



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



GBY21

TIME

1 hour 30 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 blue or black ink only. **Do not write with a gel pen.**

Answer **all fourteen** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **90**.

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 **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**.

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 _____ .

[4]



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

(a) (i) Which type of blood vessel carries blood away from the heart?

_____ [1]

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

_____ [1]

(b) Explain why veins have valves.

_____ [1]

(c) Explain why an artery has a thick layer of muscle.

_____ [1]

(d) Name the vein which carries blood from the lungs to the heart.

_____ [1]

[Turn over]



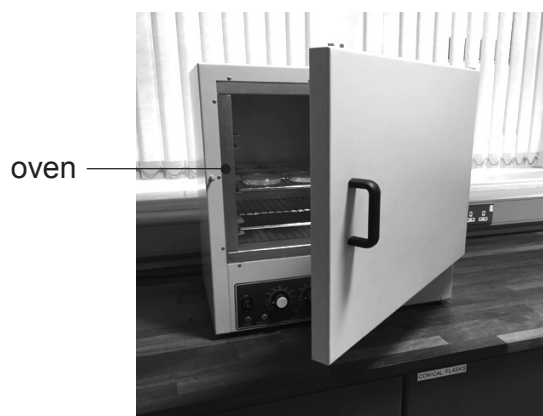
3 There are a number of ways to measure growth.

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

| Organism | Method of measuring growth |
|----------|----------------------------|
| Mouse | Count number of cells |
| Yeast | Measure length |
| | Dry mass |

[2]

The photographs show an oven and a balance.



© Principal Examiner



© jauhari1 / iStock / Thinkstock

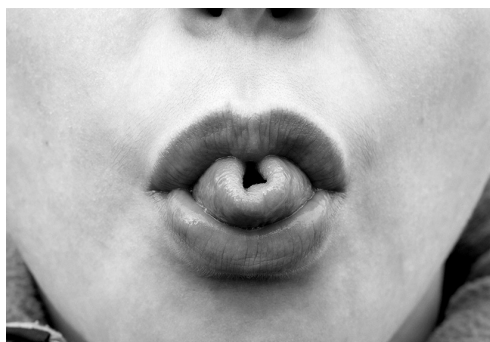
(b) This apparatus can be used to measure the dry mass of a plant.

Describe how.

[3]



- 4 The photograph shows a girl rolling her tongue.



© Herve Conge, ISM / Science Photo Library

Tongue rolling is controlled by a gene.

- (a) What is a gene?

_____ [1]

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.

| | | Mother | |
|--------|---|---------|----|
| | | Gametes | |
| Father | R | | Rr |
| | r | | rr |

 [2]

- (ii) Draw a circle around the genotype of the homozygous recessive child. [1]

- (iii) What proportion of the children could be heterozygous?

_____ [1]

[Turn over]



- 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.

bar chart

histogram

scatter graph

[1]

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

- (ii) Describe how.

_____ [1]

- (b) Tongue rolling is an example of variation.

- (i) Name this **type** of variation.

_____ [1]

Tongue rolling is controlled by genes.

Height can also be controlled by genes.

- (ii) Give **one other** cause of variation in height.

_____ [1]



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]

The chemical released in girls is oestrogen.

- (b) Where in the girl's reproductive system is oestrogen produced?

[1]

- (c) Name the chemical which causes secondary sexual characteristics to develop in boys.

[1]

- (d) (i) Describe **one** secondary sexual characteristic which develops **only** in **boys**.

_____ [1]

- (ii) Describe **one** secondary sexual characteristic which develops **only** in **girls**.

