



General Certificate of Secondary Education
2016

Centre Number

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Candidate Number

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Biology

Unit 2

Foundation Tier

[GBY21]

FRIDAY 17 JUNE, MORNING

MV18

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.

Complete in blue or black ink only.

Answer **all fourteen** 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 **14**.

1 Look at the words in the box.

surgery	container	uncontrolled	capsule
X-rays	uneven	malignant	controlled

Use words from the box to **complete the sentences**.
[4 marks]

Cancer is _____ cell division.

Cancer can result in two types of tumour.

Tumours can be benign or _____ .

Benign tumours are surrounded by a
_____ and can be easily removed
by _____ .

2 Arteries, veins and capillaries carry blood around the body.

(a) (i) Which type of blood vessel carries blood away from the heart? [1 mark]

(ii) Which type of blood vessel has walls which are one cell thick? [1 mark]

(b) Explain why veins have valves. [1 mark]

(c) Explain why an artery has a thick layer of muscle. [1 mark]

(d) Name the vein which carries blood from the lungs to the heart. [1 mark]

3 There are a number of ways to measure growth.

(a) **Draw lines** to link each organism to the **best** method of measuring its growth. [2 marks]

Organism

Method of measuring growth

Mouse

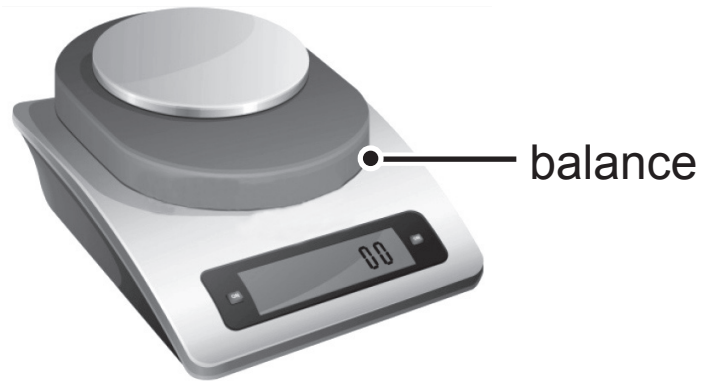
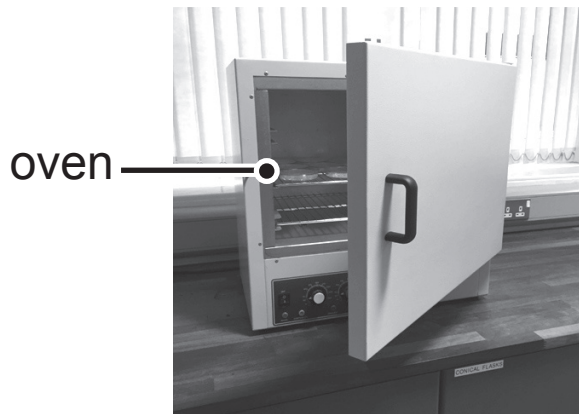
Count number of cells

Measure length

Yeast

Dry mass

The photographs show an oven and a balance.



(b) This apparatus can be used to measure the dry mass of a plant.

Describe how. [3 marks]

4 The photograph shows a girl rolling her tongue.



Tongue rolling is controlled by a gene.

(a) What is a gene? [1 mark]

The gene for tongue rolling has two alleles.

The allele for tongue rolling (**R**) is dominant to the allele for non-rolling (**r**).

- (b) (i) Complete the Punnett square** to show the possible children of two people who can roll their tongue.
[2 marks]

		Mother	
		Gametes R	r
Father	R		Rr
	r		rr

- (ii)** Draw a circle around the genotype of the homozygous recessive child. [1 mark]
- (iii)** What proportion of the children could be heterozygous? [1 mark]
-

- 5 (a) A group of Year 10 pupils carried out a survey of their class.

The numbers of tongue rollers and non-rollers were counted.

The table shows the results.

Number of pupils	
Tongue rollers	Non-rollers
17	3

- (i) Suggest which type of graph should be used to present these results.

Draw a **circle** around the correct answer. [1 mark]

bar chart

histogram

scatter graph

The pupils could have made the results of the survey more reliable.

- (ii) Describe how. [1 mark]
-

(b) Tongue rolling is an example of variation.

(i) Name this **type** of variation. [1 mark]

Tongue rolling is controlled by genes.

