



**Surname** \_\_\_\_\_

**Other Names** \_\_\_\_\_

**Centre Number** \_\_\_\_\_

**Candidate Number** \_\_\_\_\_

**Candidate Signature** \_\_\_\_\_

**I declare this is my own work.**

**GCSE  
BIOLOGY**

**H**

**Higher Tier Paper 1H**

**8461/1H**

**Time allowed: 1 hour 45 minutes**

**At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.**

**[Turn over]**



**For this paper you must have:**

- a ruler
- a scientific calculator.

## **INSTRUCTIONS**

- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Answer ALL questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.



## **INFORMATION**

- **The maximum mark for this paper is 100.**
- **The marks for questions are shown in brackets.**
- **You are expected to use a calculator where appropriate.**
- **You are reminded of the need for good English and clear presentation in your answers.**

**DO NOT TURN OVER UNTIL TOLD TO DO SO**



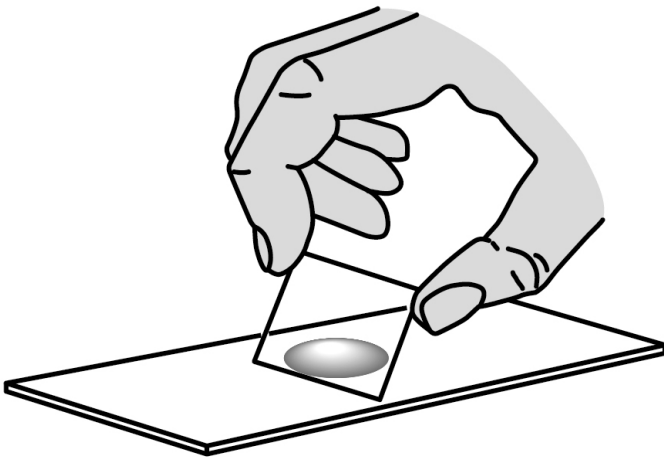
**Answer ALL questions in the spaces provided.**

**0 1**

**A student prepared some animal cells to view using a microscope.**

**FIGURE 1 shows the student preparing the cells.**

**FIGURE 1**



0	1	.	1
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Name **TWO** pieces of laboratory equipment the student could have used to **PREPARE** cells to view using a microscope. [2 marks]

1

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2

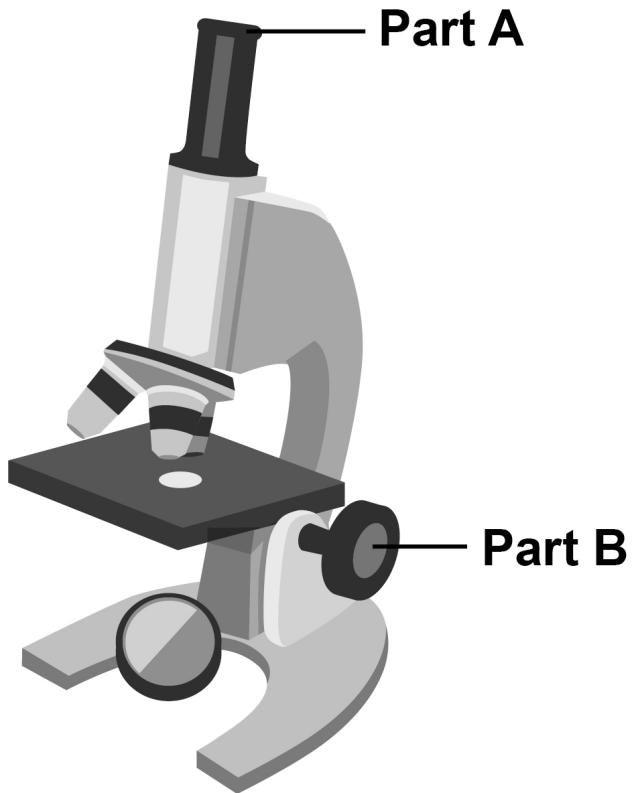
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[Turn over]



**FIGURE 2** shows the student's light microscope.

**FIGURE 2**



0 1 . 2

**Name part A. [1 mark]**

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**0 1 . 3****What is the function of part B? [1 mark]**

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**0 1 . 4****The student tried to look at the cells using the microscope.****Suggest ONE reason why the student could NOT see any cells when looking through part A. [1 mark]**

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**[Turn over]**







0	1	.	6
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**When placed into a beaker of water:**

- a red blood cell bursts
- a plant cell does **NOT** burst.

**Explain why the red blood cell bursts but the plant cell does NOT burst. [2 marks]**

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13



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**[Turn over]**



0 2

**A student investigated the effectiveness of three different antibiotics.**

**FIGURE 3, on the opposite page, shows how the student set up an agar plate.**

**The student used aseptic techniques to make sure that only one type of bacterium was growing on the agar.**

0 2 . 1

**Describe TWO aseptic techniques the student should have used. [2 marks]**

1

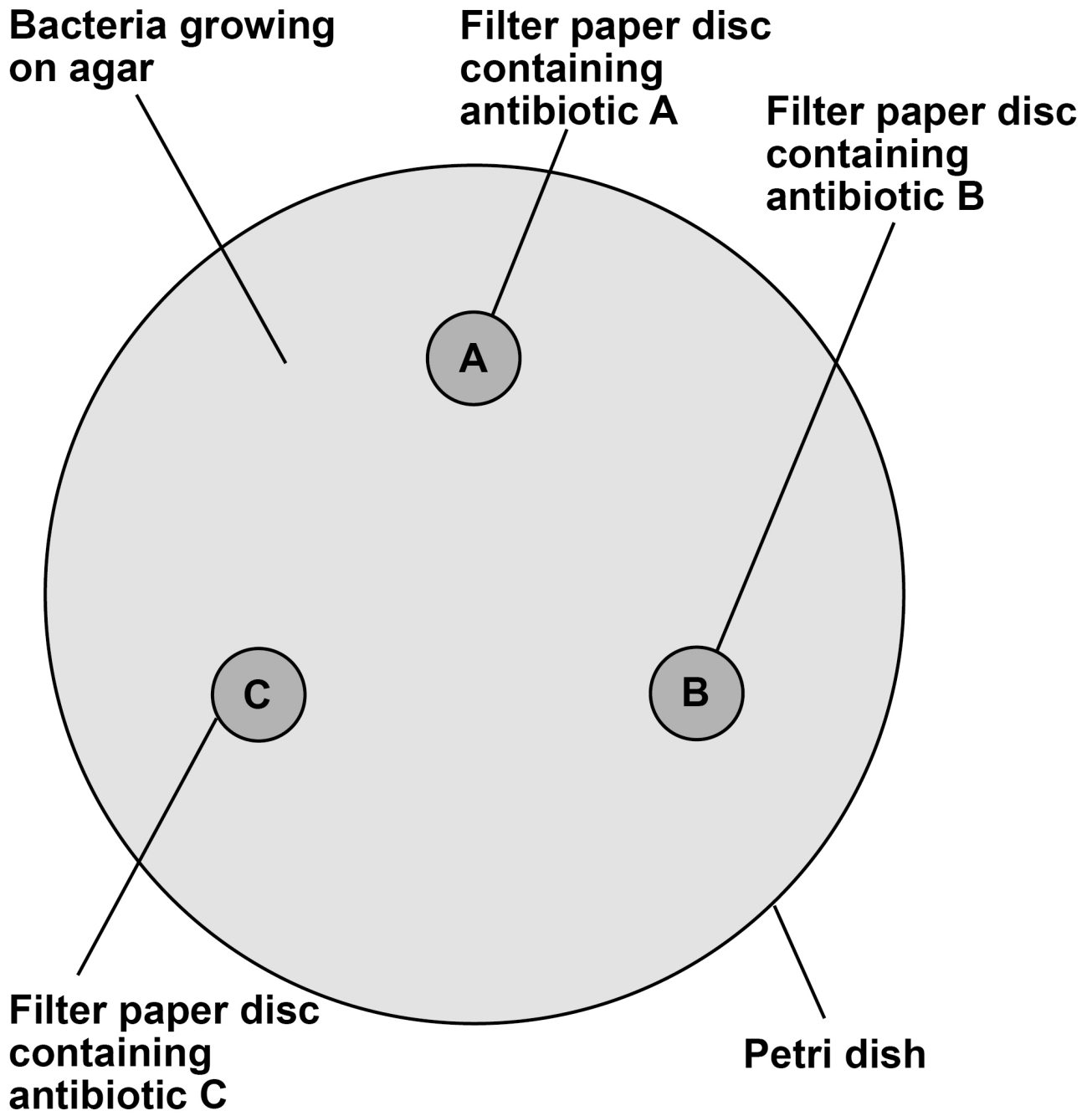
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2

