



General Certificate of Secondary Education
2023

Centre Number

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Candidate Number

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Biology

Unit 2

Foundation Tier

MV18

[GBL21]

FRIDAY 9 JUNE, AFTERNOON

Time

1 hour 30 minutes, plus your additional time allowance.

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 on blank pages.

Complete in black ink only.

Answer **all eleven** questions.

Information for Candidates

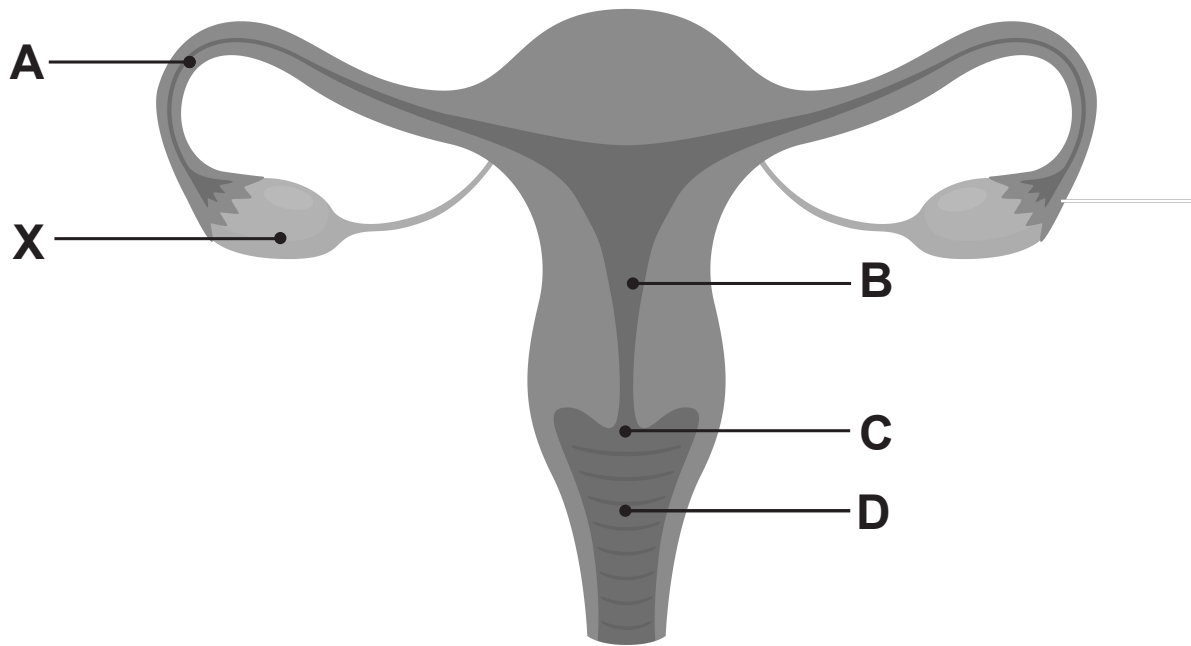
The total mark for this paper is 90.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in

Question **5(a)**.

1 The diagram shows part of the female reproductive system.



Look at the diagram.

(a) Name parts **A**, **B**, **C** and **D**. [4 marks]

A _____

B _____

C _____

D _____

(b) What is the function of part **X**? [1 mark]

- 2 The table gives information on the structure and function of three types of blood vessel.

Complete the table. [6 marks]

Type of blood vessel	Direction of blood flow	Thickness of wall	Valves present
	away from the heart	thick	
vein		thin	
	from arteries to veins		no

(ii) Name the hormone which is produced in part X.
[1 mark]

Circle the correct answer.

Oestrogen

Testosterone

Progesterone

(b) Give **two** secondary sexual characteristics which occur **only** in males. [2 marks]

1. _____

2. _____

(c) Give **one** secondary sexual characteristic which occurs in **both** males and females. [1 mark]

