

FOR OFFICIAL USE

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**X007/101**

Section B  
Total

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NATIONAL  
QUALIFICATIONS  
2002

FRIDAY, 31 MAY  
1.00 PM – 2.30 PM

**BIOLOGY**  
**INTERMEDIATE 1**

**Fill in these boxes and read what is printed below.**

Full name of centre

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Town

--

Forename(s)

--

Surname

--

Date of birth

Day Month Year

--	--	--	--	--	--	--	--

Scottish candidate number

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Number of seat

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**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.

**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 section 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.

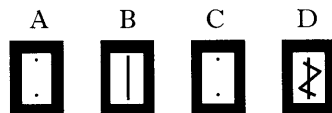
**Sample Question**

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

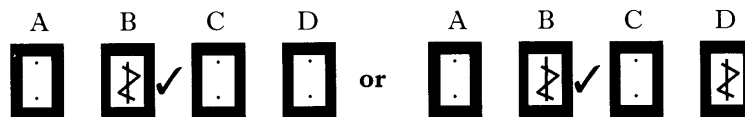
- A Bread
- B Butter
- C Sugar
- D Apple

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:

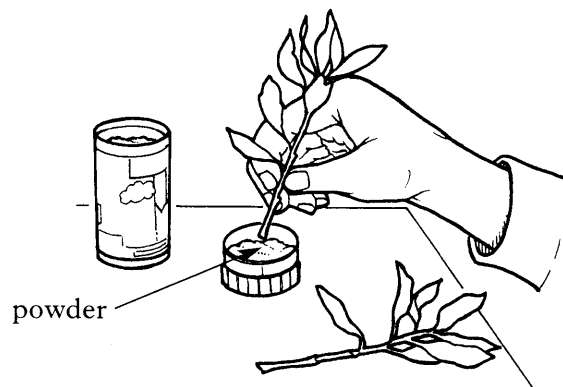


SECTION A

All questions in this Section should be attempted.

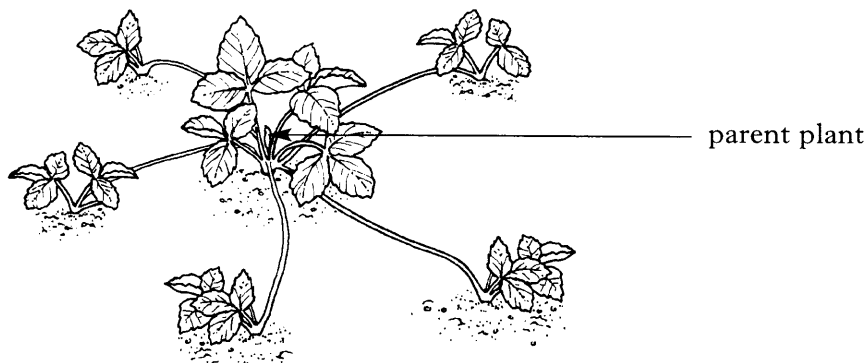
Answers should be given on the separate answer sheet provided.

1. Pelleted seeds are
  - A enclosed in a small ball of clay
  - B germinated before sowing
  - C kept in a freezer for three weeks
  - D mixed with fine silver sand.
2. The diagram below shows a cutting about to be dipped into a powder.



The powder is being used to

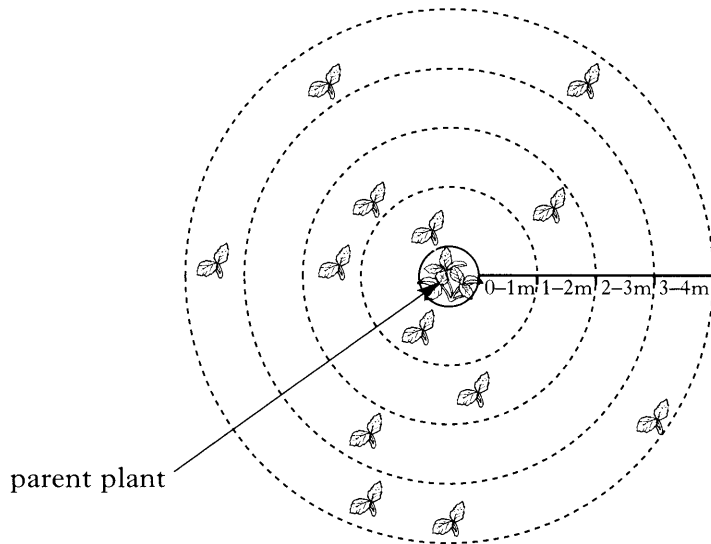
- A speed up growth of the stem
  - B slow down growth of the leaves
  - C speed up growth of roots
  - D slow down growth of roots.
3. The diagram shows a parent strawberry plant surrounded by young plants.



Young strawberry plants can grow from

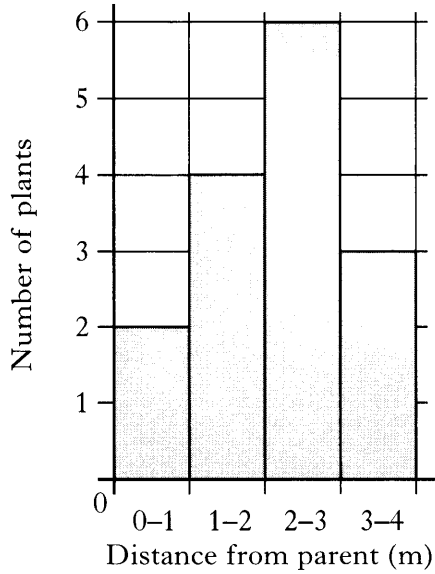
- A runners
- B offsets
- C bulbs
- D tubers.