Height can also be controlled by genes.

(ii) Give **one other** cause of variation in height.
[1 mark]

6 Secondary sexual characteristics develop in girls and boys during puberty.

The development of these characteristics is caused by chemicals released from the reproductive organs.

(a) What **type** of chemical causes the development of secondary sexual characteristics? [1 mark]

The chemical released in girls is oestrogen.

(b) Where in the girl's reproductive system is oestrogen produced? [1 mark]

(c) Name the chemical which causes secondary sexual characteristics to develop in boys. [1 mark]

(d) (i) Describe **one** secondary sexual characteristic which develops **only** in **boys**. [1 mark]

(ii) Describe **one** secondary sexual characteristic which develops **only** in **girls**. [1 mark]

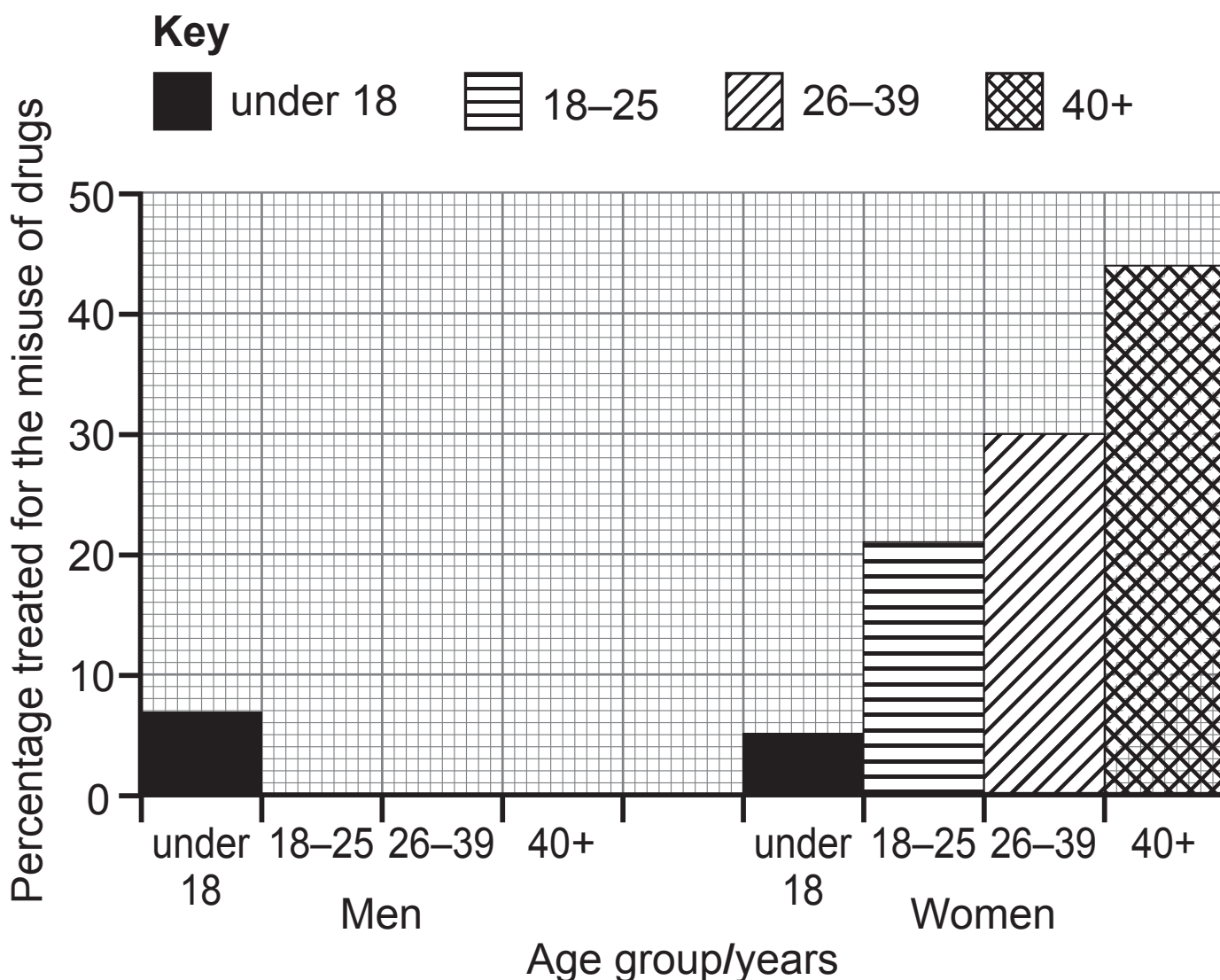
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(Questions continue overleaf)

7 The number of men and women treated for the misuse of drugs was recorded in Northern Ireland between April 2013 and March 2014.

