FOR OFFICIAL USE

X007/101

X0071002 1

Section B Total

NATIONAL QUALIFICATIONS 2011

WEDNESDAY, 1 JUNE 9.00 AM – 10.30 AM

BIOLOGY INTERMEDIATE 1

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

Scottish candidate number

Number of seat

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?

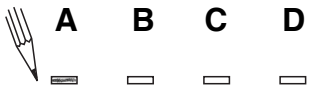
A Butter

B Bread

C Sugar

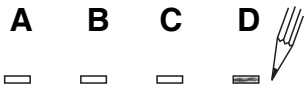
D Apple

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 picture below shows an antifungal cream.

Which of the following medical conditions can **both** be treated with this cream?

A Anaemia and athlete's foot

B Eczema and angina

C Thrush and anaemia

D Thrush and athlete's foot

2. Which of the following explains why bacteria are developing resistance to antibiotics?

A The range of antibiotics is increasing.

B Different antibiotics are effective against different bacteria.

C Antibiotics only act on bacteria and not viruses.

D Antibiotics are being over-used.

3. Three different micro-organisms, X, Y and Z, were grown in separate fermenters.

Each micro-organism produced a different antibiotic.

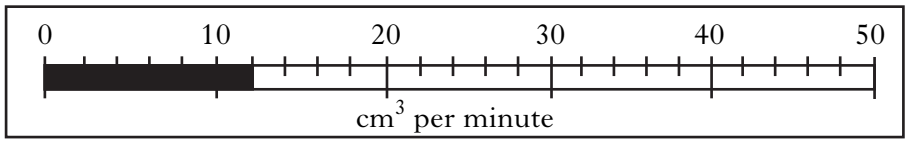
The mass per litre of antibiotic produced by each micro-organism is shown in the table below.

Micro-organism	*Mass per litre of antibiotic produced* (mg)
X	10
Y	15
Z	30

Which of the following shows the **simple whole number ratio** of the mass per litre of antibiotic produced by X, Y and Z?

	X : *Y* : *Z*
A	1 : 2 : 1
B	2 : 3 : 6
C	6 : 3 : 2
D	10 : 15 : 30

4. The scale below shows how much oxygen is delivered to a fermenter in **one minute**.



How much oxygen would be delivered in **one hour**?

A 11 cm^3

B 12 cm^3

C 660 cm^3

D 720 cm^3

5. Fermented milk drinks are produced using

A rennet and whey

B yeast and whey

C an enzyme and rennet

D an enzyme and yeast.

6. Pasteurised milk has been treated to

A destroy disease-causing microbes

B remove some of the fat

C preserve the milk

D destroy the microbes which cause the milk to sour.

7. Which of the following is produced by **upgrading** the waste from yeast-based industries?

A Animal feed such as cattle cake

B Colouring for salmon flesh

C Flavouring for crisps

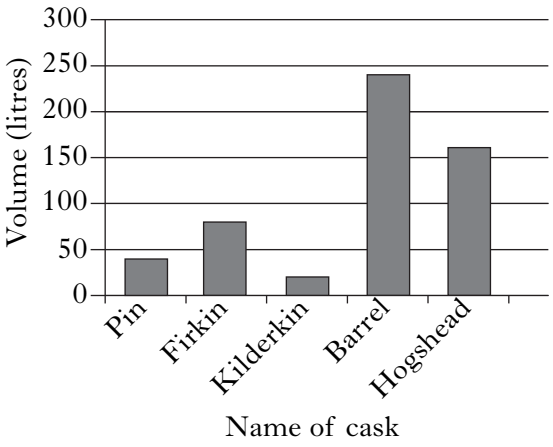
D Rennet for use in cheese making

8. The table below shows the volumes of five different casks used to contain beer.

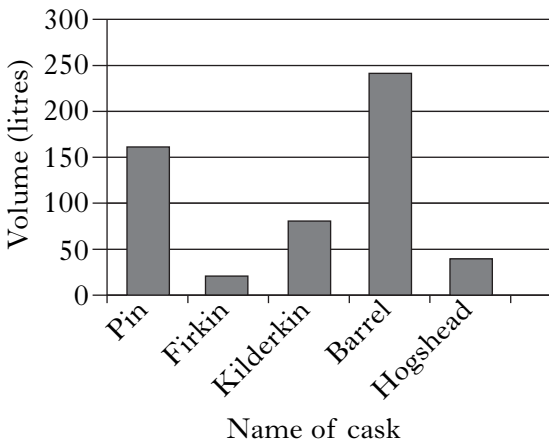
Name of cask	*Volume* (litres)
Pin	20
Firkin	40
Kilderkin	80
Barrel	160
Hogshead	240

Which of the following bar charts represents this information?

