Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2023–2024

Single Award Science: Biology

Unit 1

Higher Tier

[GSA12]

GSA12

MONDAY 13 NOVEMBER 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 eleven** questions.

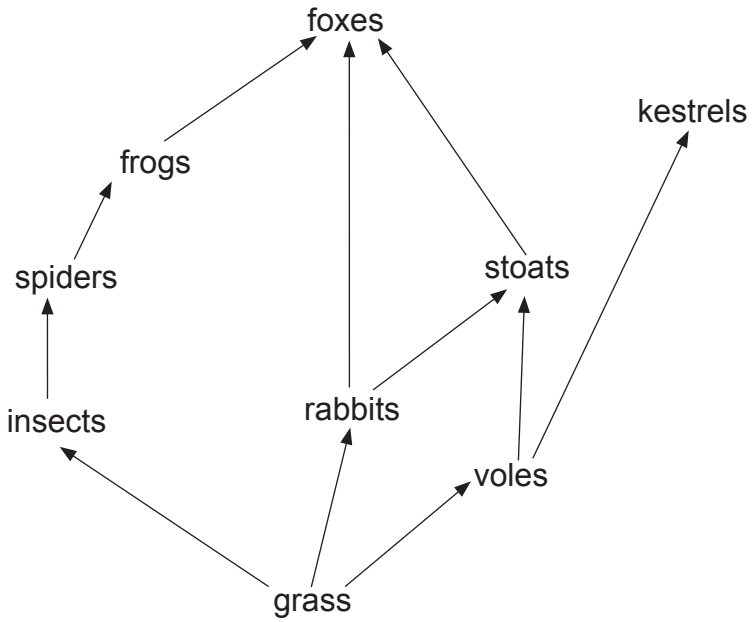
INFORMATION FOR CANDIDATES

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**.

14354

20GSA1201

1 **(a)** Shown below is part of a woodland food web.



Use the food web to answer the following questions.

(i) Complete the food chain below.

[1]

(ii) What effect, if any, would a decrease in the number of kestrels have on the number of stoats? Explain your answer.

_____

_____

_____ [2]

The photograph below shows a hedgerow in a farmer's field.

(b) Give **two** reasons why the hedgerow helps increase biodiversity in this field.

1. _____

2. _____ [2]

The photograph below shows some lichen on a tree. Lichen is a **biotic** pollution monitor.

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

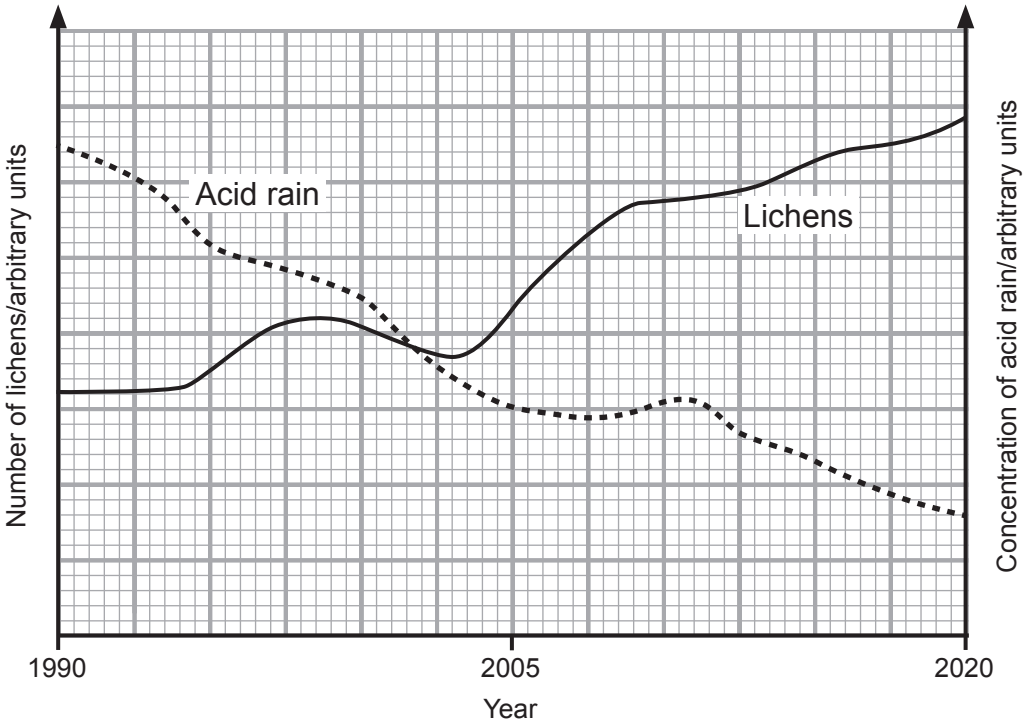
_____ [1]

