

A



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

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

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

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

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

**GCSE**

**BIOLOGY**

**F**

**Foundation Tier Paper 1F**

**8461/1F**

**Tuesday 15 May 2018 Afternoon**

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

- **There are 100 marks available on this paper.**
- **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**



4

**0 1**

**This question is about the cell cycle.**

**0 1 . 1**

**Chromosomes are copied during the cell cycle.**

**Where are chromosomes found?  
[1 mark]**

**Tick ONE box.**

**Cytoplasm**

**Nucleus**

**Ribosomes**

**Vacuole**



5

**01.2** What is the name of a section of a chromosome that controls a characteristic? [1 mark]

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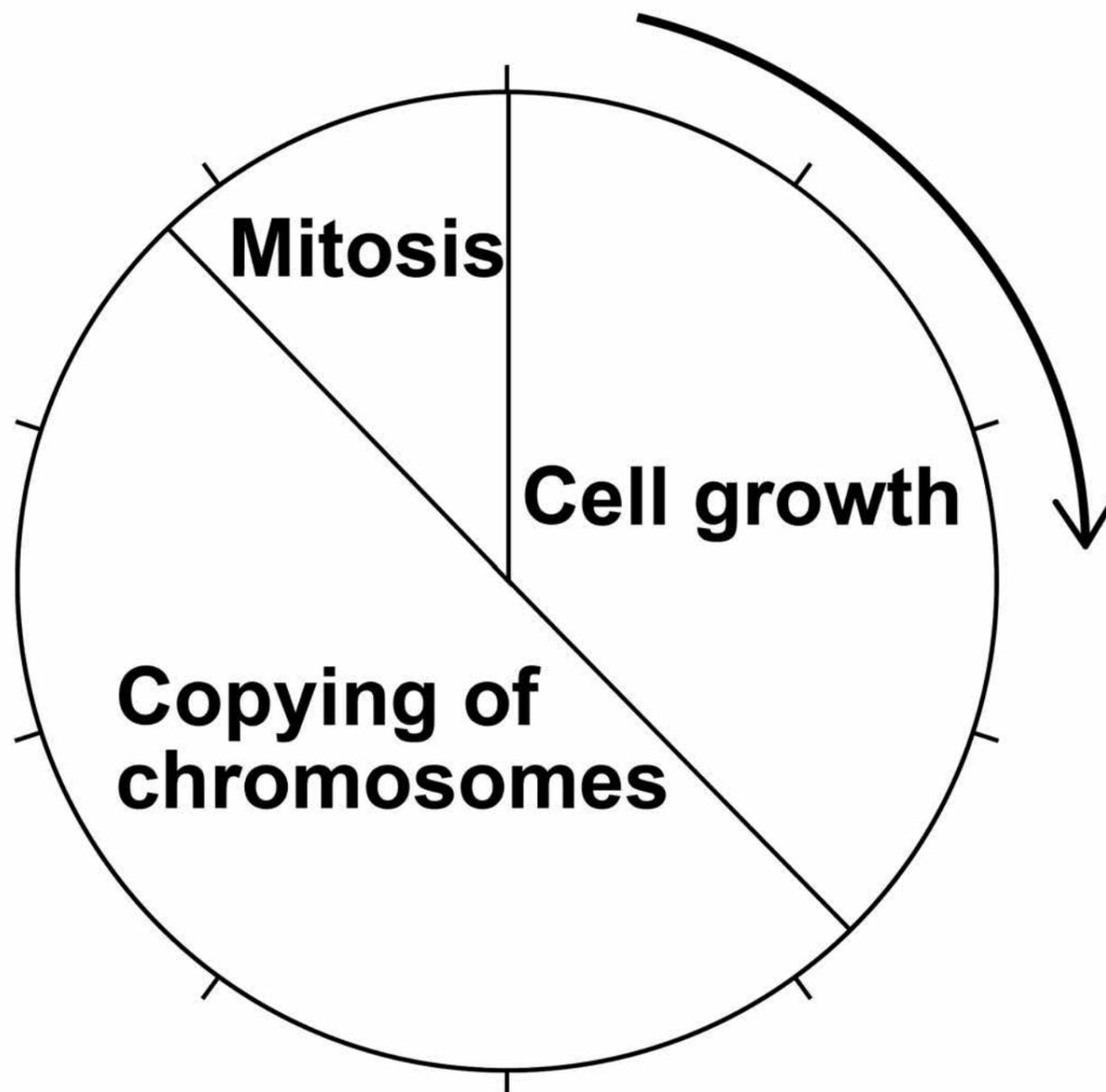
**[Turn over]**



6

**FIGURE 1** shows information about the cell cycle.

**FIGURE 1**



7

**0 1 . 3** Which stage of the cell cycle in **FIGURE 1** takes the most time?  
[1 mark]

**Tick ONE box.**

**Cell growth**

**Copying of chromosomes**

**Mitosis**

**[Turn over]**



8

**01.4** During mitosis cells need extra energy.

**Which cell structures provide most of this energy? [1 mark]**

**Tick ONE box.**

**Chromosomes**

**Cytoplasm**

**Mitochondria**

**Ribosomes**



**01.5** The cell cycle in FIGURE 1 on page 6 takes two hours in total.

The cell growth stage takes 45 minutes.