4. The diagram below shows the position of young strawberry plants around their parent plant.

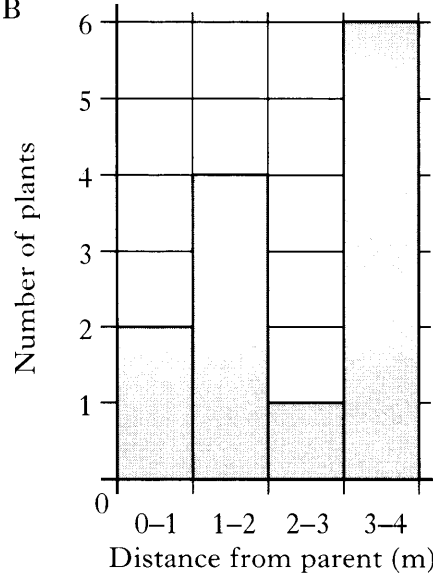


Which of the following graphs correctly represents this information?

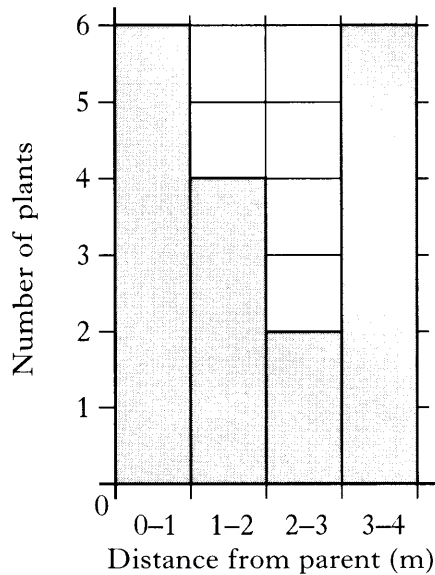
A



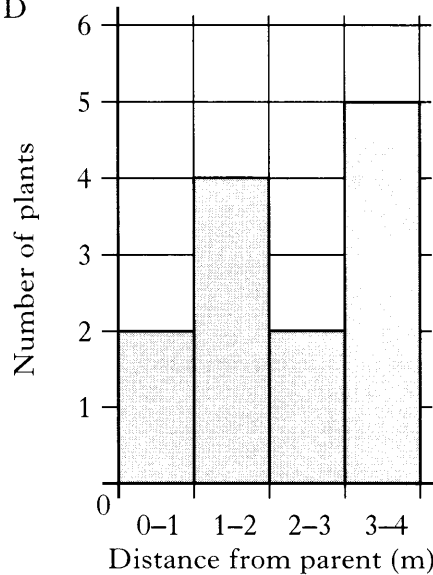
B



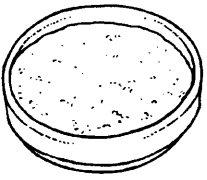
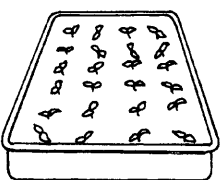

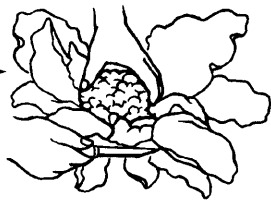
C



D



**Questions 5 and 6** refer to the table below which shows timescales for growing cauliflowers.

<i>Sowing</i>	<i>Pricking out or thinning</i>	<i>Transplanting</i>	<i>Harvesting</i>
			
<b>In a frame</b> Late September to early October 2001	Prick out to 5 cm apart when large enough to handle	April 2002	July 2002
<b>In a greenhouse</b> Late January to early February 2002	Prick out to 5 cm apart when large enough to handle	March 2002	July 2002
<b>In the open ground</b> August 2001	Thin to 45 cm apart	Not transplanted	July 2002

5. When would the cauliflowers grown in a greenhouse be transplanted?

- A Late January–early February
- B March
- C April
- D July

6. Which conditions lead to the shortest time from sowing to harvest?

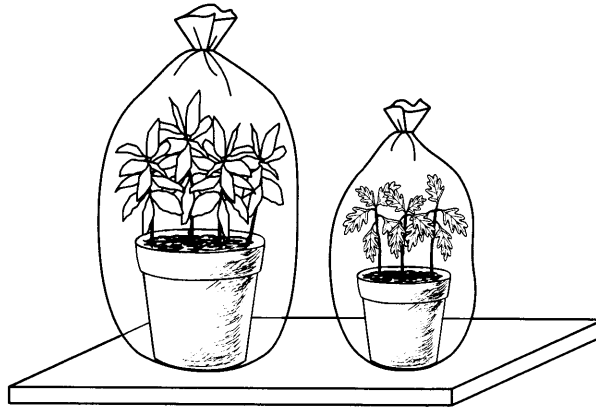
- A In a frame
- B In a greenhouse
- C In the open ground
- D None of these as the cauliflowers are harvested at the same time

7. Why do plant growers prick out seedlings?

- A To control pests
- B To remove dead flowers
- C To give the seedlings more water and space
- D To control grey mould

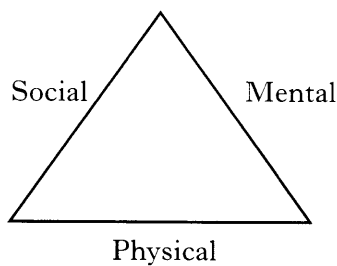
**[Turn over**

8. The cuttings in the drawing have been enclosed in plastic bags.



This results in

- A an increase in light intensity
  - B an increase in humidity
  - C a decrease in temperature
  - D a decrease in leaf area.
9. Potato breeders expect to harvest **ten** times the weight of potatoes planted.
- A potato breeder planted one kilogram of potatoes in the spring of 2000. He decided to plant all the potatoes he harvests each October in order to build up a large stock.
- What weight of potatoes does he expect to harvest, three growing seasons later, in October 2002?
- A 3 kg
  - B 30 kg
  - C 100 kg
  - D 1000 kg
10. There are three aspects to health shown in the health triangle.



Which of the following is a physical aspect of health?

- A No stress at work
- B Eating a balanced diet
- C Looking forward to the weekend
- D Enjoying the company of friends

11. The instrument used to measure blood pressure is a

- A sphygmomanometer
- B skin callipers
- C clinical thermometer
- D pulsometer.