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**FIGURE 3**



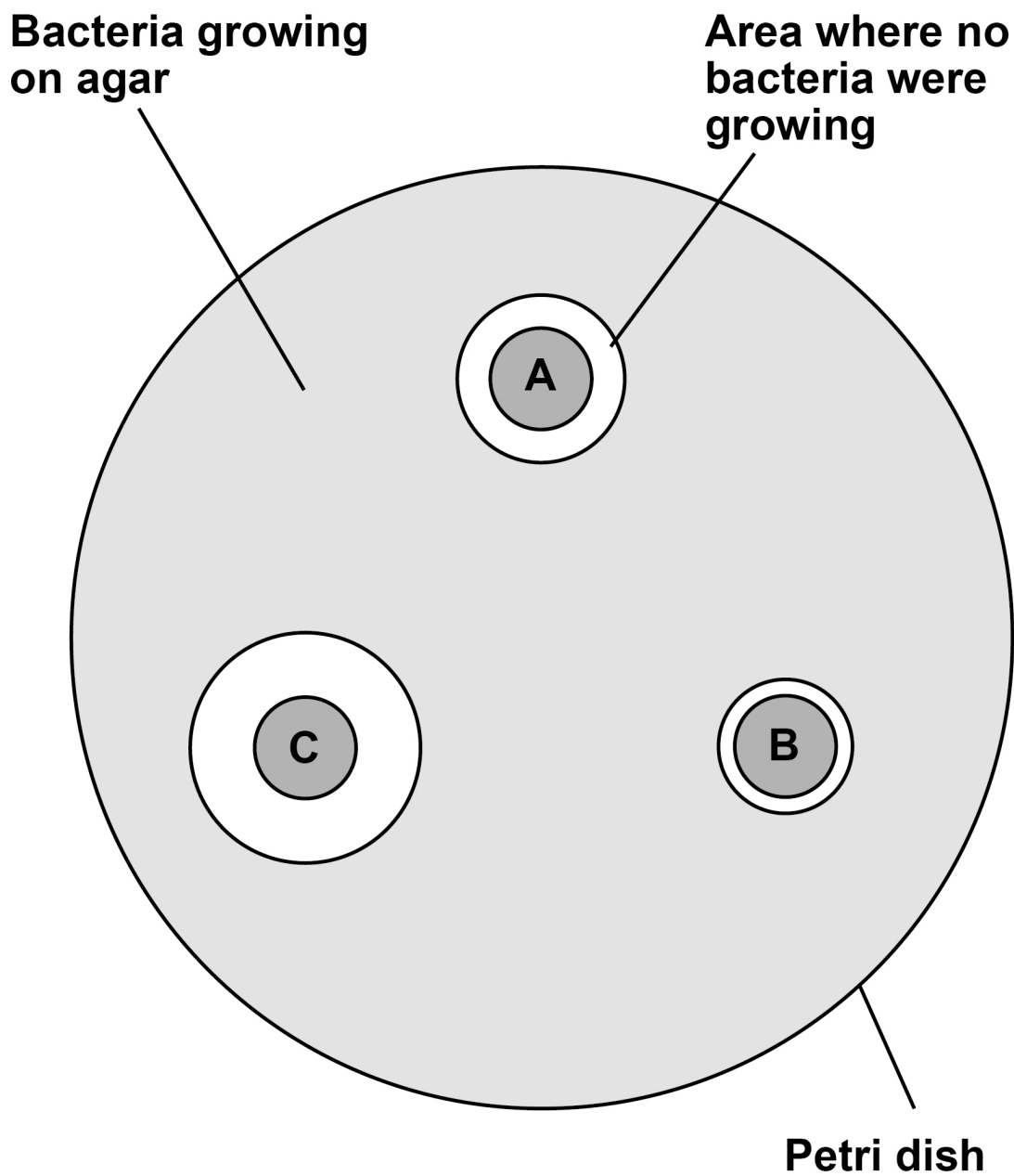
**[Turn over]**



The student placed the agar plate in an incubator at 25 °C for 48 hours.

FIGURE 4 shows the agar plate after 48 hours.

