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Total

X007/101

NATIONAL QUALIFICATIONS 2000

MONDAY, 29 MAY
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

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

SECTION B

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 and rough work 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.

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.

SCOTTISH QUALIFICATIONS AUTHORITY

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Read carefully

1 Check that the answer sheet provided is for Biology Intermediate 1 (Section A).

2 Fill in the details required on the answer sheet.

3 In this paper a question is answered by indicating the choice A, B, C or D by a stroke made in **ink** in the appropriate place in the answer sheet—see the sample question below.

4 For each question there is only **one** correct answer.

5 Rough working, if required, should be done only on this question paper—or on the rough working sheet provided—**not** on the answer sheet.

6 At the end of the examination the answer sheet for Section A **must** be placed **inside** this answer book.

Sample Question

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

A Bread

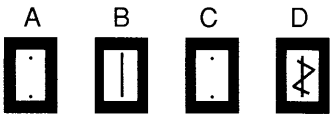
B Butter

C Sugar

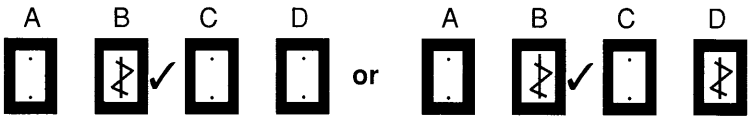
D Apple

The correct answer is **B**—butter. A **heavy** vertical line should be drawn joining the two dots in the appropriate box in the column headed **B** as shown in the example on the answer sheet.

If, after you have recorded your answer, you decide that you have made an error and wish to make a change, you should cancel the original answer and put a vertical stroke in the box you now consider to be correct. Thus, if you want to change an answer D to an answer B, your answer sheet would look like this:



If you want to change back to an answer which has already been scored out, you should enter a tick (✓) to the **right** of the box of your choice, thus:



SECTION A

All questions in this Section should be attempted.

Answers should be given on the separate answer sheet provided.

1. Which of the following allow nutrients and oxygen to pass from the blood to the tissues?

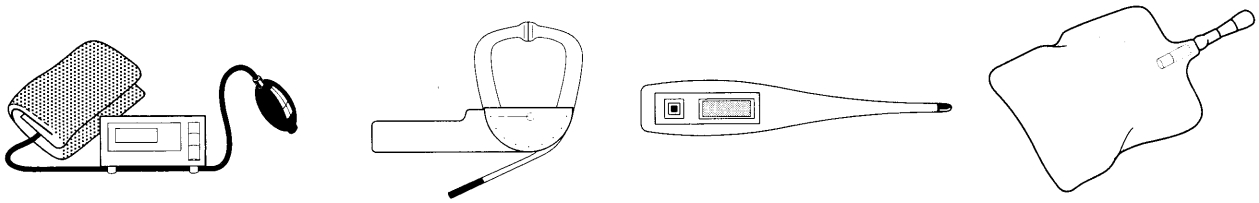
   A Arteries

   B Veins

   C Capillaries

   D Heart valves

Questions 2 and 3 refer to the diagrams of equipment below.



A B C D

2. Which piece of equipment is used to measure body fat?

3. Which piece of equipment is used to measure body temperature?

4. Which of the following statements is correct?

   A Blood carries oxygen to the tissues.

   B Blood carries wastes to the tissues.

   C Blood carries oxygen away from the tissues.

   D Blood carries nutrients away from the tissues.