The table and the graph compare the age groups of those men and women treated for the misuse of drugs.

Age group/ years	Percentage of men treated for the misuse of drugs	Percentage of women treated for the misuse of drugs
Under 18	7	5
18–25	36	21
26–39	39	30
40+	18	44



- (a) (i) **Complete the graph** on page 12 for the percentage of **men** treated for the misuse of drugs.
The first bar has been drawn for you. [3 marks]

Look at the graph.

- (ii) Describe the trend in the age of men treated for the misuse of drugs. [2 marks]

Look at the results for people **under 40 years of age**.

- (b) How does the **total** percentage of men under the age of 40 years treated for the misuse of drugs compare to the total percentage of women under the age of 40 years treated for the misuse of drugs?

Use data for the percentage of under 40 year olds to support your answer. [2 marks]

8 (a) Penicillin is an antibiotic.

It was discovered by Alexander Fleming.

(i) **Choose** the **two** scientists who developed penicillin for large-scale production.

Draw a **circle** around the **two** correct answers.
[2 marks]

Florey Watson Crick Chain Wilkins Chargaff

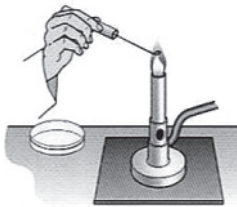
(ii) Name the type of organism that produces penicillin.
[1 mark]

A patient suffering from a throat infection had a sample of bacteria taken from his throat by a nurse.

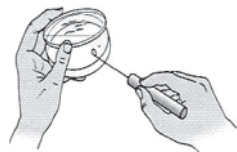
The bacteria in the sample were inoculated on to a Petri dish of sterile agar in the hospital laboratory.

The diagrams show some of the aseptic techniques used during inoculation.

(b) Explain the reason for each aseptic technique.



Flame inoculating loop. [1 mark]



Do not completely remove lid. [1 mark]