Calculate the time taken for mitosis. [2 marks]

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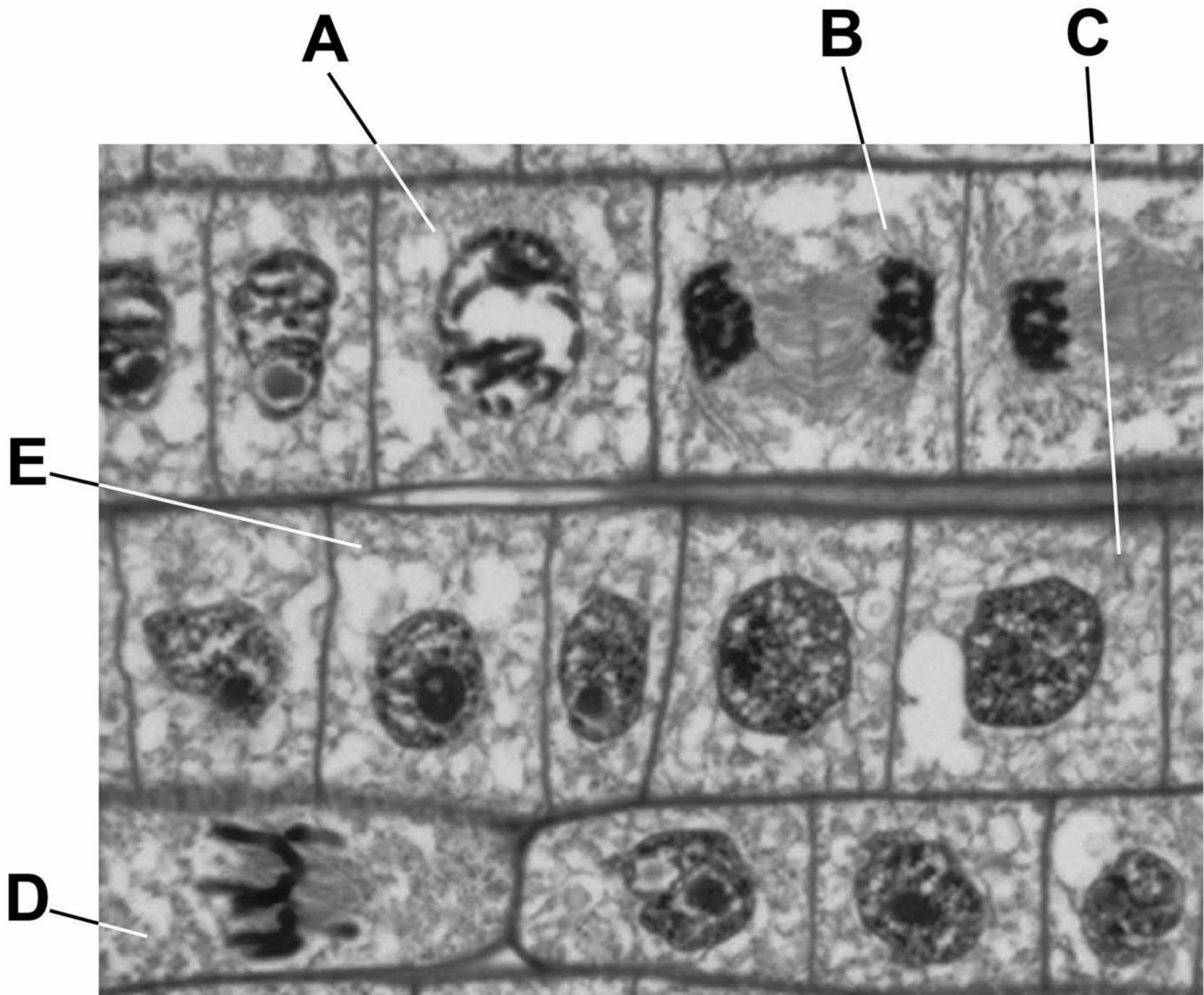
Time = \_\_\_\_\_ minutes