5. Which of the following conditions is detected by a low peak flow reading?

   A Diabetes

   B Asthma

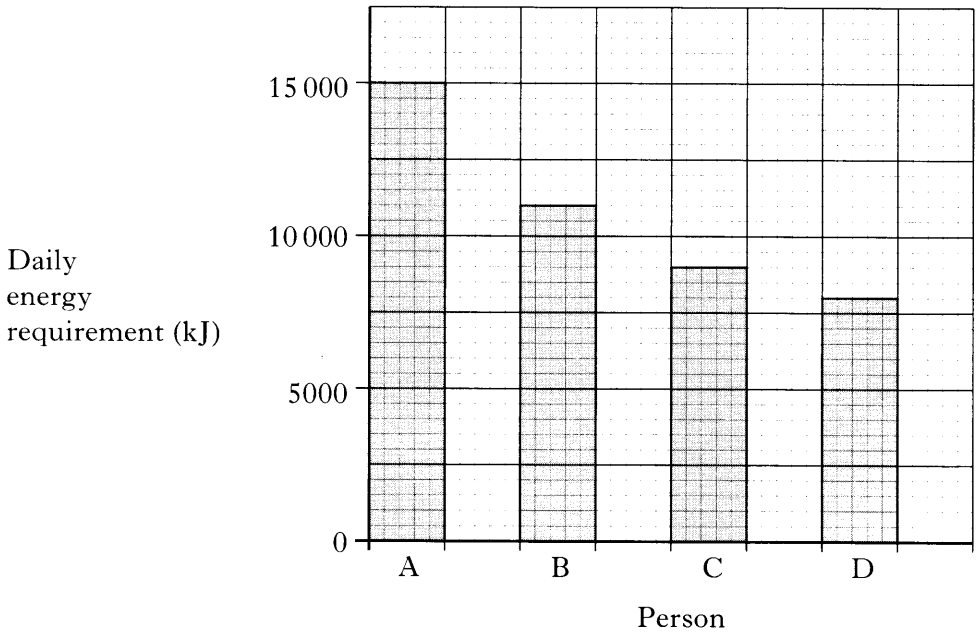
   C Anorexia

   D Leukaemia

[Turn over

Questions 6, 7 and 8 refer to the information in the bar chart below.

The daily energy requirement increases with the level of activity. The bar chart shows the daily energy requirement of four people.



6. Which person is most likely to be an athlete?

7. Which person has a daily energy requirement of 8000 kJ?

8. In the daily diet of person B, 1100 kJ come from fat.

What percentage of his daily diet is fat?

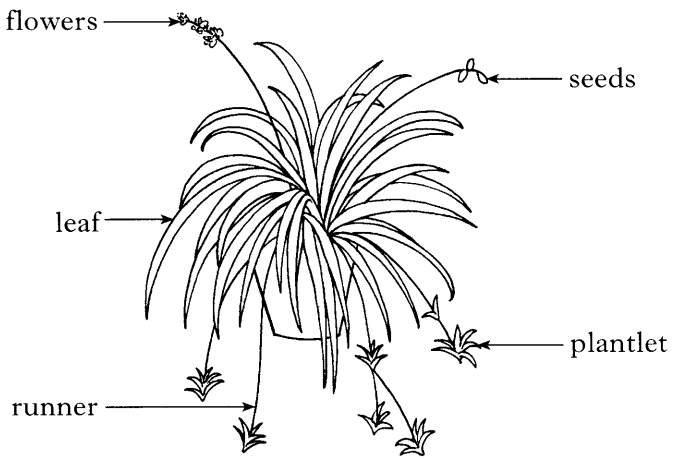
A 1%

B 10%

C 11%

D 14%

9. The diagram below shows a spider plant.



Select the best procedure to **quickly** produce a healthy new plant.

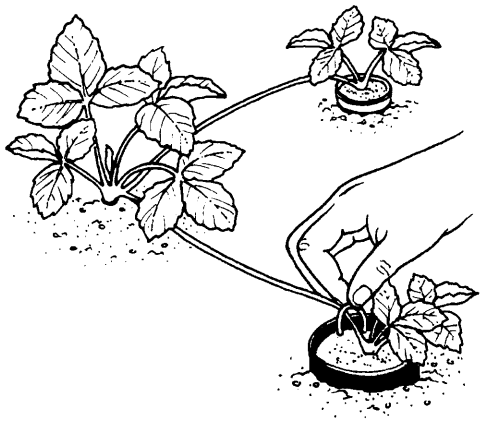
A Detach a plantlet and press it into the surface of a pot of compost.

B Detach a leaf and press the stalk end into the surface of a pot of compost.

C Use a bent wire to peg down a plantlet into the surface of a pot of compost.

D Detach a flowerhead containing seeds and sow some seeds in a pot of compost.

10. The diagram below shows a strawberry plant being propagated.



The plant is being propagated by

A tubers

B seeds

C runners

D layering.

[Turn over

11. Which of the following indicates that a plant needs potting on?

A The plant is infected with green aphids.