[Turn over

(d) Another way to monitor changes in the environment is to measure **abiotic** factors. Give **one** example of an abiotic factor.

_____ [1]

The graph below shows how the concentration of acid rain affected the number of lichens on trees over a 30-year period.

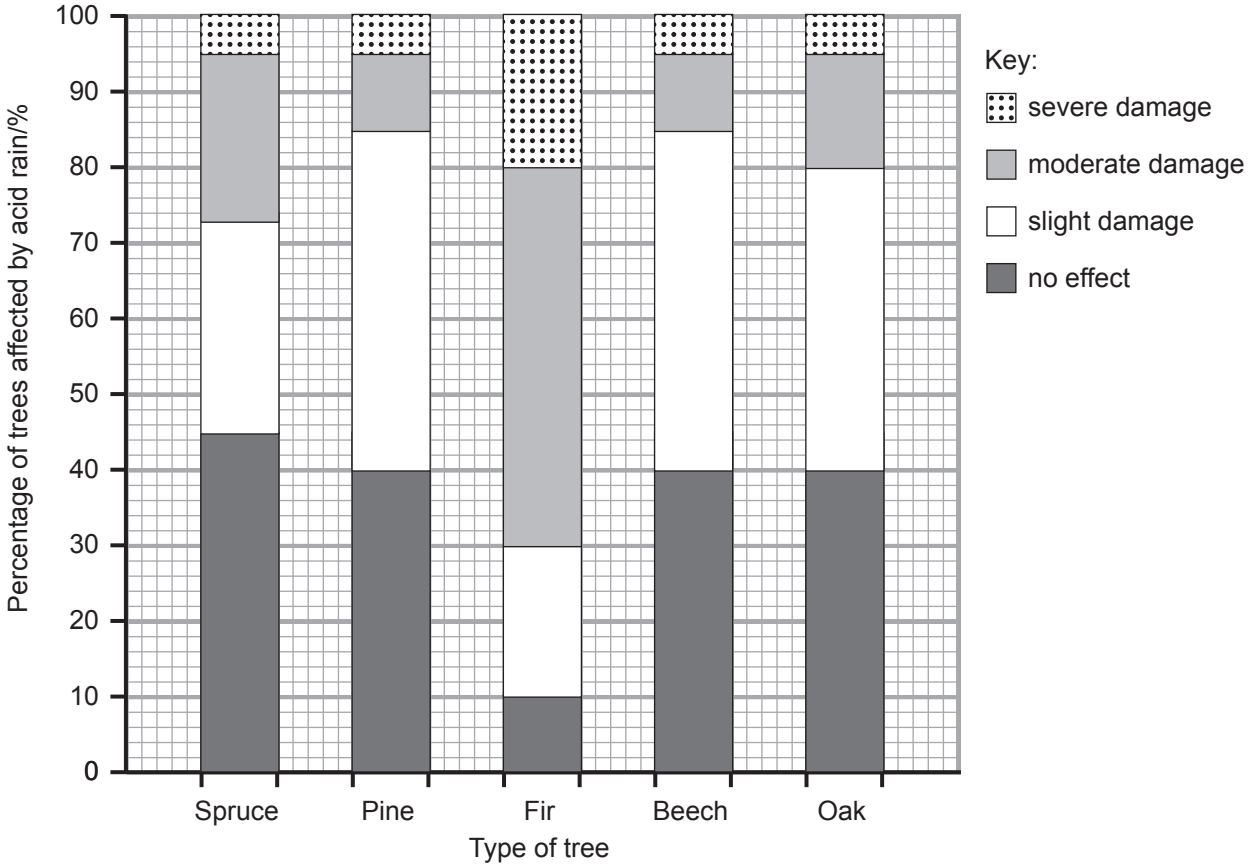


(e) Describe how the change in the concentration of acid rain affected the number of lichens on trees over this 30-year period.