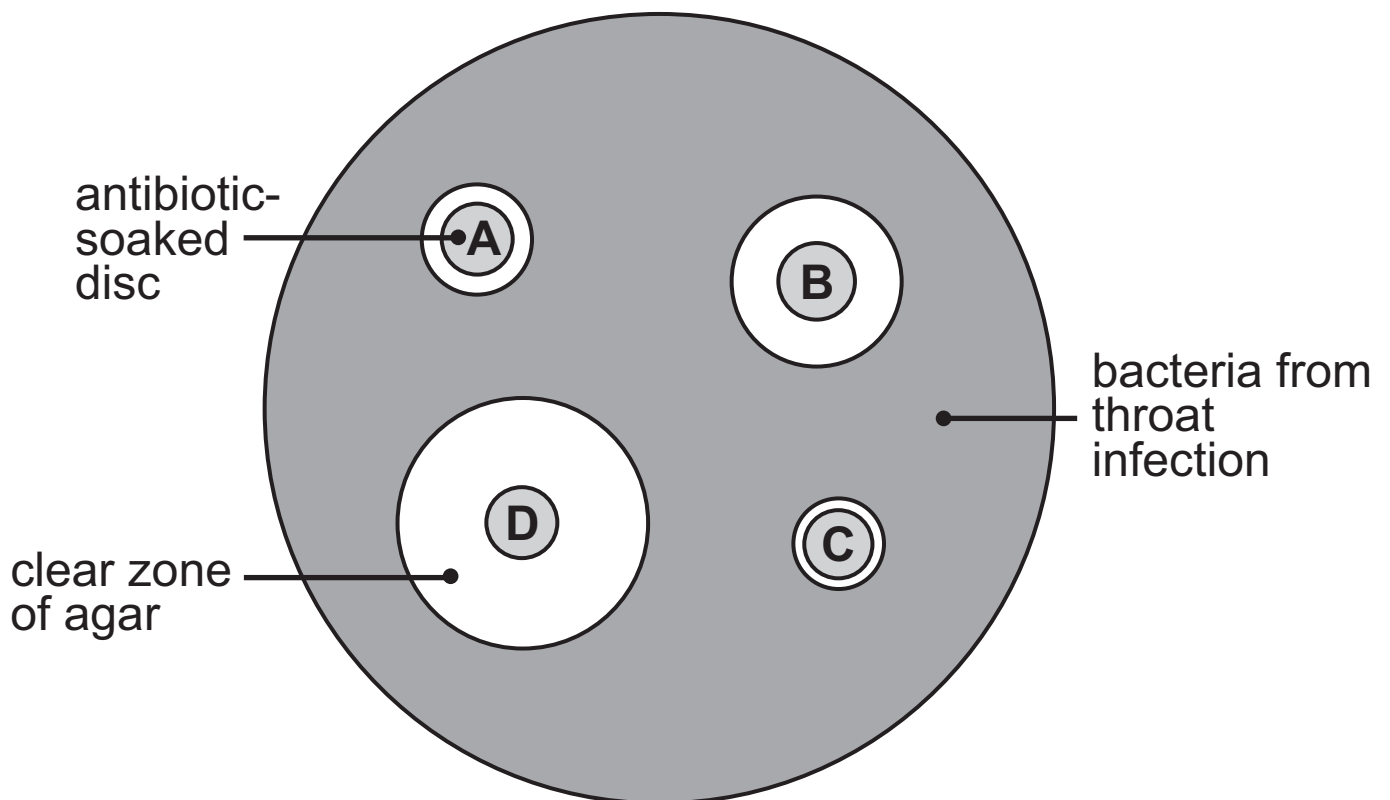


Wash hands after inoculation. [1 mark]

Filter paper discs were soaked in four different antibiotics, A, B, C and D.

These discs were then placed on the bacteria growing on the agar in the Petri dish.

The diagram shows the Petri dish after it was incubated for 48 hours.



The area of the clear zone around each antibiotic-soaked disc was measured.

The table shows the results.

Antibiotic disc	Area of clear zone /mm ²
A	79
B	177
C	50
D	380

Look at the results.

- (c) Suggest which antibiotic a doctor should prescribe for the patient suffering from this throat infection.
Give **data** from the table to help explain your answer.
[3 marks]

Antibiotic _____

Explanation _____

9 The diagram shows part of a molecule.

This molecule is found in the nucleus of cells.

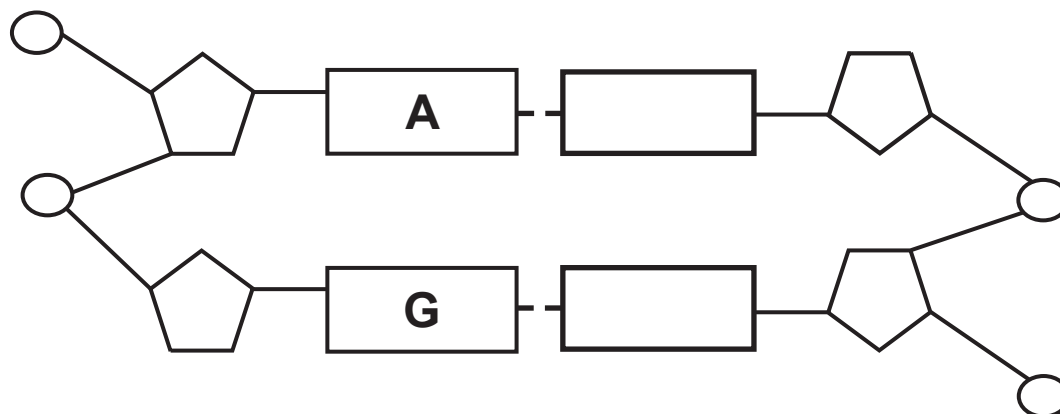


Look at the diagram.

(a) (i) Name this molecule. [1 mark]

(ii) What term is used to describe the shape of this molecule? [1 mark]

The diagram shows a section of this molecule.