**[Turn over]**



**FIGURE 2 shows some cells in different stages of the cell cycle.**

**FIGURE 2**



**01.6** Which cell is NOT dividing by mitosis? [1 mark]

**Tick ONE box.**

**A**

**B**

**C**

**D**

**[Turn over]**



12

**01.7** Cell E in FIGURE 2, on page 10, contains 8 chromosomes.

**Cell E divides by mitosis.**

**How many chromosomes will each new cell contain? [1 mark]**

**Tick ONE box.**

**2****4****8****16**

13

**01.8** Why is mitosis important in living organisms? [1 mark]

**Tick ONE box.**

**To produce gametes**

**To produce variation**

**To release energy**

**To repair tissues**

**[Turn over]**

9



**0 2** Plants are made up of cells, tissues and organs.

**0 2.1** Draw ONE line from each level of organisation to the correct plant part. [2 marks]

**LEVEL OF ORGANISATION**

**PLANT PART**

Leaf

Organ

Root hair

Spongy mesophyll

Tissue

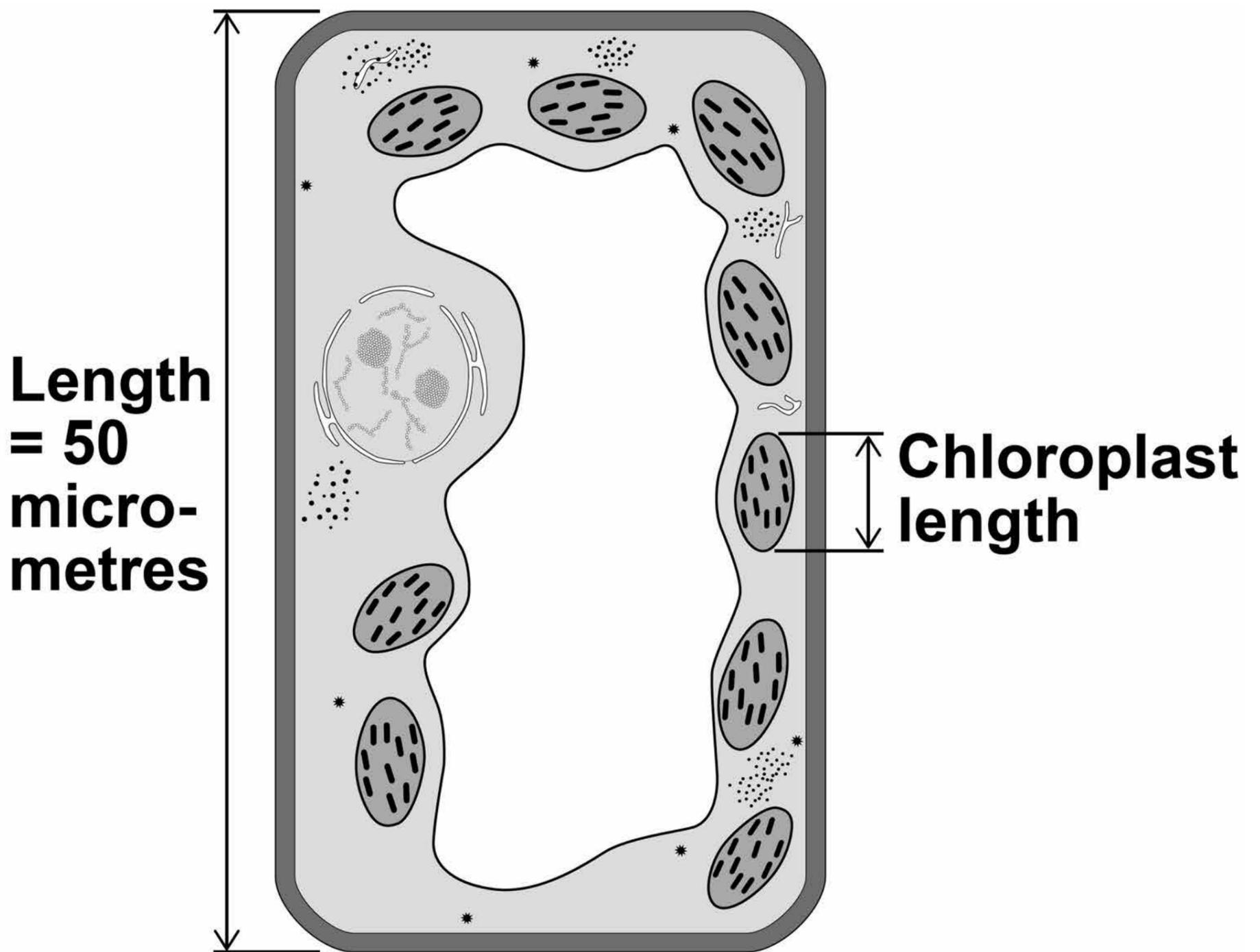
Vacuole

Xylem cell



**FIGURE 3** shows a plant cell drawn to scale.

**FIGURE 3**



**[Turn over]**



**02.2** Where in a plant would the cell in **FIGURE 3**, on page 15, be found?  
[1 mark]

**Tick ONE box.**

**Epidermis**

**Palisade mesophyll**

**Phloem**

**Xylem**

**02.3** Calculate the length of the chloroplast labelled in FIGURE 3, on page 15. [2 marks]

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Length = \_\_\_\_\_ micrometres

**02.4** Cells in plant roots do NOT photosynthesise.

Give ONE reason why. [1 mark]