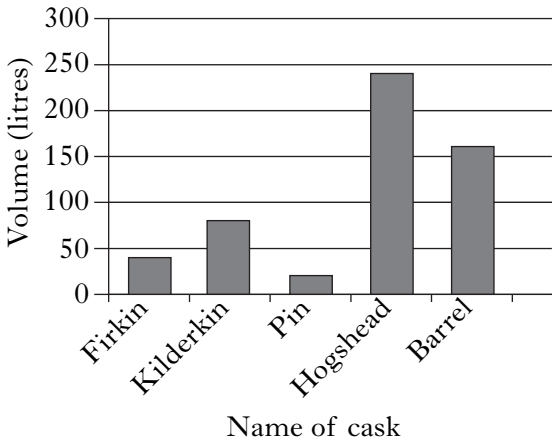
A



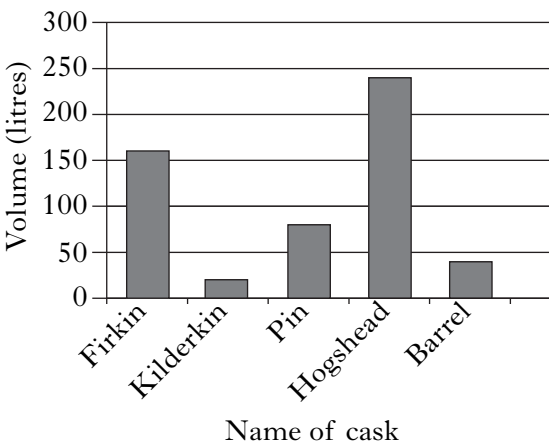
B



C

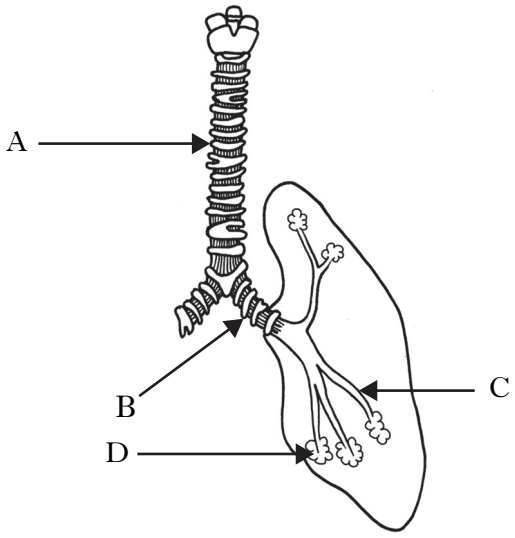


D



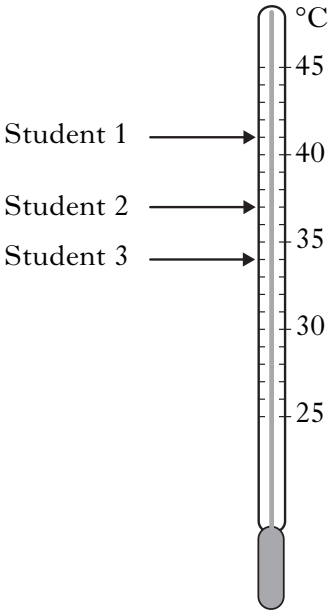
[Turn over

9. The diagram below shows part of the human breathing system.



Where does oxygen pass into the blood?

10. The thermometer below shows the body temperature of three students.



Which line in the table below indicates the relationship between the body temperature of each student and their health?

	Student 1	*Student 2*	*Student 3*
A	Healthy	Fever	Hypothermia
B	Fever	Healthy	Hypothermia
C	Fever	Hypothermia	Healthy
D	Hypothermia	Healthy	Fever

11. The table below shows the number of people with different health conditions in a nursing home.

Health condition	*Number of people*
angina	10
high blood pressure	5
high cholesterol	3
arthritis	2

What percentage of these people has high blood pressure?

A 5 %

B 15 %

C 20 %

D 25 %

12. The medical condition anaemia can be detected by blood tests that show

A the presence of antibodies

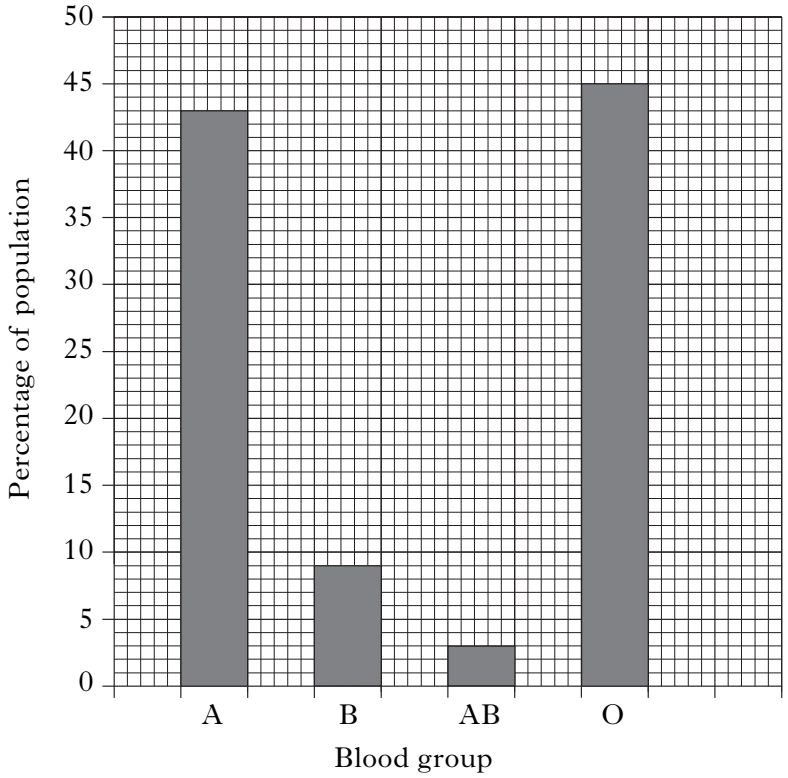
B a low iron content

C an abnormal blood cell count

D a high sugar level.

[Turn over

13. The graph below shows the percentage of a population with blood groups A, B, AB and O.



What percentage of the population has either blood group A **or** blood group B?

A 3 %

B 48 %

C 52 %

D 55 %

14. The list below refers to breathing.

1 Breathing rate increases and depth of breathing decreases

2 Breathing rate increases and depth of breathing increases

3 Rate of gas exchange increases

Which of the following correctly describes what happens during exercise?

A 1 only

B 2 only

C 1 and 3 only

D 2 and 3 only

15. Capillaries are blood vessels which allow

A oxygen and nutrients to enter the tissues

B carbon dioxide and waste to enter the tissues

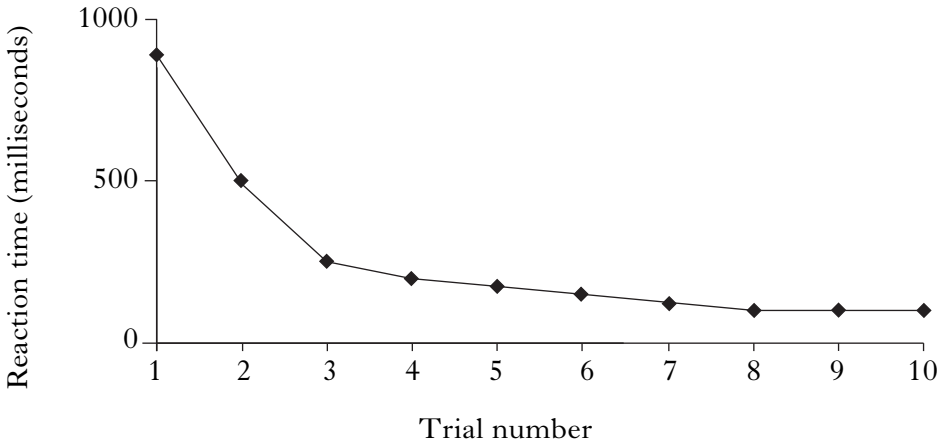
C oxygen and waste to leave the tissues

D carbon dioxide and nutrients to leave the tissues.

16. Which line in the table below shows the cause of muscle fatigue and how it is relieved?

	Cause of muscle fatigue	*Relieved by*
A	too little oxygen	more exercise
B	too much oxygen	more exercise
C	too little oxygen	relaxation
D	too much oxygen	relaxation

17. The graph below shows a student's reaction time over ten trials.



The change in reaction time shown on the graph is most likely to have been due to

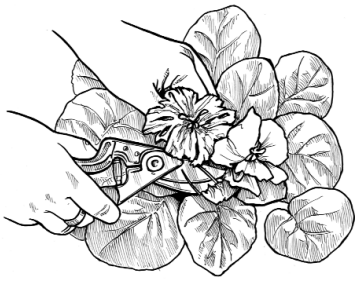
A fatigue

B practice

C a nerve disorder

D drinking alcohol.