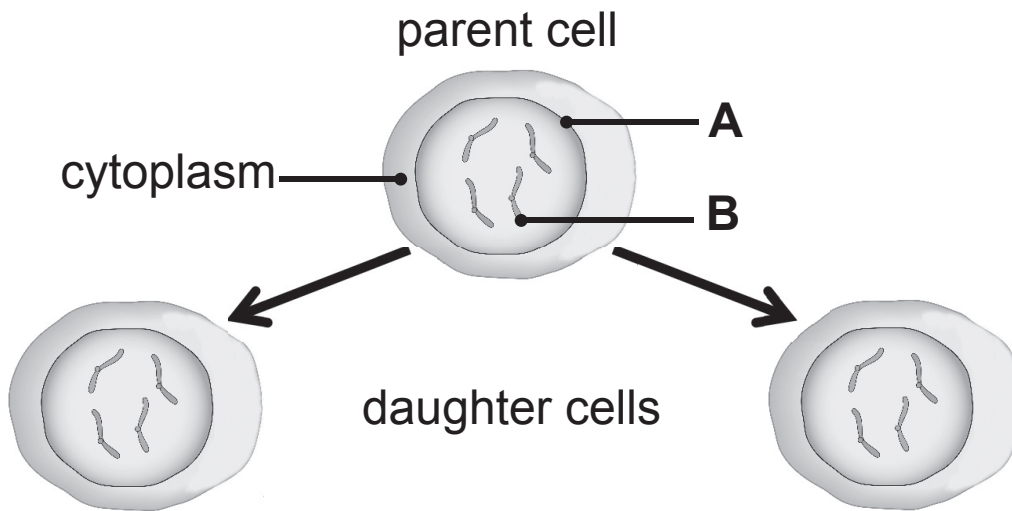
Look at the diagram.

(b) (i) Draw a circle around a sugar in this molecule. [1 mark]

(ii) **A** and **G** are bases.

Complete the diagram by writing the letter for each matching base in the empty boxes. [2 marks]

(c) The diagram shows a parent cell which has divided by mitosis to produce two daughter cells.



(i) Name **A** and **B**. [1 mark for each]