_____ [1]

[Turn over]

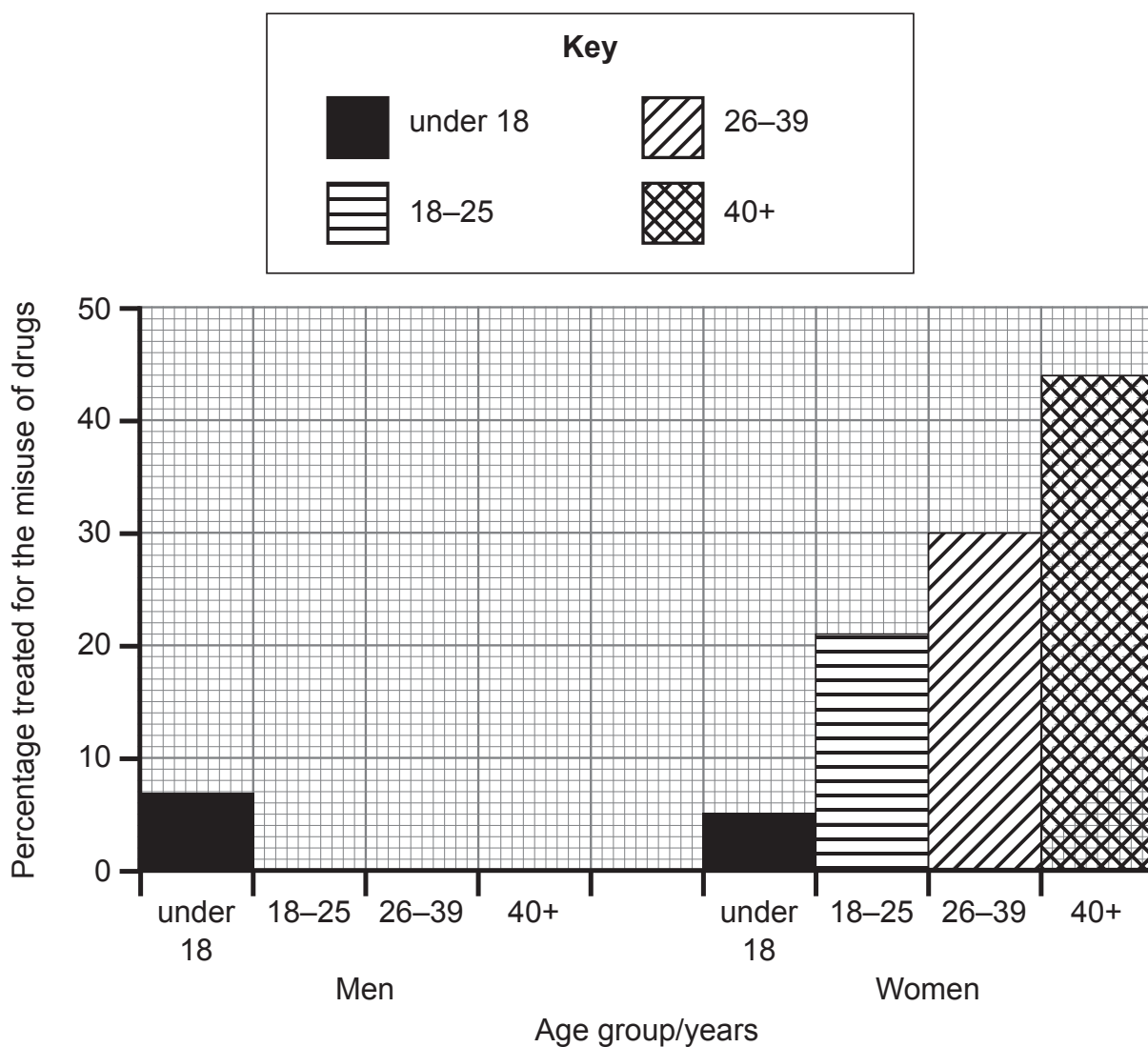


- 7 The number of men and women treated for the misuse of drugs was recorded in Northern Ireland between April 2013 and March 2014.

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 |

Statistics 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.



- (a) (i) **Complete the graph** for the percentage of **men** treated for the misuse of drugs.

The first bar has been drawn for you.

[3]

Look at the graph.

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

[2]

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]

[Turn over



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.

Florey Watson Crick Chain Wilkins Chargaff [2]

- (ii) Name the type of organism that produces penicillin.

_____ [1]

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.

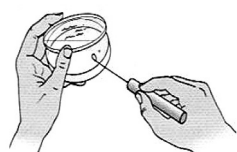
The diagrams show some of the aseptic techniques used during inoculation.

- (b) Explain the reason for each aseptic technique.



