

FOR OFFICIAL USE

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Mark

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NATIONAL QUALIFICATIONS 2015

BIOLOGY
INTERMEDIATE 1

X007/10/02

WEDNESDAY, 13 MAY
9.00 AM – 10.30 AM



Fill in these boxes and read what is printed below.

Full name of centre

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Town

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Forename(s)

--

Surname

--

Number of seat

--

Date of birth

Day

Month

Year

Scottish candidate number

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SECTION A (25 marks)

Instructions for completion of Section A are given on page two.

For this section of the examination you must use an **HB pencil**.

SECTION B (50 marks)

- 1 All questions should be attempted.
- 2 The questions may be answered in any order but all answers are to be written in the spaces provided in this answer book, **and must be written clearly and legibly in ink**.
- 3 Additional space for answers will be found at the end of the book. If further space is required, supplementary sheets may be obtained from the Invigilator and should be inserted inside the **front** cover of this book.
- 4 The numbers of questions must be clearly inserted with any answers written in the additional space.
- 5 Rough work, if any should be necessary, should be written in this book and then scored through when the fair copy has been written. If further space is required, a supplementary sheet for rough work may be obtained from the Invigilator.
- 6 Before leaving the examination room you must give this book to the Invigilator. If you do not, you may lose all the marks for this paper.

Use **blue** or **black** ink only.



Read carefully

- 1 Check that the answer sheet provided is for **Biology Intermediate 1 (Section A)**.
- 2 For this section of the examination you must use an **HB pencil**, and where necessary, an eraser.
- 3 Check that the answer sheet you have been given has **your name, date of birth, SCN** (Scottish Candidate Number) and **Centre Name** printed on it.
Do not change any of these details.
- 4 If any of this information is wrong, tell the Invigilator immediately.
- 5 If this information is correct, **print** your name and seat number in the boxes provided.
- 6 The answer to each question is **either** A, B, C or D. Decide what your answer is, then, using your pencil, put a horizontal line in the space provided (see sample question below).
- 7 There is **only one correct** answer to each question.
- 8 Any rough working should be done on the question paper or the rough working sheet, **not** on your answer sheet.
- 9 At the end of the examination, put the **answer sheet for Section A inside the front cover of this answer book**.

Sample Question

Which of the following foods contains a high proportion of fat?

- A Butter
- B Bread
- C Sugar
- D Apple

The correct answer is **A**—Butter. The answer **A** has been clearly marked in **pencil** with a horizontal line (see below).



Changing an answer

If you decide to change your answer, carefully erase your first answer and, using your pencil, fill in the answer you want. The answer below has been changed to **D**.

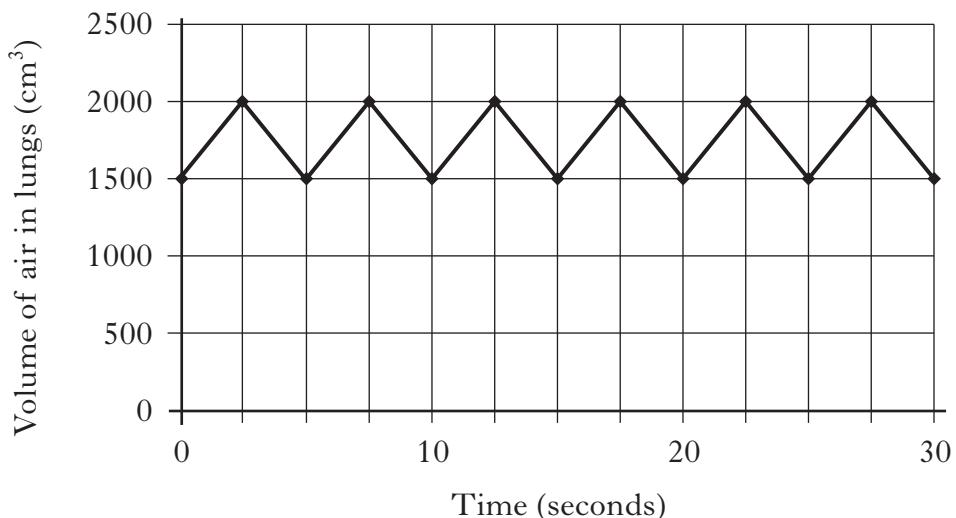


SECTION A

All questions in this section should be attempted.

Answers should be given on the separate answer sheet provided.

1. The maximum volume of air breathed out of the lungs in one breath after maximum inspiration is the
 - peak flow
 - tidal volume
 - vital capacity
 - breathing rate.
2. The graph below shows the volume of air in a student's lungs during a thirty second period of time.



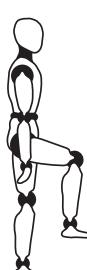
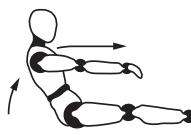
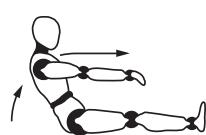
The student's breathing rate, in breaths per minute, was

- 6
- 12
- 500
- 3000.

[Turn over



3. Groups of students took part in an investigation into the effect of exercise on pulse rate, as shown in the table below.

<p><i>Group 1</i></p>  <p>Males Heavy exercise: 50 Step-Ups</p>	<p><i>Group 2</i></p>  <p>Males Light exercise: 10 Step-Ups</p>
<p><i>Group 3</i></p>  <p>Females Heavy exercise: 50 Step-Ups</p>	<p><i>Group 4</i></p>  <p>Females Heavy exercise: 50 Sit-Ups</p>
<p><i>Group 5</i></p>  <p>Males Light exercise: 10 Sit-Ups</p>	<p><i>Group 6</i></p>  <p>Females Light exercise: 10 Step-Ups</p>

Which two groups should be compared to investigate the effect of the sex of an individual on their pulse rate during exercise?

- A 1 and 6
- B 2 and 6
- C 3 and 4
- D 5 and 6

4. An **unfit** person is most likely to have a

- A long recovery time and a low resting pulse rate
- B short recovery time and a high resting pulse rate
- C long recovery time and a high resting pulse rate
- D short recovery time and a low resting pulse rate.



5. Low and high blood pressure can cause health problems.

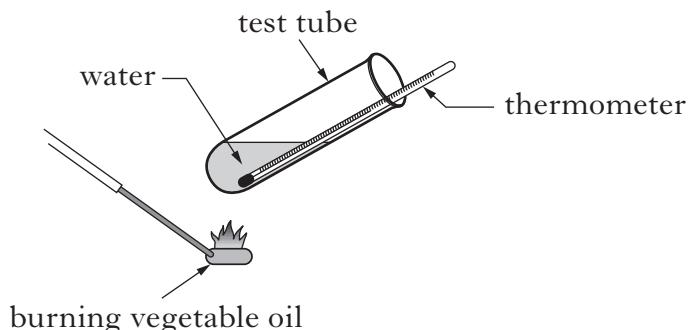
Which line in the table below correctly describes a health problem linked to blood pressure?