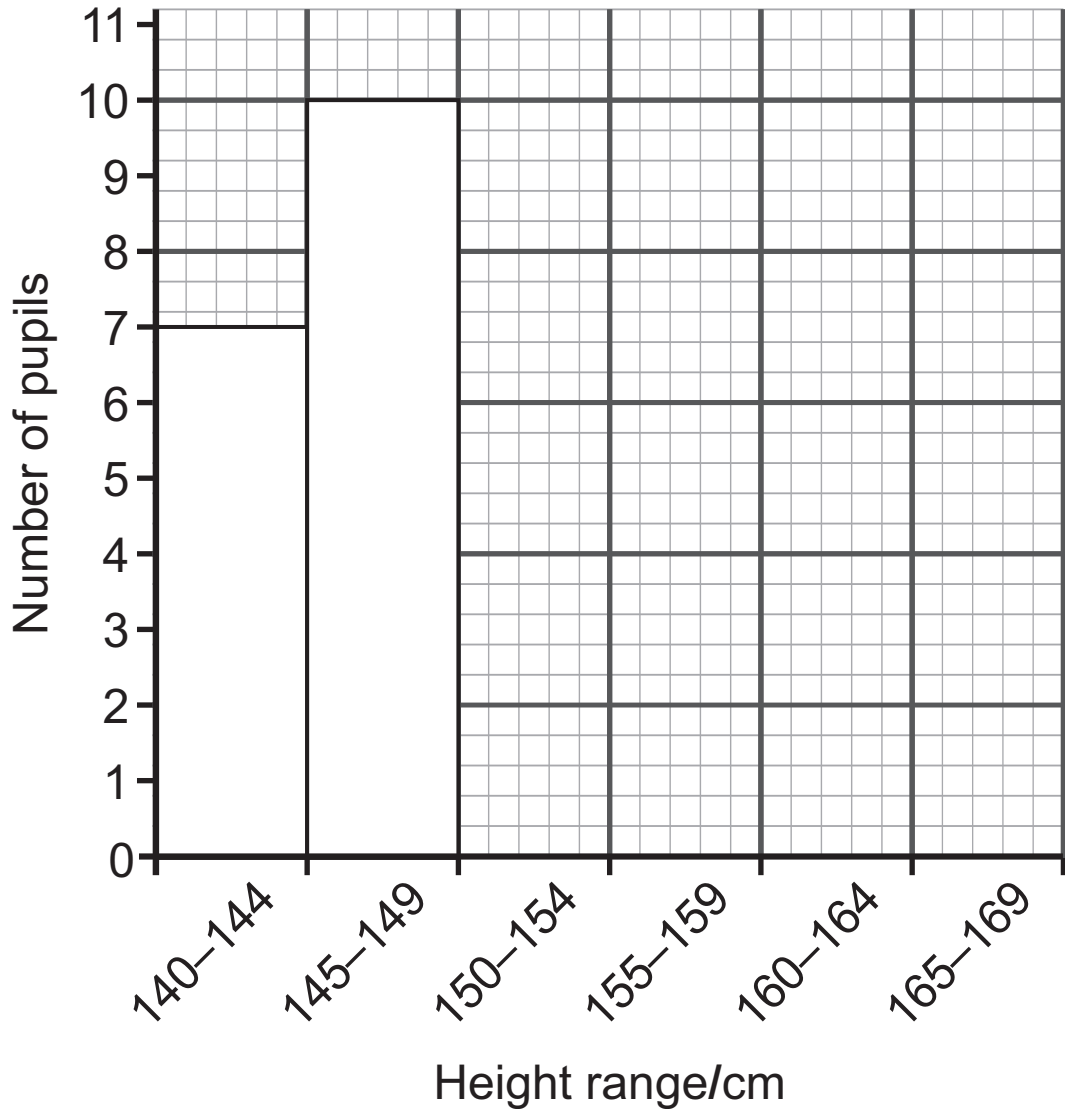
- 4 (a) A group of pupils measured their heights.

The table shows their results.

Height range/cm	Tally	Number of pupils
140 – 144	HHH II	7
145 – 149	HHH HHH	10
150 – 154	HHH HHH I	11
155 – 159	HHH III	
160 – 164	II	
165 – 169	I	1

- (i) Complete the table to show the number of pupils in each height range. [1 mark]

(ii) Complete the graph of their results. [3 marks]



(iii) Name the type of graph you have drawn. [1 mark]

Height is an example of continuous variation.

(iv) Give **one other** example of continuous variation in the pupils. [1 mark]

Variation can also be discontinuous.

