Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2023

Double Award Science
Biology

Unit B2

Foundation Tier

[GDW41]

GDW41

FRIDAY 9 JUNE, AFTERNOON

TIME

1 hour 15 minutes.

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 70.
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 **8**.

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1 Diseases can be spread from person to person by a variety of methods.

(a) Use a ruler to draw a line from **each** disease to its method of spread.

Disease	Method of spread
chlamydia	through food
tuberculosis	through sexual intercourse
salmonella	
cold	through droplets in the air

[4]

(b) Name the type of chemical used to treat salmonella.

_____ [1]

(c) The diagram below shows a Petri dish with agar.

(i) Name a type of microorganism that can be grown on agar in a Petri dish.

_____ [1]

(ii) Give the term for the group of techniques used to safely grow microorganisms on agar in a Petri dish.

_____ [1]

[Turn over

2 **(a)** What is the role of platelets in blood?

_____

_____ [1]

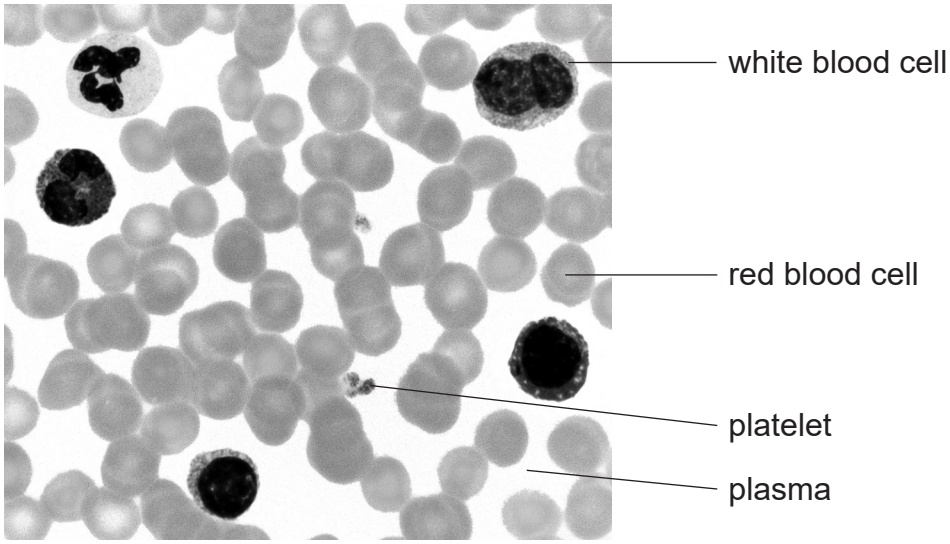
(b) The liquid part of blood is plasma.

Name **two** substances transported in plasma.

1. _____

2. _____ [2]

(c) The photograph shows a microscope slide of blood.



(i) Give **two** differences in structure between white blood cells and red blood cells.

1. _____

_____

2. _____

_____ [2]

(ii) There are normally fewer white blood cells than red blood cells.

Usually the ratio is 1 white blood cell to 650 red blood cells.

Using the number of **white blood cells** in **the photograph opposite**, calculate the number of red blood cells you would expect in this sample of blood.

_____ [2]

(iii) The ratio of white blood cells to red blood cells in **this** sample of blood is **higher** than normal.

Suggest a reason why.

_____

_____ [1]

[Turn over

3 **(a)** DNA is the molecule that forms the genetic material in cells.

(i) Describe the shape of the DNA molecule.

_____ [1]

(ii) Where would you find DNA in a cell?