FIGURE 4



0 2 . 2

**Which antibiotic is the LEAST effective?**

**Give a reason for your answer. [1 mark]**

**Least effective antibiotic** \_\_\_\_\_

**Reason** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[Turn over]**







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Area = \_\_\_\_\_

Unit \_\_\_\_\_

0	2	.	4
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**Suggest ONE way the student could improve the investigation. [1 mark]**

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[Turn over]

9



0	3
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**Body Mass Index (BMI) is a way of finding out if a person's body mass falls within a healthy range for their height.**

**TABLE 1 shows information about two people.**

**TABLE 1**

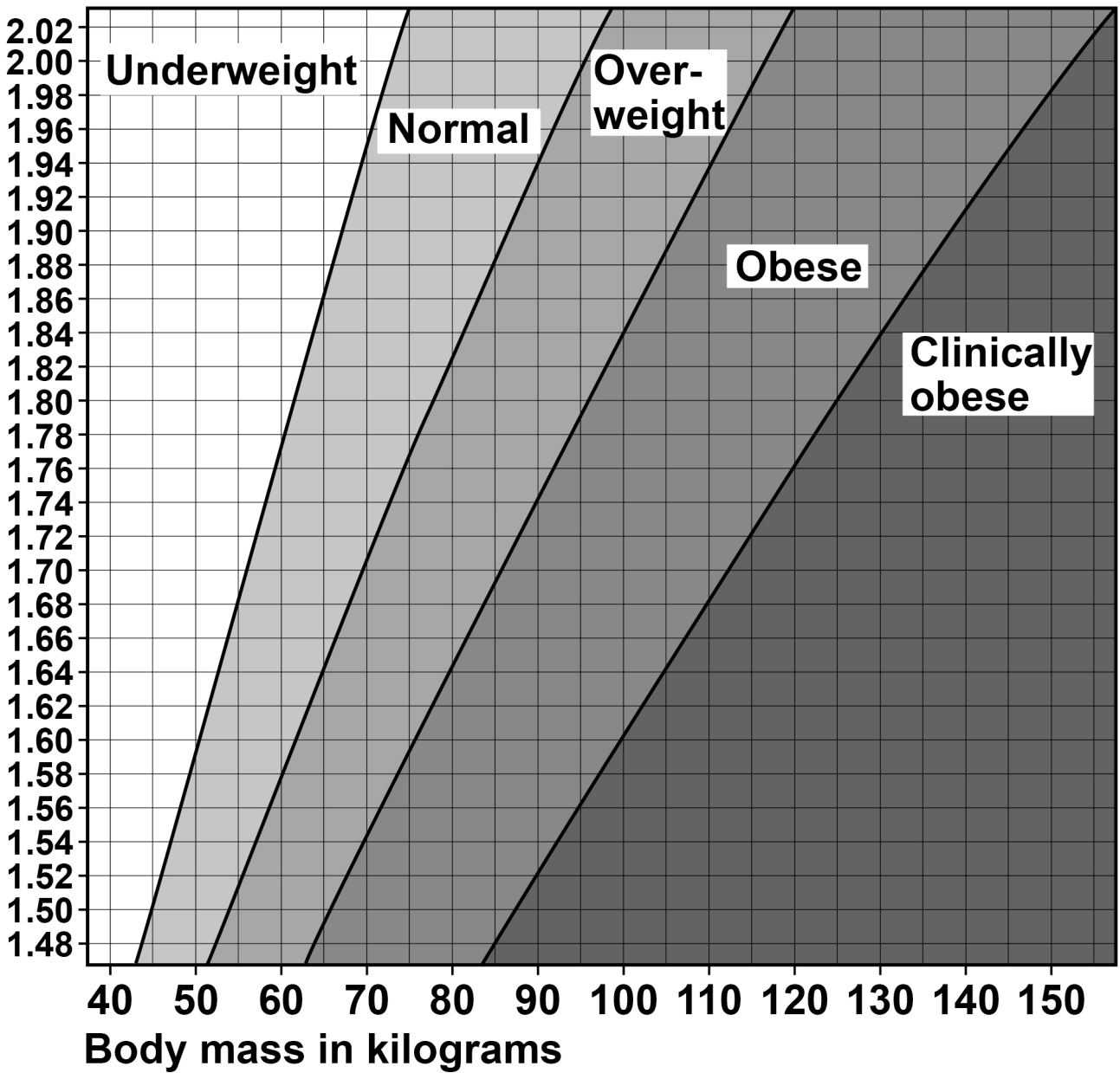
<b>Person</b>	<b>Body mass in kg</b>	<b>Height in m</b>	<b>BMI in kg/m<sup>2</sup></b>
<b>A</b>	<b>63</b>	<b>1.65</b>	<b>23.1</b>
<b>B</b>	<b>92</b>	<b>1.71</b>	<b>X</b>

**FIGURE 5, on the opposite page, shows five BMI categories for adults.**



FIGURE 5

Height  
in  
metres



[Turn over]



03.1

Which is the BMI category of person A in TABLE 1?  
[1 mark]

Tick (✓) ONE box.

Clinically obese

Normal

Obese

Overweight

Underweight

REPEAT OF TABLE 1

Person	Body mass in kg	Height in m	BMI in kg/m <sup>2</sup>
A	63	1.65	23.1
B	92	1.71	X





Scientists think there is a link between BMI and life expectancy.

TABLE 2 shows information about predicted life expectancy of men after the age of 50.

TABLE 2

<b>BMI Category</b>	<b>Predicted number of years living in good health after the age of 50</b>	<b>Predicted number of years living in bad health after the age of 50</b>
<b>Normal</b>	<b>19.06</b>	<b>4.98</b>
<b>Overweight</b>	<b>18.68</b>	<b>5.32</b>
<b>Obese</b>	<b>16.37</b>	<b>7.08</b>
<b>Clinically obese</b>	<b>13.07</b>	<b>10.10</b>



03.3

Describe TWO patterns shown in TABLE 2 about the effects of BMI category. [2 marks]

1

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2

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[Turn over]



The number of people who are obese in the UK is increasing.

03.4

Explain the financial impact on the UK economy of an increasing number of people who are obese. [2 marks]

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03.5

A person who is obese is more at risk of arthritis.

Arthritis is a condition that damages joints.

Suggest how arthritis could affect a person's lifestyle.  
[1 mark]

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03.6

A person who eats a diet high in saturated fat might become obese.

Name TWO health conditions that might develop if a person eats a diet high in saturated fat.

Do NOT refer to arthritis in your answer. [2 marks]

1

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2

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[Turn over]

11



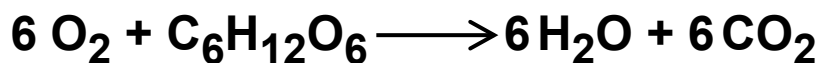
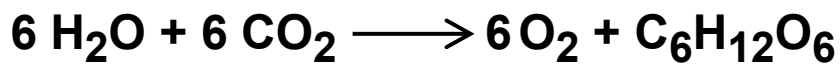
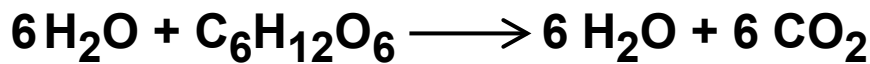
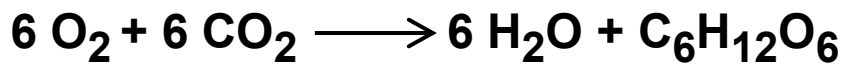
0	4
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All living organisms respire.

0	4	.	1
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What is the chemical equation for aerobic respiration?  
[1 mark]

Tick (✓) ONE box.



0	4	.	2
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Name the sub-cellular structures where aerobic respiration takes place. [1 mark]

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0 4 . 3

Energy is released in respiration.