(b) Give **two** examples of discontinuous variation in the pupils. [2 marks]

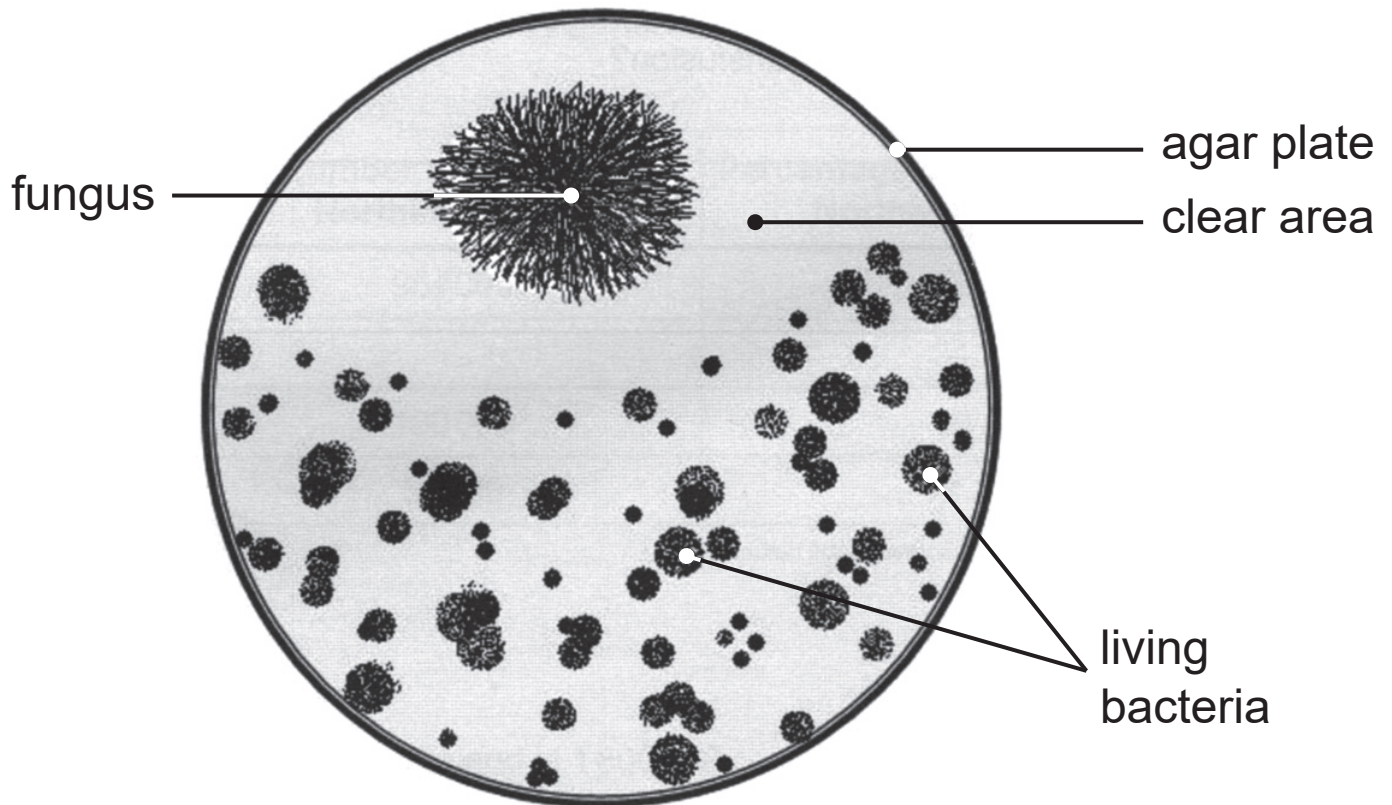
1. _____

2. _____

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(Questions continue overleaf)

5 Penicillin was discovered in 1928. The diagram shows the result of an experiment which led to the discovery of penicillin.