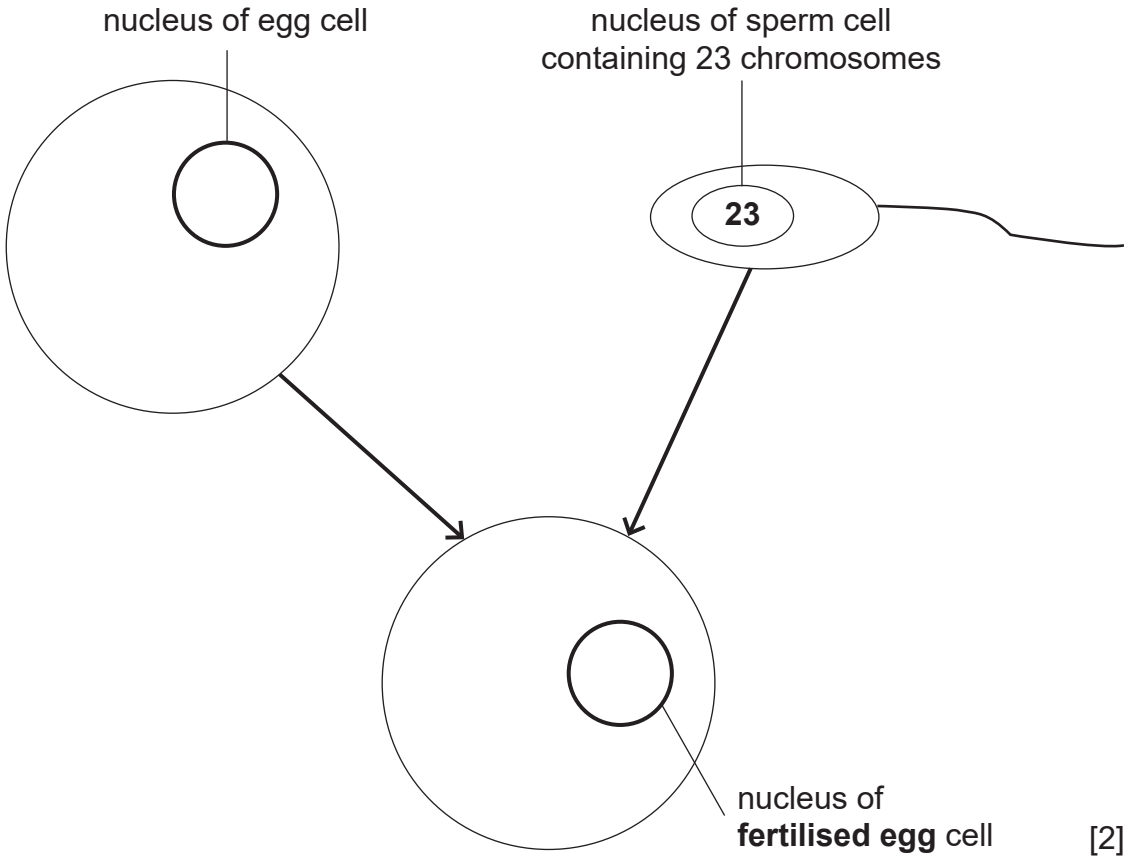
_____ [1]

Down's syndrome is a genetic condition.

The diagram shows an egg cell, a sperm cell and a fertilised egg cell.

(b) On the diagram write the number of chromosomes that would be present:

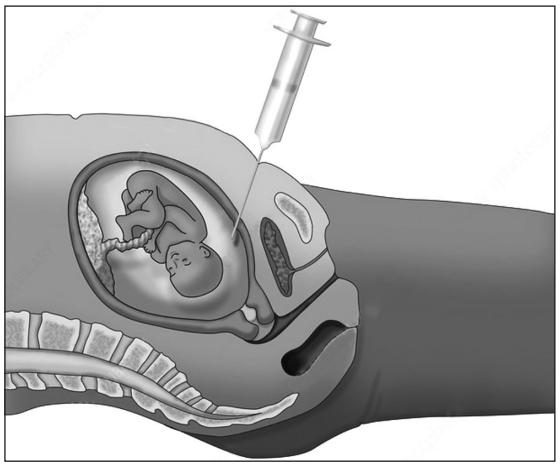
- in the nucleus of the **fertilised egg** cell if it developed into a baby with **Down's syndrome**
- in the nucleus of the egg cell



[2]

An amniocentesis test can be carried out during pregnancy to find out if a baby has Down's syndrome.