12. Which row in the table correctly describes veins, arteries and capillaries?

	<i>Veins</i>	<i>Arteries</i>	<i>Capillaries</i>
A	carry blood towards the heart	link capillaries and veins	carry blood towards the body
B	carry blood away from the heart	carry blood towards the heart	link veins to arteries
C	link arteries to capillaries	carry blood away from the heart	carry blood towards the heart
D	carry blood towards the heart	carry blood towards the body	link arteries to veins

13. The body temperature that would indicate a fever due to infection is

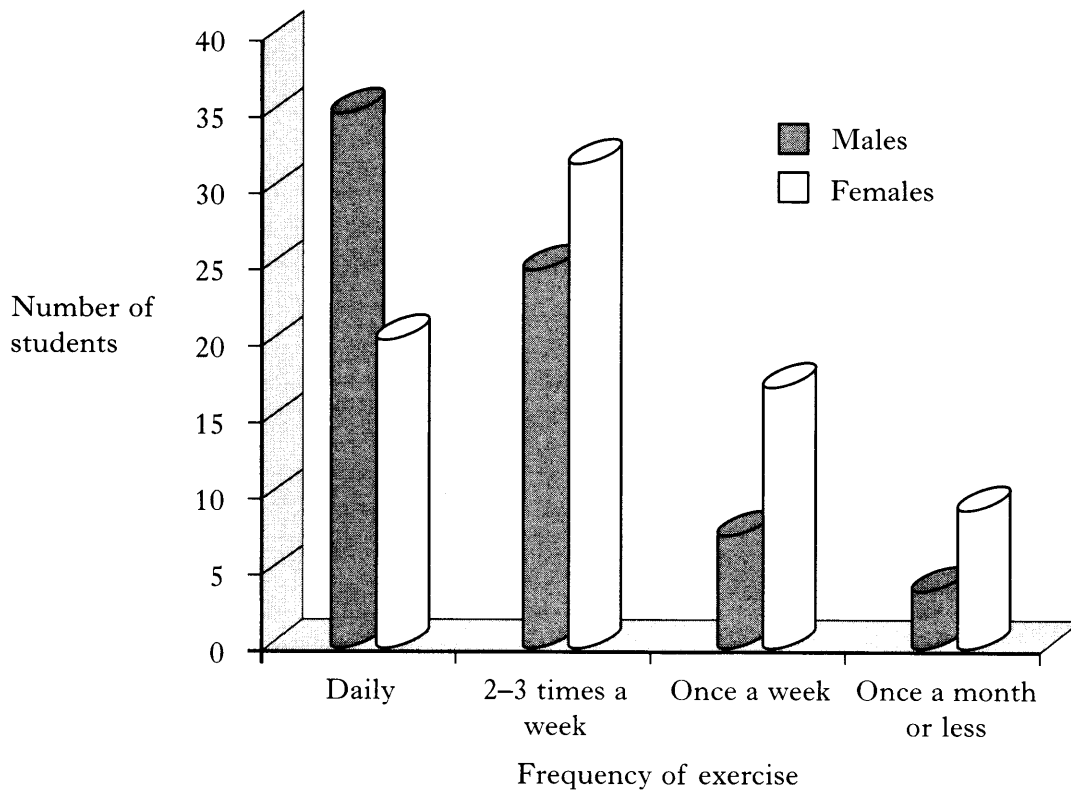
- A 30 °C
- B 35 °C
- C 37 °C
- D 40 °C.

14. Which of the following foods are used for body-building?

- A Proteins
- B Carbohydrates
- C Vitamins
- D Fats

**[Turn over**

15. The graph below shows how often a sample of Scottish students take exercise.



**From the graph**, which of the following statements is correct?

- A More females exercise daily than males.
- B Fewer females exercise 2-3 times a week than males.
- C More males exercise once a week than females.
- D Fewer males exercise once a month or less than females.

16. Excessive alcohol consumption can have both short term and long term effects.

Which is an example of a long term effect?

- A Liver damage
- B Poor judgement
- C Slower reaction time
- D Poor muscle control



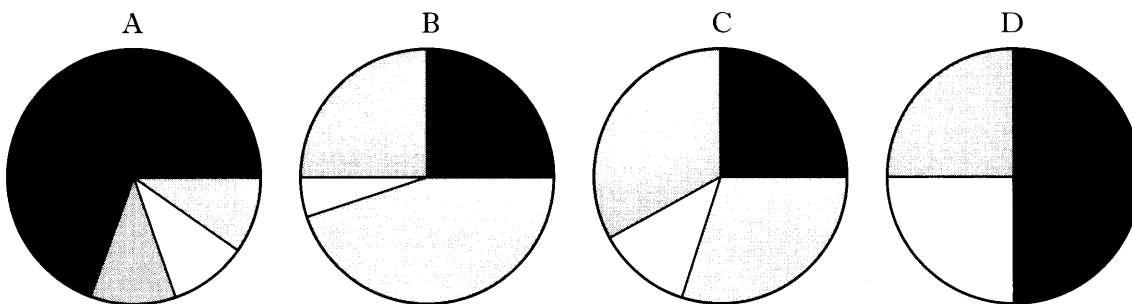
17. The following table shows the responses of Scottish 15 year olds when asked about their smoking habits.

<i>Response</i>	<i>Percentage of 15 year olds</i>
Never smoked	25
Tried smoking	33
Occasional smoker	12
Regular smoker	30

Which of the pie charts below presents this data correctly?

Key

- |   |               |   |                   |
|---|---------------|---|-------------------|
|  | Never smoked  |  | Occasional smoker |
|  | Tried smoking |  | Regular smoker    |



18. The birthweight of a baby can be affected if its mother smoked cigarettes during pregnancy. The table shows the results of a survey into the smoking behaviour of mothers and the birthweights of their babies.