18. A gardener carefully removed withered flowers from an African Violet plant to encourage further flowering, as shown in the following diagram.



This is called

A pricking out

B dead heading

C potting on

D taking cuttings.

19. Four methods of plant propagation are listed below.

1 runners

2 cuttings

3 offsets

4 layering

Which of the following are both **artificial** methods of plant propagation?

A 1 and 3

B 1 and 4

C 2 and 3

D 2 and 4

20. The table below shows the number of new plants growing on five spider plants and five Mother of Thousands plants.

	Number of new plants				
Type of plant	*Plant 1*	*Plant 2*	*Plant 3*	*Plant 4*	*Plant 5*
Mother of Thousands plant	12	19	15	8	36
Spider plant	2	8	5	3	2

Which of the following shows the average number of new plants on each type of plant?

	Average number of new plants	
	Mother of Thousands plant	*Spider plant*
A	4	18
B	18	4
C	20	90
D	90	20

21. What name is given to fine seeds that are enclosed in a ball of clay?

A Pelleted

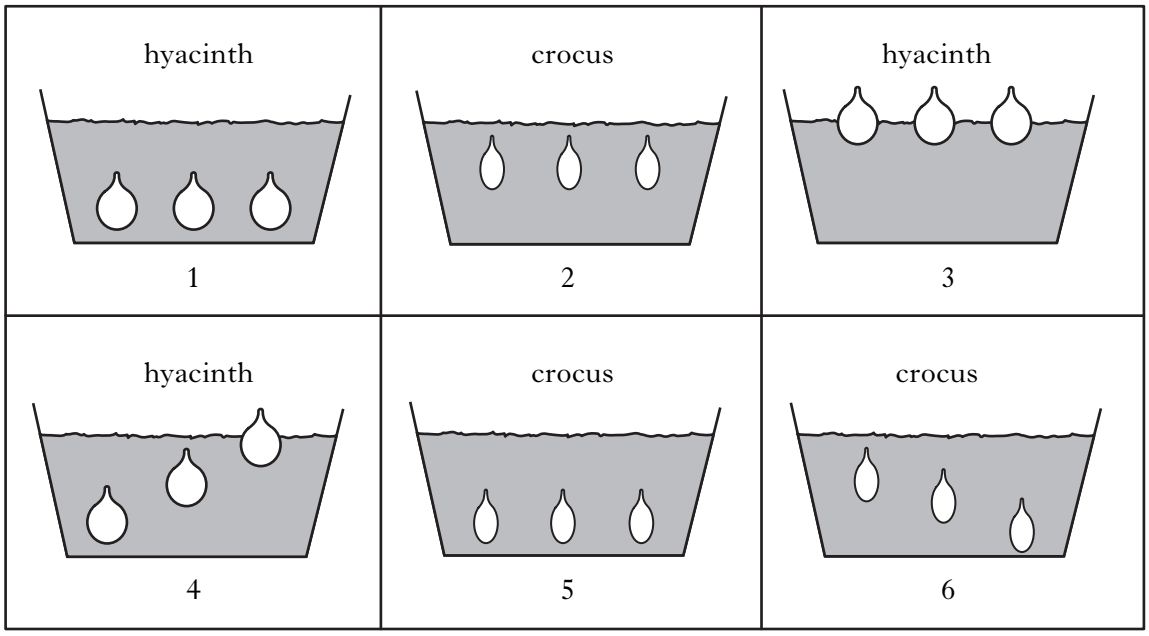
B Pre-germinated

C Chitted

D Non-pelleted

Questions **22** and **23** refer to the investigation below.

The following pots were set up to investigate the growth of hyacinth and crocus bulbs.



22. Which two pots should be compared to investigate the effect of **depth of planting** on the growth of crocus bulbs?

A 1 and 3

B 2 and 5

C 3 and 5

D 4 and 6

23. To investigate the growth of different **types of bulb**, pot 1 is best compared with pot

A 2

B 3

C 5

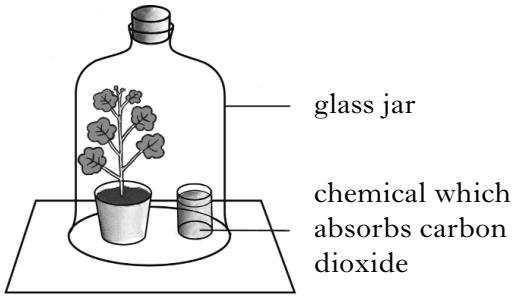
D 6.

24. Which line in the table below correctly matches a material used in composts with its property?

	Material	*Property*
A	Sand	improves drainage
B	Peat	improves drainage
C	Fertiliser	improves water retention
D	Perlite	provides nutrients

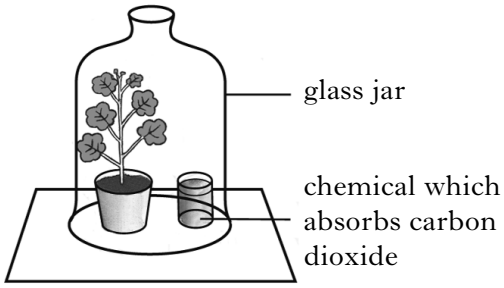
[Turn over

25. The apparatus below was set up to investigate if carbon dioxide is needed for photosynthesis.

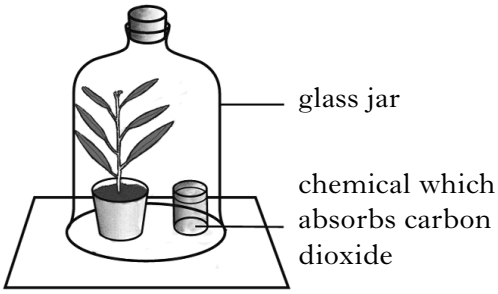


Which of the following would be a suitable control for this experiment?

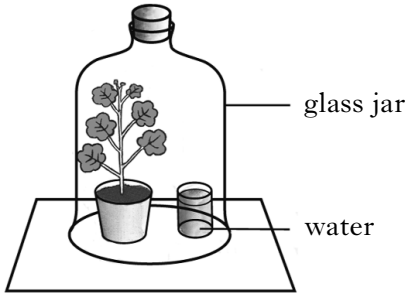
A



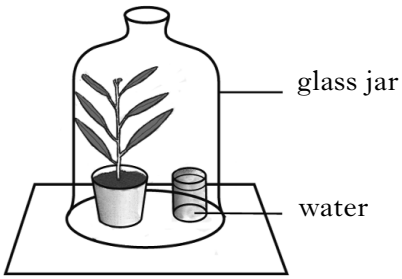
B



C



D



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

[Turn over for SECTION B on *Page fourteen*

Marks

SECTION B

All questions in this Section should be attempted.
All answers must be written clearly and legibly in blue or black ink.