The diagram shows how an amniocentesis test is carried out.



(c) Describe how an amniocentesis test is carried out.

_____

_____

_____

_____

_____

_____ [3]

[Turn over

(d) Down's syndrome is a genetic condition that is passed from a parent to a child.

(i) What term describes how conditions such as Down's syndrome are passed from a parent to a child?

Circle the correct answer in the list below.

inherited communicable viral [1]

(ii) In the list, circle the name of **one** other genetic condition that can be passed from a parent to a child.

HPV Huntington's disease athlete's foot [1]

4 One type of pea plant has flowers that are violet or flowers that are white.

In these pea plants, violet flower colour is dominant to white flower colour.

Let **R** represent the allele for violet flowers.

Let **r** represent the allele for white flowers.

(a) Give the **two** possible genotypes for a pea plant that has violet flowers.

_____ and _____ [2]

A pea plant with violet flowers is crossed with a pea plant with white flowers.

All the offspring of these pea plants had violet flowers.

(b) Draw a Punnett square to show this cross.

[4]

5 Mitosis and meiosis are processes that occur in human cells.

The table gives statements about these processes.

Place a tick [✓] in the empty box for the correct response for each statement.

Statement	true for **mitosis only**	true for **meiosis only**	true for **both mitosis and meiosis**
produces two daughter cells			
produces haploid cells			
is a type of cell division			
produces sperm cells			
is a reduction division			
produces genetically identical cells			

[6]

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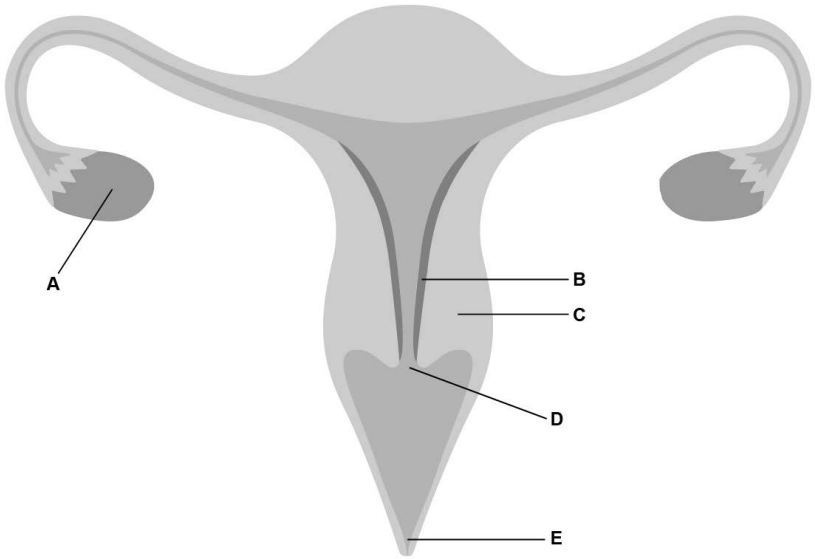
[Turn over

6 The diagram shows the female reproductive system.



(a) How often does ovulation usually occur in a female of reproductive age?

Circle the correct answer from the list below.

once every two months once a month twice a month [1]

(b) **(i)** Give the letter of the part of the reproductive system where ovulation takes place.

_____ [1]

(ii) Give the letter of the part of the reproductive system that is lost if fertilisation does **not** occur.

_____ [1]

(c) Contraceptive methods can be used to prevent pregnancy.

(i) Mark on the diagram, with the letter **X**, the part of the female reproductive system that is altered in female sterilisation. [1]

(ii) Explain how **this** contraceptive method prevents pregnancy.

_____

_____ [1]

(iii) Give **one** disadvantage of **this** type of contraceptive method.

_____

_____ [1]

(d) The contraceptive pill is another contraceptive method.