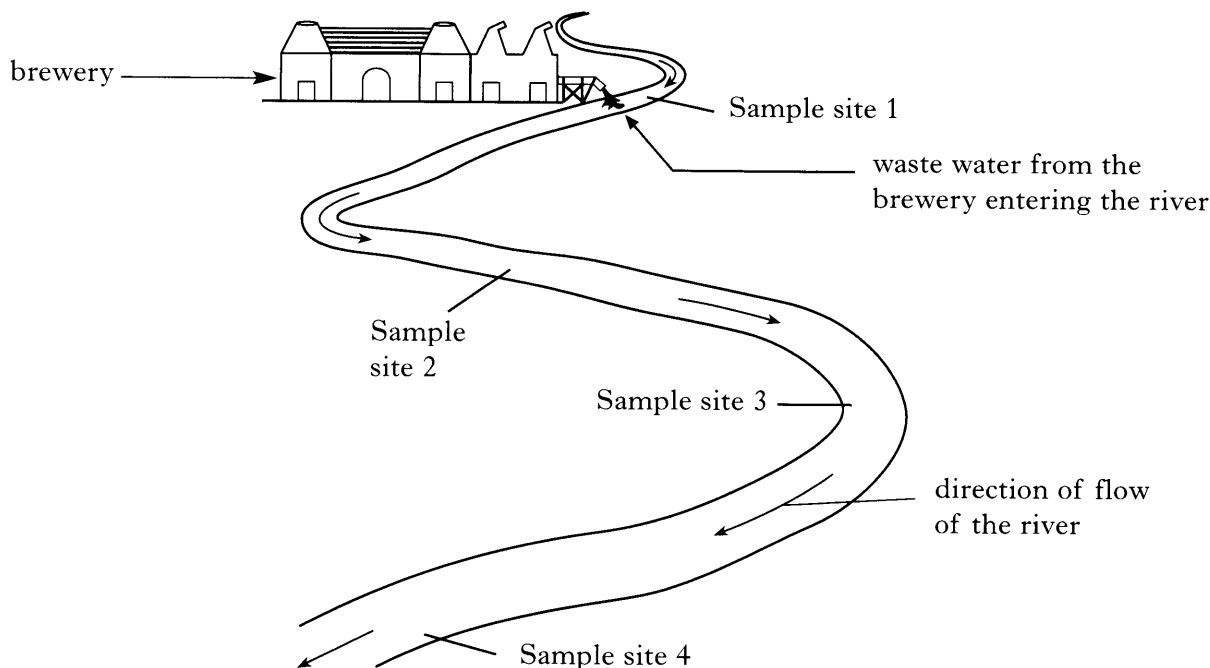
<i>Smoking behaviour of mothers</i>	<i>Average birthweight of their babies (g)</i>
Non-smokers	3400
Stopped smoking between 0 to 8 weeks of the pregnancy	3396
Stopped smoking between 8 to 16 weeks of the pregnancy	3250
Smoked for the whole of the pregnancy	3128

Which of the following conclusions can be drawn from these results?

- A Babies born to mothers who were non-smokers were the lightest.
- B Smoking by mothers had no effect on the birthweight of their babies.
- C Mothers who smoked for the whole pregnancy had the lightest babies.
- D When the mothers stopped smoking made no difference to the birthweight.

Questions 19, 20 and 21 refer to the information below.

A water sample was taken from each of four sites in a river as shown in the diagram.



Methylene blue dye can be used to indicate the oxygen content of water in which organisms are living.

Methylene blue changes from blue to colourless as oxygen is used up.

The table below shows the colour changes when methylene blue was added to each water sample.

<i>Sample number</i>	<i>Colour at start</i>	<i>Colour after 3 days</i>
1	blue	blue
2	blue	colourless
3	blue	colourless
4	blue	blue

19. Which of the changes below would make the results more reliable?

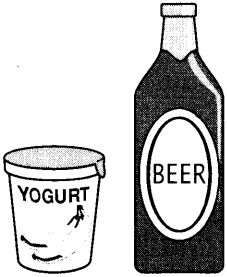

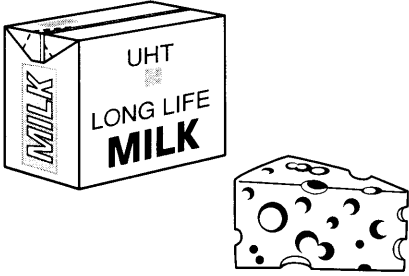

- A Not taking a sample at site 2
- B Boiling the water before adding methylene blue to the samples
- C Taking several samples at each site
- D Taking the samples at the same time of day

20. A suitable control for this investigation would contain

- A river water only
- B methylene blue only
- C distilled water only
- D methylene blue and distilled water.

21. The methylene blue in samples 2 and 3 becomes colourless because these samples contain
- A beer
  - B bacteria
  - C whey
  - D detergent.

22. Which of the following are **both** made using yeast?

<p>A Yogurt and beer</p> 	<p>B Bread and UHT milk</p> 
<p>C UHT milk and cheese</p> 	<p>D Bread and a fermented milk drink</p> 

23. Which statement about the treatment of milk is correct?

Milk

- A has resazurin added to keep it fresh for a longer period
- B has fat removed to make evaporated milk
- C is pasteurised to destroy harmful bacteria
- D is tested with rennet to make sure it is safe for human consumption.

[Turn over

24. Which of the following are **all** sources of the rennet used in cheese-making?
- A Calves, fungi and genetically engineered yeast
  - B Bacteria, fungi and genetically engineered yeast
  - C Calves, fungi and bacteria
  - D Calves, bacteria and genetically engineered yeast
25. Which of the following statements is true for **cask conditioned** beer?
- A The carbon dioxide in it has been produced by fermentation in the cask.
  - B It has a long shelf life.
  - C It has been filtered.
  - D The carbon dioxide in it has been pumped in under pressure.