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**[Turn over]**



18

**02.5** As a plant grows, new root hair cells are formed from unspecialised cells.

**How does an unspecialised cell become a new root hair cell?  
[1 mark]**

**Tick ONE box.**

**Differentiation**

**Metabolism**

**Transpiration**

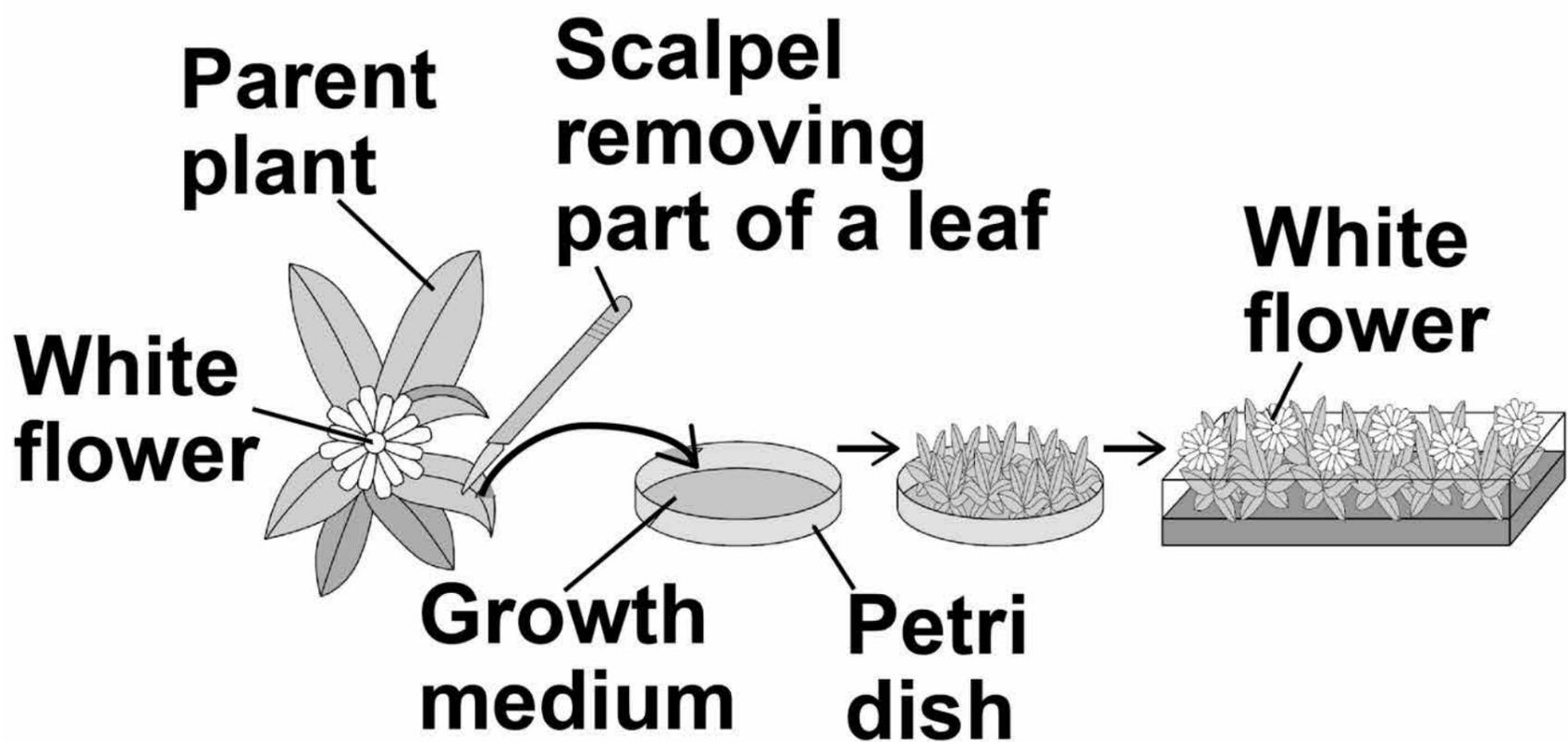
**Transport**



**Scientists can clone plants using tissue culture.**

**FIGURE 4 shows the process of tissue culture.**

**FIGURE 4**



**[Turn over]**



20

**0 2 . 6** Why might scientists want to clone plants? [1 mark]

**Tick ONE box.**

**To create new species of plants.**

**To introduce variation into plants.**

**To protect endangered plants from extinction.**

**To reduce disease resistance in plants.**



**02.7** What is the advantage of cloning plants using tissue culture?  
[1 mark]

**Tick ONE box.**

**No special equipment is needed.**

**Plants can be produced quickly.**

**The flowers are all different colours.**

**The offspring are all genetically different.**

**[Turn over]**



**0 2 . 8** The growth medium in **FIGURE 4**, on page 19, helps the plants to grow.

**Name ONE substance in the growth medium. [1 mark]**

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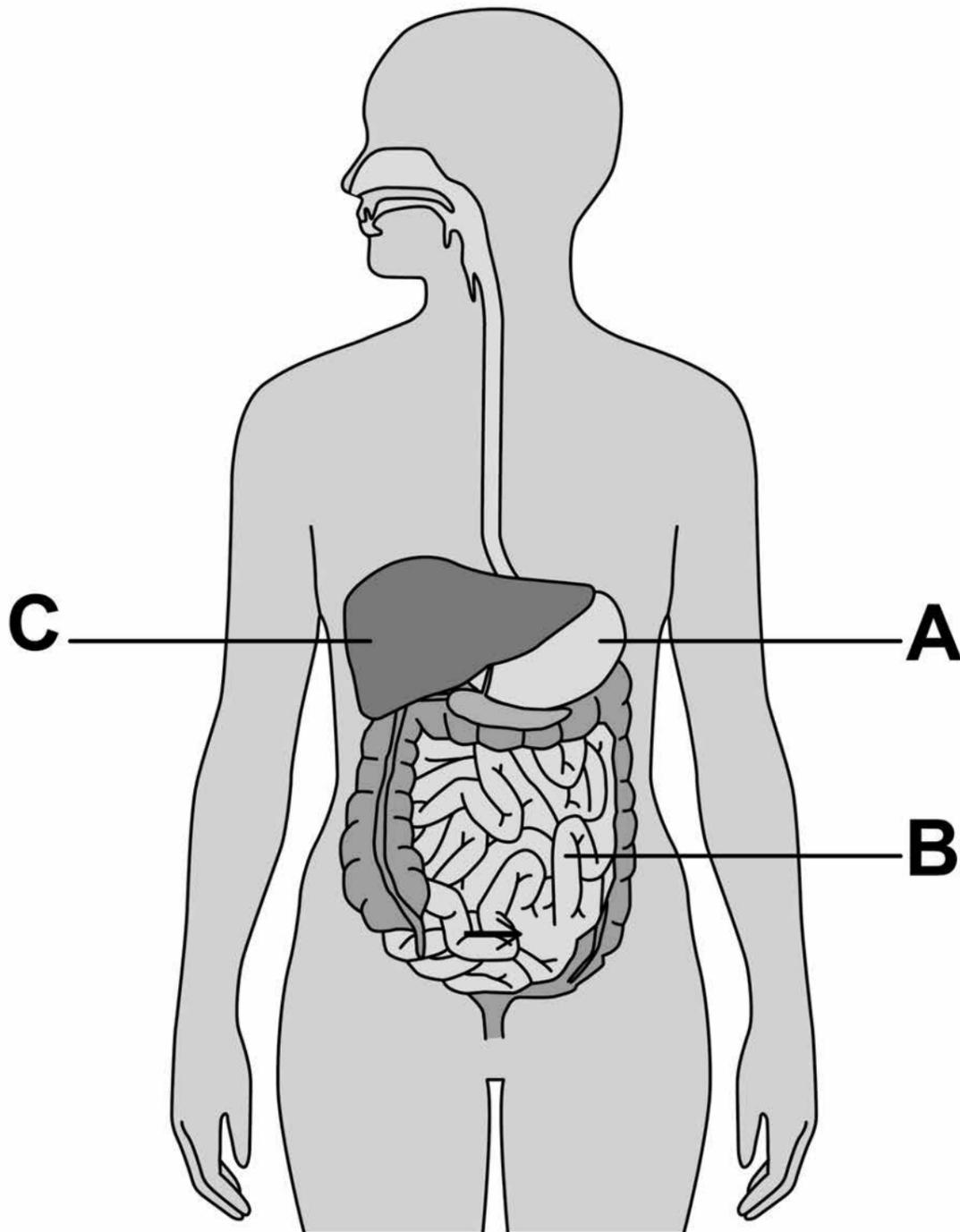
<b>10</b>



03

**FIGURE 5** shows the human digestive system.

**FIGURE 5**



**03.1** Label organs A, B and C.  
**[3 marks]**

**A** \_\_\_\_\_

**B** \_\_\_\_\_

**C** \_\_\_\_\_



**[Turn over]**

**03.2 Complete the sentences.**

**Choose the answers from the list. [3 marks]**

**catalyse**

**denatured**

**digest**

**energise**

**excreted**

**ingested**

**insoluble**

**soluble**



25

**Digestion is the process of breaking down large food molecules into smaller molecules that are**

\_\_\_\_\_ .