	<i>Blood pressure</i>	<i>Health problem</i>
A	low	angina
B	low	heart attack
C	high	fainting
D	high	stroke

6. Which line in the table below correctly matches a food group to its use in a healthy body?

	<i>Food group</i>	<i>Use</i>
A	vitamins	energy
B	carbohydrates	protection against deficiency disease
C	protein	growth and repair of cells
D	fats	growth and repair of cells

7. A student used the apparatus below to investigate the release of energy from two fatty foods: vegetable oil and butter.

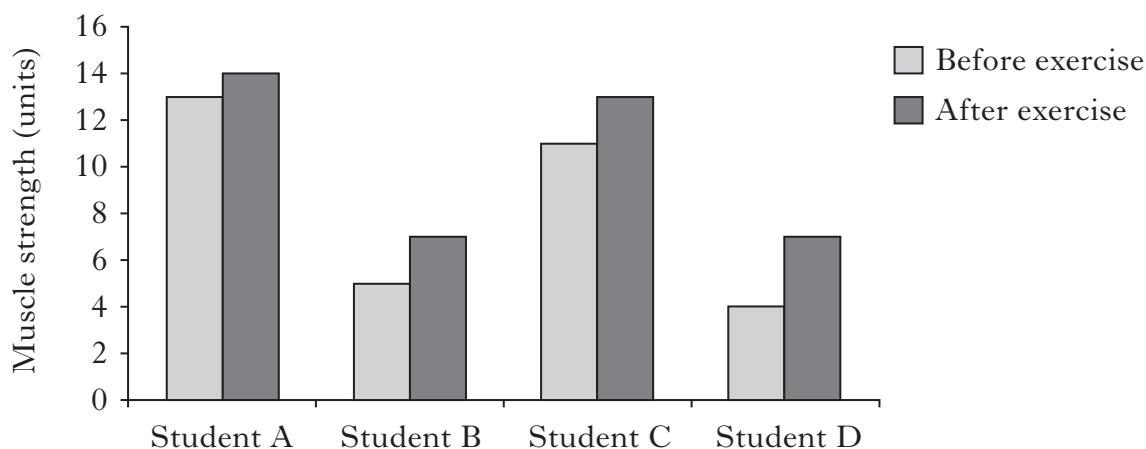


Which of the following should be changed when the procedure is repeated to complete the investigation?

- A Mass of food
- B Type of food
- C Volume of water
- D Starting temperature of water



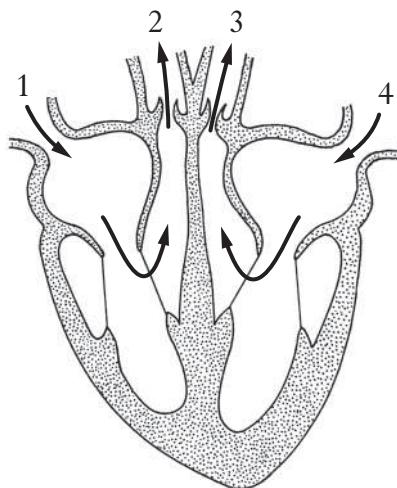
8. The graph below shows the change in muscle strength of four students following a period of regular exercise.



Which student showed the biggest increase in muscle strength?

9. The diagram below represents a human heart and its blood vessels.

The arrows indicate the direction of blood flow.



Which of the blood vessels are arteries?

- A 1 and 2
- B 2 and 3
- C 3 and 4
- D 1 and 4



10. Sweet pea seeds are often **chitted** before sowing.

This is done because

- A the seed coats are thick
- B they are pelleted seeds
- C the seeds are very small
- D it prevents mould attacking the seeds.

11. An investigation was carried out to compare the germination of four different types of seeds.

The results are shown in the table below.

Type of seed	Number of seeds sown	Number of seeds germinated
sunflower	32	17
barley	20	17
geranium	22	11
mustard	26	12

Which type of seed had **less than 50%** seed germination?

- A Sunflower
- B Barley
- C Geranium
- D Mustard

12. One advantage of dormancy in seeds is that germination

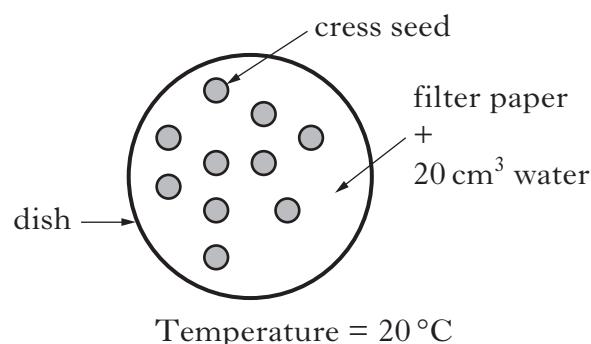
- A is quicker
- B can occur in winter
- C requires less water
- D is delayed until spring.

[Turn over



13. A student investigated if water was needed for cress seeds to germinate.

A dish was set up as shown below.



Which of the following dishes would be a suitable **control** for this experiment?

<p>A</p> <p>A circular dish containing a layer of filter paper. Several cress seeds are scattered on the filter paper. A label indicates '+ 0 cm³ water'. The dish is labeled 'dish' and the temperature is 'Temperature = 20 °C'.</p>	<p>B</p> <p>A circular dish containing a layer of filter paper. Several cress seeds are scattered on the filter paper. A label indicates '+ 0 cm³ water'. The dish is labeled 'dish' and the temperature is 'Temperature = 30 °C'.</p>
<p>C</p> <p>A circular dish containing a layer of filter paper. Several cress seeds are scattered on the filter paper. A label indicates '+ 20 cm³ water'. The dish is labeled 'dish' and the temperature is 'Temperature = 20 °C'.</p>	<p>D</p> <p>A circular dish containing a layer of filter paper. Several cress seeds are scattered on the filter paper. A label indicates '+ 20 cm³ water'. The dish is labeled 'dish' and the temperature is 'Temperature = 30 °C'.</p>



14. An **advantage** of providing heat during plant propagation is that there is

- A faster growth
- B high water loss
- C high energy costs
- D faster spread of diseases.

15. Which line in the table below shows the conditions that would result in the **lowest** water loss in plants?

	<i>Humidity</i>	<i>Temperature</i>
A	high	low
B	low	low
C	low	high
D	high	high

16. Four steps in taking a stem cutting are listed below.

- Step 1: Remove lower leaves from the cutting
- Step 2: Apply rooting powder
- Step 3: Insert the cutting into compost
- Step 4: Cut the stem below a node