1. (*a*) Read the following passage carefully.

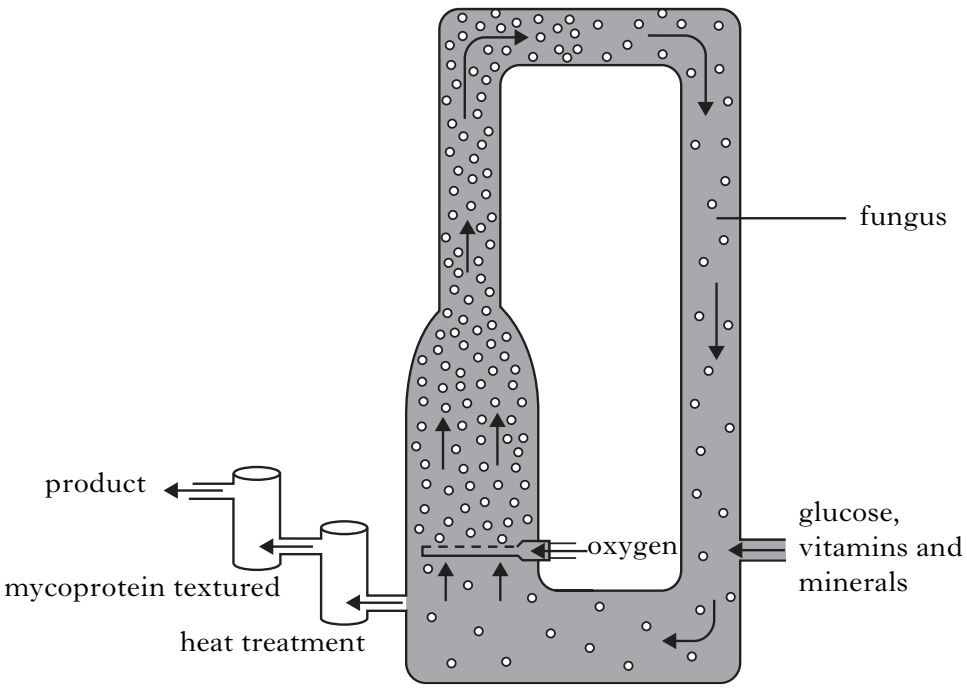
Meat for Veggies?
Adapted from *Metro*, Thursday 15 January 2009

Mycoprotein, the unique ingredient in meat substitute products, can play a valuable role in helping overweight people to reduce the levels of fat and calories in their diets. This protein-rich fungus was first used as an ingredient for meat-free pies but is now found in a wide range of vegetarian foods.

The fungus is grown in large tanks called fermenters as shown in the diagram below. Oxygen, glucose, vitamins and minerals are supplied to help growth. Fungus is then harvested, the mycoprotein is extracted and then passed through a heat treatment stage.

Heat treatment prevents the formation of uric acid which can lead to a painful condition called gout. Finally, the mycoprotein is textured into products which look like chunks of beef or mince, chicken breasts, meatballs or turkey roasts.

Fermenter



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

(i) Why can mycoprotein be recommended as part of the diet of overweight people?

_____

_____ **1**

DO NOT WRITE IN THIS MARGIN

1. (*a*) (continued) *Marks*

(ii) Name the condition which can be caused by uric acid.

_____ **1**

(iii) Name **two** products that mycoprotein can be made to look like.

Product 1 _____

Product 2 _____ **1**

(*b*) Name one other product, **not mentioned in the passage**, which can be made in a fermenter.

_____ **1**

(*c*) Name the fungus used to produce flavourings and food colourings.

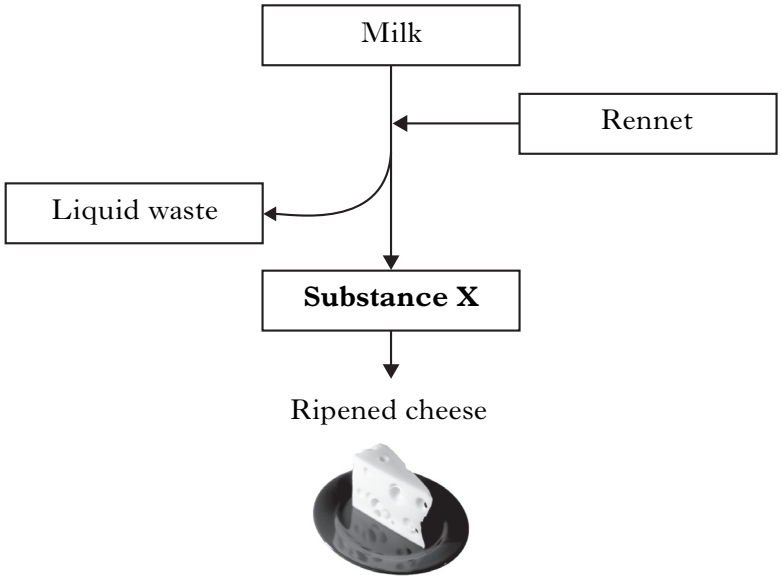
_____ **1**

[Turn over

2. (*a*) The diagram below shows some steps in cheese making.

DO NOT WRITE IN THIS MARGIN

Marks



(i) Name substance X.

_____ **1**

(ii) Describe what rennet does to the milk to produce substance X.

_____

_____ **1**

(iii) Rennet can be obtained from genetically engineered fungi.
State **one other** source of rennet.

_____ **1**

(*b*) Cheese can be made using the milk from different animals.
The table below shows the percentage of solids in the milk of four animals.

	Percentage of solids in milk				*Percentage Total Solids*
Animal	*Fat*	*Protein*	*Sugar*	*Minerals*	
Cow	3·8	3·0	4·8	0·7	12·3
Goat	6·0	3·3		0·8	14·7
Sheep	8·0	3·6	4·7	0·9	17·2
Buffalo	7·0	4·8	4·7	0·7	17·2

(i) Complete the table by inserting the percentage of sugar in goat milk.
Space for calculation

1

2. (*b*) (continued) *Marks*

(ii) Use the information in the table and the following two statements to answer the question below.

- The higher the percentage of total solids, the greater the quantity of cheese produced.
- The higher the percentage of fat, the softer the cheese produced.