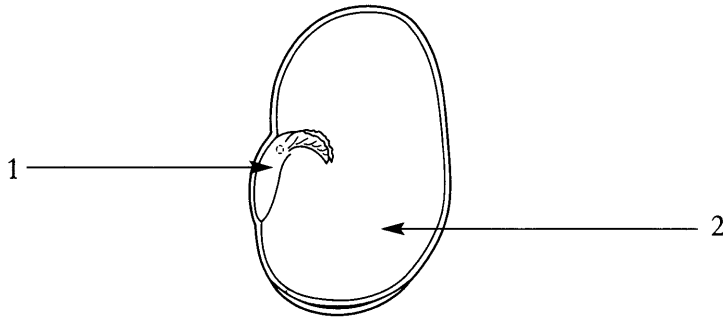
**Candidates are reminded that the answer sheet for Section A MUST be returned inside this answer book.**

Marks

**SECTION B**

**All questions in this Section should be attempted.**

1. The diagram shows the structure of a bean seed.



- (a) Use the diagram to complete the table below.

<i>Label</i>	<i>Name of seed part</i>
1	
2	

1

- (b) Soon after germination the seedling begins to make its own food.



Name the process by which plants make food.

\_\_\_\_\_

1

- (c) Explain the advantage of seed dormancy.

\_\_\_\_\_

\_\_\_\_\_

1

Marks

2. (a) The diagrams and table below show some plants and the beneficial insects attracted to them.

**Beneficial Insects**



lacewings



hoverflies



ladybirds



bees



butterflies

<i>Plant</i>	<i>Beneficial Insects</i>				
Rosemary					
Yarrow					
Fennel					
Angelica					
Anthemis					
Buddleia					
Marigold					
Cosmos					

Answer the following questions, using the information above.

- (i) Which plant attracts most beneficial insects?

\_\_\_\_\_ 1

- (ii) Which plant only attracts lacewings?

\_\_\_\_\_ 1

- (iii) Which insects are attracted to Cosmos?

\_\_\_\_\_ 1

- (b) Not all insects are beneficial.

Name **one** insect pest found in gardens.

\_\_\_\_\_ 1

3. The results of an investigation into the time taken for Candytuft seeds to germinate are shown in the table below.

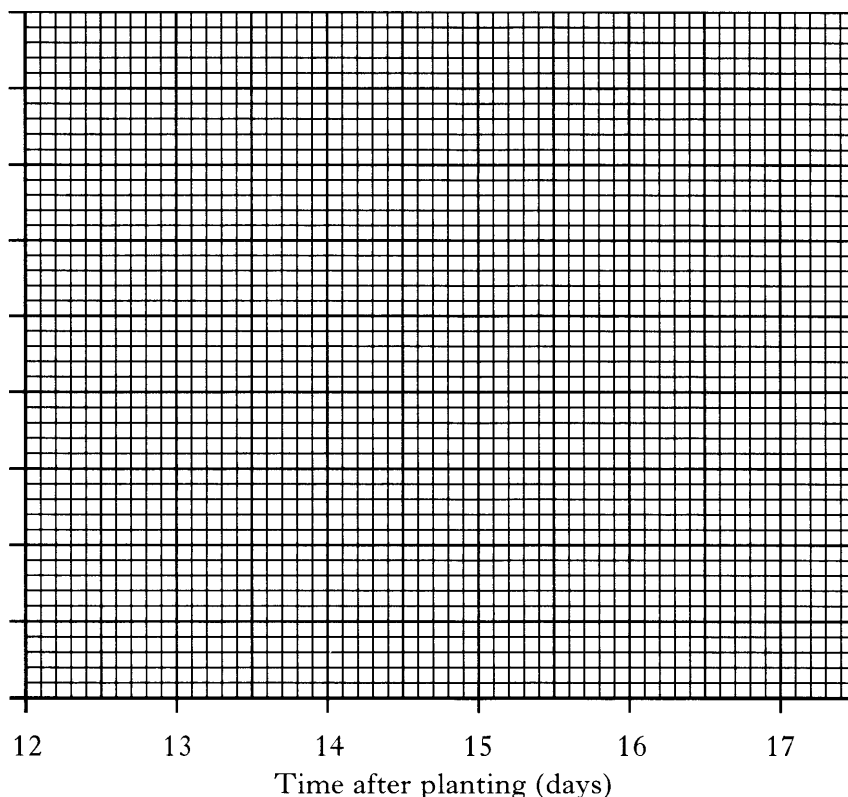
<i>Time after planting (days)</i>	<i>Total number of seeds germinated by that day</i>
12	11
13	27
14	40
15	58
16	73
17	81

- (a) On the grid below, plot a **line graph** by

- (i) putting a scale on the vertical axis
- (ii) providing a label for the vertical axis
- (iii) plotting the graph.

1  
1  
1

(Additional graph paper, if required, will be found on page 28.)



- (b) Ninety seeds were planted.  
Calculate the percentage of the seeds that germinated.

*Space for calculation.*

\_\_\_\_\_ %

1

Marks

4. Read the following passage carefully.

There are many different varieties of potato. First early varieties are ready for eating in June. Two examples are Arran Pilot which is floury when cooked and Sutton Foremost which is firm when cooked. Craigs Royal is a second early, ready between July and September, with a waxy flesh. The white fleshed Pentland Dell and yellow fleshed Desiree are both maincrop varieties, which are not ready until October.

(a) Use the information in the passage to complete the table below.

<i>Potato variety</i>	<i>When ready</i>	<i>Appearance when cooked</i>
Arran Pilot	June	floury
Sutton Foremost		firm
Craigs Royal	July to September	
	October	yellow

3

(b) Name the food storage organ produced by a potato.

\_\_\_\_\_

1

(c) Plants growing in a greenhouse require water. The water can be supplied using a watering can.

State **one** other way of supplying water.

\_\_\_\_\_

1

(d) Greenhouses protect plants from the effects of low temperatures.

State **one** other method of protecting plants.