Explain how the contraceptive pill works to prevent pregnancy.

_____

_____

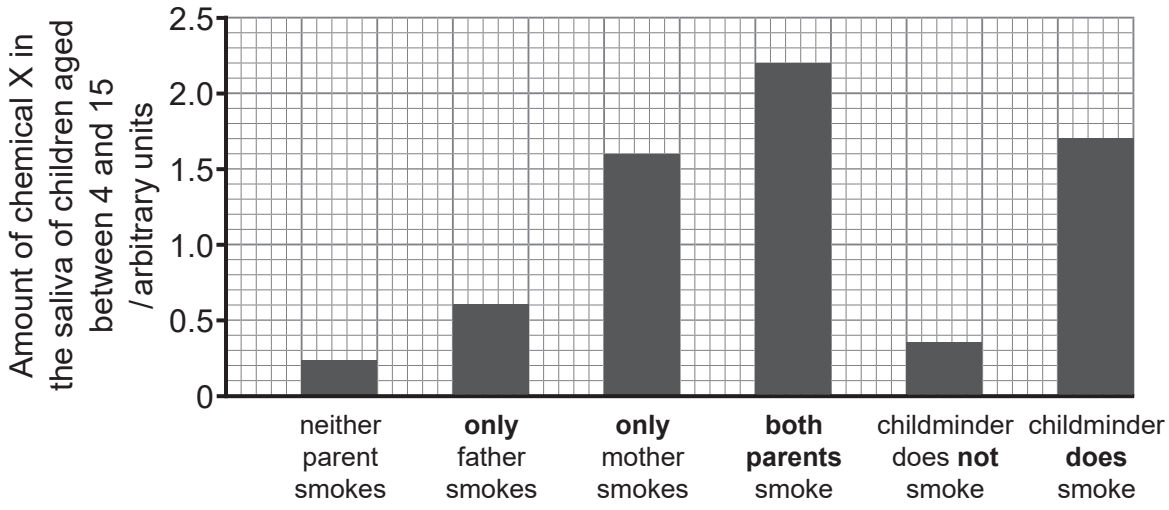
_____

_____ [2]

7 Passive smoking occurs when a person who does not smoke breathes in cigarette smoke.

Between 1996 and 2006, scientists measured the amount of a chemical (chemical X) in the saliva of groups of children between the ages of 4 and 15.

The bar chart shows some of their results.



(a) Use the bar chart to complete the table.

Place a tick [✓] in the empty box for the correct response for each statement.

Statements	True	False	Can't tell
The amount of chemical X in the saliva of children who have a childminder who **smokes** is the same as in children who have a childminder who does **not** smoke.			
The amount of chemical X in the saliva of children where **neither** parent smokes is the lowest in any group.			
The amount of chemical X in the saliva of children who have **only** a father who smokes is lower than the amount in children who have **only** a mother who smokes.			
The amount of chemical X in the saliva of children aged between 4 and 7 is **exactly the same** as the amount in children aged between 8 and 11.			
The amount of chemical X in the saliva of children where **both** parents smoke is equal to the figure for the amounts where **only** the father smokes and the figure for **only** the mother smokes **added together**.			

[5]

[Turn over

The higher the amount of chemical X in the saliva of children, the higher the amount of nicotine in their blood.

(b) Suggest why children are more likely to become smokers when they grow up if at least one parent or their childminder smokes.

_____

_____

_____ [1]

(c) Parents and childminders who smoked, smoked both inside the house and in public areas.

Smoking in public areas was banned in the UK in 2007.

This caused the amount of chemical X in the saliva of children aged between 4 and 15 to decrease.

Suggest why.