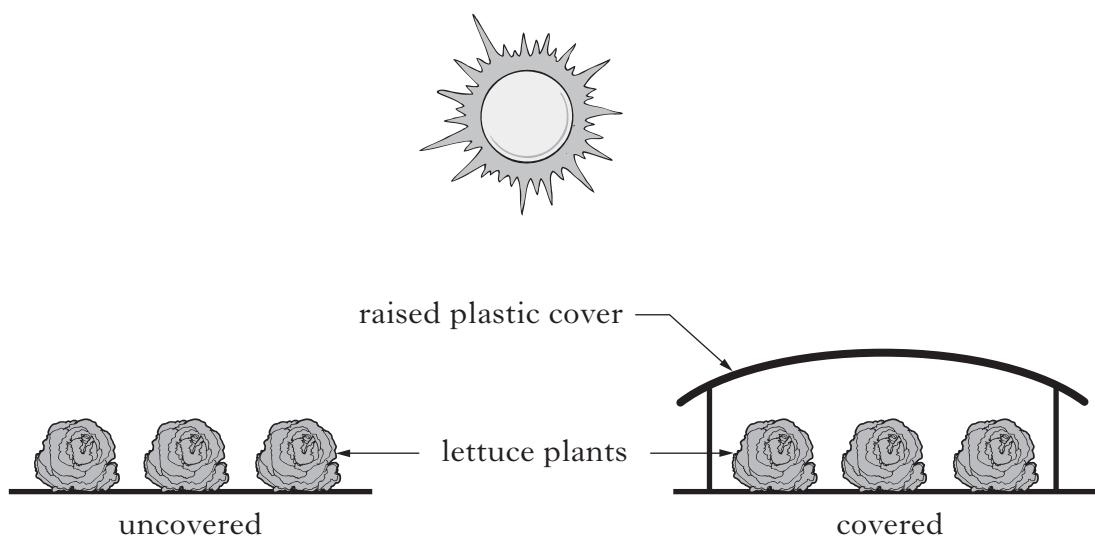
The correct order in which these steps should be carried out is

- A $1 \rightarrow 2 \rightarrow 4 \rightarrow 3$
- B $2 \rightarrow 4 \rightarrow 1 \rightarrow 3$
- C $4 \rightarrow 1 \rightarrow 2 \rightarrow 3$
- D $4 \rightarrow 1 \rightarrow 3 \rightarrow 2$.

[Turn over



17. An investigation was carried out into the effect of a plastic cover on the growth of lettuce plants.



The following measurements were taken during the investigation.

- 1 The temperature of the uncovered soil
- 2 The temperature of the covered soil
- 3 The final mass of the uncovered plants
- 4 The final mass of the covered plants

Which of the measurements should be used to investigate the effect of the plastic cover on the growth of lettuce plants?

- A 1 and 2 only
- B 1 and 3 only
- C 2 and 4 only
- D 3 and 4 only

18. Which of the following statements about the treatment of milk is correct?

- A Milk is pasteurised to kill harmful bacteria.
- B Some water is removed to produce UHT milk.
- C Some fat is removed to produce evaporated milk.
- D Samples are tested with rennet to make sure milk is fit for human consumption.



19. There are 4.0 g of fat in 100 g of whole milk and 2.0 g of fat in 100 g of semi-skimmed milk.

What mass of fat would be present in 100 g of **skimmed** milk?

- A 0.0 g
- B 0.1 g
- C 2.0 g
- D 3.0 g

20. The table below shows the percentage composition of milk from four different types of animals.

<i>Animal</i>	<i>Percentage Composition (%)</i>		
	<i>Protein</i>	<i>Fat</i>	<i>Sugar</i>
buffalo	4.3	7.5	4.8
cow	3.5	3.5	4.5
goat	3.6	4.1	4.1
sheep	5.8	6.7	4.8

Water, vitamins and minerals make up the rest of the milk.

Which type of milk has most water, vitamins and minerals?

- A Buffalo
- B Cow
- C Goat
- D Sheep

21. Which of the following is added to milk to make yoghurt?

- A Rennet
- B Yeast
- C Enzymes
- D Bacteria

[Turn over



22. The table below shows information about some detergents.

<i>Detergent</i>	<i>Digests stains at lower temperatures</i>	<i>Damages delicate fibres</i>
A	no	yes
B	yes	yes
C	no	no
D	yes	no

Which is the biological detergent?

23. The release of detergents into rivers and lakes can cause an increase in the growth of algae.

Which line in the table below shows the effects when these algae die?

	<i>Numbers of bacteria</i>	<i>Availability of oxygen</i>	<i>Numbers and types of other organisms</i>
A	↑	↓	↑
B	↑	↓	↓
C	↓	↑	↓
D	↓	↑	↑

↑	Increase
↓	Decrease



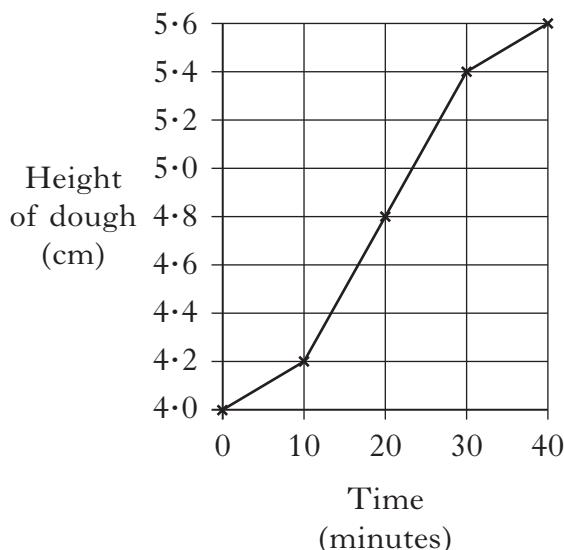
* X 0 0 7 1 0 0 2 1 2 *

24. The results from an investigation on the rising of bread dough are shown below.

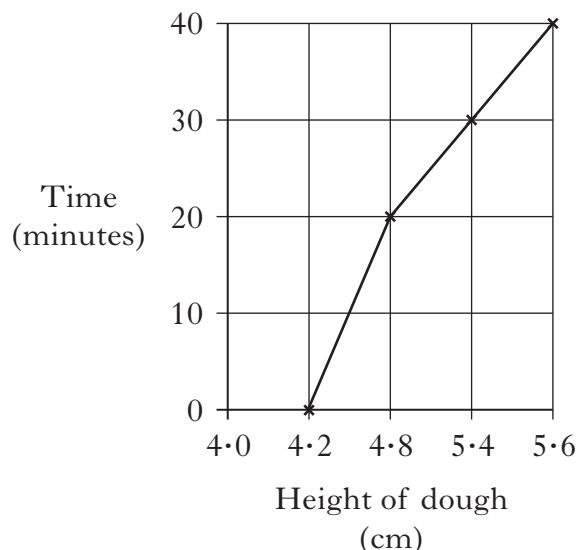
Time (minutes)	10	20	30	40
Height of dough (cm)	4.2	4.8	5.4	5.6

Which of the following graphs presents these results correctly?