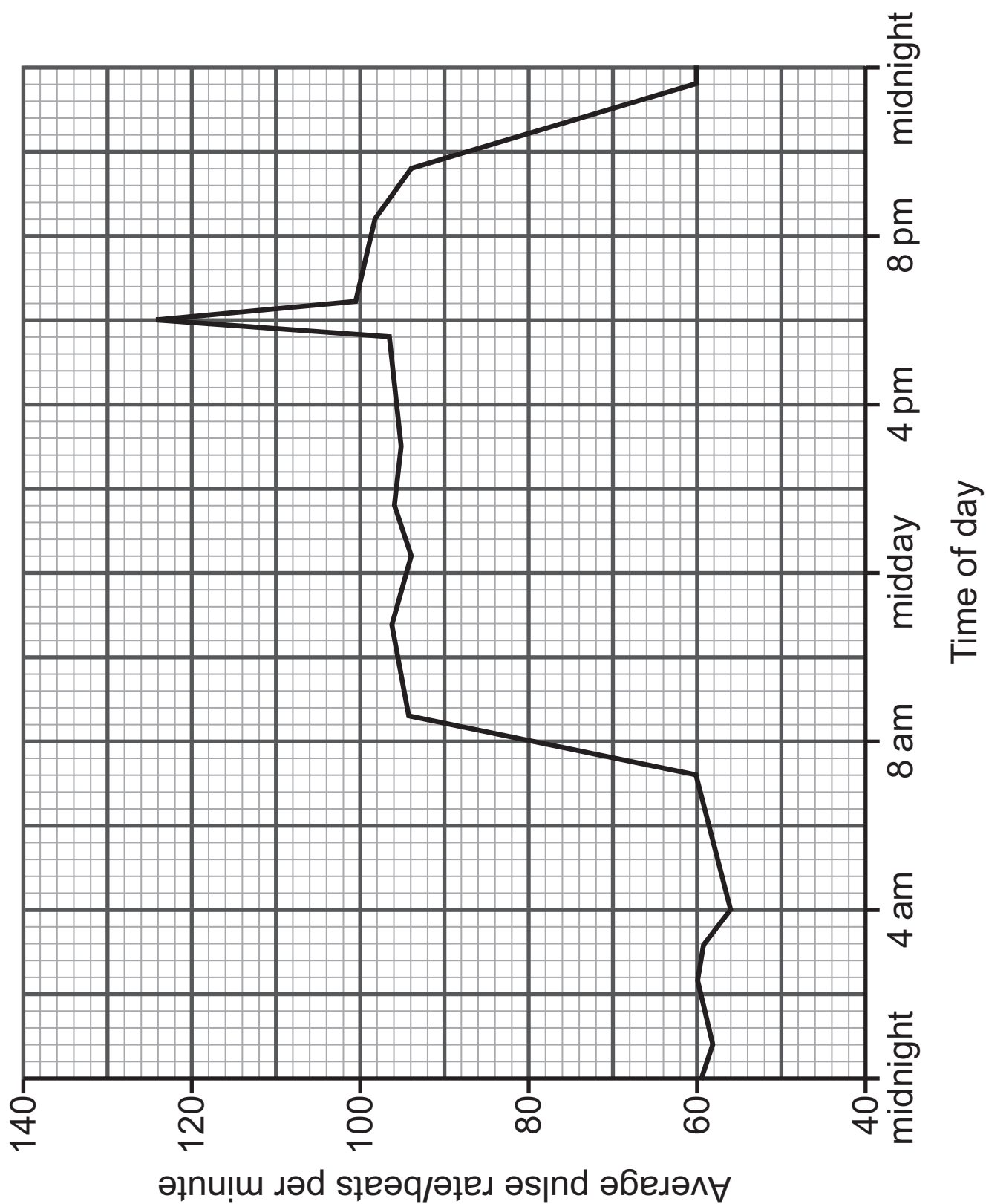
Look at the diagram.

(a) Use the diagram and your knowledge to

- name the scientist who discovered penicillin.
- describe how penicillin was discovered.
- explain the clear area. [6 marks]

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

- 6 (a) The graph shows the changes in the average pulse rate of a student over 24 hours.



Look at the graph.

- (i) At what time was the lowest average pulse rate recorded? [1 mark]

- (ii) Suggest **one** reason why the average pulse rate was so low at this time. [1 mark]

(b) At 6 pm the student was training in the gym.

- (i) Give the highest average pulse rate reached during training. [2 marks]