Milk from which animal would produce the greatest quantity of soft cheese?

_____ **1**

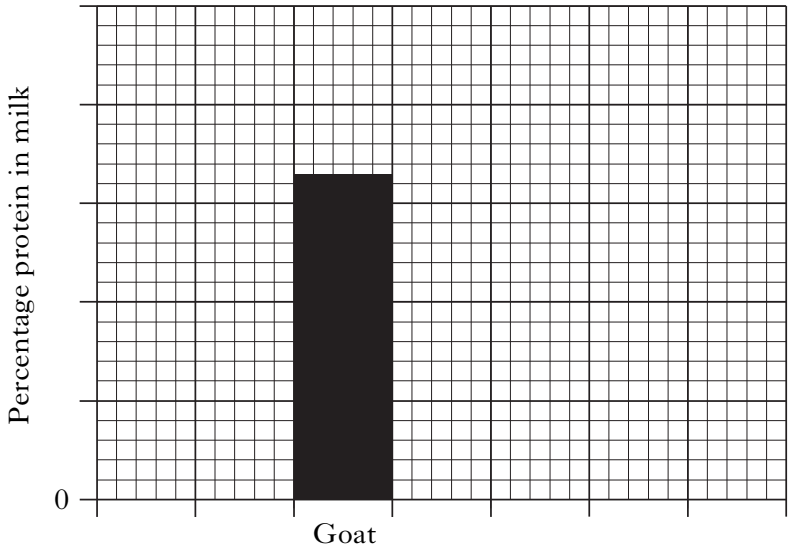
(*c*) On the grid below, complete the bar chart of percentage **protein** in the different types of milk by:

(i) completing the horizontal axis; **1**

(ii) putting a scale on the vertical axis; **1**

(iii) plotting the bars for the other types of animals. **1**

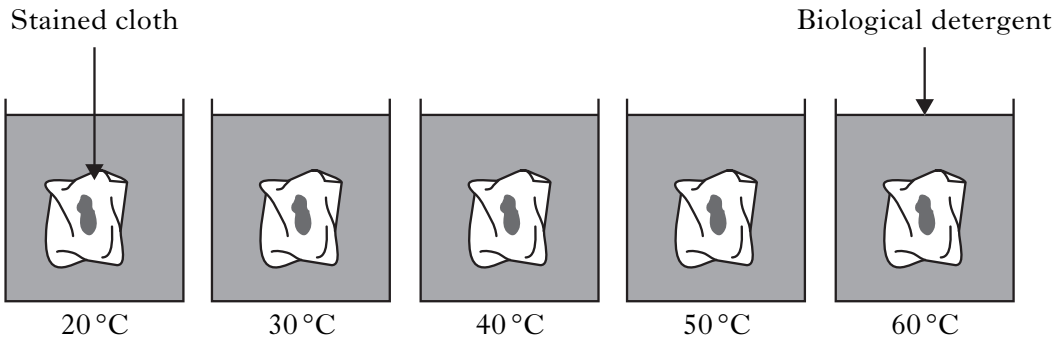
(Additional graph paper, if required, will be found on *Page thirty*.)



[Turn over

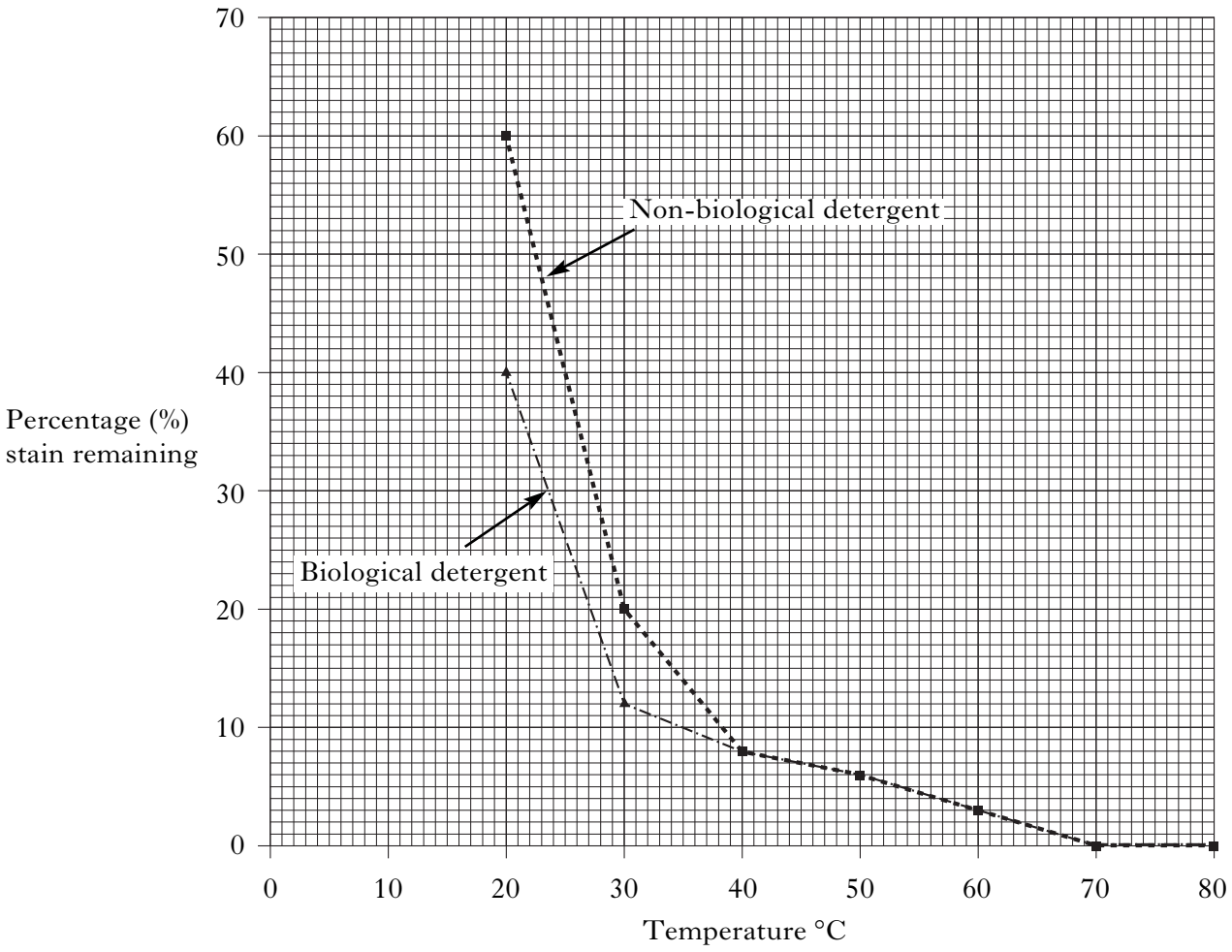
3. (*a*) An investigation was carried out into the effectiveness of detergents on removing stains at different temperatures.