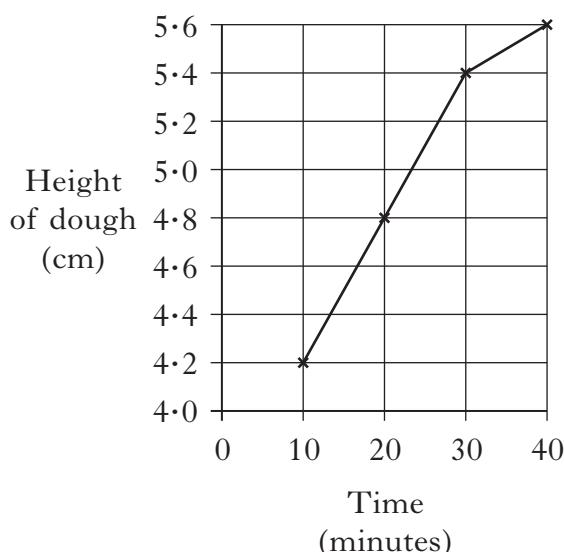
A



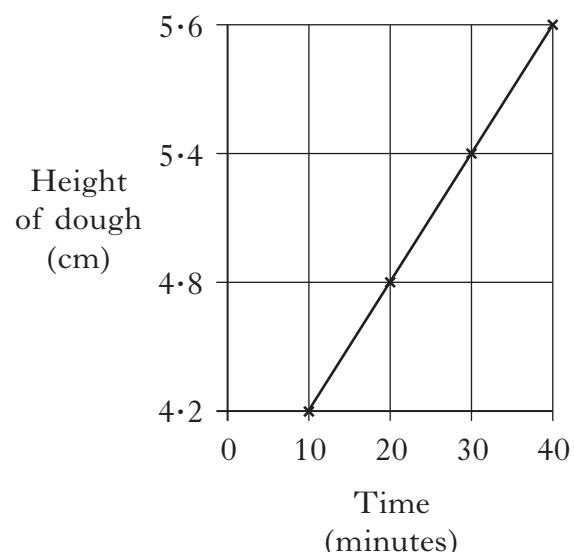
B



C



D

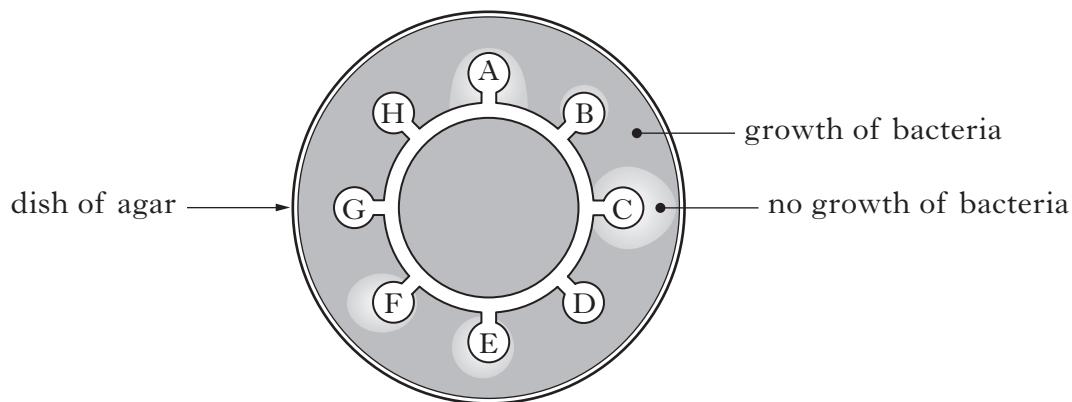


[Turn over



25. A disc containing eight different antibiotics (A–H) was placed on a plate on which one type of bacteria was growing.

The diagram below shows the appearance of the plate after being kept at 25 °C for 48 hours.



The **reliability** of this investigation would be increased by repeating the experiment using

- A a different type of bacteria and different antibiotics
- B a different type of bacteria and the same antibiotics
- C the same type of bacteria and the same antibiotics
- D the same type of bacteria and different antibiotics.

Candidates are reminded that the answer sheet for Section A MUST be returned inside this answer book.



[Turn over for SECTION B on *Page sixteen*

[DO NOT WRITE ON THIS PAGE]



SECTION B

All questions in this Section should be attempted.

Marks

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All answers must be written clearly and legibly in blue or black ink.

1. (a) Read the following passage carefully.

Antibiotics

Antibiotics have been used since the 1930s to prevent or treat a wide variety of infections in plants, animals and humans.

The word “antibiotic” comes from the Greek words “anti” (against) and “bios” (life).

Most antibiotic discoveries and developments were made between 1928 and 1940, including Alexander Fleming’s development of penicillin from the *Penicillium* fungus.

More than 90% of antibiotics are made from bacteria, fungi or moulds and there are 160 varieties in use today.

Use the information **in the passage** to answer the following questions.

- (i) Name the **two** groups of organisms, other than humans, in which infections are treated using antibiotics.

_____ and _____.

1

- (ii) When were most antibiotics discovered or developed?

1

- (iii) Calculate the percentage of antibiotics which are **not** made from bacteria, fungi or moulds.

Space for calculation

_____ %

1

- (b) State **one** possible effect on bacteria of the over-use of antibiotics.

1

- (c) Name the type of chemicals used to treat infections such as athlete’s foot and thrush.

1



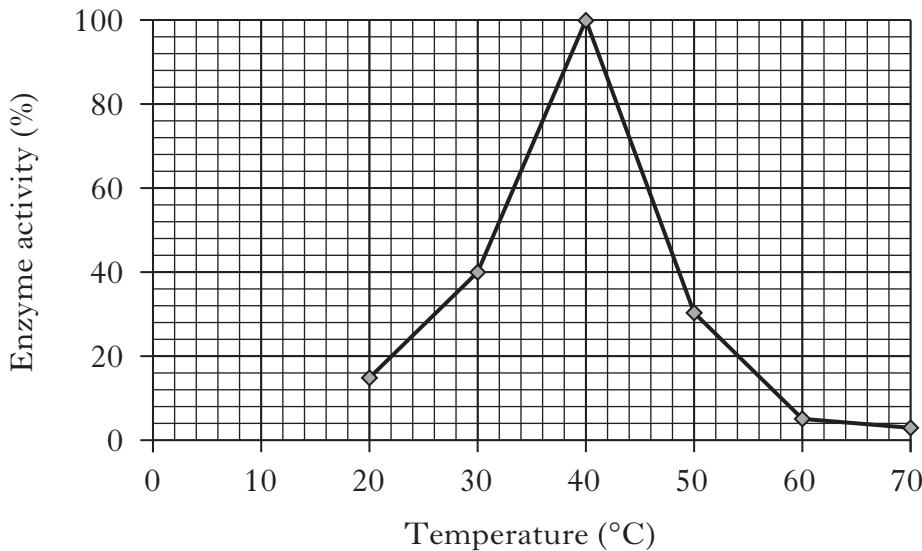
* X 0 0 7 1 0 0 2 1 6 *

2. (a) The activity of an enzyme from a biological washing powder was tested at different temperatures.

Marks

The results are shown in the graph below.

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THIS
MARGIN



- (i) Complete the table below to show the enzyme activity at each temperature.

Temperature (°C)	Enzyme activity (%)
20	15
	40
40	100
50	
60	5
70	3

1

- (ii) At which temperature would a washing powder containing this enzyme be best at removing stains?

_____ °C

1

- (b) Name the type of micro-organism which produces large quantities of enzymes when grown in industrial fermenters.

1

- (c) Explain why the enzymes in biological washing powders are enclosed in a harmless coating.