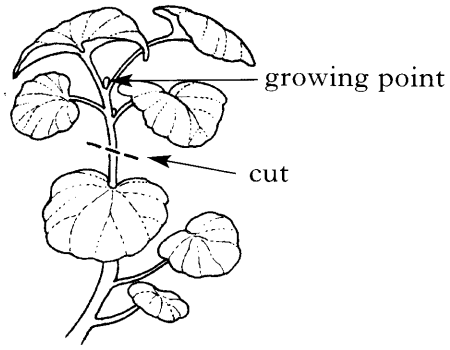
B Roots are growing out of the holes in the base of the pot.

C The leaves are limp and drooping.

D The flowers fall off soon after opening.

12. A student is going to take a stem cutting from a geranium plant.

She uses secateurs to take a cutting which contains a growing point as shown in the diagram below.



The list below contains some of the remaining steps in the procedure.

1 Remove the lower leaves.
2 Place the cutting in the compost.
3 Water the compost.
4 Cut below a node.
5 Dip the base of the cutting into rooting powder.

Which of the following shows the correct sequence of steps?

A $4 \rightarrow 5 \rightarrow 2 \rightarrow 1 \rightarrow 3$

B $5 \rightarrow 4 \rightarrow 3 \rightarrow 2 \rightarrow 1$

C $5 \rightarrow 1 \rightarrow 4 \rightarrow 2 \rightarrow 3$

D $4 \rightarrow 1 \rightarrow 5 \rightarrow 2 \rightarrow 3$

Questions 13 and 14 refer to the results table below.

Four methods for rooting softwood cuttings were investigated.

	Percentage of cuttings rooted with each method			
Plant	*A heated propagator*	*An unheated propagator*	*A plastic pot covered with a plastic bag*	*A clay pot covered with a plastic bag*
Azalea	90	93	83	17
Clematis	77	83	40	10
Cotinus	30	17	3	10
Wisteria	67	63	90	30

13. Which method appears to be best for rooting Clematis cuttings?

A A heated propagator

B An unheated propagator

C A plastic pot covered with a plastic bag

D A clay pot covered with a plastic bag

14. The plant which would root best in a plastic pot covered with a plastic bag is

A Azalea

B Clematis

C Cotinus

D Wisteria.

15. Which of the following are the best conditions for growing a desert cactus?

A A sunny position, well watered and misted often

B A sunny position, compost allowed to dry between watering and well ventilated

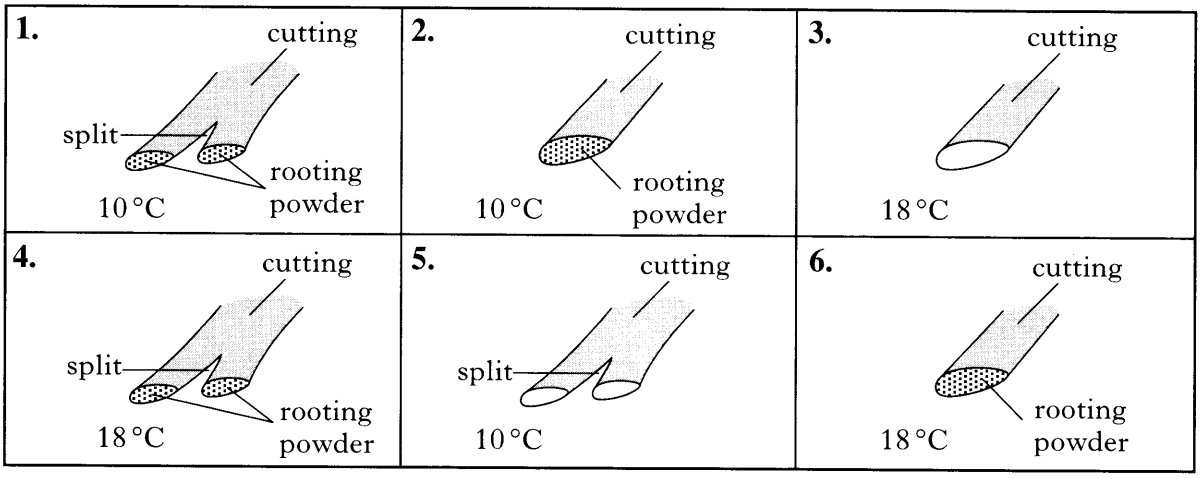
C A shady position, compost allowed to dry between watering and well ventilated

D A shady position, well watered and misted often

[Turn over

Questions 16 and 17 refer to the information below.