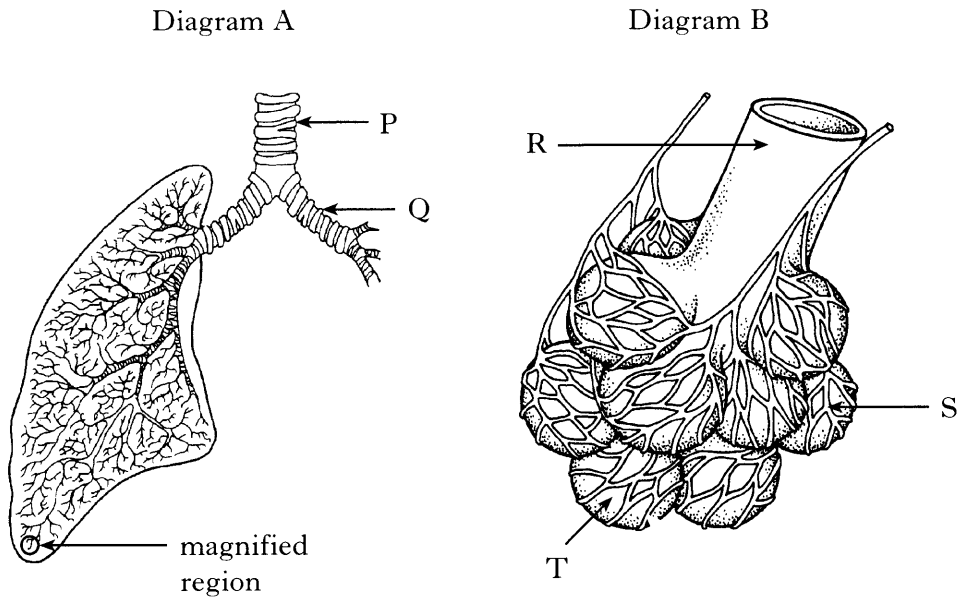
\_\_\_\_\_

1



Marks

5. (a) Diagram A shows some structures in the human breathing system.  
Diagram B shows a magnification of the small region of the lung circled in Diagram A.



- (i) Use the letters from the diagrams to complete the table below.

Structure	Letter
Windpipe	
Bronchus	
Bronchiole	

2

- (ii) Underline one option in the brackets to make the sentences below correct.

In the capillary, { oxygen / carbon dioxide } moves from air sacs into the blood

and { oxygen / carbon dioxide } moves from the blood into the air sacs.

1

- (b) Name the gas in tobacco smoke that reduces the ability of the blood to carry oxygen.

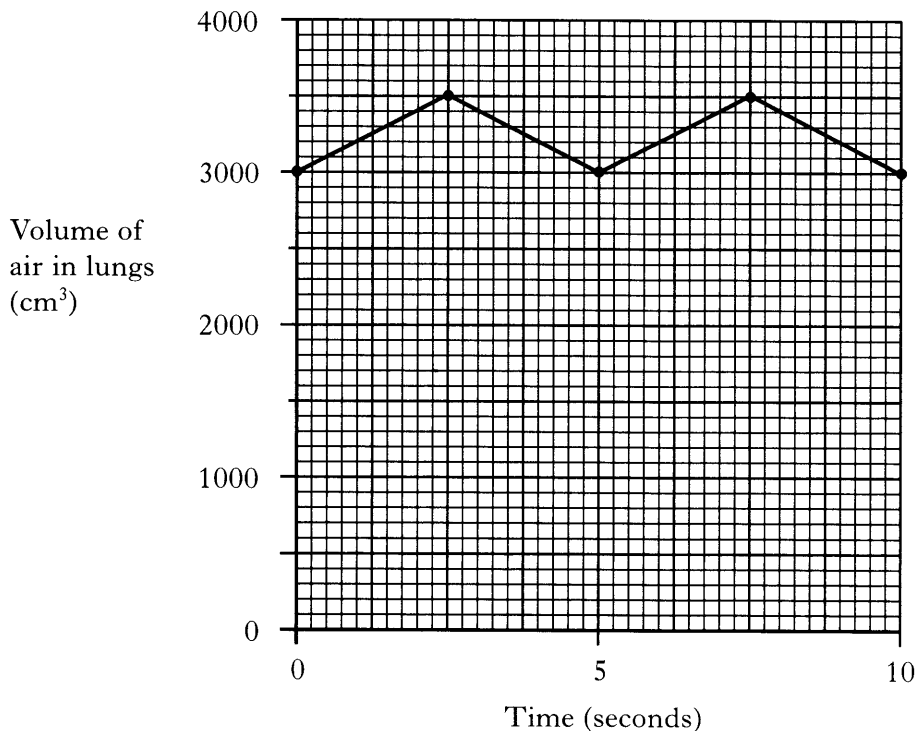
\_\_\_\_\_

1

Marks

5. (continued)

- (c) The volume of air in the lungs of a student was recorded during a ten second period, as shown in the graph below.



- (i) Use the graph to calculate the tidal volume.

*Space for calculation*

\_\_\_\_\_ cm<sup>3</sup>

1

- (ii) Calculate the number of breaths the student would take in **one minute**.

*Space for calculation*

\_\_\_\_\_ breaths

1

- (d) Explain what is meant by the term *vital capacity*.

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1

Marks

6. An investigation to compare the fitness of two female students was carried out. The following description outlines the steps in the investigation.
1. Each student measured her resting pulse rate.
  2. They then went out to the playing field for a period of vigorous exercise.
  3. On return, they measured their pulse rates immediately.
  4. They continued to measure their pulse rates each minute until they returned to the resting value.
  5. They compared their results to see who was fitter.

(a) Identify **two** variables that should be kept the same if their results are to be compared.

1 \_\_\_\_\_

2 \_\_\_\_\_

2

(b) The results are shown in the table below.

Name	Pulse rate (beats per minute)		Time for pulse rate to return to the resting value (minutes)
	Resting	After exercise	
Kelly	60	100	3
Claire	70	120	6

(i) What is the *time taken for pulse rate to return to the resting value* usually called?

\_\_\_\_\_

1

(ii) Which of the students is fitter?

Give a reason for your answer.

Student \_\_\_\_\_

Reason \_\_\_\_\_

\_\_\_\_\_

1

(c) What effect does **regular** exercise have on a person's resting pulse rate?

\_\_\_\_\_

1

Marks

7. In 1995, the recommended maximum drinking levels were 21 units of alcohol per week for men and 14 units for women.

The percentage of the population in each age group drinking more than the recommended maximum level is shown in the table below.