**Enzymes help to break down food because they \_\_\_\_\_ chemical reactions.**

**If the temperature of an enzyme gets too high, the enzyme is**

\_\_\_\_\_ .

**[Turn over]**



26

**03.3** Protease is an enzyme.

**Protease breaks down protein.**

**What is protein broken down into? [1 mark]**

**Tick ONE box.**

**Amino acids**

**Fatty acids**

**Glucose**

**Glycerol**



**03.4** Why is protein needed by the body? [1 mark]

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**03.5** Which organ in the human digestive system produces protease? [1 mark]

**Tick ONE box.**

**Gall bladder**

**Large intestine**

**Liver**

**Stomach**

**[Turn over]**





**03.7** Complete the sentence.

**Choose the answer from the list.  
[1 mark]**

**fat**

**fibre**

**minerals**

**vitamins**

**Obesity can be caused by a diet  
high in \_\_\_\_\_.**

**[Turn over]**



30

**03.8** Complete the sentence.

**Choose the answer from the list. [1 mark]**

**skin cancer**

**type 1 diabetes**

**type 2 diabetes**

**Obesity is a risk factor for**

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<b>15</b>

**04** This question is about the circulatory system.

**04.1** Draw ONE line from each blood component to its function. [3 marks]



**BLOOD  
COMPONENT**

**FUNCTION**

**Platelet**

**Destroys  
microorganisms**

**Red blood cell**

**Helps the blood  
to clot**

**White blood cell**

**Transports  
glucose around  
the body**

**Transports  
oxygen around  
the body**

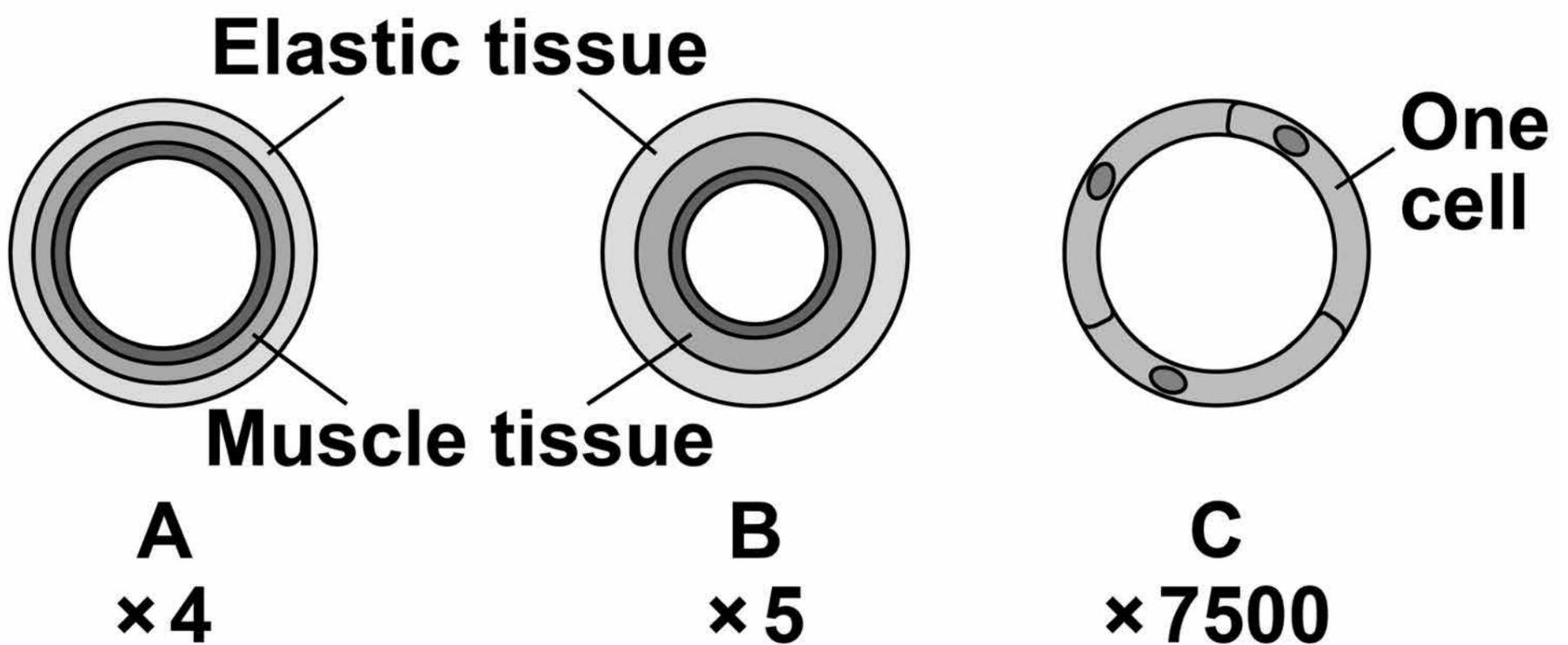
**Transports urea**

**[Turn over]**



**04.2** FIGURE 6 shows cross sections of the three main types of blood vessel found in the human body. Each blood vessel is drawn to the scale shown.