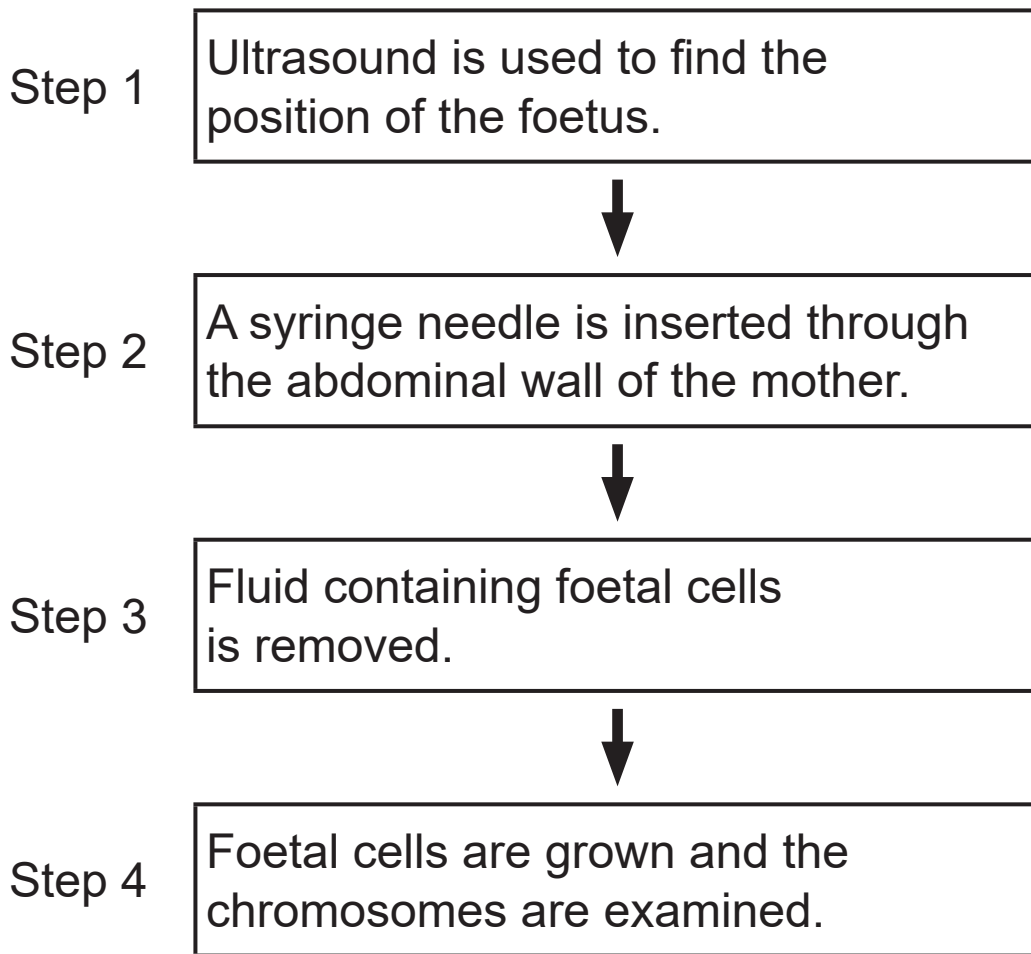
(ii) Explain why the average pulse rate increased during training. [4 marks]

(iii) Give **one** long-term benefit of exercise on the heart. [1 mark]

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(Questions continue overleaf)

7 (a) The flow diagram shows some steps involved in the genetic screening of a foetus.



Look at the flow diagram.

(i) Suggest why step 1 is necessary. [1 mark]

(ii) Give **two other** risks associated with step 2.

[2 marks]

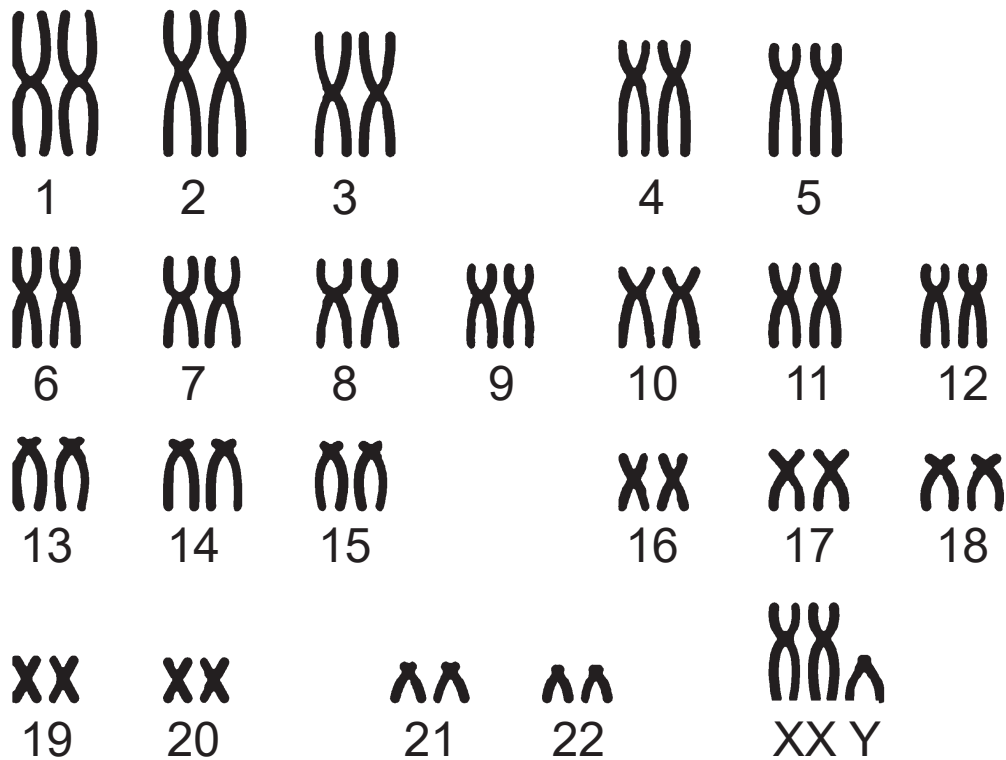
1. _____

2. _____

(iii) Name the fluid which is removed in step 3.