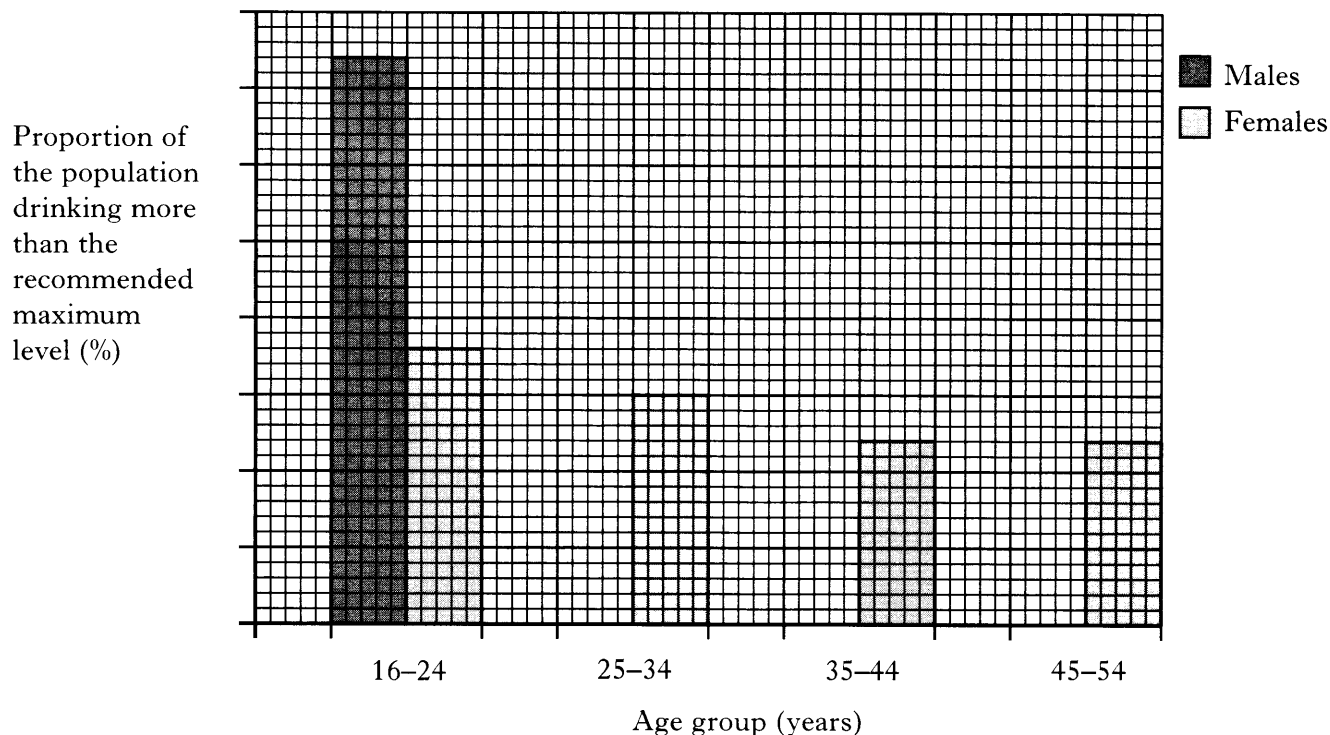
Age group (years)	Proportion of the population drinking more than the recommended maximum level (%)	
	Males	Females
16-24	37	18
25-34	34	15
35-44	33	12
45-54	31	12

(Scottish health survey 1995)

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

- (i) putting a scale on the vertical axis 1
- (ii) plotting the remaining results for males. 1

(Additional graph paper, if required, will be found on page 28.)



Marks

**7. (continued)**

(b) What **two** conclusions can be drawn from the table?

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

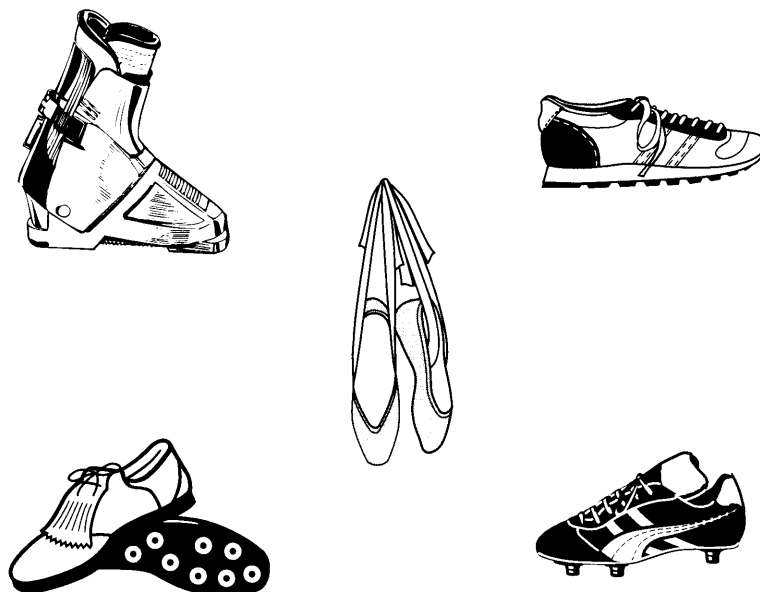
2

**[Turn over**

Marks

8. (a) Read the following passage carefully.

LOOK OUT. YOU COULD BE TREADING ON 140 000 SPORES.  
Adapted from *Guardian Unlimited*



A ballet shoe may seem an inoffensive, delicate thing, but many times more fungal spores are likely to be lurking inside it than in a running shoe, according to new research. Ballet shoes are among the top five breeding grounds for foot fungus.

At Loughborough University, items of footwear from different students were collected. They were wiped with a dry sponge on the inside to absorb moisture containing fungal spores. The sponges were taken back to the laboratory and analysed.

Football boots topped the league with 140 000 spores per boot. Ski boots came second on the list, with 100 000 spores, followed by golf shoes with 93 000 and ballet shoes with 64 000 per shoe. Running shoes had a score of 640.