The following treatments were set up to investigate the best conditions for rooting cuttings.



16. The results of which two treatments should be compared to find the effect of temperature on rooting?

A 2 and 6

B 2 and 5

C 3 and 4

D 1 and 6

17. To investigate the effect of rooting powder, treatment 1 is best compared with

A treatment 2

B treatment 3

C treatment 4

D treatment 5.

18. Rennet is used in the manufacture of

A cheese

B bread

C beer

D yoghurt.

19. The following are steps in the making of yoghurt.

1 Add yoghurt bacteria.
2 Cool the milk to 40 °C to provide the best growing conditions for the yoghurt bacteria.
3 Heat the milk to 90 °C to kill all bacteria.
4 Leave for 6 hours to allow the yoghurt bacteria to act on the milk and convert it to a yoghurt.

Which of the following shows the steps in the production of yoghurt in the correct order?

A $4 \rightarrow 3 \rightarrow 2 \rightarrow 1$

B $3 \rightarrow 1 \rightarrow 4 \rightarrow 2$

C $4 \rightarrow 2 \rightarrow 3 \rightarrow 1$

D $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

20. Resazurin dye can be used to test the quality of milk samples.

The table below shows the colour changes for resazurin associated with a range of milk qualities.

Colour of milk sample	*Milk quality*
Remains purple	Good
Becomes mauve	Satisfactory
Becomes pink	Poor
Becomes clear	Unfit for consumption

When tested with resazurin, a sample of milk changed from purple to pink.

The milk quality was

A satisfactory

B unfit for consumption

C poor

D good.

21. Which of the following is made using bacteria?

A Wine

B Cheese

C Fermented milk drinks

D UHT milk

[Turn over

22. Which of the following correctly describes antibiotics?

	Produced by	*Effective against*
A	plant viruses	yeast
B	baking yeast	viruses
C	soil bacteria	fungi
D	soil fungi	bacteria

Questions 23, 24 and 25 refer to the information below.

A class investigation into the effect of two different yeasts on the rising of bread dough was carried out.

The dough was made by weighing out the flour, salt, sugar, and yeast and mixing with a measured volume of water.

The results from the five student groups are shown below.

Group	*Increase in height of dough containing yeast A* (mm)	*Increase in height of dough containing yeast B* (mm)
1	34	22
2	12	33
3	28	43
4	24	29
5	17	38

23. What is the average increase in the height of dough containing yeast A?

A 20 mm

B 23 mm

C 30 mm

D 33 mm

24. Which variable was changed in this investigation?

A The type of yeast used

B The weight of flour used

C The volume of water used

D The weight of sugar used

25. A suitable control for this investigation would be

A a dough made from flour, salt, sugar, water and yeast A

B a dough made from flour, salt, water and yeast A

C a dough made from flour, sugar, water and yeast B

D a dough made from flour, salt, sugar and water.

Candidates are reminded that the answer sheet for SECTION A MUST be returned INSIDE this answer book.

[Turn over for Section B on *Page twelve*

DO NOT WRITE IN THIS MARGIN

Marks

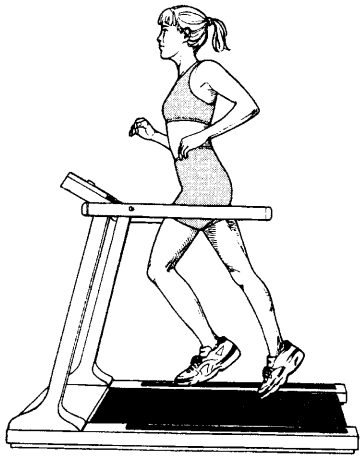
SECTION B

All questions in this Section should be attempted.

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

Adapted from *Ultrafit* magazine.

Running is a natural type of exercise which can also be performed indoors by running on a treadmill.



