) Researchers are trying to find out if damaged heart tissue can be repaired by stem cell therapy. If successful it could lead to a shorter patient recovery time.

(i) What are **stem cells**?

[2]

(ii) Suggest **one** way that stem cell therapy being used to treat heart disease could reduce the costs to the National Health Service (NHS).

[1]

(c) Smoking is a lifestyle factor that increases the risk of developing heart disease.

(i) Give **one** other lifestyle factor that can increase the risk of developing heart disease.

[1]

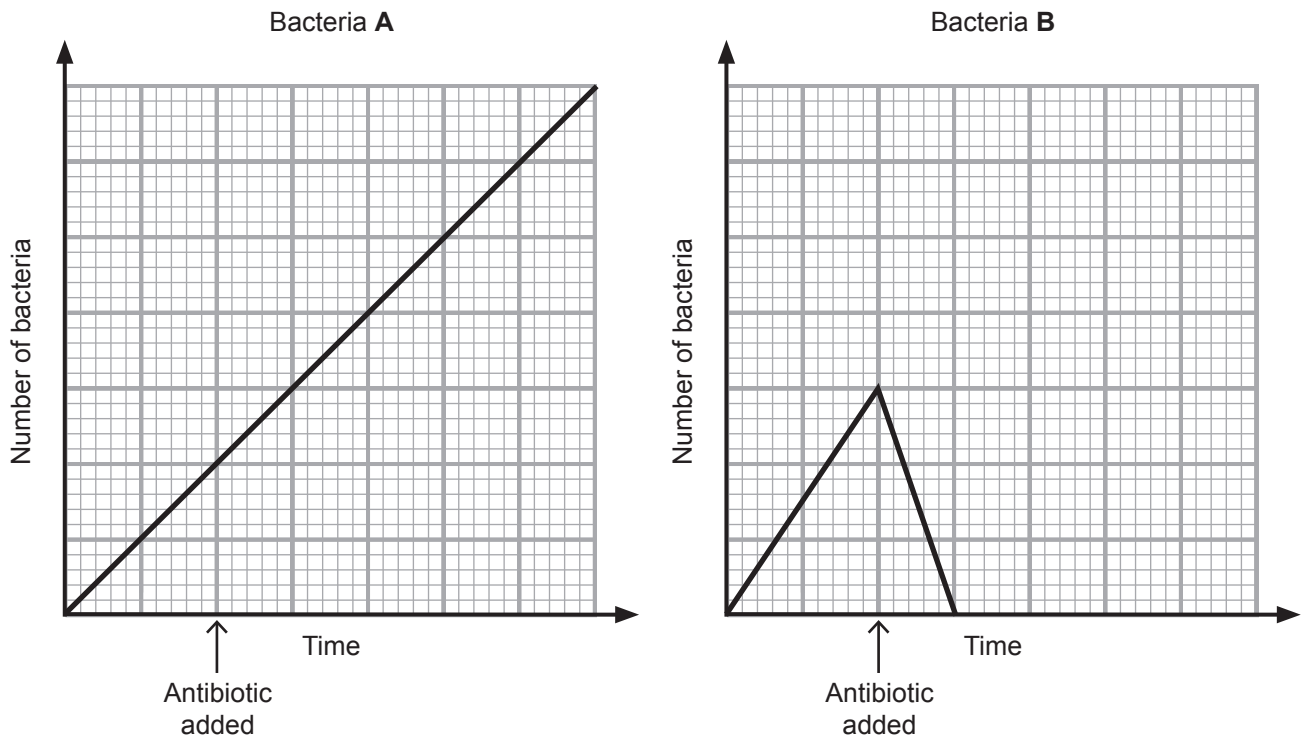
(ii) Carbon monoxide is a harmful substance found in cigarette smoke. Describe and explain the effect that carbon monoxide has on the body.

[2]

[Turn over



- 5 (a) Scientists carried out an investigation into the effect of an antibiotic on two types of bacteria **A** and **B**. Their results are shown below.



- (i) Describe the **effect**, if any, of the antibiotic on each type of bacteria.

_____ [1]

- (ii) Using your understanding of natural selection, explain fully the result shown for bacteria **A** after the antibiotic has been added.