Foot fungus thrives in hot, moist and dark conditions, so the feet of sweaty sports enthusiasts are prone to such infections.

Marks

**8. (a) (continued)**

**Answer the questions below**, using the information in the passage.

- (i) Complete the table to show the number of fungal spores found in the different types of footwear.

<i>Type of footwear</i>	<i>Number of fungal spores</i>
Football boots	140 000

2

- (ii) Calculate the simple whole number ratio of the number of fungal spores found in a ballet shoe to the number found in a running shoe.

*Space for calculation*

Ratio \_\_\_\_\_ : \_\_\_\_\_

1

- (iii) From the passage, state **two** conditions which encourage growth of the fungus.

1 \_\_\_\_\_

2 \_\_\_\_\_

1

- (b) Name a fungal infection of the feet.

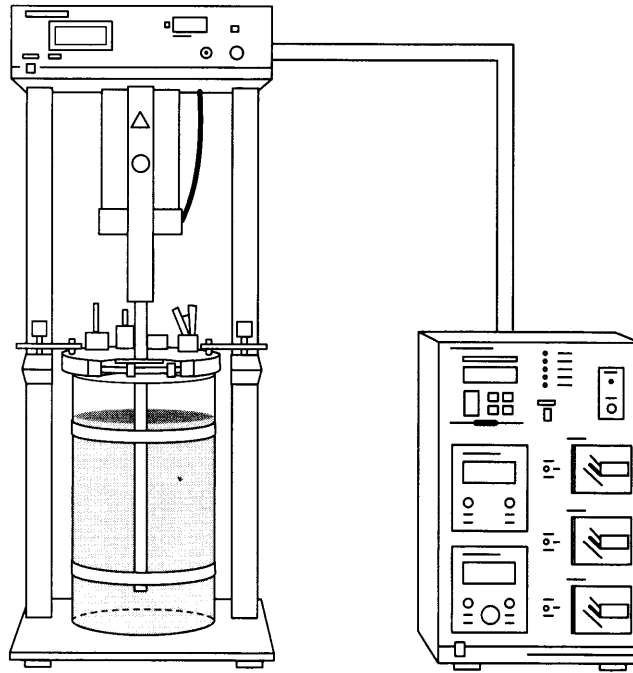
\_\_\_\_\_

1

**[Turn over**

Marks

9. (a) A vessel used to produce an antibiotic is shown in the diagram.



- (i) Name the type of vessel shown in the diagram.

\_\_\_\_\_

1

- (ii) State **one** condition which should be controlled during the production process.

\_\_\_\_\_

1

- (iii) What is used to monitor and control conditions in the vessel?

\_\_\_\_\_

1



Marks

9. (continued)

(b) The following statements are incomplete.

Complete each statement by inserting the missing word.

(i) Infections such as thrush can be treated using \_\_\_\_\_  
drugs.

(ii) Biological washing powders contain \_\_\_\_\_ which help  
digest protein stains.

(iii) Products made from \_\_\_\_\_ can be used to flavour  
crisps or to make salmon flesh pink.

3

(c) Some people are concerned about the overuse of antibiotics which can lead to  
bacteria developing resistance to the antibiotics.

Explain what the term *resistance* means.

\_\_\_\_\_

\_\_\_\_\_

1

[Turn over

Marks

10. A student carried out an investigation to compare how well four different brands of detergent removed stains from cloths.

Four square pieces of cloth were each stained using 5 cm<sup>3</sup> of curry sauce.  
Equal volumes of each detergent solution were poured into separate beakers.

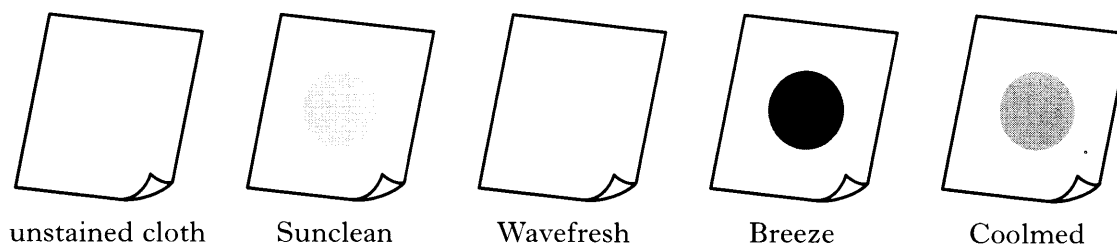
Each cloth was then treated as described below.

1. Soaked in 200 cm<sup>3</sup> of detergent solution for 20 minutes
2. Removed from the solution
3. Rinsed in clean water
4. Dried for 20 minutes in an oven

The washed cloths were then compared with one that had not been stained.

Each cloth was given a cleaning score out of 10 depending on how much stain had been removed. A score of 10 means that all the stain was removed.

The results are shown in the diagrams and table below.



<i>Detergent</i>	<i>Cloth</i>	<i>Temperature</i>	<i>Cleaning score out of 10</i>
Sunclean (biological)	Cotton	30 °C	8
Wavefresh (biological)	Nylon	30 °C	10
Breeze (non-biological)	Cotton	30 °C	5
Coolmed (non-biological)	Nylon	30 °C	7

- (a) A temperature of 30 °C was used in this investigation.

Give **one** advantage of washing clothes at low temperatures.

\_\_\_\_\_

1

Marks

10. (continued)

(b) (i) Which **two** variables were altered during the investigation?

1 \_\_\_\_\_

2 \_\_\_\_\_

1

(ii) The student said that **Wavefresh** was better than **Sunclean** at removing curry stains.

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

\_\_\_\_\_

\_\_\_\_\_

1

(iii) What valid conclusion **can** be drawn about the effectiveness of biological detergents from this investigation?

\_\_\_\_\_

\_\_\_\_\_

1

(iv) Suggest **one** way in which the investigation could be improved.

\_\_\_\_\_

\_\_\_\_\_

1

[END OF QUESTION PAPER]

[Turn over