A simple workout could involve a warm up of 5–10 minutes at an easy pace, keeping the heart rate at 55–60% of its maximum. The pace is then increased until the heart rate reaches a higher steady rate for 20–30 minutes. Beginners should aim for a target heart rate of between 60–70% of the maximum heart rate. However, trained athletes should aim for a target rate of 70–80% of the maximum.

A warm down period of 5–10 minutes of easy jogging is carried out by everyone until the heart rate falls below 55% of the maximum.

Answer the questions below using the information from the passage.

(i) How long should a person spend warming up?

_____ minutes **1**

(ii) For what percentage of the maximum heart rate should a beginner aim in a simple workout?

_____ % **1**

(iii) What percentage of the maximum heart rate indicates the end of the warm down period?

_____ % **1**

DO NOT WRITE IN THIS MARGIN

Marks

1. (continued)

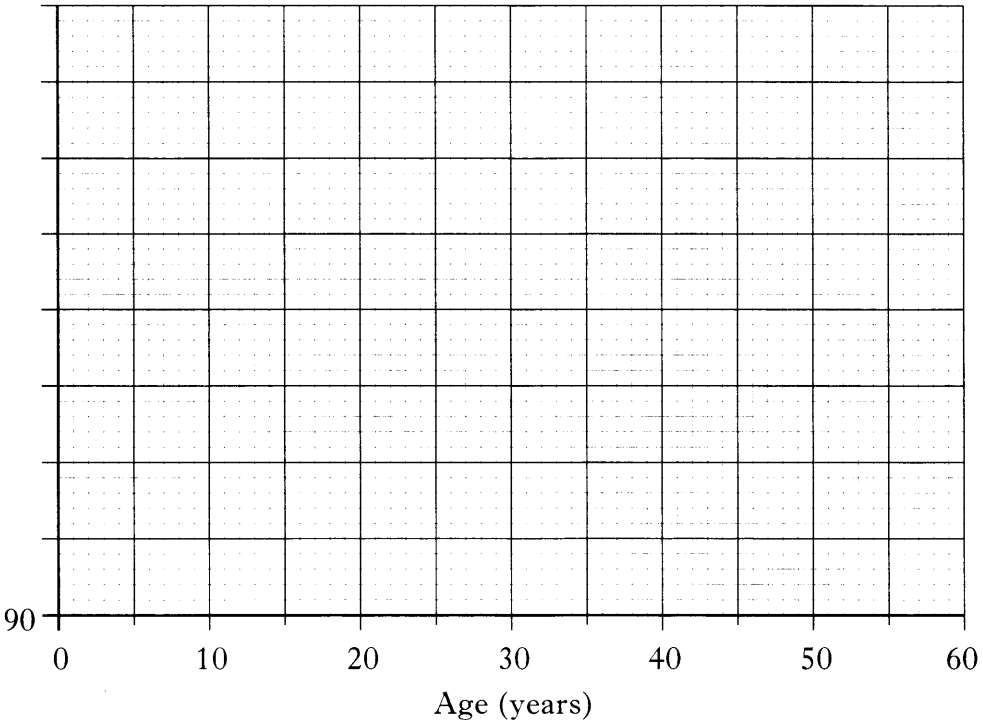
(*b*) The target heart rate during a workout varies for beginners according to their age.

Target heart rates have been calculated and are shown in the table below.

Age (years)	15	20	30	40	50	60
Target heart rate (beats/minute)	123	120	114	108	102	96

(i) Provide a suitable scale and label the vertical axis on the grid below. **2**

(ii) Present the results in the table as a line graph. **1**
(Additional graph paper, if required, will be found on page 25.)



(iii) Describe the effect of increasing age on the target heart rate.

_____

_____ **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks

1. (continued)

(*c*) A lack of regular exercise can lead to high blood pressure.

Name **one** health problem that can result from high blood pressure.

_____ **1**

(*d*) Exercise increases heart rate.

What name is given to the time taken for the heart rate to return to normal after exercise?

_____ **1**

(*e*) Describe the effect of regular exercise on the resting pulse rate.

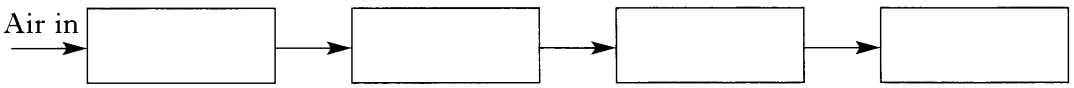
_____ **1**

DO NOT WRITE IN THIS MARGIN

Marks

2. (*a*) Air sacs, bronchioles, windpipe and bronchi are structures of the breathing system.