Give TWO uses of the energy released in respiration.  
[2 marks]

1

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2

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[Turn over]



04.4

**Describe TWO differences between aerobic and anaerobic respiration in humans.**

**Do NOT refer to oxygen in your answer. [2 marks]**

**1**

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**2**

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0	4	.	5
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**What are the TWO products of anaerobic respiration in plant cells? [2 marks]**

**Tick (✓) TWO boxes.**

**Carbon dioxide**

**Ethanol**

**Glucose**

**Lactic acid**

**Water**

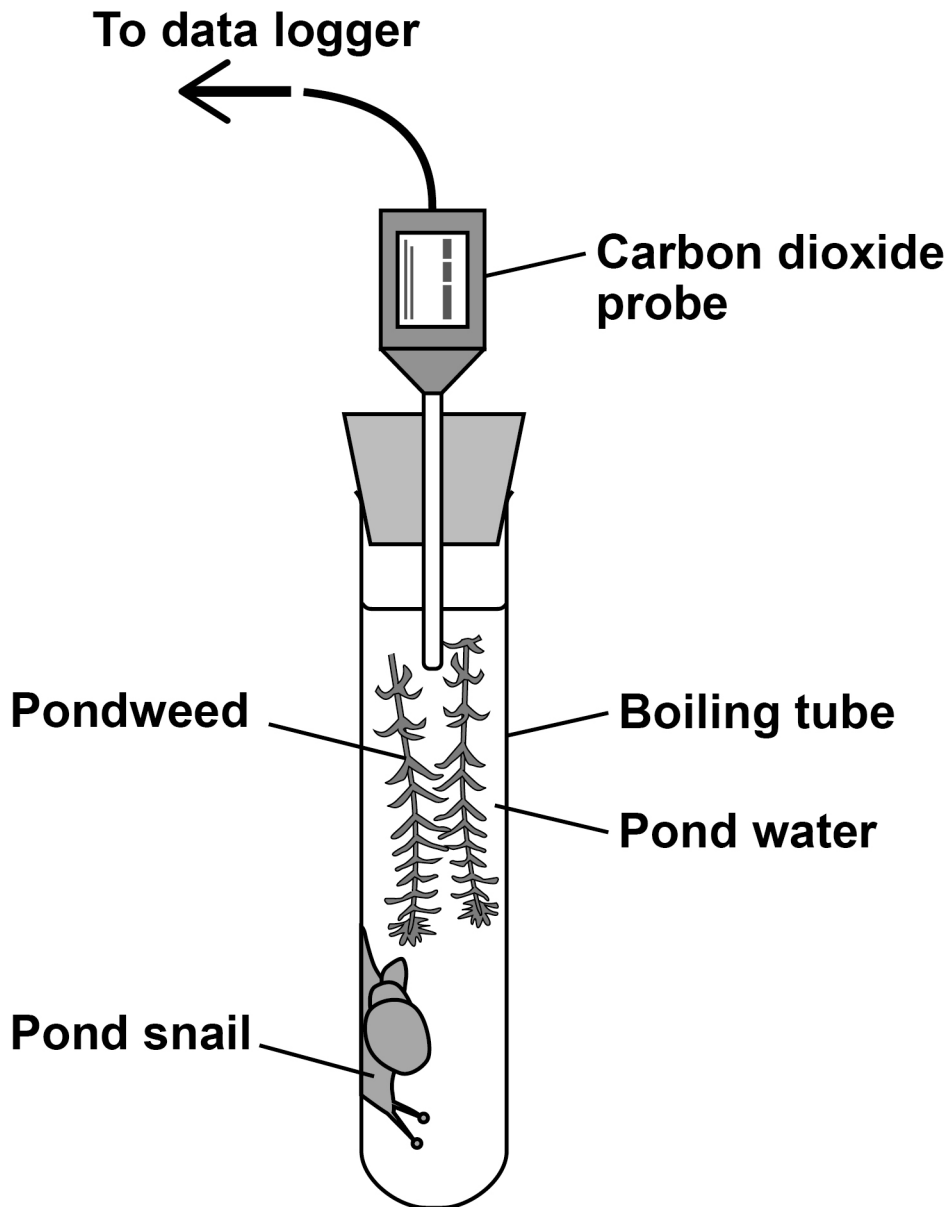
**[Turn over]**



A scientist investigated respiration and photosynthesis using some pondweed and a pond snail.

FIGURE 6 shows the apparatus used.