_____

_____ [1]

(f) The bar graph below shows the effect of acid rain on different types of trees in a forest.



(i) Which type of tree is **least** affected by acid rain?

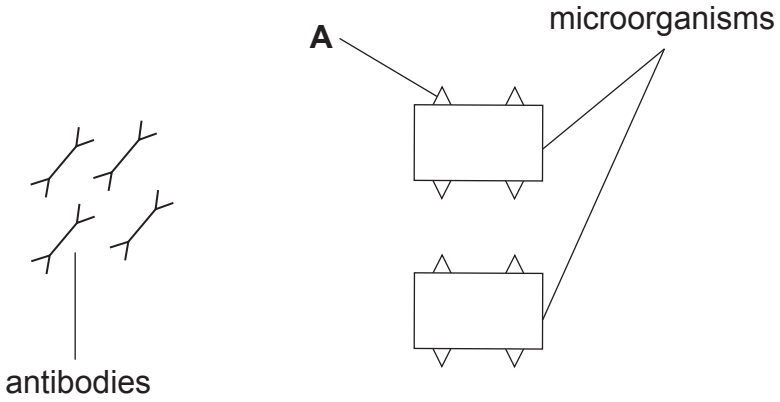
_____ [1]

(ii) What percentage of Fir trees suffered severe damage due to acid rain?

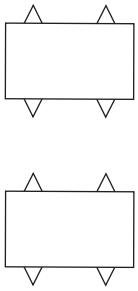
_____ % [1]

[Turn over

2 **(a)** The diagram below shows the antibodies produced when microorganisms enter the blood.



(i) Complete the diagram below to show how the antibodies clump the microorganisms together.



[1]

(ii) Name the structure labelled **A** on the microorganism.

_____ [1]

(iii) Name the type of white blood cells that produce antibodies.

_____ [1]

(b) **(i)** Name the type of immunity which involves the body producing its own antibodies.

_____ [1]

(ii) Suggest **one** advantage of this type of immunity.

_____ [1]

3 Protein is one of the main food types needed for a balanced diet.
Describe how you would test a food for the presence of protein.

Your answer should include:

- the name of a food which contains protein;
- the function of protein in the body;
- the name of the reagent used to test for protein; and
- the colour change if protein is present.

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

[6]

4 Himalayan balsam is a competitive invasive plant species that is found in many parts of Northern Ireland.

(a) Give **one** feature that is common to all competitive invasive species.

_____

_____ [1]

(b) In a food chain, Himalayan balsam is described as a producer.
What term is used to describe animals that feed on producers?

_____ [1]

(c) Suggest **one** advantage of increasing the number of animals who feed on Himalayan balsam.

_____

_____ [1]

5 The table below shows the percentage of adults, in different age groups, who drink alcohol in Northern Ireland.

Age group/ years	Adults who drink alcohol/%	
	Male	Female
18 – 29	86	79
30 – 44	84	77
45 – 59	75	70
60 – 75	64	53

(a) Give **two** conclusions that can be made from this data.

1. _____

_____

2. _____

_____ [2]

(b) Binge drinking is more common in younger age groups.

(i) What is meant by the term **binge drinking**?

_____

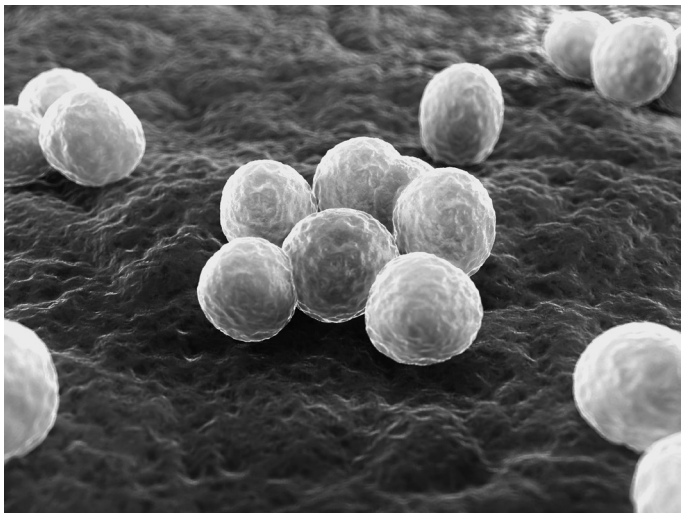
_____ [1]