1



* X 0 0 7 1 0 0 2 1 7 *

3. (a) During the production of cheese, the time taken for it to set and its firmness are affected by temperature and acidity (pH).

The table below shows the firmness of cheese produced in different conditions.

Temperature (°C)	Acidity (pH)	Time taken to set (s)	Firmness
12	5.5	80	soft
12	6.0	135	very soft
28	5.5	60	very firm
28	6.0	100	firm

Use the information in the table to answer the following questions.

- (i) Describe the effect on the firmness of cheese as the temperature is increased.

1

- (ii) Identify the temperature **and** acidity at which cheese would set fastest.

Temperature _____ °C

Acidity (pH) _____

1

- (b) Name the substance which clots the protein in milk during cheese-making.

1



* X 0 0 7 1 0 0 2 1 8 *

3. (continued)

- (c) The following table shows the percentage (%) of fat and sugar in three yoghurts: A, B and C.

Yoghurt	Percentage (%)	
	fat	sugar
A	2·8	3·9
B	4·0	4·5
C	0·4	3·0

- (i) The **range** of the percentage of sugar in the three yoghurts is from

_____ to _____ % **1**

- (ii) Calculate the **simple whole number ratio** of the percentage fat in yoghurt A compared to yoghurt C.

Space for calculation

_____ : _____ **1**
Yoghurt A Yoghurt C

[Turn over



* X 0 0 7 1 0 0 2 1 9 *

4. (a) Fermented milk drinks can be made by adding an enzyme and a micro-organism to milk.

Name the type of micro-organism used in this process.

1

- (b) The table below shows three features of beers.

Complete the table by inserting ticks (✓) to indicate whether each feature refers to cask conditioned beer, brewery conditioned beer or both types of beer.

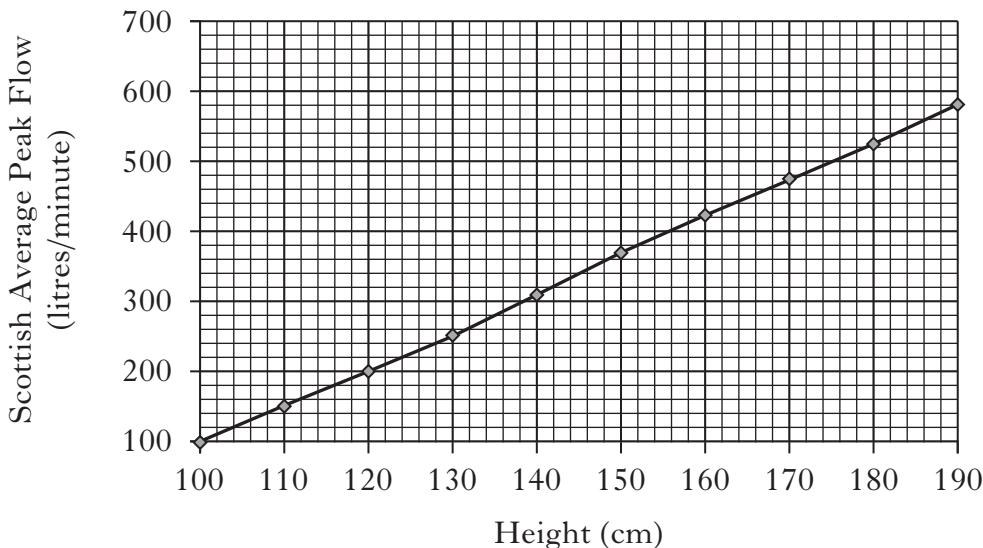
<i>Features of beers</i>	<i>Type of beer</i>	
	<i>Cask conditioned</i>	<i>Brewery conditioned</i>
Yeast is not removed		
Alcohol is produced		
Extra carbon dioxide is added		

2



* X 0 0 7 1 0 0 2 2 0 *

5. (a) The graph below shows the Scottish average **peak flow** for children of different heights.



- (i) State **one** conclusion that can be drawn from the information in the graph.

1

- (ii) A child with a height of 130 cm has a peak flow of 300 litres/minute.

Which of the following would best describe this child's peak flow?

Tick (✓) the correct box.

Above Scottish average

Scottish average

Below Scottish average

1

- (b) A child repeatedly has a peak flow reading below the average for their height.

Name **one** medical condition that this child may be diagnosed with.

1

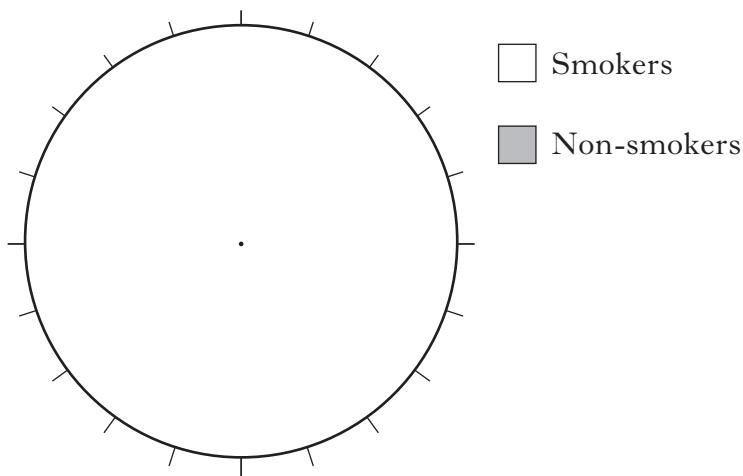


* X 0 0 7 1 0 0 2 2 1 *

6. (a) Smoking cigarettes is the main cause of deaths from lung cancer in the UK. Only 15% of people who die from lung cancer are non-smokers.

Present this information in the pie chart below.

Deaths from lung cancer



1

- (b) The photograph below shows a scan of a healthy unborn baby.



Smoking when pregnant can damage the health of the baby.

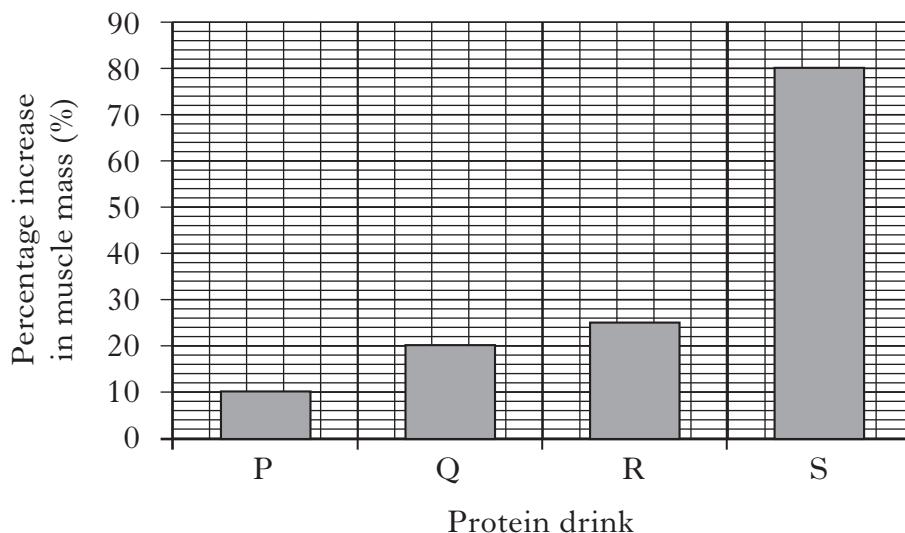
Name **one other** health risk during pregnancy that could affect the baby.