Identical pieces of cloth were stained and washed under the conditions shown below, using biological detergent.



The investigation was repeated using five more pieces of stained cloth, washed in non-biological detergent at the temperatures shown above.

The results are shown in the graph below.



3. (*a*) (continued) *Marks*

(i) State the **lowest** temperature at which both detergents were equally effective.

_____ °C **1**

(ii) At which temperature did the non-biological detergent **remove** 80% of the stain?

_____ °C **1**

(iii) Suggest **one** feature of the stained cloth which must be kept the same to make the investigation **valid**.

_____ **1**

(iv) Which of the following describes **one** way that would make the investigation more **reliable?**

Tick (✓) the correct box.

☐ Use a wider range of temperatures

☐ Repeat the investigation at different temperatures

☐ Repeat the investigation at the same temperatures **1**

(*b*) **<u>Underline</u>** one option in each set of brackets to make the statement below correct.

{Bacteria / Enzymes} are present in biological detergents.

They are enclosed in a {harmless coating / ball of clay}. **1**

(*c*) Detergents contain chemicals which, if released in waste water, can be toxic to wildlife.

Describe **one** method of reducing this environmental impact.

_____

_____ **1**

Marks

4. A group of students investigated the effect of exercise on pulse rate.

The results are shown in the table below.

Student	*Sex*	*Pulse rate* (beats per minute)		
		Before exercise	*After 15 minutes exercise*	*After 5 minutes rest*
Laura	Female	70	110	70
Erin	Female	70	116	79
Bibiana	Female	82	124	85
Robbie	Male	83	120	91
Jack	Male	85	131	85

(*a*) The average pulse rate for males before exercise is 84 beats per minute.

Calculate the average pulse rate for the **females** in the group **before** exercise.

Space for calculation

Average pulse rate for females: _____ beats per minute **1**

(*b*) What conclusion can be drawn when the pulse rates before and after 15 minutes exercise are compared?

_____

_____ **1**

(*c*) How many students had a recovery time which was greater than 5 minutes?

_____ students **1**

(*d*) The same students took part in a repeat of this investigation six months later and their recovery times were all shorter.

Suggest **one** reason for this result.

_____ **1**

DO NOT WRITE IN THIS MARGIN

Marks

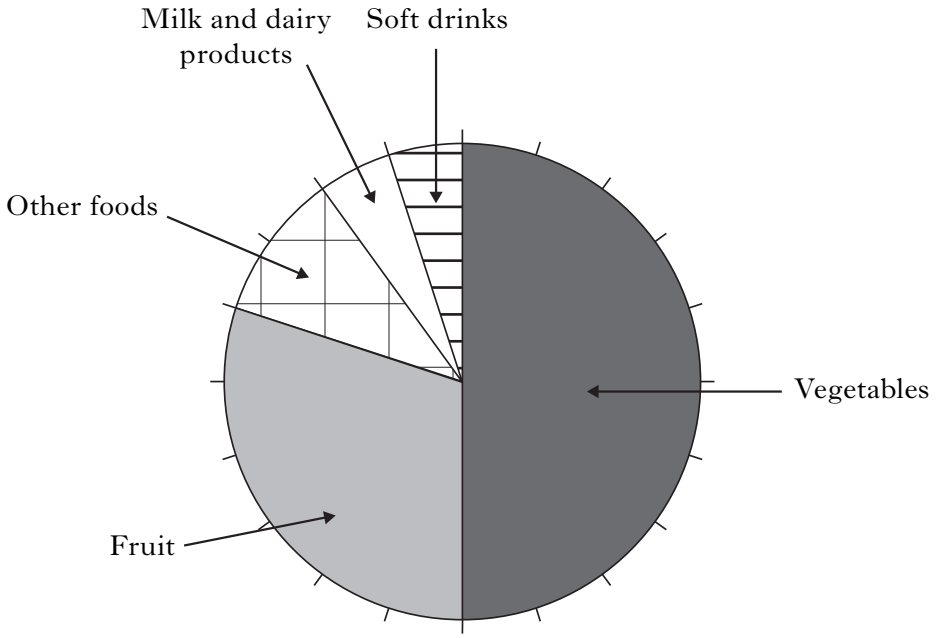
5. A variety of food groups are needed for a healthy diet.

(*a*) Use lines to connect each of the food groups to their correct use.

Food group	***Use***
Fats	protect against deficiency diseases
Carbohydrates	provide energy
Proteins	growth and repair of cells/tissues
Vitamins and minerals	

2

(*b*) The pie chart below shows five sources of vitamin C and the percentage that each source contributes to a healthy diet.



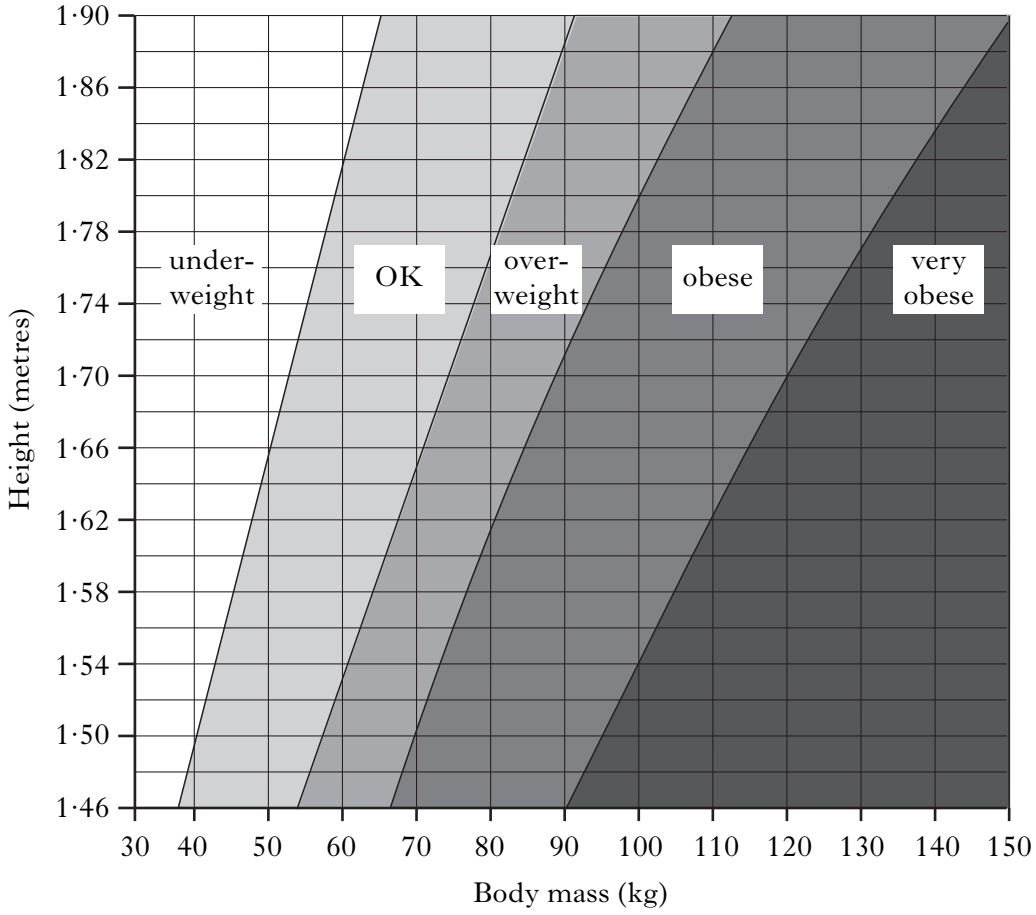
Use the information above to complete the following table.