(ii) Give **one** harmful effect of binge drinking on the human body.

_____ [1]

[Turn over

6 The photograph below shows MRSA on the skin of a person.



MRSA will only cause an infection if it gets into the blood.

(a) Suggest **one** reason why most MRSA infections take place in hospitals.

_____

_____ [1]

(b) Suggest **two** steps that are taken to restrict the spread of MRSA infections in hospitals.

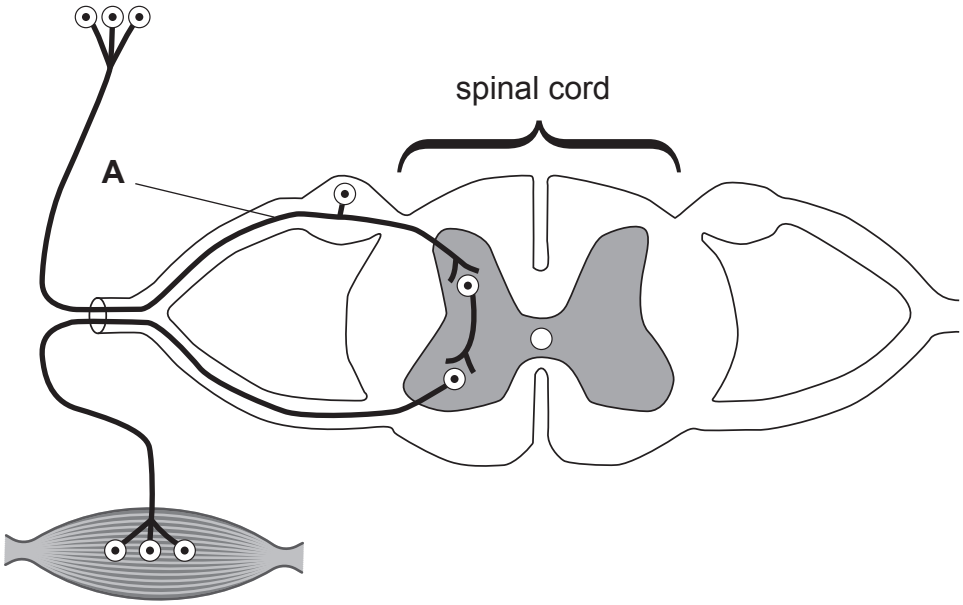
1. _____

_____

2. _____

_____ [2]

7 **(a)** The diagram below shows a reflex arc.



(i) Name the neurone labelled **A**.

_____ [1]

(ii) Complete the following sentence.

The connection between two neurones is called a

_____ . [1]

(b) Give **one** reason why reflex actions are quicker than voluntary actions.

_____

_____ [1]

[Turn over

8 Auxin is a hormone produced in a plant that causes a growth response to light.

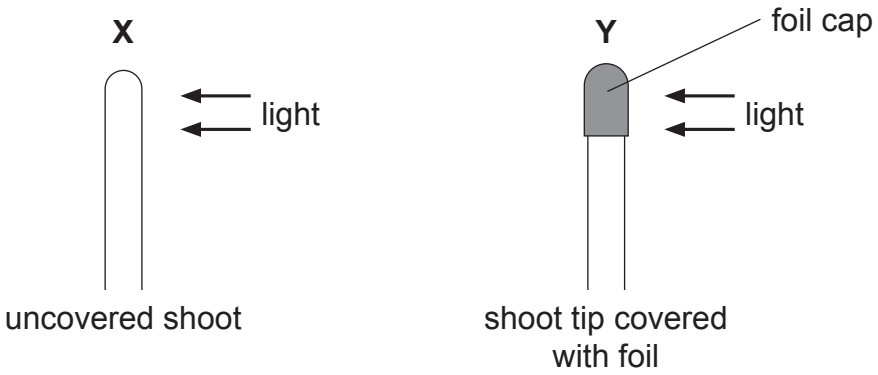
(a) Name this growth response.