1



7. It is claimed that protein drinks P, Q, R and S increase muscle growth if consumed regularly by bodybuilders.

The graph below shows the percentage increase of muscle mass in bodybuilders due to regular consumption of each of these protein drinks.



- (a) (i) A bodybuilder weighing 100 kg has a muscle mass of 40 kg. He starts to regularly take protein drink P.

Calculate his new total muscle mass due to taking the protein drink.

Space for calculation

New total muscle mass = _____ kg

1

- (ii) How many times greater is the percentage increase in muscle mass when consuming protein drink S compared to protein drink Q?

Space for calculation

_____ times greater 1



7. (continued)

- (b) Decide if the following statements about muscles are **True** or **False** and tick (✓) the appropriate box.

If the statement is **false**, write the correct word in the **correction** box to replace the word underlined.

<i>Statement</i>	<i>True</i>	<i>False</i>	<i>Correction</i>
During exercise, <u>carbon dioxide</u> uptake in the muscles is increased.			
Muscle fatigue occurs when <u>insufficient</u> oxygen is available to the muscles.			

2



* X 0 0 7 1 0 0 2 2 4 *

8. (a) Physiological measurements are useful as indicators of health. Complete the table below to show the correct instrument used to make each physiological measurement.

<i>Physiological measurement</i>	<i>Instrument</i>
body fat	
	clinical thermometer
	digital sphygmomanometer

2

- (b) Underline one option in each set of brackets to make the sentences below correct.

(i) In capillaries, $\left. \begin{matrix} \text{nutrients} \\ \text{waste} \end{matrix} \right\}$ and $\left. \begin{matrix} \text{carbon dioxide} \\ \text{oxygen} \end{matrix} \right\}$

pass from the blood into the tissues.

1

(ii) At the same time, $\left. \begin{matrix} \text{carbon dioxide} \\ \text{oxygen} \end{matrix} \right\}$ and $\left. \begin{matrix} \text{nutrients} \\ \text{waste} \end{matrix} \right\}$

leave the tissues and pass into the blood.

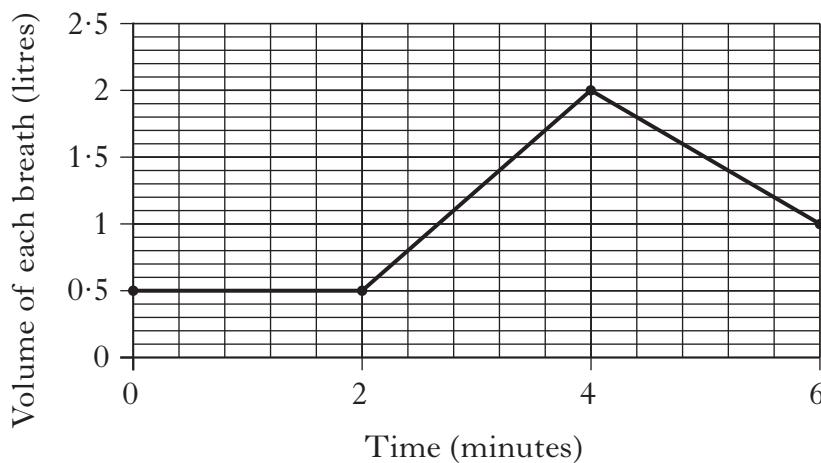
1

[Turn over



* X 0 0 7 1 0 0 2 2 5 *

9. (a) The graph below shows the volume of each breath of a student before, during and after exercise.



- (i) For how long did the student exercise?

_____ minutes

1

- (ii) Calculate the increase in volume of the student's breath between its lowest and highest points.

Space for calculation

_____ litres

1

- (b) The table below shows the student's pulse rate at the start and end of the period of exercise.

	Pulse rate (beats per minute)
Start of period of exercise	69
End of period of exercise	85

What would the student's pulse rate be at the end of their recovery time?

_____ beats per minute

1



10. (a) During an investigation, a student deadheaded five different types of plant in a garden.

He then counted the number of new flowers produced by each of the plants two weeks later.

The results are shown in the table below.

<i>Name of plant</i>	<i>Number of new flowers</i>
Fuchsia	10
Tea rose	4
Marigold	13
Chrysanthemum	6
Hydrangea	9

- (i) On the grid below, complete the **bar graph** by

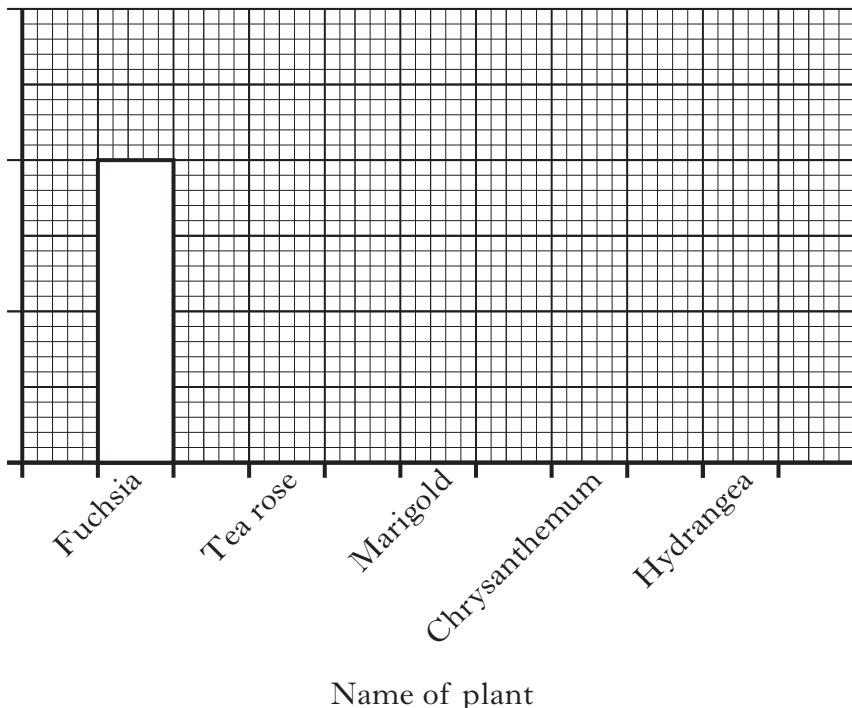
1 providing a label and scale on the vertical axis;

2 plotting the remaining results.

1

1

(Additional graph paper, if required, will be found on
Page thirty-two.)