Source of vitamin C	*Percentage of vitamin C contributed*
Soft drinks	5
Milk and dairy products	5
	30
	50
Other foods	

1

Marks

6. (*a*) The graph below shows the relationship between body mass and height for adults.



(i) Complete the following table using information in the graph.

Person	*Body mass* (kg)	*Height* (metres)	*Description*
X	100	1·62	Obese
Y	50	1·86	
Z	120	1·82	

1

(ii) Complete the following sentence which relates to a person whose body mass is 100 kg and is obese.

"The height of this person is between _____ metres and _____ metres".

1

6. (continued) *Marks*

(*b*) There can be health implications of being underweight or overweight.

Being underweight can indicate that a person may have cancer.

(i) State **one** other possible health condition which can be indicated by being **underweight**.

_____ **1**

(ii) State **one** health risk which can result from being **overweight**.

_____ **1**

(*c*) Name **one** instrument that can be used to measure body fat.

_____ **1**

[Turn over

Marks

7. (*a*) To improve your fitness, you should exercise hard enough to reach the Target Heart Rate for your age.

The table below shows the Target Heart Rate for different ages.

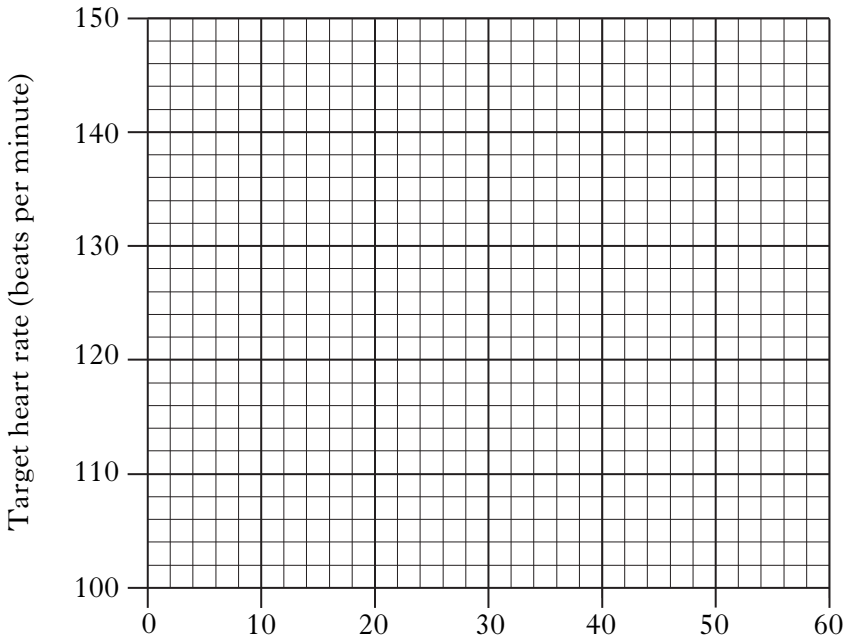
	Age (years)					
	15	20	30	40	50	60
Target Heart Rate (beats per minute)	145	140	130	125	115	110

(i) On the grid below, complete the **line graph** by:

1 putting a label on the horizontal axis; **1**

2 plotting the graph. **1**

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



(ii) State **one** conclusion that can be drawn from these results.

_____

_____ **1**

7. (continued) *Marks*

(*b*) The heart pumps blood around the body.

Circle **one** option, in each set of brackets, to make the sentence about the circulation of blood correct.

{Arteries / Capillaries / Veins} carry blood away from the heart and

{arteries / capillaries / veins} carry it back to the heart. **1**

[Turn over

Marks

8. (*a*) Some insects help gardeners by eating pests which attack their plants.

The table below shows some of these beneficial insects and the pests that they eat.

Beneficial insect	*Pests eaten*
hover flies	leaf hoppers, caterpillars
ground beetles	snails, slugs
ladybirds	aphids
wasps	caterpillars, grubs
lacewings	aphids

The picture below shows aphids.

(i) Which **two** beneficial insects eat aphids?

_____ and _____ **1**

(ii) Name this method of controlling pests.

_____ **1**

(*b*) Some gardeners use insecticides to control pests.

What effect might the use of insecticides have on beneficial insects?

_____

_____ **1**

(*c*) Name a common disease which can affect plants and describe a method used to control this disease.

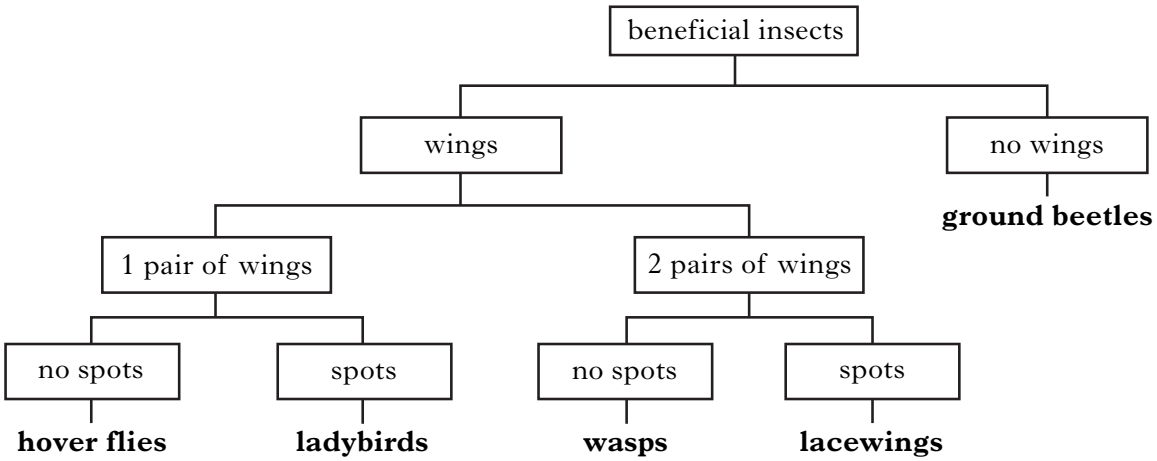
Plant disease _____

Method of control _____ **1**

8. (continued)

Marks

(*d*) The key below describes some of the characteristics of beneficial insects.