[1 mark]

(b) The diagram shows the chromosomes examined from a foetus which was diagnosed with a genetic condition called Klinefelter syndrome.



Look at the diagram.

(i) The chromosomes are from a male foetus.
Explain how you can tell this. [1 mark]

(ii) Describe how the sex chromosomes differ from the sex chromosomes of a foetus without this genetic condition.

Use evidence from this diagram to support your answer. [1 mark]

(iii) Describe **one** ethical dilemma facing parents of a foetus diagnosed with a serious genetic condition. [1 mark]

- 8 The Mangalitzza pig is native to Hungary. It can have curly or straight hair.



Curly hair is caused by a dominant allele **A**.

Straight hair is caused by a recessive allele **a**.

- (a) Explain what is meant by a **dominant allele**.
[2 marks]

A farmer had a breeding pair of Mangalitza pigs.

He wanted to know the genotype of the sow (female) and the boar (male).

He bred them and recorded the number of piglets in five litters with each type of hair.

Out of a total of 56 piglets, 14 had straight hair and the rest had curly hair.

(b) Calculate the percentage of piglets with **curly** hair.
[3 marks]

Show your working.

_____ %

The farmer used this data to draw a Punnett square diagram of the cross.

- (c) Complete the Punnett square of the cross between the two curly-haired pigs. [3 marks]

		boar	
sow	gametes		
	A		
	a		

- (d) What term describes the genotype of the sow?
[1 mark]

- (e) Do the numbers of piglets with each type of hair fit the numbers expected from the Punnett square?
[2 marks]

Use data to support your answer.

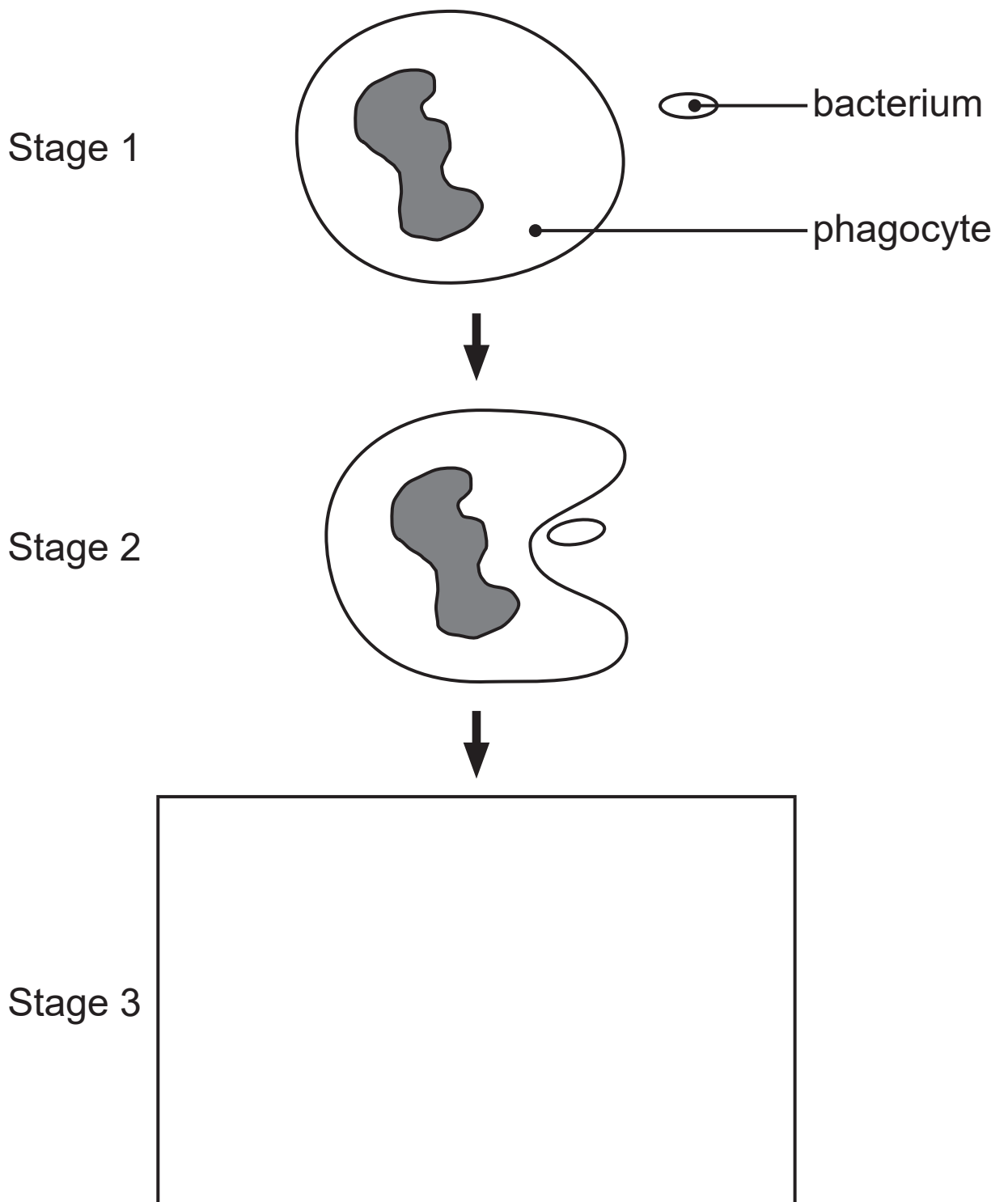
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(Questions continue overleaf)