_____

_____

_____

_____

_____

_____

_____

_____ [3]

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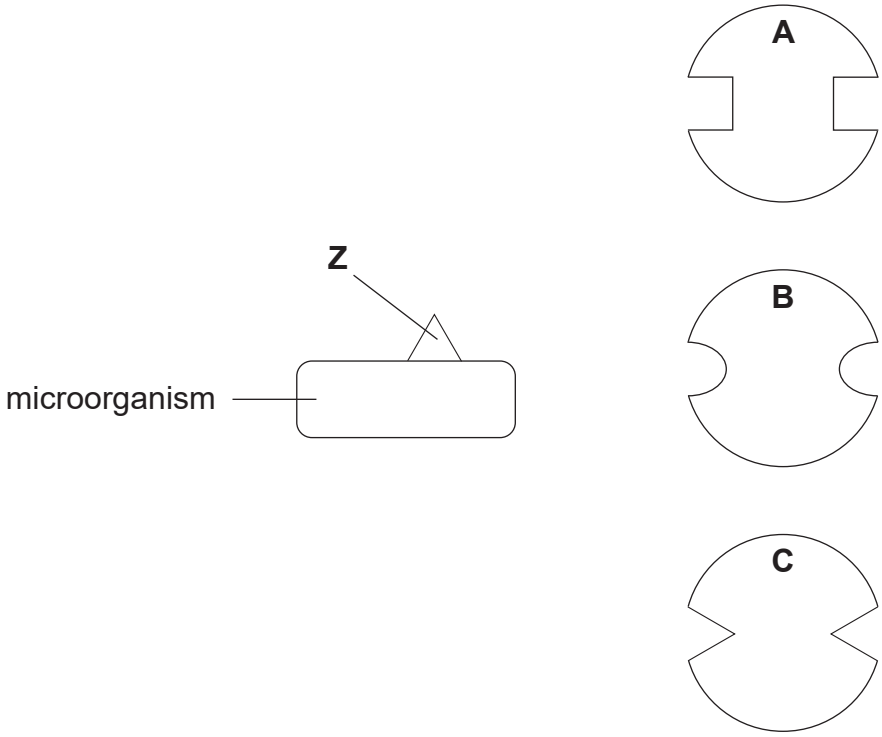
(Questions continue overleaf)

[Turn over

8 When a microorganism enters the body, the body produces antibodies to defend itself and provide immunity.

The diagram shows an example of a microorganism and three possible antibodies, **A**, **B** and **C**.



Use the diagram and your knowledge to describe and explain the steps that occur to protect the body against **this** microorganism.

Your answer should include how antibodies are made and how they work.

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

[6]

[Turn over

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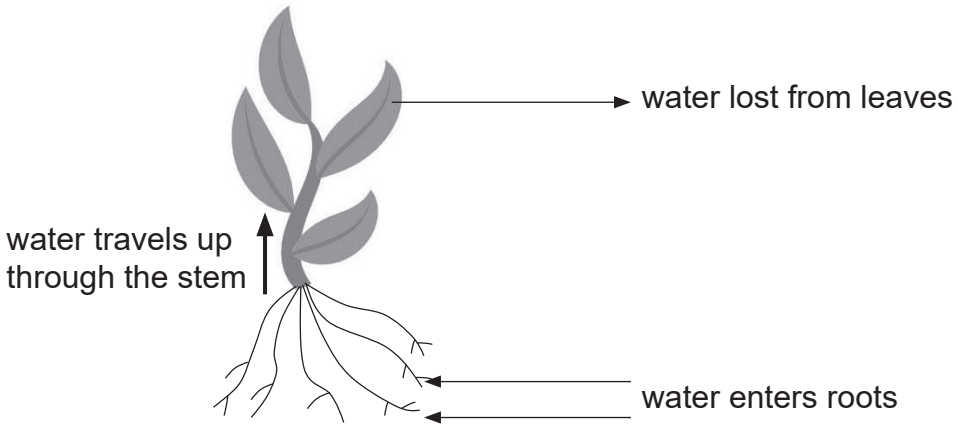
9 The diagram shows the pathway of water through a plant.



(a) (i) Name the process by which **water** enters the roots of a plant.

_____ [1]

(ii) Name the process where water is lost by diffusion through the stomata in the leaves of a plant.