(i) Complete the table below using the information in the key

Beneficial insect	*Number of pairs of wings*	*Spots*
	1	no
ground beetles		no
ladybirds	1	
	2	no
lacewings		

2

(ii) From the key or table, state the difference between ladybirds and lacewings.

_____ **1**

(*e*) Bees are beneficial insects.

The number of bees visiting a garden in the years 2000 and 2010 is shown in the table below.

	Year	
	2000	*2010*
Number of bees visiting the garden	240	60

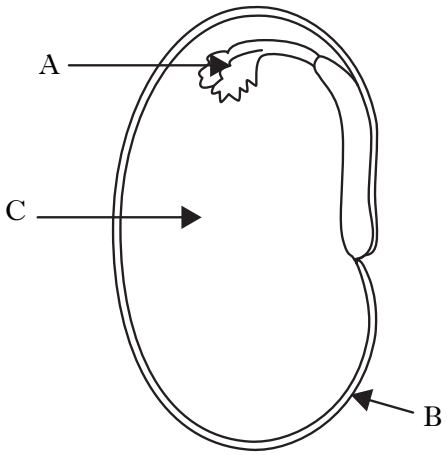
Calculate how many times greater was the number of bees that visited the garden in 2000 compared to 2010.

Space for calculation

_____ times more bees. **1**

Marks

9. A bean seed is shown in the diagram below.



(*a*) Complete the table below by inserting the names and functions of the parts of the bean seed.

Part	*Name*	*Description of function*
A		
B	seed coat	
C		provides food for growth

3

(*b*) Dormancy of seeds is a natural advantage to some plants.

Describe what is meant by dormancy.

_____ **1**

DO NOT WRITE IN THIS MARGIN

9. (continued)

Marks

(*c*) The table below shows the temperatures required before and during the germination of four types of seeds.

Type of seeds	*Temperature required before germination*	*Temperature required during germination*
Anemone	warm or cold	warm
Fraxinus	warm, then cold	warm
Smilacina	cold, then warm, then cold	warm
Erythronium	cold	cold

The different seeds were all sown in a constantly heated greenhouse and left for one week to germinate.

(i) Which type of seed would be most likely to germinate?

_____ **1**

(ii) **Fully** describe the changes in temperature required for Fraxinus seeds to germinate

_____ **1**

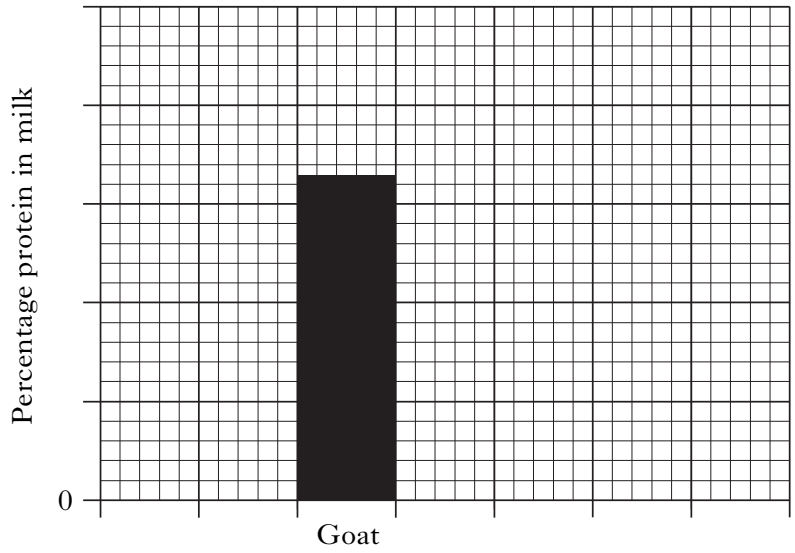
(*d*) State **one** condition, other than a suitable temperature, required for seed germination.

_____ **1**

[*END OF QUESTION PAPER*]

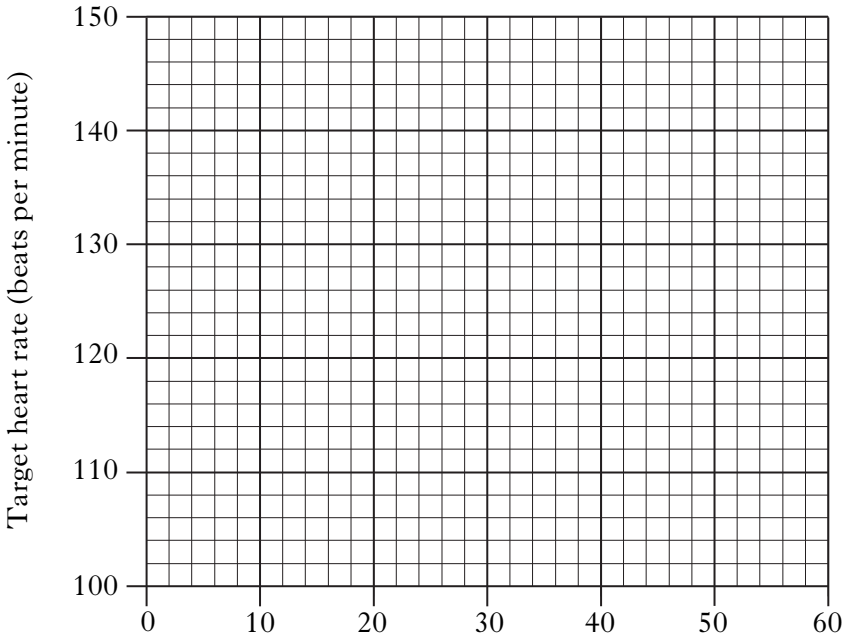
SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 2(*c*)



SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 7(*a*)(i)



DO NOT WRITE IN THIS MARGIN

SPACE FOR ANSWERS

ACKNOWLEDGEMENTS

Section B Question 1(*a*)—Article is adapted from "Quorn to be wild . . . now veg food targets fatties" by Miles Erwin, taken from *Metro, 15 January 2009*. Reproduced by permission of Metro, Solo Syndication.