_____ [1]

(b) Give **one** advantage, to the plant, of this growth response.

_____ [1]

In an investigation two shoots (**X** and **Y**) were set up as shown below.



The table below shows possible results for each shoot after one week.

	Shoot	
	X	**Y**
A	bends to the left	bends to the right
B	bends to the right	bends to the left
C	bends to the right	does not bend
D	bends to the left	does not bend

(c) Which letter **A**, **B**, **C** or **D** best describes what happens after one week?

_____ [1]

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(Questions continue overleaf)

9 The table below gives information about five different varieties of wheat which were developed in the last century.

Variety of wheat	Year variety first grown	Average height/ cm	Grain yield/ tonnes per hectare
Little Joss	1908	142	6.0
Holdfast	1935	126	6.3
Capella Deprez	1953	110	6.7
Maris Huntsman	1972	106	7.5
Norman	1980	84	8.7

(a) Give **one** trend shown by this information.

_____

_____ [1]

(b) The photograph below shows a purple tomato plant produced by genetic engineering.

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

_____

_____ [2]

(ii) Give **two** reasons why some people are opposed to genetic engineering of plants.

1. _____

_____

2. _____

_____ [2]

(iii) Name a human hormone that is produced by genetic engineering.

_____ [1]

Farmers breed cattle to improve the composition of milk.
Shown below is the composition of milk produced by different breeds of cattle.

	Milk composition (g/L)		
Breed	**Fat**	**Protein**	**Sugar**
Ayrshire	3.97	3.26	4.63
Brown Swiss	3.80	3.18	4.80
Guernsey	4.58	3.49	4.78
Holstein	3.56	3.02	4.61
Jersey	4.97	3.03	4.70

(c) Which breed produces milk that could increase the risk of developing heart disease? Give **one** reason for your answer.

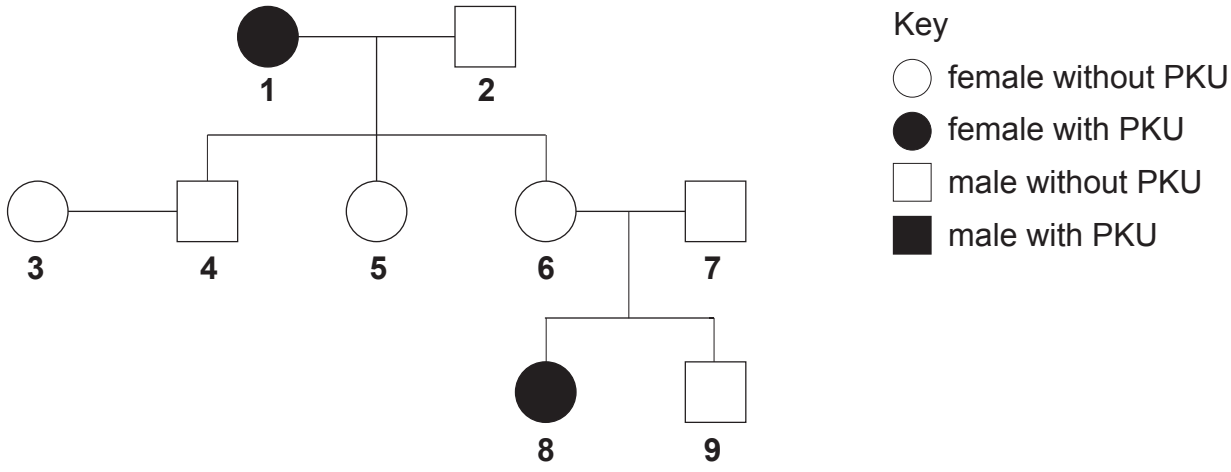
_____

_____ [2]

[Turn over

10 Phenylketonuria (PKU) is an inherited genetic condition.

The diagram below shows how PKU is inherited in a family.