Flame inoculating loop.

_____ [1]



Do not completely remove lid.

_____ [1]



Wash hands after inoculation.

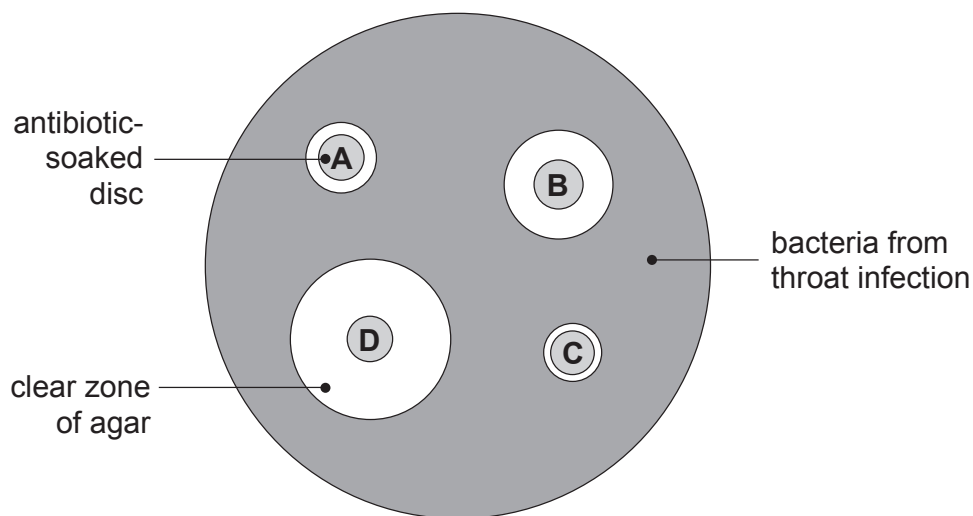
_____ [1]

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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.

Antibiotic _____

Explanation _____

_____ [3]

[Turn over



9 The diagram shows part of a molecule.

This molecule is found in the nucleus of cells.



Source: CCEA

Look at the diagram.

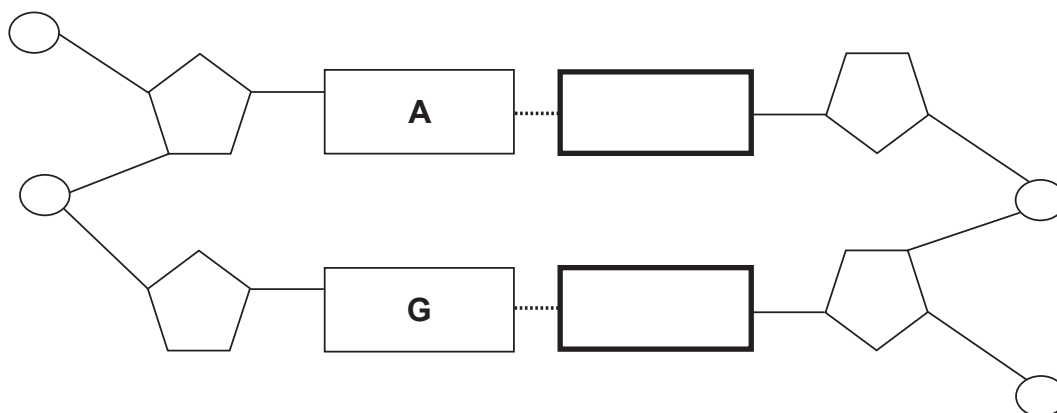
(a) (i) Name this molecule.

[1]

(ii) What term is used to describe the shape of this molecule?

[1]

The diagram shows a section of this molecule.



Look at the diagram.

(b) (i) Draw a circle around a sugar in this molecule.