FIGURE 6



**The apparatus was left in a well-lit room for 5 days.**

**The data logger recorded the concentration of carbon dioxide continuously.**

**After 5 days, the scientist completely covered the boiling tube with black paper.**

**The data logger continued to record the concentration of carbon dioxide.**

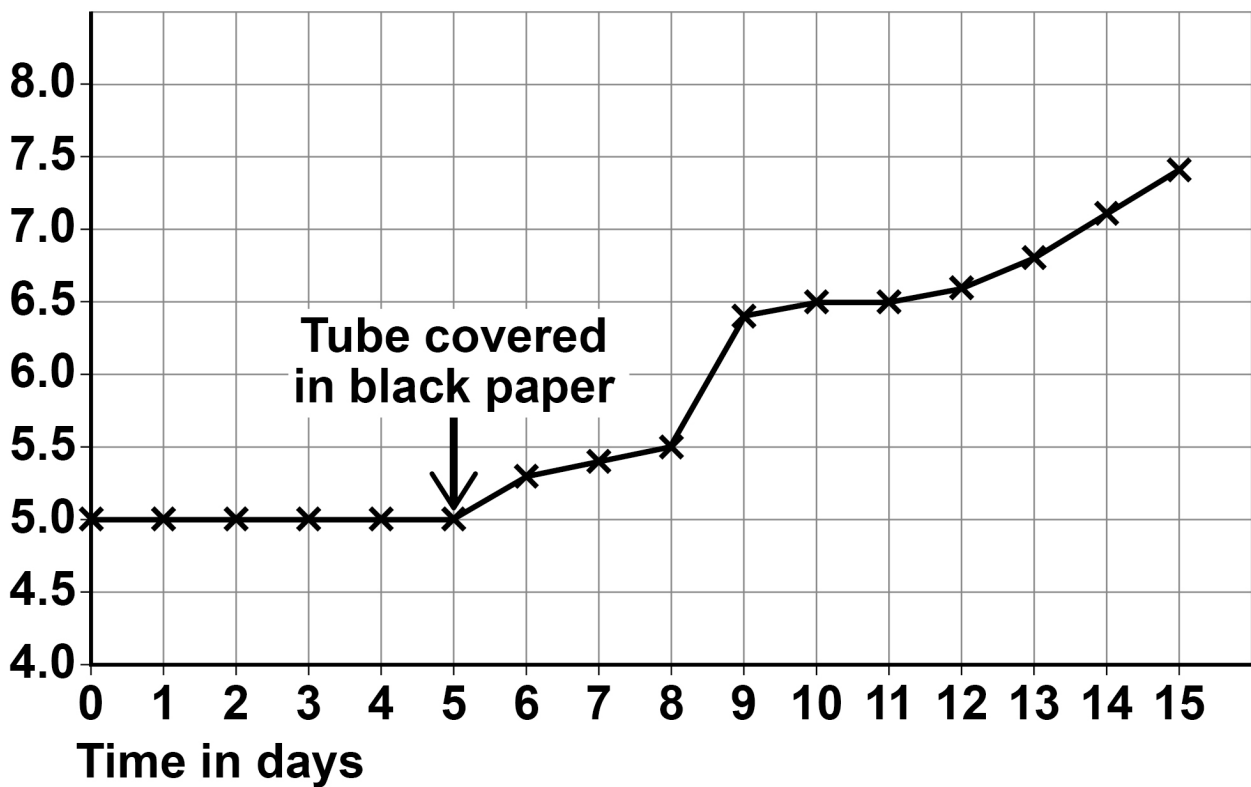
**[Turn over]**



**FIGURE 7** shows the concentration of carbon dioxide inside the boiling tube over 15 days.

**FIGURE 7**

Concentration  
of carbon  
dioxide in  
arbitrary units





**0 4 . 6**

**Explain why the concentration of carbon dioxide in the tube stayed the same between day 0 and day 5.**

**[2 marks]**

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**0 4 . 7**

**Suggest why the concentration of carbon dioxide increased between day 5 and day 10. [1 mark]**

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**[Turn over]**





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**[Turn over]**



**0 5**

**Amylase is an enzyme that breaks down starch.**

**0 5 . 1**

**Amylase is a polymer of smaller molecules.**

**Name the type of smaller molecule. [1 mark]**

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**0 5 . 2**

**Name the THREE parts of the human digestive system that produce amylase. [2 marks]**

**1** \_\_\_\_\_

**2** \_\_\_\_\_

**3** \_\_\_\_\_

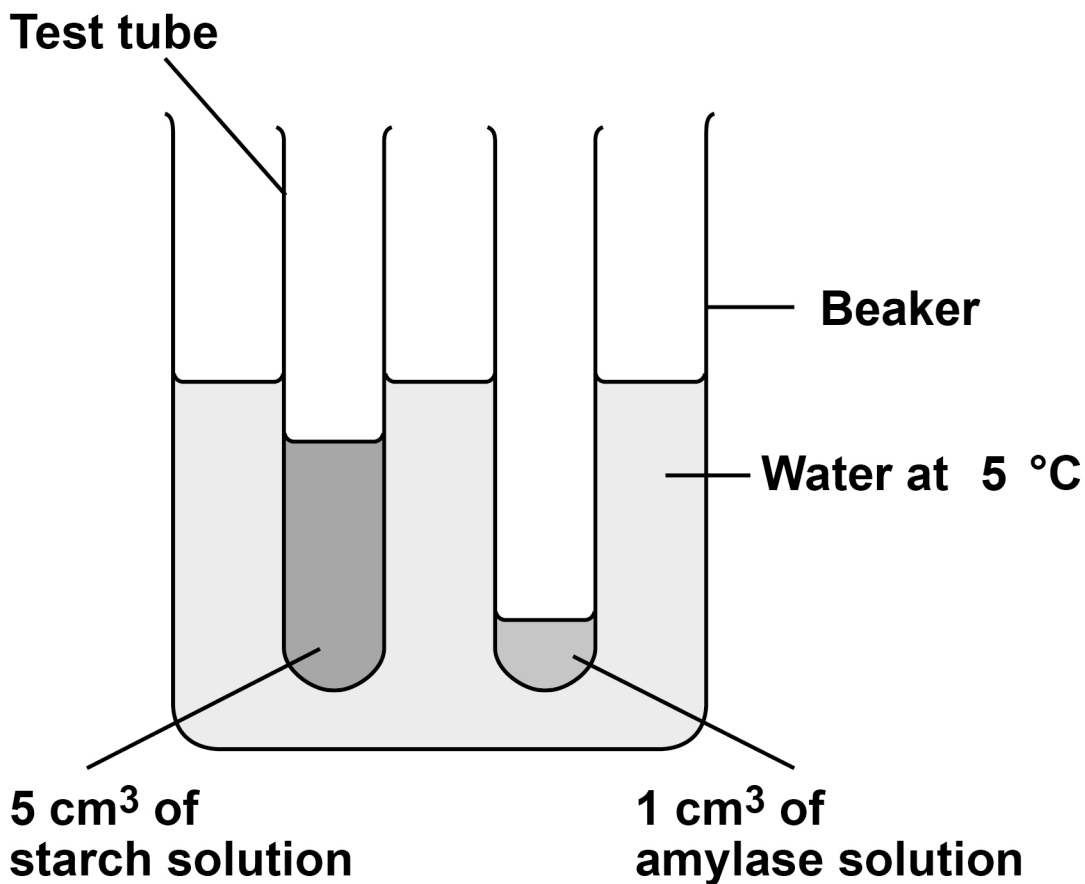




A student investigated the effect of temperature on the activity of amylase.

FIGURE 8 shows the apparatus used.

FIGURE 8



This is the method used.

1. Set up the apparatus as shown in FIGURE 8.
2. After 5 minutes, pour the starch solution into the amylase solution and mix.

3. Remove one drop of the starch-amylase mixture and place onto a spotting tile.
4. Immediately add two drops of iodine solution to the starch-amylase mixture on the spotting tile.
5. Record the colour of the iodine solution added to the starch-amylase mixture.
6. Repeat steps 3 to 5 every minute until the iodine solution stays yellow-brown.
7. Repeat steps 1 to 6 using water at different temperatures.

05.4

Name TWO control variables the student used in the investigation. [2 marks]

1 \_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_

[Turn over]

0	5	.	5
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**Why did the student leave the starch solution and amylase solution for 5 minutes before mixing them?**  
**[1 mark]**

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**TABLE 3** shows the results of the investigation.