**FIGURE 6**



33

**Which blood vessel has the smallest diameter? [1 mark]**

**Tick ONE box.**

**A****B****C**

**0 4 . 3** Which blood vessel in **FIGURE 6** is an artery?

**Give ONE reason for your answer. [2 marks]**

**Blood vessel:** \_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

**[Turn over]**



**TABLE 1** gives information about the blood flow in two people.

**TABLE 1**

<b>Person</b>	<b>Blood flow through the coronary arteries in <math>\text{cm}^3/\text{minute}</math></b>
<b>A - does NOT have coronary heart disease</b>	<b>250</b>
<b>B - has coronary heart disease</b>	<b>155</b>

**0 4 . 4** Calculate the difference in blood flow between person A and person B. [1 mark]

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**Difference = \_\_\_\_\_  $\text{cm}^3/\text{minute}$**



**0 4 . 5** Suggest why blood flow through the coronary arteries is lower in people with coronary heart disease. [1 mark]

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**[Turn over]**

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37

**04.6** Calculate the volume of blood flowing through the coronary arteries of person A in 1 hour.

**Give your answer in  $\text{dm}^3$ .**  
**[2 marks]**

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**Volume of blood in 1 hour =**

\_\_\_\_\_  **$\text{dm}^3$**

**[Turn over]**



**Coronary heart disease can be treated by:**

- **inserting a stent**
- **using a Coronary Artery Bypass Graft (CABG).**

**TABLE 2 gives information about each method.**

**TABLE 2**

	<b>STENT</b>	<b>CABG</b>
<b>PROCEDURE</b>	<b>The patient is awake during the procedure.</b>  <b>A small cut is made in the skin.</b>	<b>The patient is not awake during the procedure.</b>  <b>The chest is cut open.</b>



**A wire mesh is inserted into the coronary artery via a blood vessel in the arm or leg.**

**A section of blood vessel from the arm or leg is removed. It is used to create a new channel for blood to bypass the blockage in the coronary artery.**

**[Turn over]**



	<b>STENT</b>	<b>CABG</b>
<b>When procedure is recommended</b>	<b>When only one blockage is present</b>	<b>When multiple blockages are present</b>
<b>Time spent in hospital after procedure</b>	<b>2-3 hours</b>	<b>at least 7 days</b>
<b>Recovery time after procedure</b>	<b>7 days</b>	<b>12 weeks</b>
<b>Risk of heart attack during procedure</b>	<b>1%</b>	<b>2%</b>
<b>Chance of failure within one year</b>	<b>40%</b>	<b>5%</b>



**0 4 . 7** Give TWO advantages of using a stent instead of CABG. [2 marks]

1

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2

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**0 4 . 8** Give TWO advantages of using CABG instead of a stent. [2 marks]

1

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2

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**[Turn over]**

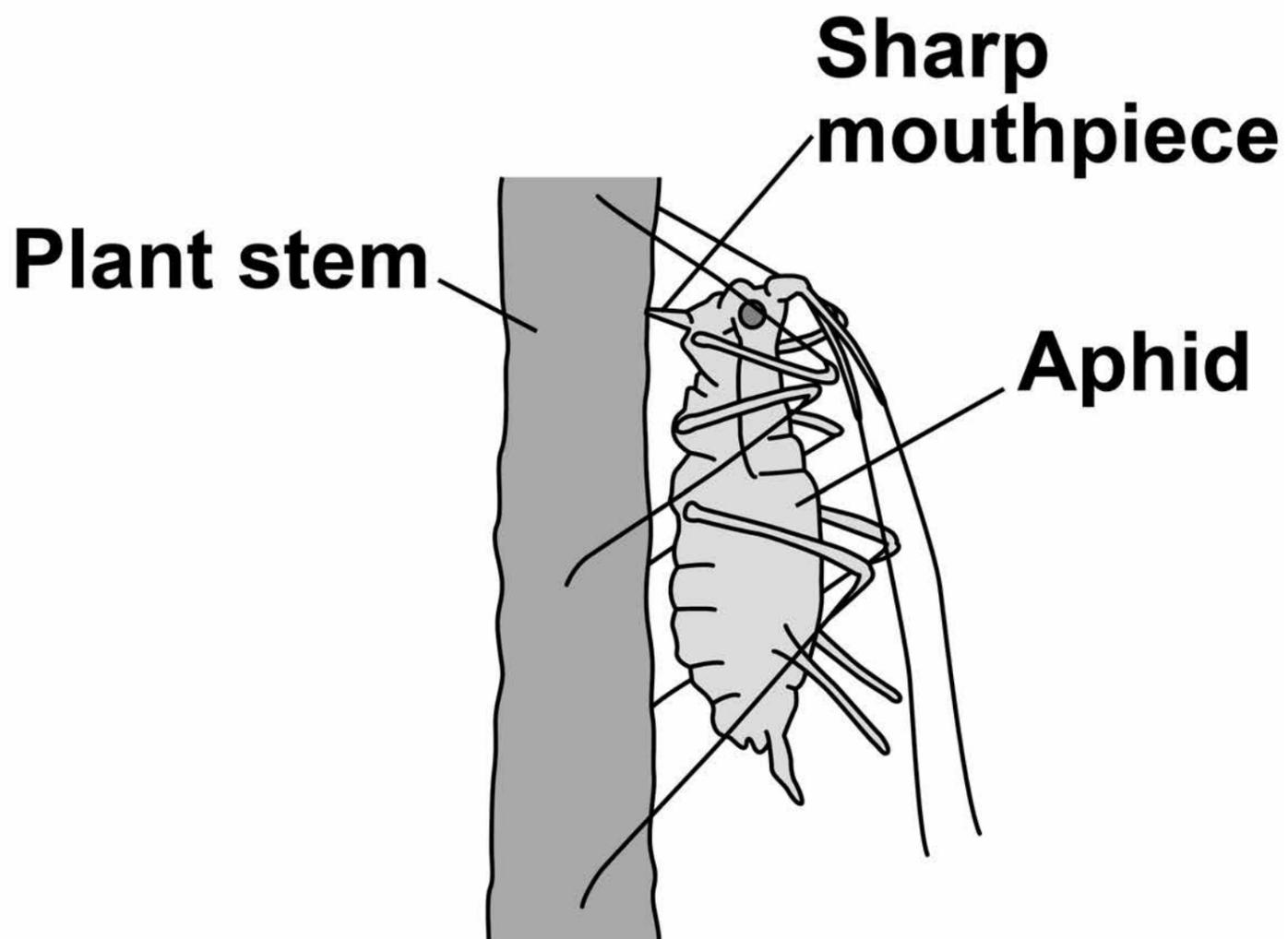


**0 5**

**Aphids are small insects that carry pathogens.**

**FIGURE 7 shows an aphid feeding from a plant stem.**

**FIGURE 7**



**0 5 . 1** An aphid feeds by inserting its sharp mouthpiece into the stem of a plant.

After feeding, the mouthpiece of an aphid contains a high concentration of dissolved sugars.