[Turn over



* X 0 0 7 1 0 0 2 2 7 *

10. (a) (continued)

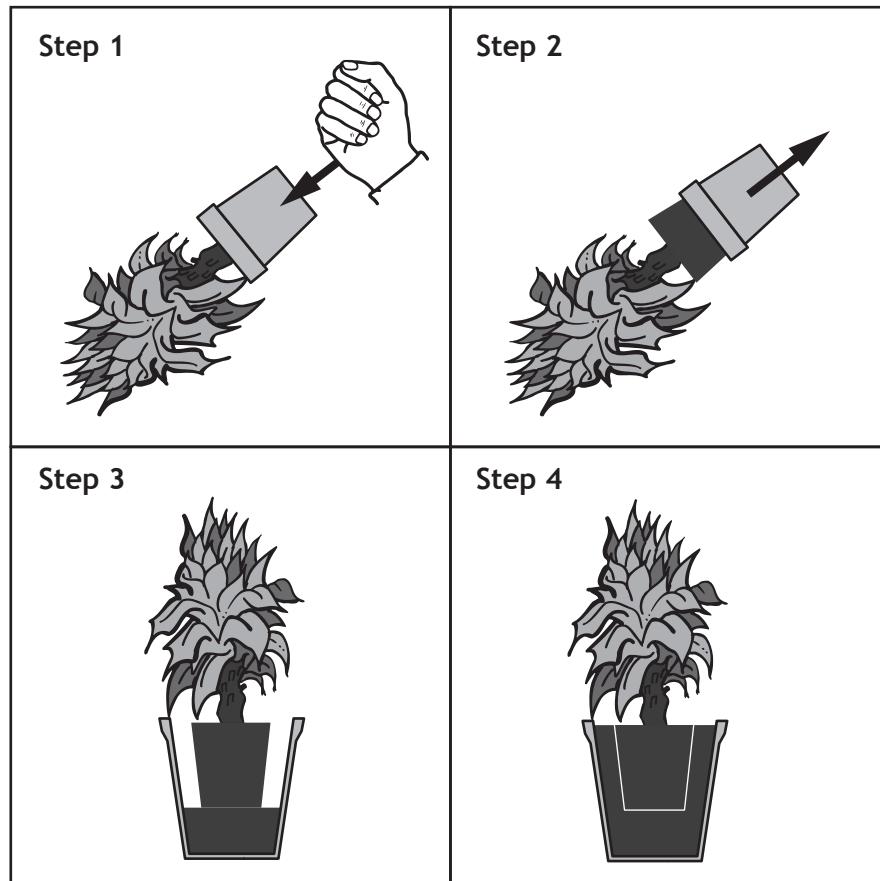
- (ii) The student stated that deadheading any plant results in new flowers being produced.

Explain why this is **not** a valid conclusion.

1

- (b) Deadheading is one method of maintaining plants.

The pictures below show a different method of maintaining plants.



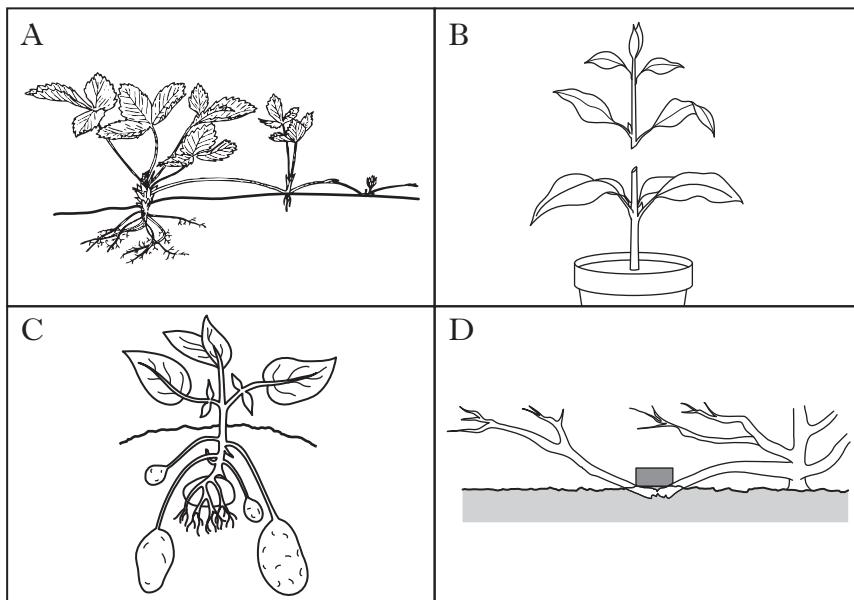
Name the procedure which is being carried out on this plant.

1



* X 0 0 7 1 0 0 2 2 8 *

11. (a) The diagrams below show four methods of propagating plants.



- (i) Use the letters from the diagrams above to identify the following.

- 1 **Two** methods of **artificial** propagation

Letters _____

1

- 2 Propagation by runners

Letter _____

1

- (ii) Name the **type** of food storage organ shown in diagram C above.

1

- (b) Phosphorus (P) is a mineral required for root growth.

Name **one** other mineral and state why it is important for plant growth.

Mineral: _____

Importance for plant growth: _____

1



* X 0 0 7 1 0 0 2 2 9 *

12. (a) Sweet pea seedlings were grown in suitable conditions for 6 weeks.

Marks

DO NOT
WRITE IN
THIS
MARGIN

At the start of each week over the 6 week period, 20 of the seedlings were washed clean and weighed.

The results are shown in the table below.

<i>Age of seedling (weeks)</i>	Start	1	2	3	4	5	6
<i>Mass of 20 seedlings (g)</i>	12	10	6	4	12	30	60

- (i) On the grid below, complete the **line graph** to show the mass of 20 seedlings over the 6 week period by:

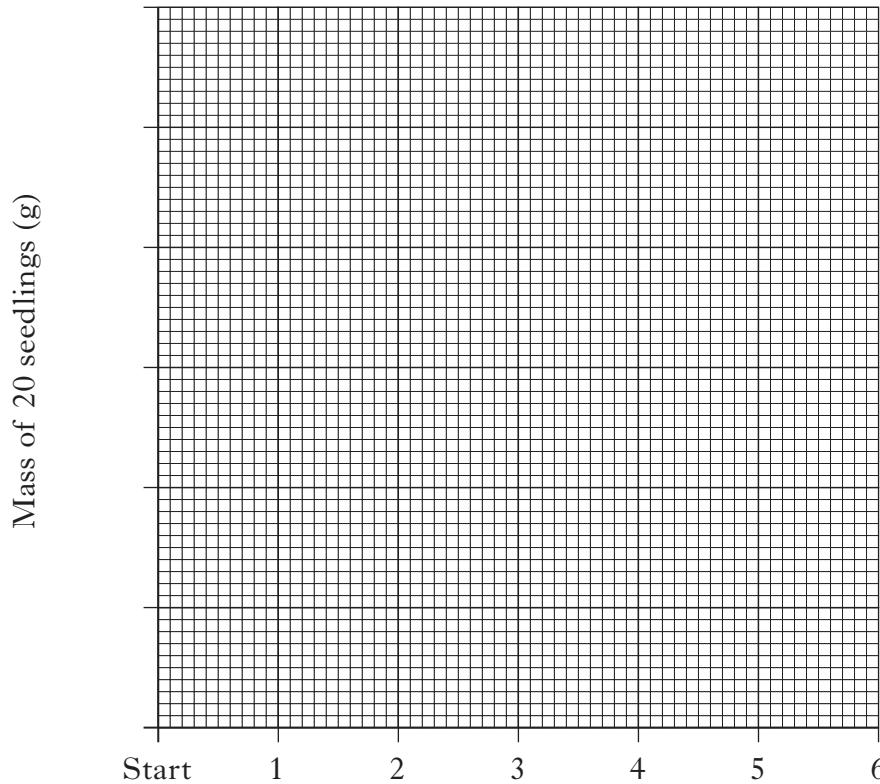
- 1 labelling the horizontal axis;
- 2 adding a scale to the vertical axis;
- 3 plotting the results.