**TABLE 3**

Temperature in °C	Time taken until iodine solution stays yellow-brown in minutes
5	did not become yellow-brown
20	5
35	2
50	7
65	14
80	did not become yellow-brown

0 5 . 6

**What conclusion can be made about the effect of temperature on amylase activity between 20 °C and 65 °C? [1 mark]**

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**[Turn over]**



**REPEAT OF TABLE 3**

<b>Temperature in °C</b>	<b>Time taken until iodine solution stays yellow-brown in minutes</b>
<b>5</b>	<b>did not become yellow-brown</b>
<b>20</b>	<b>5</b>
<b>35</b>	<b>2</b>
<b>50</b>	<b>7</b>
<b>65</b>	<b>14</b>
<b>80</b>	<b>did not become yellow-brown</b>

**05.7**

**Explain the results at 5 °C and at 80 °C.**

**Use TABLE 3. [5 marks]**

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**0 5 . 8**

**The student investigated the effect of temperature on amylase activity.**

**Describe how the student could extend the investigation to determine the effect of a different factor on amylase activity. [2 marks]**

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17



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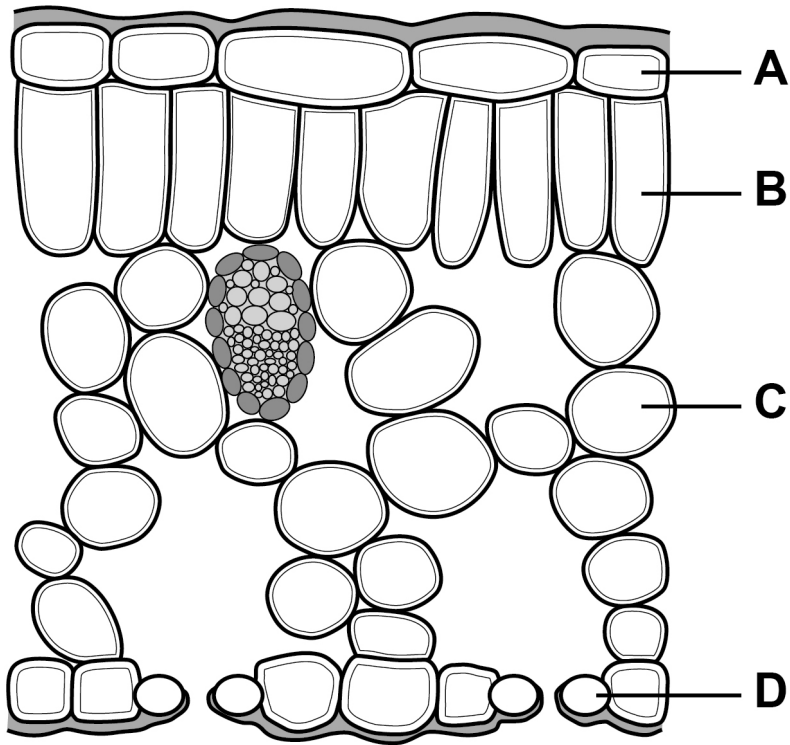
**[Turn over]**



06

FIGURE 9 shows a cross section of a leaf.

FIGURE 9



**06.1****Which cell is most transparent? [1 mark]****Tick (✓) ONE box.****A****B****C****D****06.2****Which cell structure in a leaf mesophyll cell is NOT found in a root hair cell? [1 mark]**

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**[Turn over]**

**Plants lose water through their leaves.**

**06.3**

**Name the cells in a leaf that control the rate of water loss. [1 mark]**

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**06.4**

**Water is taken in by the roots, transported up the plant and lost from the leaves.**

**Which scientific term describes this movement of water? [1 mark]**

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**0 6 . 5**

**Which change would decrease the rate of water loss from a plant's leaves? [1 mark]**

**Tick (✓) ONE box.**

**Increased humidity**

**Increased light intensity**

**Increased density of stomata**

**Increased temperature**

**[Turn over]**



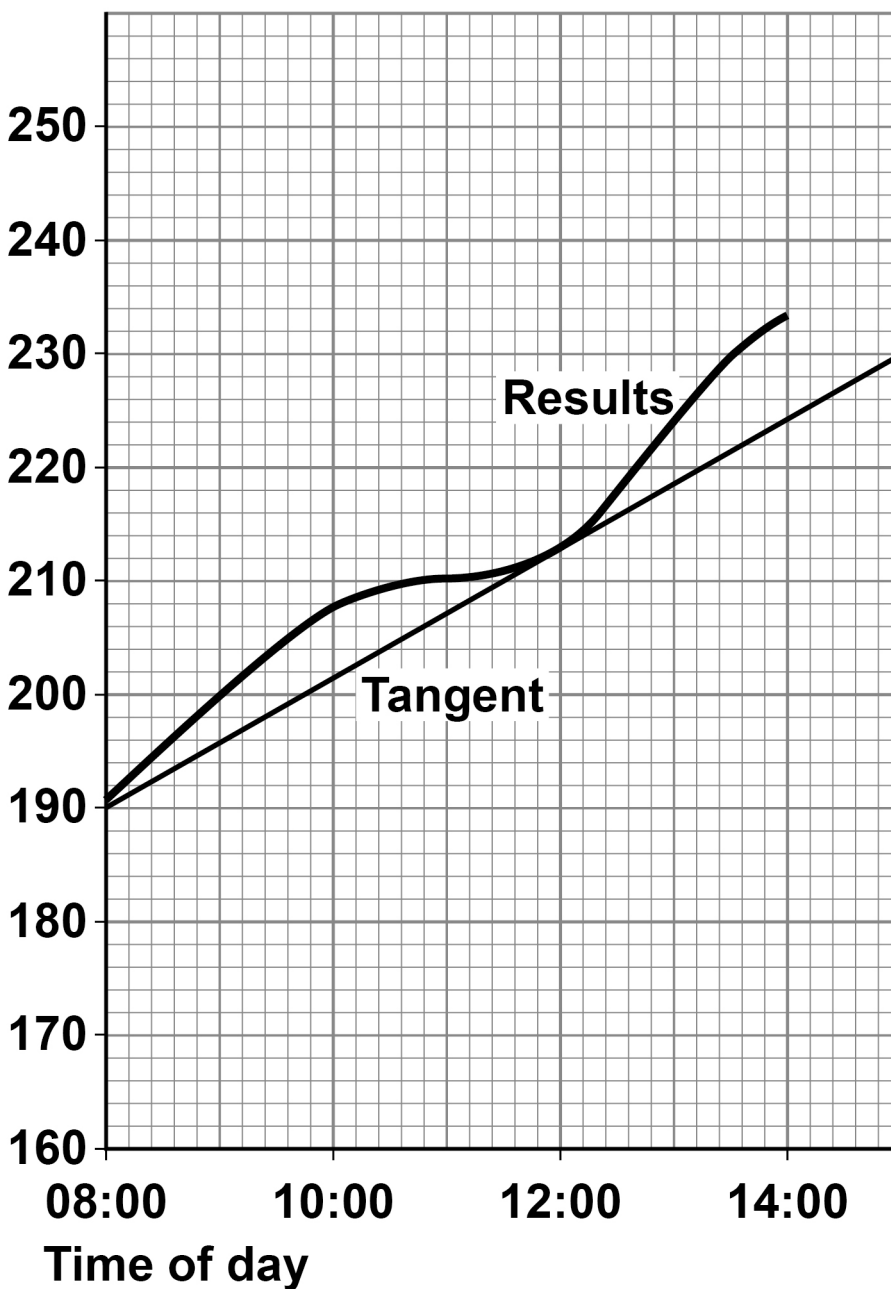




FIGURE 10 shows the total volume of water lost from a plant over 6 hours.