Which part of the plant was the aphid feeding from? [1 mark]

Tick **ONE** box.

**Palisade layer**

**Phloem**

**Stomata**

**Xylem**

**[Turn over]**



**0 5 . 2** What is the process that transports dissolved sugars around a plant? [1 mark]

**Tick ONE box.**

**Filtration**

**Respiration**

**Translocation**

**Transpiration**



**0 5 . 3** Plants infected with aphids have stunted growth.

**Explain ONE way the removal of dissolved sugars from the stem of the plant causes stunted growth.  
[2 marks]**

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**[Turn over]**

46

**0 5 . 4** Most aphids do not have wings when they hatch. After several generations, some aphids hatch which have wings and can fly.

**Explain the advantage to the aphid of being able to fly.**

**[2 marks]**

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**0 5 . 5** The leaves of some plants release oils onto their surface.

**Suggest how the production of oil on the surface of a leaf may protect the plant from aphids.  
[1 mark]**

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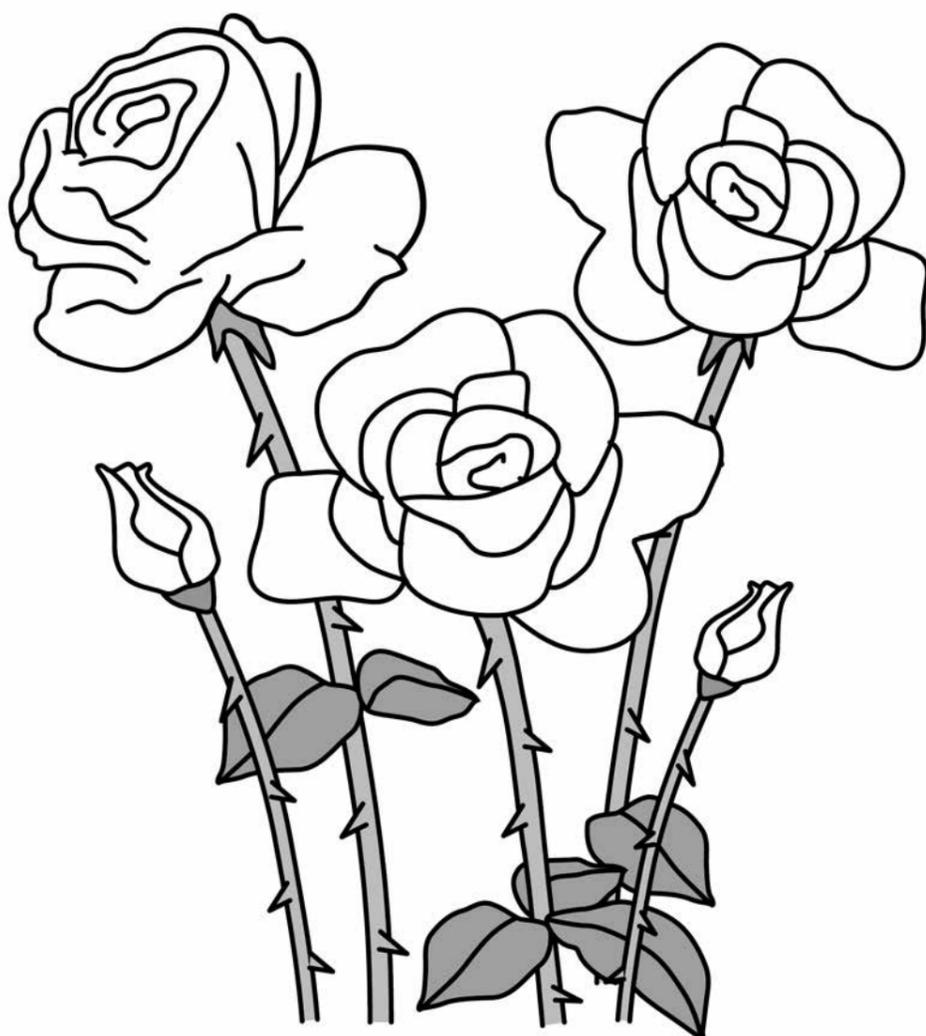
**[Turn over]**

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**FIGURE 8** shows part of a rose plant.