9 (a) Give **two** ways bacteria are prevented from entering the body. [2 marks]

1. _____

2. _____

(b) The diagram shows two stages of phagocytosis.



Look at the diagram.

(i) Describe what is happening in **stage 2**. [1 mark]

(ii) **Complete** the diagram by drawing **stage 3** of phagocytosis in the box provided. [2 marks]

(iii) Describe how the bacterium is destroyed in **stage 3**. [1 mark]

Another type of white blood cell destroys bacteria.

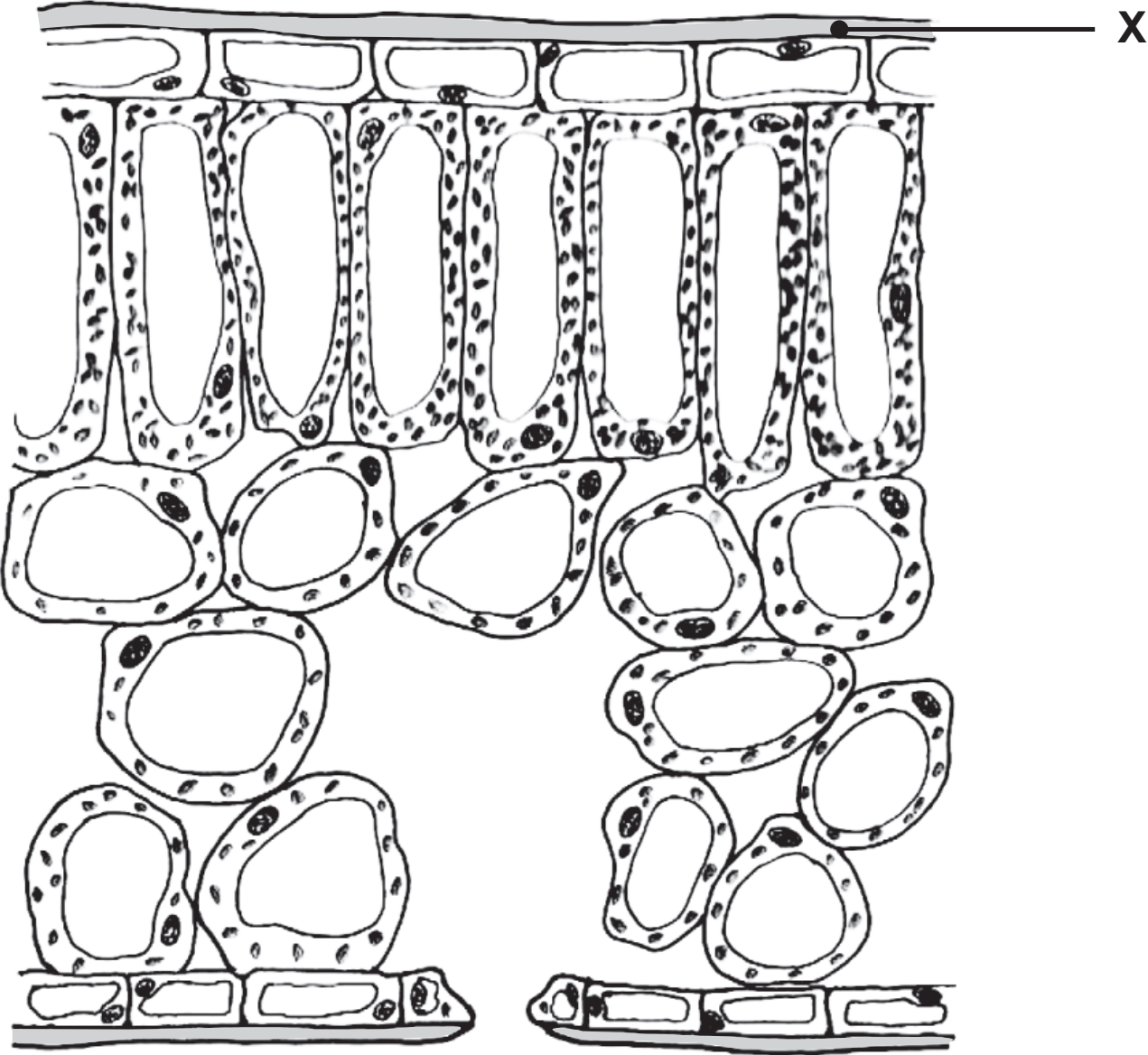
(c) Name this type of white blood cell and describe how it destroys bacteria. [1 mark for each]