FIGURE 10

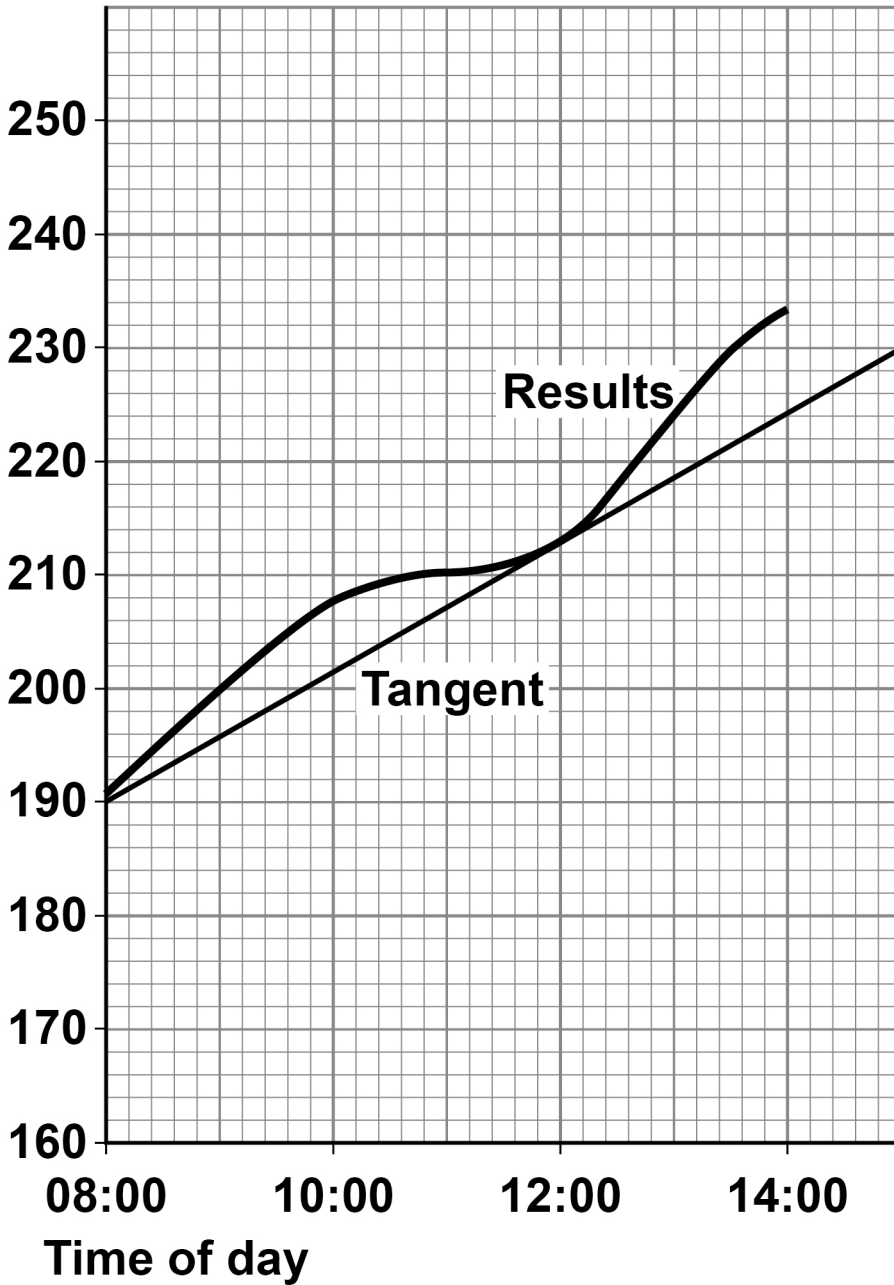
Total  
volume of  
water lost  
in  $\text{cm}^3$





## REPEAT OF FIGURE 10

Total  
volume of  
water lost  
in  $\text{cm}^3$



0	6	.	8
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The rate of water loss at midnight was much lower than at 12:00

Explain why. [2 marks]

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[Turn over]