Complete the flow chart below to show the order in which air **breathed in** passes through these structures.



1

(*b*) Cigarette smoke contains a substance which prevents blood carrying oxygen.

Name this substance in cigarette smoke.

_____

1

(*c*) Smoking cigarettes increases the risk of developing health problems.

Name **one** illness which can result from smoking cigarettes.

_____

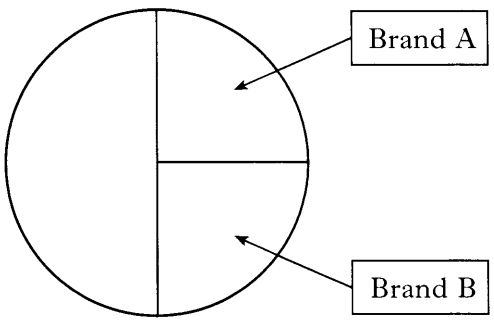
1

(*d*) The table below shows the mass of tar in four different brands of cigarettes.

Brand of cigarette	*Mass of tar* (mg)
A	15
B	15
C	20
D	10

(i) Use information in the table to **complete and label** the pie chart below.

(An additional pie chart, if required, will be found on page 25.)



2

(ii) Calculate the average mass of tar in the four brands of cigarettes.

Space for calculation

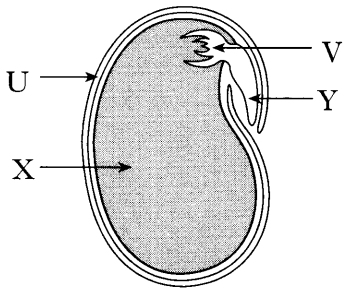
_____ mg

1

DO NOT WRITE IN THIS MARGIN

Marks

3. (*a*) The diagram below shows the structure of a bean seed.



(i) State the function of part X.

_____ **1**

(ii) Which part develops into the shoot?

_____ **1**

(*b*) An investigation to find the percentage of water in fresh seeds and seeds which had been stored was carried out.

The following description outlines the steps in the investigation.

1. Ten fresh bean seeds were weighed and the total mass noted.
2. The seeds were placed in an oven set at 95 °C.
3. After 24 hours the seeds were reweighed and the total mass noted.
4. Steps 2 and 3 were repeated until there was no further change in the total mass of the seeds.
5. The procedure was repeated using ten stored bean seeds.

The results are shown in the table below.

Type of seed	*Mass of ten seeds at step 1* (g)	*Mass of ten seeds at step 4* (g)	*Water loss* (g)	*Water loss* (%)
Fresh	14	7	7	50
Stored	16	12	4	

(i) Calculate the water loss as a percentage for the stored seeds.
Space for calculation

_____ % **1**

DO NOT WRITE IN THIS MARGIN

Marks

3. (*b*) (continued)

(ii) Why was it important to repeat steps 2 and 3 until there was no change in mass?

_____ **1**

(iii) Why were ten seeds of each type used?

_____ **1**

(*c*) State **one** condition required for seed germination.