_____ [1]

[Turn over

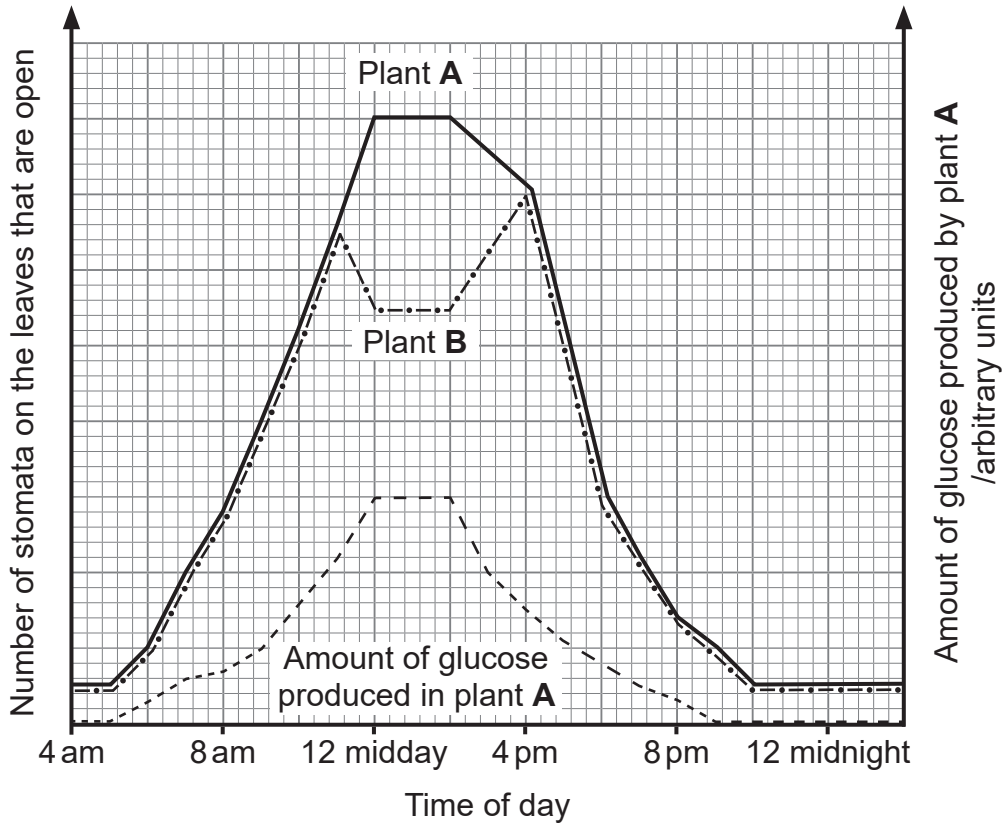
(b) Scientists investigated the number of stomata that were open at different times of the day in two different types of plants, plant **A** and plant **B**.

The two plants were the same size and had the same number of stomata on their leaves.

The scientists also measured the amount of glucose produced by **plant A** during the same day.

The graph shows their results.

- The left-hand axis is the number of stomata on the leaves that are open.
- The right-hand axis is the amount of glucose produced by plant **A**.



(i) Between what times were the highest number of stomata open in plant **A**?

_____ and _____ [1]

(ii) Suggest and explain why the highest number of stomata were open between these two times in Plant **A**.

_____

_____

_____

_____

_____

_____

_____

_____ [4]

(c) **(i)** The number of stomata that were open in plant **B** was different to the number of stomata that were open in plant **A** for part of the day.

Describe what plant **B** did to its stomata between **11 am** and **2 pm**.

_____ [1]

(ii) Suggest why this has happened in plant **B**.

_____

_____ [1]

(d) Plant **B** produced **less glucose** than plant **A**.

Suggest why.

_____

_____

_____

_____ [2]

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Question Number	Marks
1	
2	
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Total Marks	

Examiner Number

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