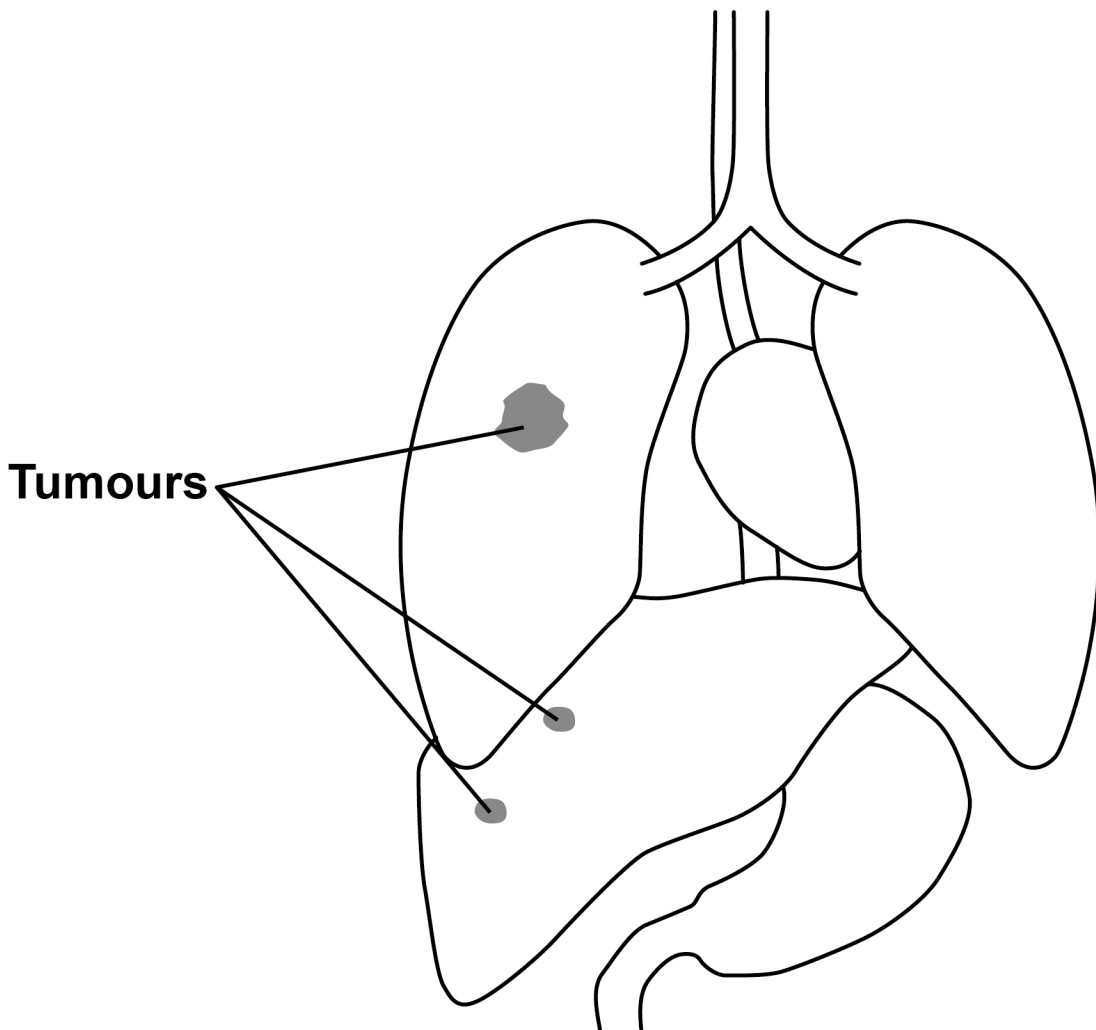
17



07

**FIGURE 11** shows where three of the same type of tumour were found in a patient.

**FIGURE 11**





**Malignant tumours are cancers.**

**0 7 . 1**

**Describe what happens to cells when a tumour forms.  
[1 mark]**

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**0 7 . 2**

**What evidence is there in FIGURE 11 to suggest that the tumour in the lung is malignant? [1 mark]**

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**[Turn over]**



**07.3**

**Some types of cancer can cause the numbers of blood components in a person's body to fall to a dangerously low level.**

**A person with one of these types of cancer may experience symptoms such as:**

- **tiredness**
- **frequent infections**
- **bleeding that will not stop after the skin is cut.**

**Explain how a very low number of blood components in the body can cause these symptoms. [6 marks]**

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**Some patients with a very low number of blood cells may be given a blood transfusion.**

**A blood transfusion is where a patient receives blood from a donor.**

**Different people have different blood groups.**

**FIGURE 12, on the opposite page, shows:**

- **the red blood cells found in people with different blood groups**
- **the antibodies that can be made by people with different blood groups.**

**60**

**Antibodies can bind to antigens that have complementary shapes.**

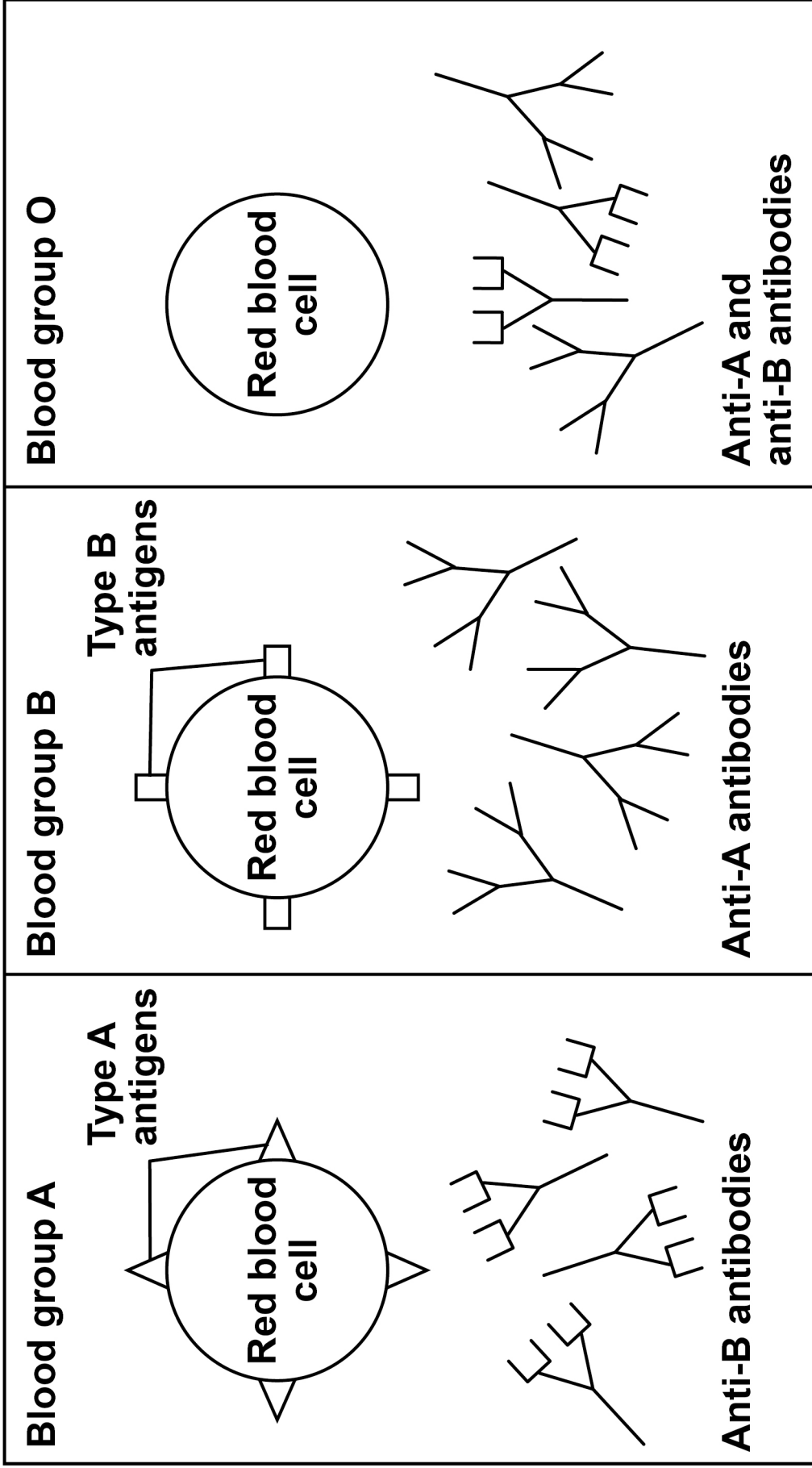
**When antibodies bind to the antigens on red blood cells, many red blood cells begin to clump together.**

**Each red blood cell is about 8  $\mu\text{m}$  in diameter.**

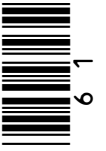
**Many capillaries have an internal diameter of about 10  $\mu\text{m}$ .**



**FIGURE 12**



**[Turn over]**



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**07.5**

**Explain why blood group O red blood cells can be given to patients with any blood group. [2 marks]**

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**07.6**

**TABLE 4 shows some of the risks associated with blood transfusions.**

**TABLE 4**

<b>Risk</b>	<b>Probability of risk occurring</b>
<b>Allergic reaction</b>	<b>0.9 %</b>
<b>Hepatitis B infection</b>	<b>1 in <math>(3 \times 10^5)</math></b>
<b>Hepatitis C infection</b>	<b><math>6.7 \times 10^{-7}</math></b>
<b>Kidney damage</b>	<b>1 in 70 000</b>





**Which risk has the LOWEST probability of occurring?  
[1 mark]**

**Tick (✓) ONE box.**

**Allergic reaction**

**Hepatitis B infection**

**Hepatitis C infection**

**Kidney damage**

**[Turn over]**





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**END OF QUESTIONS**

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<b>19</b>







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For Examiner's Use	
Question	Mark
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<b>TOTAL</b>	

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