[1]

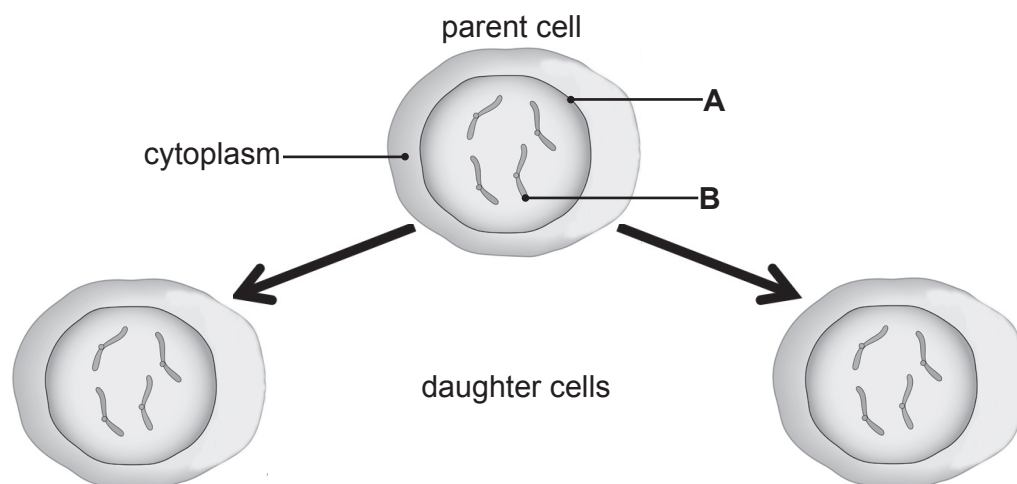
(ii) **A** and **G** are bases.

Complete the diagram by writing the letter for each matching base in the empty boxes.

[2]



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



© Dorling Kindersley / Thinkstock

- (i) Name **A** and **B**.

A _____ [1]

B _____ [1]

The daughter cells are clones.

- (ii) Use evidence from the diagram to explain what is meant by a clone.

_____ [2]

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

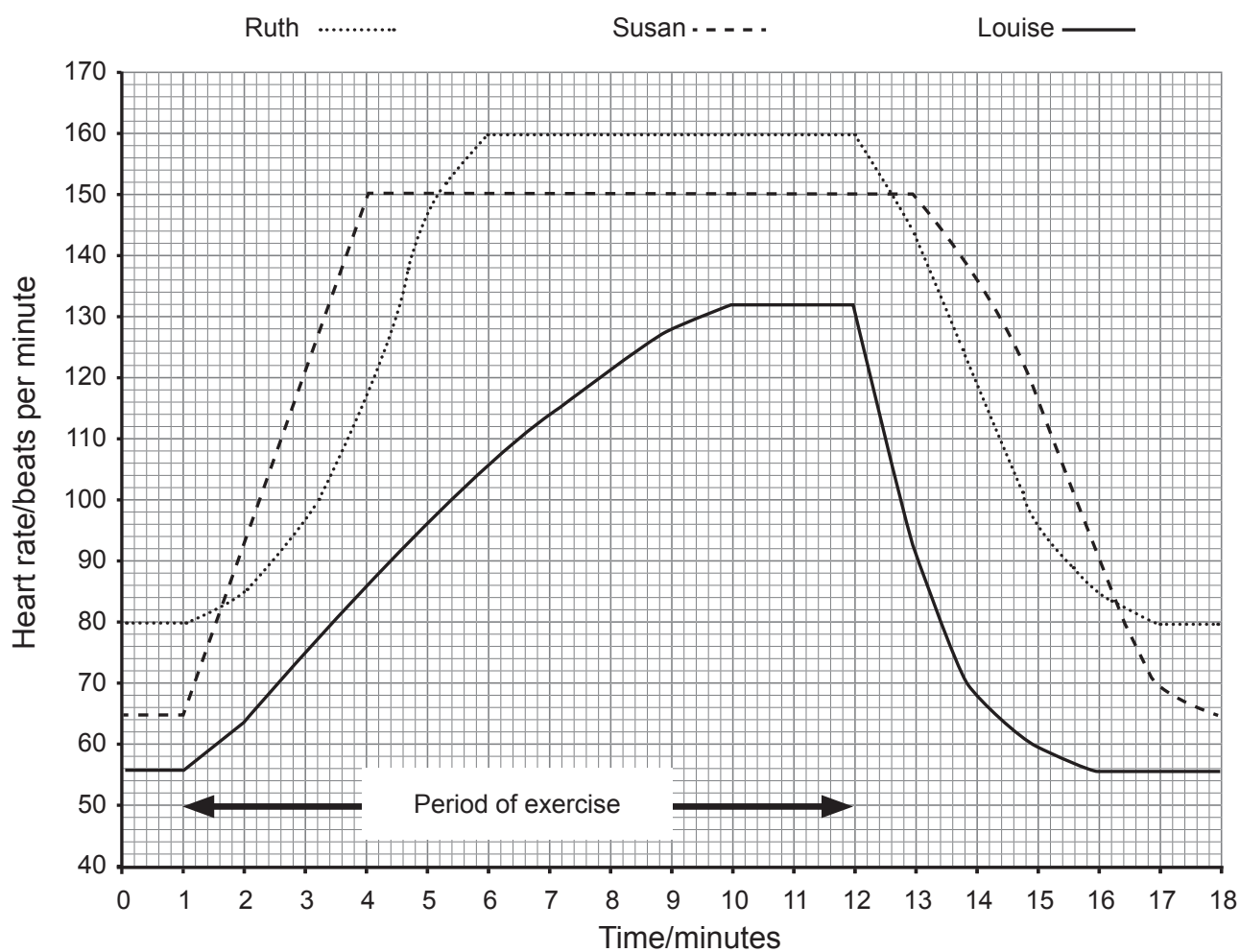
| | Mitosis | Meiosis |
|---|---------|---------|
| Number of daughter cells | 2 | |
| Number of chromosomes in each daughter cell | 4 | |