A _____

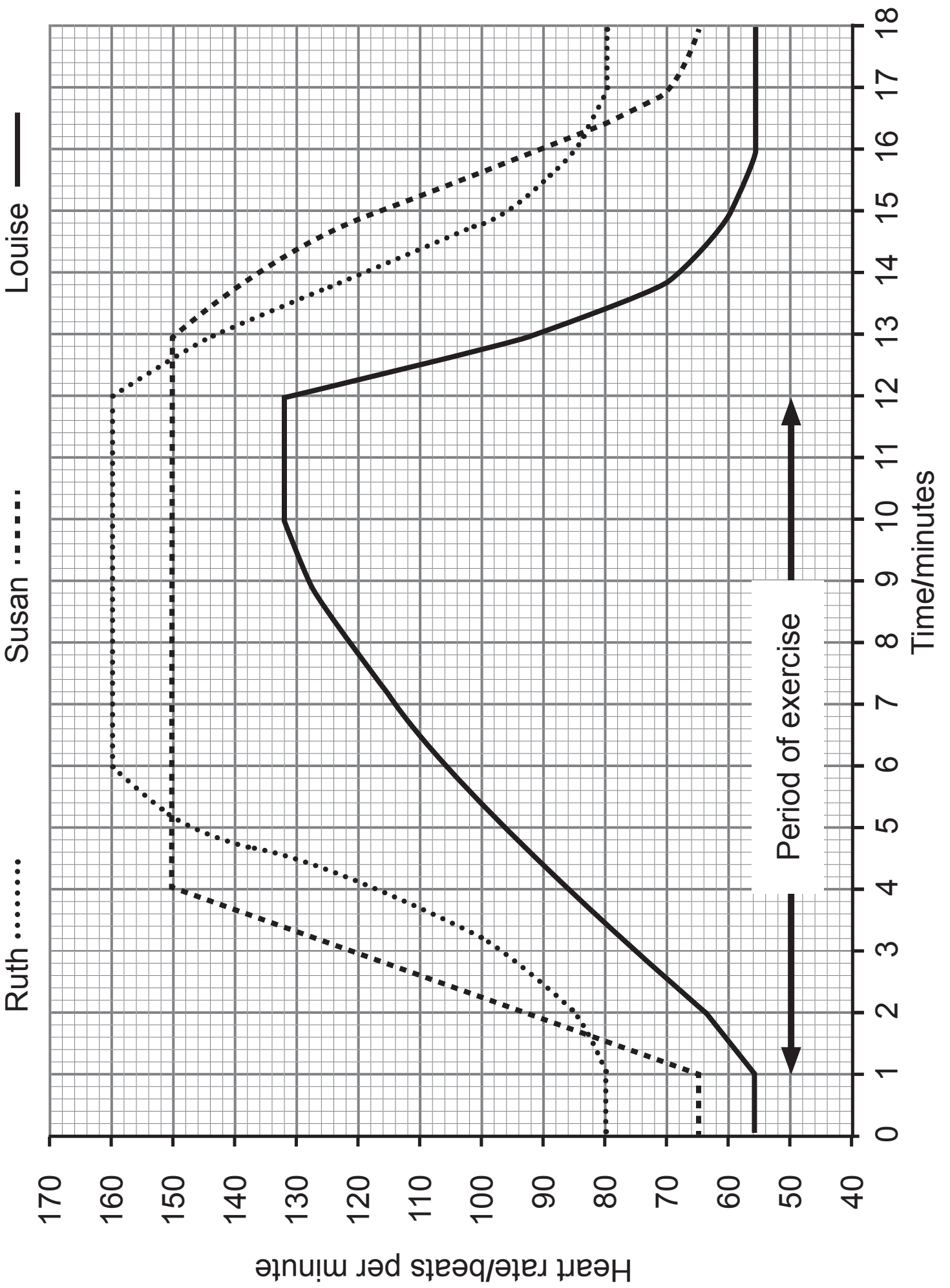
B _____

The daughter cells are clones.

(ii) Use evidence from the diagram to explain what is meant by a clone. [2 marks]

(d) Complete the table to compare the daughter cells produced when **this parent** cell divides by mitosis and meiosis. [2 marks]

	Mitosis	Meiosis
Number of daughter cells	2	
Number of chromosomes in each daughter cell	4	



10 The graph on page 20 shows the effect of exercise on the pulse rate of three students.

(a) Suggest which student is likely to have trained regularly.
[1 mark]

Give **two** reasons for your choice.

Include **data** from the graph with each reason.
[2 marks for each reason]