Name _____

Description _____

Plants have structural and chemical adaptations to protect them from damage.

(d) The diagram shows a cross section of a leaf.



Look at the diagram.

- (i) Name layer **X** and describe how it helps protect a plant from disease. [1 mark for each]

Layer **X** _____

Description _____

- (ii) Give one **other** adaptation of plant cells which helps protect them from disease. [1 mark]

Digitalis is a chemical, produced by a plant, which is poisonous to slugs and insects.

- (e) Name the plant which produces digitalis. [1 mark]

10 (a) The table shows the average percentage of different workers who develop skin cancer in Canada each year.

Type of work	Average percentage of workers who develop skin cancer
Office	8
Farming and forestry	35
Transport	9
Construction of buildings and roads	23
Other workers	25

A total of 4560 workers develop skin cancer each year.

- (i)** Calculate the number of workers in farming and forestry who develop skin cancer each year.
[2 marks]

Show your working.

(ii) Suggest why farm and forestry workers are more likely to develop skin cancer than office workers.
[2 marks]

(b) Explain how skin cancer develops. [3 marks]

(c) Give **two** ways skin cancer can be treated. [2 marks]

1. _____
2. _____

11 Coronary heart disease is a type of cardiovascular disease.

In 2019, the number of deaths in Northern Ireland due to coronary heart disease was 86 per 100 000 people.

The population of Northern Ireland in 2019 was approximately 1 885 000.

(a) Calculate the number of deaths in Northern Ireland due to coronary heart disease in 2019. [3 marks]

Show your working.

(b) The table shows data on the risk factors which may lead to four people having a heart attack due to coronary heart disease.

Person	Risk factor		
	regular exercise	blood cholesterol level /mg per 100 ml	cigarette smoker
A	yes	200	yes
B	yes	240	no
C	no	200	no
D	no	240	yes

(i) Give the letter of the person at highest risk of having a heart attack. [1 mark]

(ii) Suggest **two** lifestyle changes which this person could make to help reduce their risk of having a heart attack. [2 marks]

1. _____

2. _____

(c) Drugs such as aspirin can be used to treat cardiovascular disease.

(i) Describe how aspirin helps protect against cardiovascular disease. [2 marks]

(ii) Give **one other** drug which can be used to treat cardiovascular disease and explain how it works.
[2 marks]

This is the end of the question paper

SOURCES

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Q3(a) . . Source: © Getty Images

Q5 Source: © Chief Examiner

Q8 Source: © Getty Images

Q9(d) . . Source: © Chief Examiner

Q10(a) . . Source: © Occupational Cancer Research Centre. *Burden of occupational cancer in Canada: Major workplace carcinogens and prevention of exposure. Toronto, ON: 2019*

Q11(b) . . Source: © Principal Examiner

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Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
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10	
11	
Total Marks	

Examiner Number

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