_____ [3]



(b) In 1859 Charles Darwin used his theory of natural selection to explain the process of evolution.

(i) What is meant by the term **evolution**?

[2]

(ii) Apart from religious beliefs, give **one** reason why some scientists in 1859 did not accept the theory of evolution.

[1]

[Turn over



6 PKU is an inherited condition caused by a recessive allele.

(a) What is meant by the term **recessive**?

[1]

(b) (i) Complete the Punnett square below to show how two parents who are carriers of PKU can have a child with this condition.

H = normal allele
h = PKU allele

[2]

(ii) What is the genotype of the child suffering from PKU?

[1]

(c) Some inherited conditions can be tested for before birth.

(i) What general name is given to the process of testing for inherited conditions?

[1]

(ii) Give **one** reason why some parents do **not** want to use this type of testing.

[1]



7 Genetic engineering is a process which changes the DNA of an organism. The steps involved in the process which allows bacteria to make human insulin are outlined below, but they are **not** in the correct order.

A	bacteria reproduce so a large number of the insulin gene is produced
B	insulin is extracted and purified ready to use
C	gene for insulin is removed from a donor
D	DNA is taken out of bacteria
E	gene for insulin is inserted into bacterial DNA

(a) Using the letters **A**, **B**, **C**, **D** and **E** put the steps in the correct order. The first one has been done for you.

D _____ [2]

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

Advantage _____

Disadvantage _____

_____ [2]

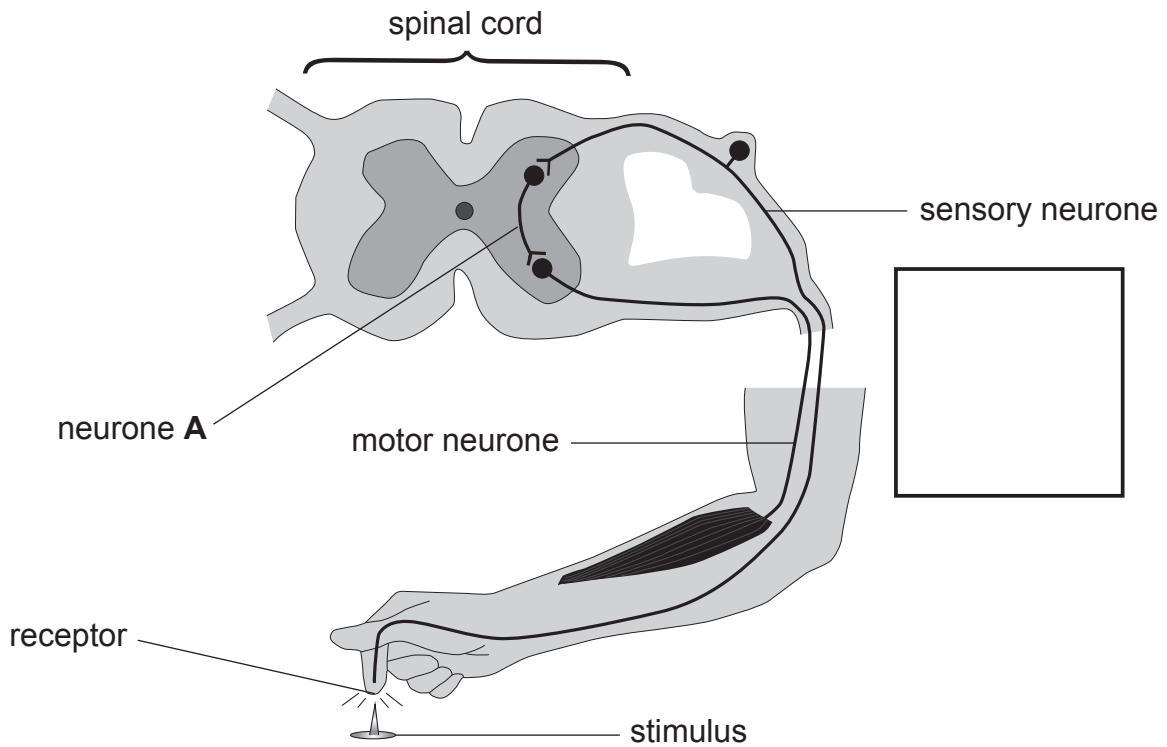
(c) What is meant by the term **genome**?