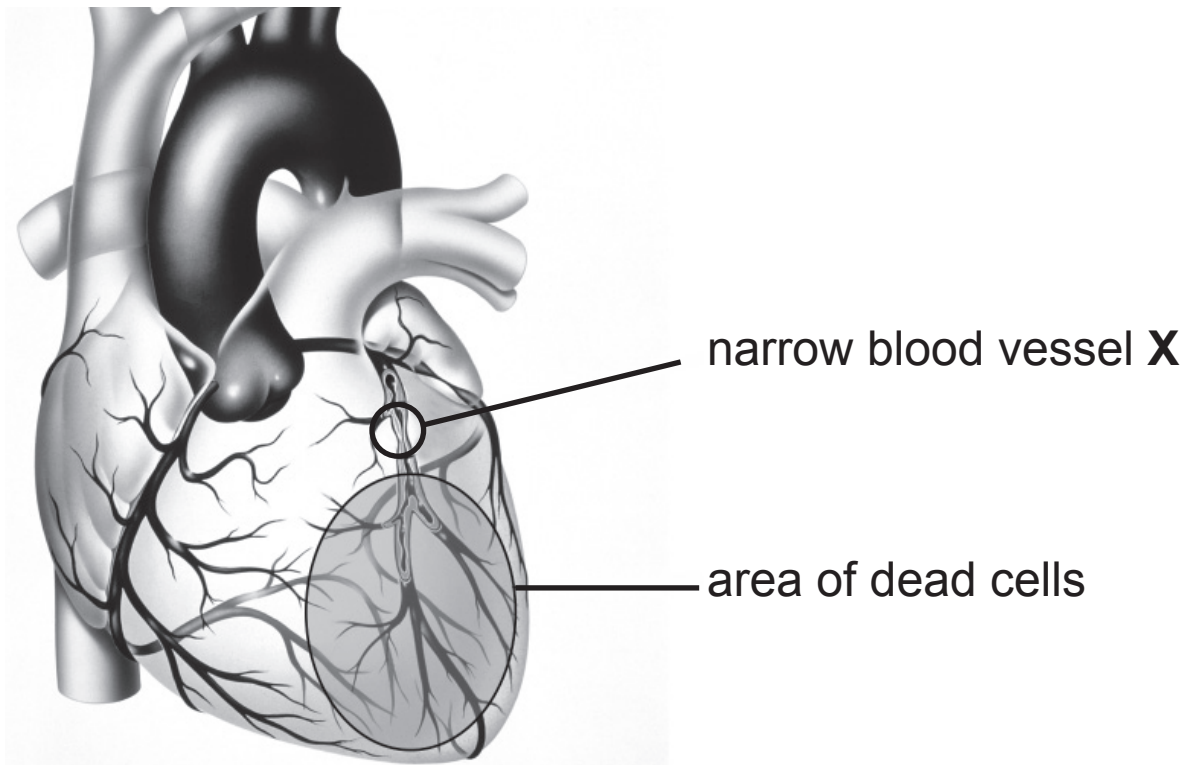
Student _____

Reason 1 _____

Reason 2 _____

(b) Give **one** way the heart benefits from regular exercise.
[1 mark]

(c) The diagram shows part of a heart after a heart attack.



(i) Name blood vessel X. [1 mark]

(ii) Suggest which type of chamber is affected by this heart attack. [1 mark]

(iii) This heart attack was caused by the inside of blood vessel **X** becoming blocked.

Suggest what caused this blockage. [1 mark]

(iv) Explain what caused the area of dead cells.
[3 marks]

11 The table gives information on some diseases caused by microorganisms.

Complete the table. [5 marks]

Disease	Type of microorganism	How disease is spread	Prevention
Measles		Droplet infection	
Athlete's foot		Contact	Wearing flip flops in a swimming pool area
	Bacterium	Eating contaminated food	Cook food thoroughly
Chlamydia	Bacterium		Use a condom

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(Questions continue overleaf)

12 A group of students used a weight potometer to investigate the water loss of three different plants after 5 days.

The table shows the results.

Plant	Loss in mass after 5 days/g	Average rate of water loss/g per day
A	8.0	
B	10.0	2.0
C	5.0	1.0

(a) Complete the table by calculating the average rate of water loss for plant **A**.

Show your working. [2 marks]

(b) Suggest two environmental factors the students should have controlled during this investigation.

[1 mark for each factor]

1. _____

2. _____

The students then counted the number of stomata found on the leaves of each plant.

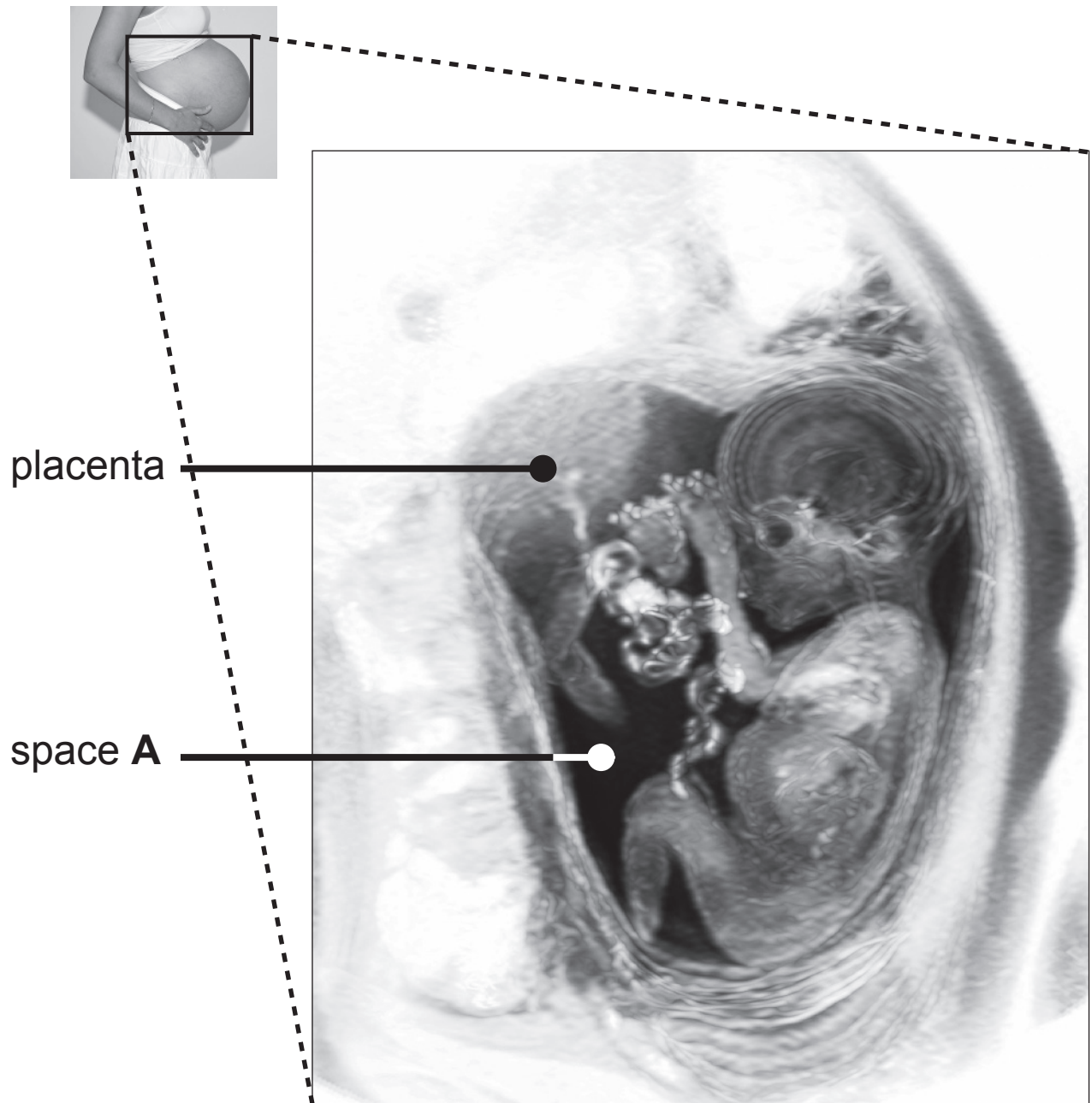
They calculated the average number of stomata per mm^2 .