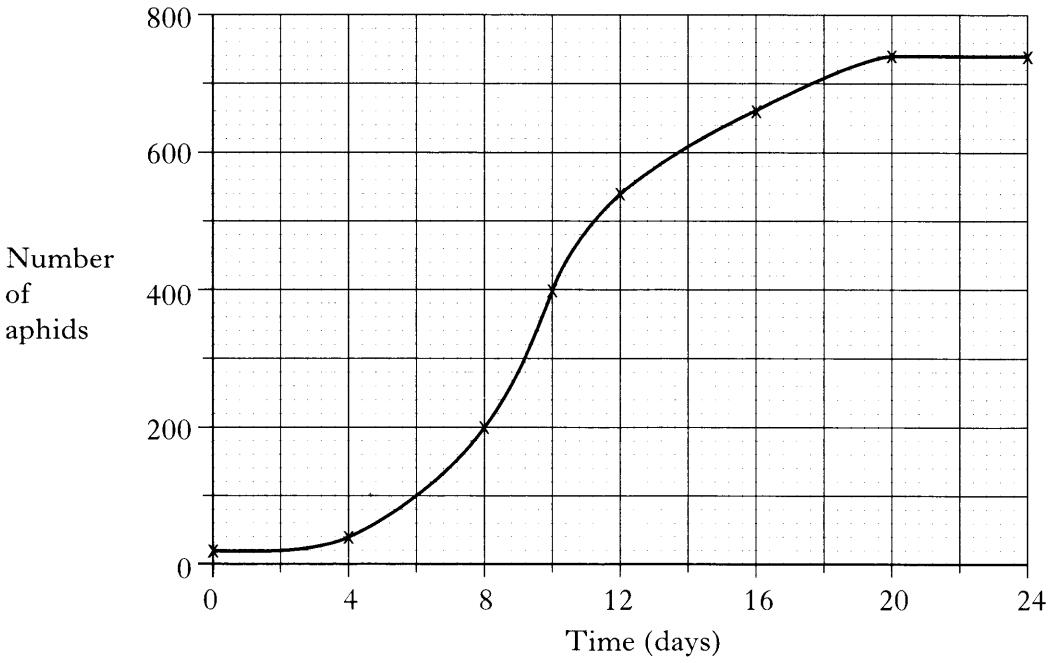
_____ **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks

4. The graph below shows the growth in a population of aphids on a rose bush.



(*a*) During which four day period was there the greatest increase in the number of aphids?

Tick (✓) the correct box.

4 – 8 days ☐

8 – 12 days ☐

12 – 16 days ☐

16 – 20 days ☐

1

(*b*) At eight days, there were 200 aphids on the rose bush.

How long does it take for this number to double?

_____ days

1

(*c*) The total number of aphids was calculated by counting the number on one leaf and multiplying by the number of leaves on the rose bush.

Suggest an improvement to make the result more reliable.

_____

_____

1

(*d*) Suggest a way of controlling a population of aphids on a rose bush.

_____

1

(*e*) Name a common fungal disease which can affect plants.

_____

1

DO NOT WRITE IN THIS MARGIN

Marks

5. (*a*) The table below shows the energy required to maintain a temperature of 4 °C in greenhouses of different sizes.

Greenhouse	*Greenhouse size* (m)	*Energy required* (kJ)
A	2 × 2	1·4
B	2 × 5	2·5
C	3 × 5	2·8
D	3 × 7	4·0

(i) What conclusion can be drawn from the information in the table?

_____

_____ **1**

(ii) How does the energy required to heat Greenhouse C compare with that required to heat Greenhouse A?

_____ **1**

(*b*) Describe **one** way in which plants can be protected from the effects of very low temperatures.

_____

_____ **1**

[Turn over

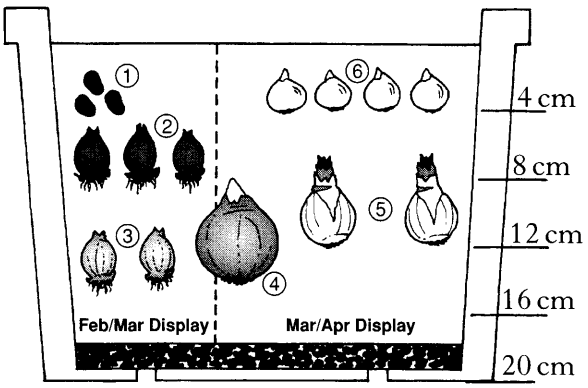
DO NOT WRITE IN THIS MARGIN

Marks

6. (*a*) The diagram below shows the planting depths of a number of bulbs and corms. Adapted from *Gardening Which?* magazine.

Key

(1) Anemone blanda
(2) Iris "Violet Beauty"
(3) Iris danfordiae
(4) Hyacinth "Carnegie"
(5) Narcissus "Tête à Tête"
(6) Crocus "Snowstorm"



Use the information in the diagram to complete the table below.

Name	*Flowering months*	*Depth of planting* (cm)
Anemone blanda	February/March	
Crocus "Snowstorm"	March/April	4
Hyacinth "Carnegie"	March/April	14
Iris _____		14
Iris _____	February/March	8
Narcissus "Tête à Tête"	March/April	

3

(*b*) Daffodils produce bulbs to store food for the growth of a new plant the following year.