The Phenylketonuria allele, **a**, is recessive to the normal allele, **A**.

(a) Give the genotype of person **1**.

_____ [1]

(b) How many **male** offspring do persons **1** and **2** have together?

_____ [1]

(c) What is the relationship of person **4** to person **5**?

_____ [1]

(d) Complete the Punnett square below to show the offspring of two parents who are heterozygous for PKU.

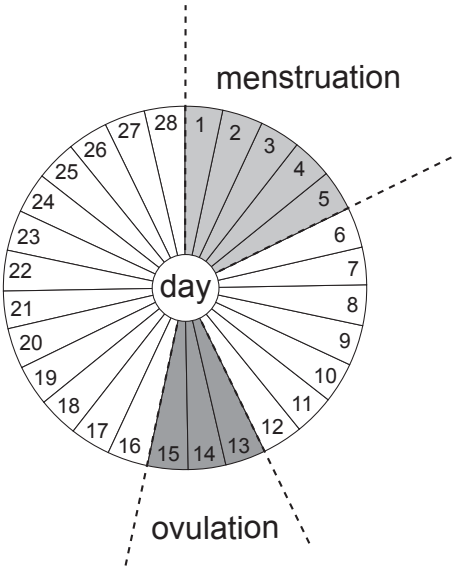
[2]

(e) What is the percentage probability of the offspring from these parents **not** having PKU?

_____ % [1]

[Turn over

11 **(a)** The diagram below shows the menstrual cycle.



(i) Name the hormone which causes ovulation to occur.

_____ [1]

(ii) Describe **one** change that would happen in the uterus between day 6 and day 12.

_____ [1]

(iii) Explain, in terms of hormones, what causes menstruation to occur after day 28.

_____

_____

_____ [2]

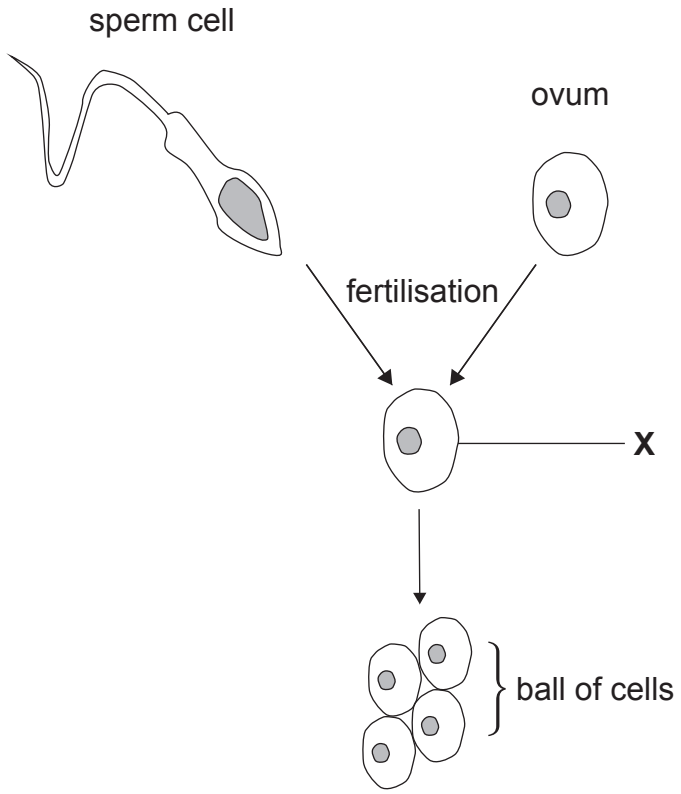
(b) Name **one** chemical method of contraception and explain how this prevents pregnancy.

_____

_____

_____ [2]

(c) The diagram below represents the process of fertilisation in humans.



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

_____ [1]

The sperm and ovum are described as being haploid.

(ii) What is meant by the term **haploid**?

_____

_____ [1]

(iii) How many **diploid** cells are shown in the diagram above?

_____ [1]

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Question Number	Marks
1	
2	
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Total Marks	

Examiner Number

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