The table shows the results.

Plant	Average number of stomata per mm^2 of leaf surface
A	51
B	74
C	18

(c) Use data from **both tables** to describe and explain the results of the investigation. [4 marks]

13 The photographs show a pregnant woman and the scan of her foetus.



Look at the photographs on page 28.

(a) (i) Name the liquid found in space **A**. [1 mark]

(ii) Explain how the liquid in space **A** protects the foetus.
[1 mark]

(b) The function of the placenta is to exchange dissolved substances between the mother and the foetus.

(i) Explain how the structure of the placenta is adapted for this function. [1 mark]

(ii) Name **one** substance that is exchanged from the foetus to the mother. [1 mark]

14 The table shows the chance of pregnancy occurring when using different types of contraception.

Type of contraception	Chance of pregnancy
Surgical	1 in 200
Mechanical	10 in 200
Chemical	2 in 200

An implant is a contraceptive device that works in a similar way to the pill.

It involves a small tube inserted under the skin in the upper arm of the woman.

This tube slowly releases chemicals.

Use the information and your knowledge to answer the following questions.

- What type of contraceptive is the implant?
- Describe how the chance of pregnancy using an implant compares to surgical and mechanical types of contraception given in the table.
- Suggest **two other** advantages and **one** disadvantage of using this method when compared to the others.

SOURCES

- Q3.....image of oven © Principal Examiner
- Q3.....image of balance scale © jauhari1 / iStock / Thinkstock
- Q4.....image of girl rolling tongue © Herve Conge, ISM / Science Photo Library
- Q7Statistics from Northern Ireland Drug Misuse Database 1 April 2013 – 31 March 2014. © Crown Copyright - Contains public sector information licensed under the Open Government Licence v3.0.
- Q8(b)Diagrams - aseptic techniques used during inoculation, © 'Biology for You' by Gareth Williams, Page 348, (Nelson Thornes, 2006), illustrations copyright © Gareth Williams and Nelson Thornes 2006, reprinted by permission of the publishers, Oxford University Press
- Q9(a)Source: CCEA
- Q9(c).....Diagram - parent cell divided by mitosis © Dorling Kindersley / Thinkstock
- Q10(c) ...Image - a heart after a hart attack © John Bavosi / Science Photo Library
- Q12.....Adapted from: www.teamsciencerocks.com
- Q13.....Image - pregnant woman © Ghislain & Marie David De Lossy / Science Photo Library
- Q13.....Image - scan of foetus © Du Cane Medical Imaging Ltd / Science Photo Library

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Question Number	Marks
1	
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Examiner Number

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