[2]

[Turn over



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



(a) Suggest which student is likely to have trained regularly.

Give **two** reasons for your choice.

Include **data** from the graph with each reason.

Student _____ [1]

Reason 1 _____

_____ [2]

Reason 2 _____

_____ [2]

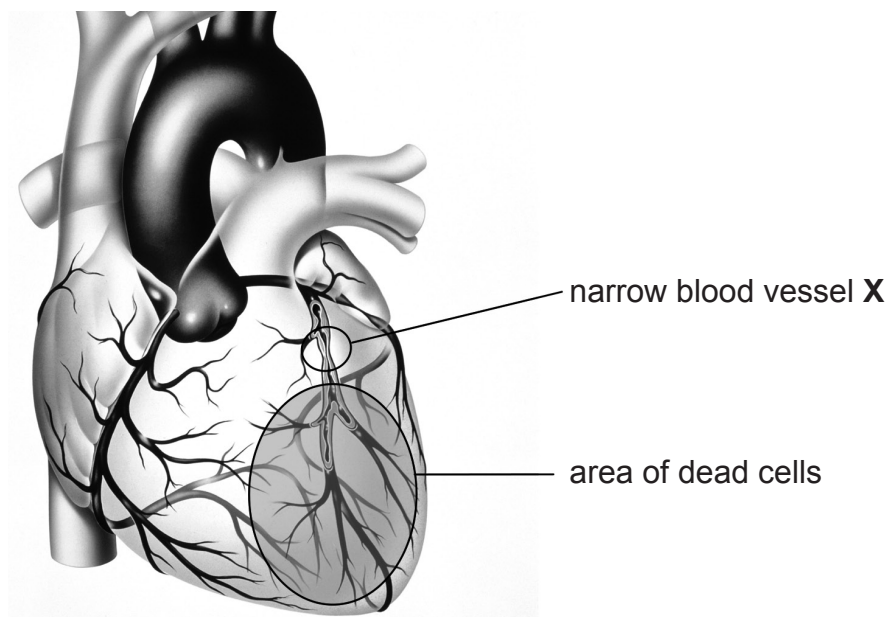
(b) Give **one** way the heart benefits from regular exercise.

_____ [1]

[Turn over



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



© John Bavosi / Science Photo Library

(i) Name blood vessel X.

[1]

(ii) Suggest which type of chamber is affected by this heart attack.

[1]

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

Suggest what caused this blockage.

[1]

(iv) Explain what caused the area of dead cells.

[3]



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

Complete the table.

| 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 |

[5]

[Turn over



- 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 |

Adapted from: www.teamsscience.rocks.com

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

Show your working.