Name the food storage organ produced by a potato.

_____

1

DO NOT WRITE IN THIS MARGIN

Marks

7. (*a*) An investigation to find out which of four antifungal treatments was most effective in preventing yeast growth was carried out.

The following description outlines the steps in the investigation.

1. A small volume of yeast suspension was spread over the surface of an agar plate using a sterile syringe.
2. A sterile cork borer was used to cut four wells in the agar plate; a sterile seeker was used to remove the discs of agar.
3. A small volume of each antifungal treatment solution was added to a separate well in the agar plate.
4. The plate was sealed and incubated for 3 days.

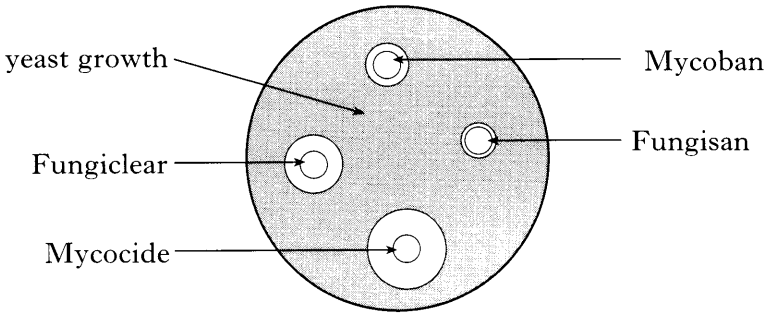
(i) State **one** variable which should be kept constant.

_____ **1**

(ii) Suggest a suitable control for this investigation.

_____ **1**

(*b*) The results are shown in the diagram below.



(i) What observation provides evidence of the effectiveness of each antifungal solution?

_____ **1**

(ii) What measurements could be made?

_____ **1**

(iii) Which antifungal solution was the most effective?

_____ **1**

(*c*) Name a human disease caused by a fungus.

_____ **1**

DO NOT WRITE IN THIS MARGIN

Marks

8. (*a*) The following information was collected from two milk cartons.

In 100 g of whole milk there was 280 kJ of energy but semi-skimmed milk provided 200 kJ/100 g.

The protein content of the two types of milk was the same at 3·4 g/100 g.

The carbohydrate content was very similar, with whole milk having 4·8 g/100 g and semi-skimmed milk 4·9 g/100 g.

The greatest difference in the milks was their fat contents. The whole milk contained 4·0 g/100 g and the semi-skimmed milk 2·0 g/100 g.

(i) Use the information above to complete the table.

Component	*Whole milk*	*Semi-skimmed milk*
Energy (kJ/100 g of milk)	280	
Protein (g/100 g milk)		3·4
Carbohydrate (g/100 g milk)	4·8	
Fat (g/100 g milk)	4·0	2·0

2

(ii) Calculate the simple whole number ratio of the fat in whole milk to that in semi-skimmed.

Space for calculation

_____ : _____ **1**

(*b*) Describe **one** difference in the heat treatments used to produce UHT milks compared with pasteurised milks.

_____ **1**

DO NOT WRITE IN THIS MARGIN

Marks

8. (continued)

(*c*) A fermented milk drink is produced using immobilised yeast and an enzyme. Decide if each of the following statements is **TRUE** or **FALSE** and tick the appropriate box.

If the statement is **FALSE, write the correct phrase in the Correction box** to replace the phrase **underlined** in the statement.

Statement	*True*	*False*	*Correction*
The yeast and the enzyme are immobilised in jelly beads.			
The yeast and the enzyme can be used only once.			
Once made, a fermented milk drink is difficult to separate from the immobilised yeast and enzyme.			

3

[Turn over for Question 9 on *Page twenty-four*

DO NOT WRITE IN THIS MARGIN

Marks

9. (*a*) Suggest **one** advantage of biological washing powders.

_____ **1**

(*b*) Explain why the enzymes in biological washing powders have a coating.

_____ **1**

(*c*) Give **one** example of the damage to the environment which might be caused by detergents.

_____ **1**

[*END OF QUESTION PAPER*]