1

1

1

(Additional graph paper, if required, will be found on *Page thirty-three*.)



- (ii) At what age did the seedlings have the lowest mass?

_____ weeks

1



12. (a) continued

- (iii) Calculate the average mass of a single seedling at age 6 weeks.

Space for calculation

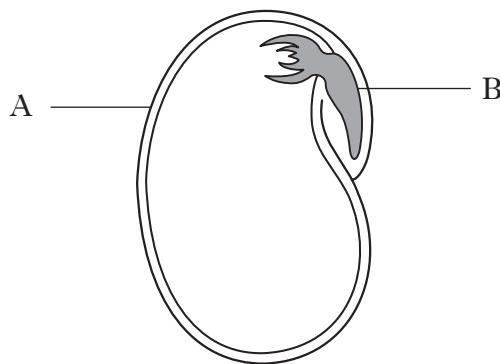
_____ g 1

- (iv) Each week of the investigation, 20 seedlings were sampled.

Explain why this was a good experimental technique.

_____ 1

- (b) The diagram below shows the structure of a seed.



- (i) Describe the function of the part labelled A.

_____ 1

- (ii) Name the part labelled B.

_____ 1

- (c) Water is one condition required for the germination of seeds.

Name **one** other condition required for seed germination.

_____ 1

[END OF QUESTION PAPER]

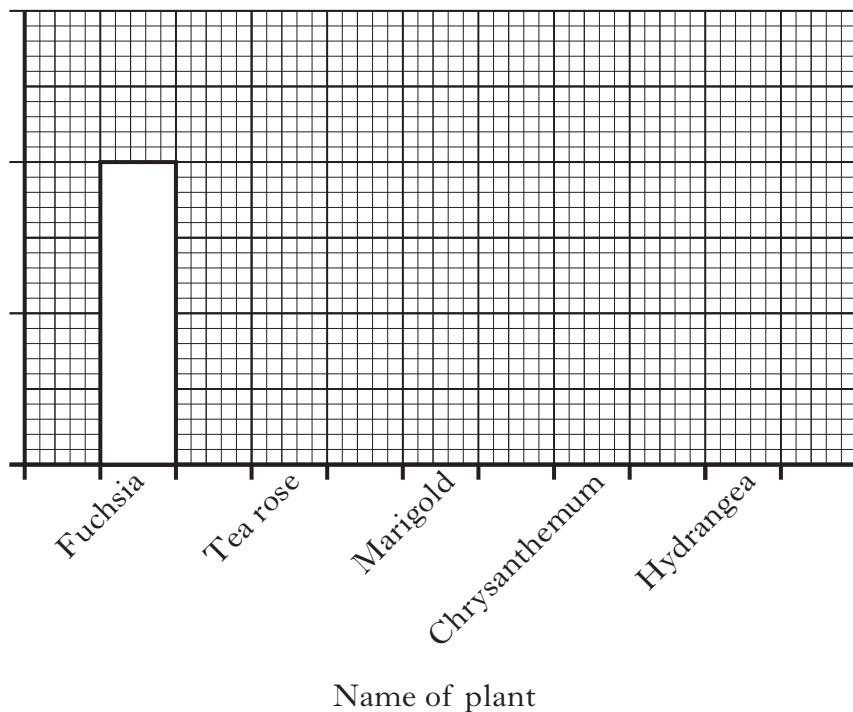


* X 0 0 7 1 0 0 2 3 1 *

SPACE FOR ANSWERS

ADDITIONAL GRAPH FOR QUESTION 10(a)(i)

DO NOT
WRITE IN
THIS
MARGIN



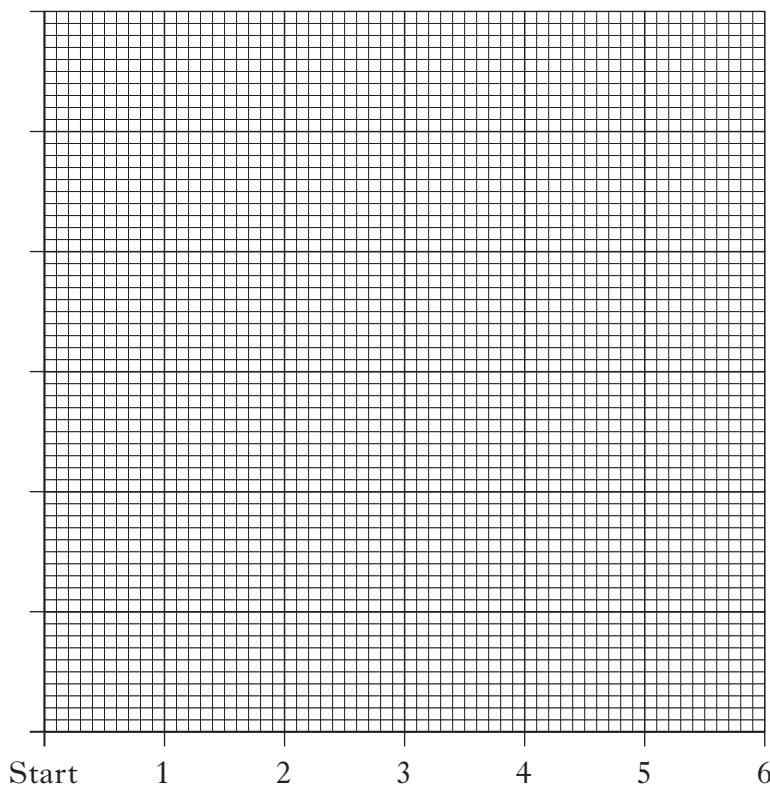
* X 0 0 7 1 0 0 2 3 2 *

SPACE FOR ANSWERS

ADDITIONAL GRAPH FOR QUESTION 12(a)(i)

DO NOT
WRITE IN
THIS
MARGIN

Mass of 20 seedlings (g)



ADDITIONAL SPACE FOR ANSWERS

DO NOT
WRITE IN
THIS
MARGIN



* X 0 0 7 1 0 0 2 3 4 *

ADDITIONAL SPACE FOR ANSWERS

DO NOT
WRITE IN
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* X 0 0 7 1 0 0 2 3 5 *

ACKNOWLEDGEMENT

Section B Q6(b) – Alex Mit/shutterstock.com