[2]

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

1. _____

_____ [1]

2. _____

_____ [1]



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

They calculated the average number of stomata per mm².

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]



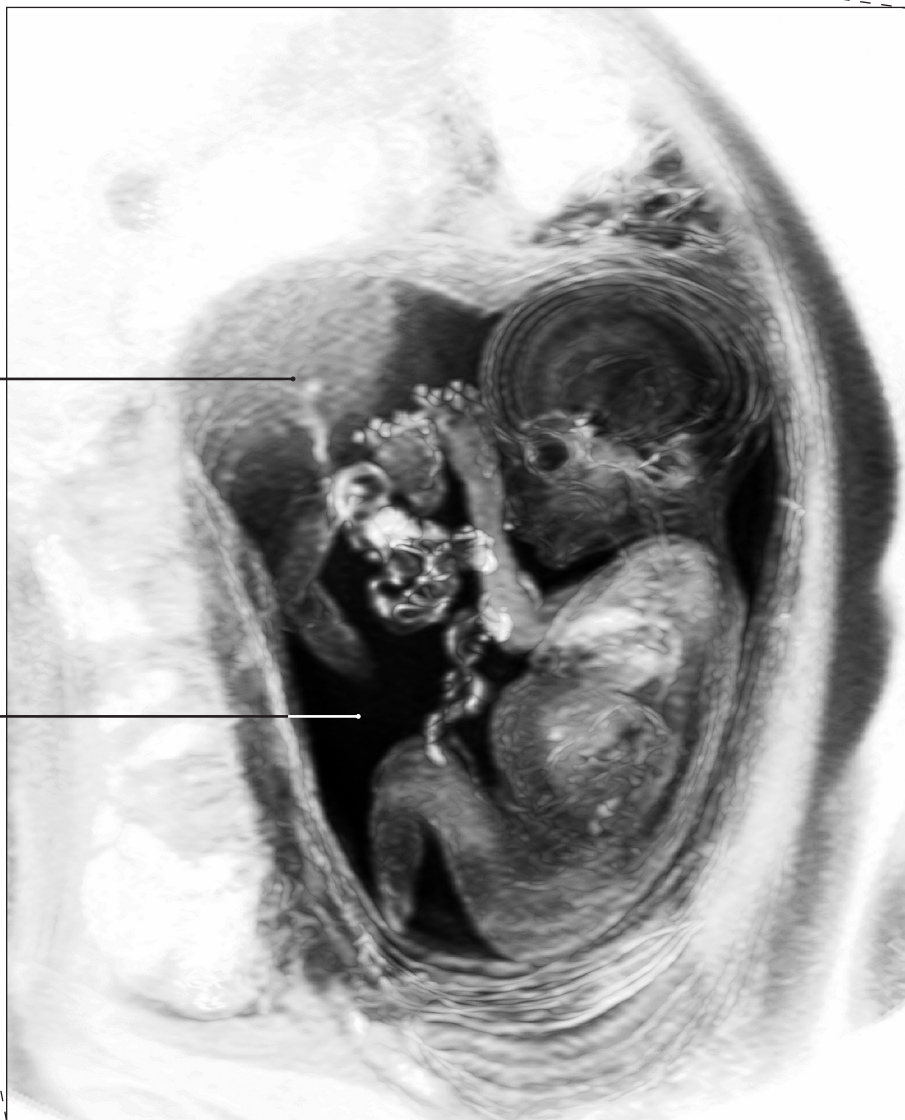
13 The photographs show a pregnant woman and the scan of her foetus.



© Ghislain & Marië David De Lossy /
Science Photo Library

placenta

space A



© Du Cane Medical Imaging Ltd / Science Photo Library



Look at the photographs.

(a) (i) Name the liquid found in space **A**.

[1]

(ii) Explain how the liquid in space **A** protects the foetus.

[1]

(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]

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

[1]

[Turn over



- 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.



[illegible]

- [illegible]

[illegible][illegible]

DO NOT WRITE ON THIS PAGE

| For Examiner's use only | |
|-------------------------|-------|
| Question Number | Marks |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
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| 11 | |
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| 14 | |

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| Total Marks | |
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Examiner Number

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