_____ [1]

[Turn over



8 (a) The diagram below shows a pathway of neurones.



Source: Principal Examiner

(i) What is the name given to **this** pathway of neurones?

_____ [1]

(ii) On the diagram above draw an arrow in the box to show the direction in which nerve impulses will travel through the sensory neurone.

[1]

(iii) What name is given to the neurone labelled **A**?

_____ [1]



- (b) The table below shows the relationship between the diameter of a neurone and the speed at which a nerve impulse travels along it.

Neurone diameter/ mm	Speed of nerve impulse/ m/s
0.001	3
0.010	5
0.050	35
0.500	50

- (i) Describe the trend shown by this information.

[1]

Dragonflies are 95% successful at catching other flying insects in mid-air.



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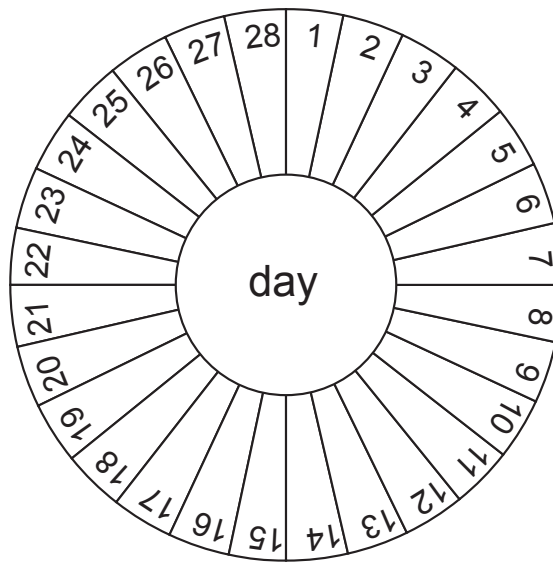
- (ii) Using information from the table above suggest how they achieve this success rate.

[1]

[Turn over



9 (a) The diagram below shows the 28 days of a typical menstrual cycle.



Source: Principal Examiner

(i) Between which days does menstruation occur in this cycle?

_____ [1]

(ii) Explain fully, in terms of hormones, what causes menstruation to occur.

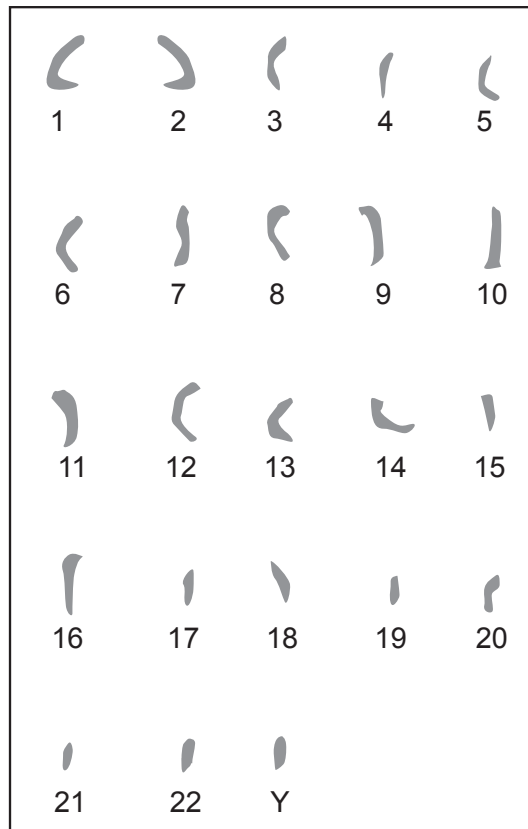
_____ [2]

(iii) An ovum is released at day 14. Describe **one** change that would happen to the uterus between days 16 and 28 if the ovum was fertilised.

_____ [1]



(b) The karyotype below shows the chromosome arrangement in a sperm cell.



(i) Give the term used to describe a cell with this number of chromosomes.

_____ [1]

(ii) In what way would the karyotype of a zygote be different?

_____ [1]

(c) Name **one** chemical method of contraception and explain how this prevents pregnancy.

_____ [2]



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For Examiner's use only	
Question Number	Marks
1	
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Total Marks	
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Examiner Number

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