**FIGURE 8**



**0 5 . 6** Give **ONE** adaptation shown in **FIGURE 8** that helps the rose plant defend itself. [1 mark]

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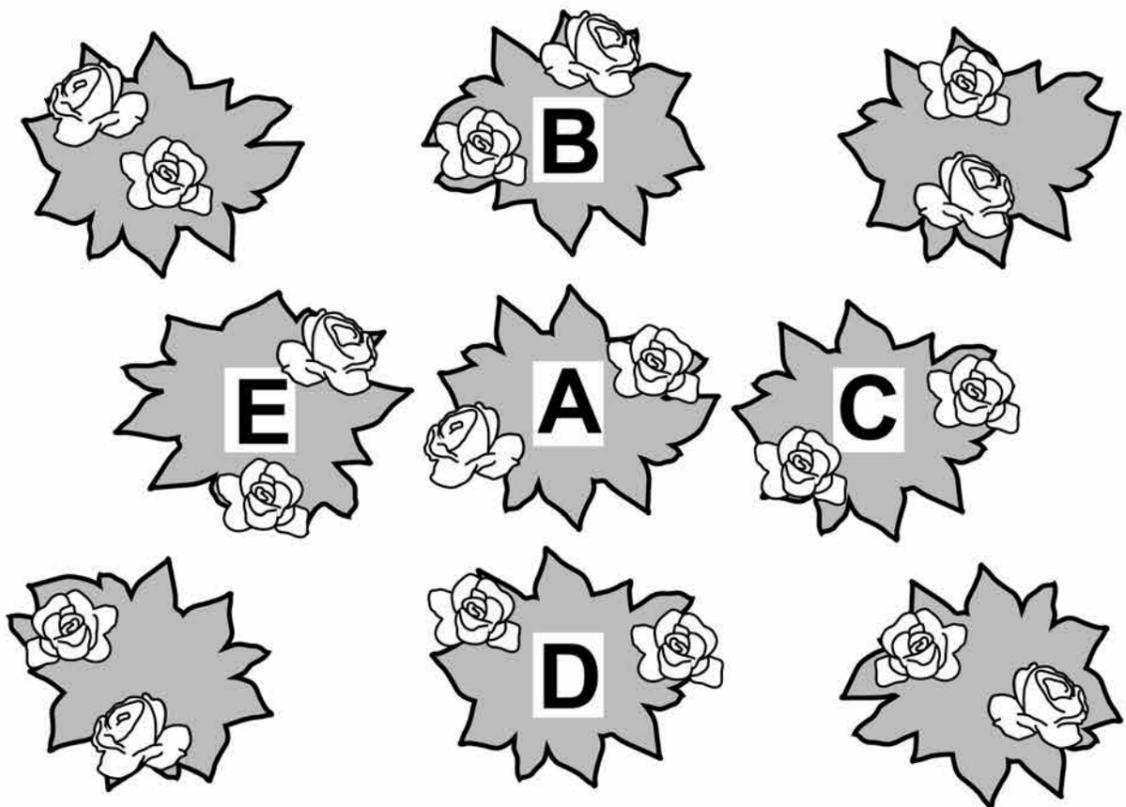
**[Turn over]**



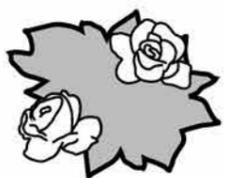
**FIGURE 9** shows a plan of a garden containing rose plants.

**FIGURE 9**

**Direction  
of wind**



**KEY**



**Rose plant**

**0 5 . 7** Plant A has the fungal disease rose black spot.

**Which plant in FIGURE 9 is the fungus likely to spread to first?**

**Give a reason for your answer.  
[2 marks]**

**Plant** \_\_\_\_\_

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

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**[Turn over]**

52

**0 5 . 8** Suggest **ONE** way the gardener could reduce the spread of rose black spot to the other plants in the garden. [1 mark]

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11



**0 6**

**Earthworms are small animals that live in soil. Earthworms have no specialised gas exchange system and absorb oxygen through their skin.**

**0 6****.1**

**What is the name of the process in which oxygen enters the skin cells? [1 mark]**

**Tick ONE box.**

**Active transport**

**Diffusion**

**Osmosis**

**Respiration**

**[Turn over]**



**TABLE 3 shows information about four skin cells of an earthworm.**

**TABLE 3**

<b>Cell</b>	<b>Percentage of oxygen</b>	
	<b>Outside cell</b>	<b>Inside cell</b>
<b>A</b>	<b>9</b>	<b>8</b>
<b>B</b>	<b>12</b>	<b>8</b>
<b>C</b>	<b>12</b>	<b>10</b>
<b>D</b>	<b>8</b>	<b>12</b>



**06.2** Which cell has the smallest difference in percentage of oxygen between the outside and the inside of the cell? [1 mark]

**Tick ONE box.**

**A**

**B**

**C**

**D**

**[Turn over]**



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57

**06.3** Which cell will oxygen move INTO the fastest? [1 mark]

**Tick ONE box.**

**A****B****C****D**

**[Turn over]**



58

**06.4** Earthworms have a large surface area to volume ratio.

**Suggest why a large surface area to volume ratio is an advantage to an earthworm. [1 mark]**

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**06.5** The earthworm uses enzymes to digest dead plants.

**Many plants contain fats or oils.**

**Which type of enzyme would digest fats? [1 mark]**

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**0 6 . 6** Earthworms move through the soil.

**This movement brings air into the soil.**

**Dead plants decay faster in soil containing earthworms compared with soil containing NO earthworms.**

**Explain why. [3 marks]**

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**[Turn over]**



60

**06.7** When earthworms reproduce, a sperm cell from one earthworm fuses with an egg cell from a different earthworm.

**Name the process when an egg cell and a sperm cell fuse.**

**[1 mark]**

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**0 6 . 8** Some types of worm reproduce by a process called fragmentation.

**In fragmentation, the worm separates into two or more parts. Each part grows into a new worm.**

**What type of reproduction is fragmentation? [1 mark]**

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**[Turn over]**

<b>10</b>



**0 7**

**Eating food containing Salmonella bacteria can cause illness.**

**0 7 . 1**

**Two symptoms of infection by Salmonella are vomiting and diarrhoea.**

**What causes these symptoms?  
[1 mark]**

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**07.2** Give TWO ways a person with a mild infection of Salmonella can help prevent the spread of the bacteria to other people.  
[2 marks]

1

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2

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[Turn over]



64

**07.3** In very serious infections of **Salmonella**, a doctor can prescribe drugs to kill the bacteria.

**What type of drug can the doctor prescribe to kill the bacteria?**  
**[1 mark]**

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**07.4** A person with AIDS may take longer than a healthy person to recover from a Salmonella infection.

**Explain why. [2 marks]**

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**[Turn over]**

**07.5** **Salmonella bacteria can be transmitted from chickens to humans. Chickens can be vaccinated to prevent the transmission of Salmonella bacteria to humans.**

**Suggest ONE other way farmers could prevent the transmission of Salmonella from chickens to humans. [1 mark]**

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**67**

**A restaurant owner employed a scientist to test the effectiveness of two kitchen cleaning liquids.**

**The scientist took samples from two work surfaces:**

- before the surfaces had been cleaned with the cleaning liquids**
- after the surfaces had been cleaned with the cleaning liquids.**

**The samples were then analysed for the number of bacteria they contained.**

**The results are shown in FIGURE 10 on page 69.**

**[Turn over]**



**07.6** Which cleaning liquid is the more effective?

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

**Cleaning liquid** \_\_\_\_\_

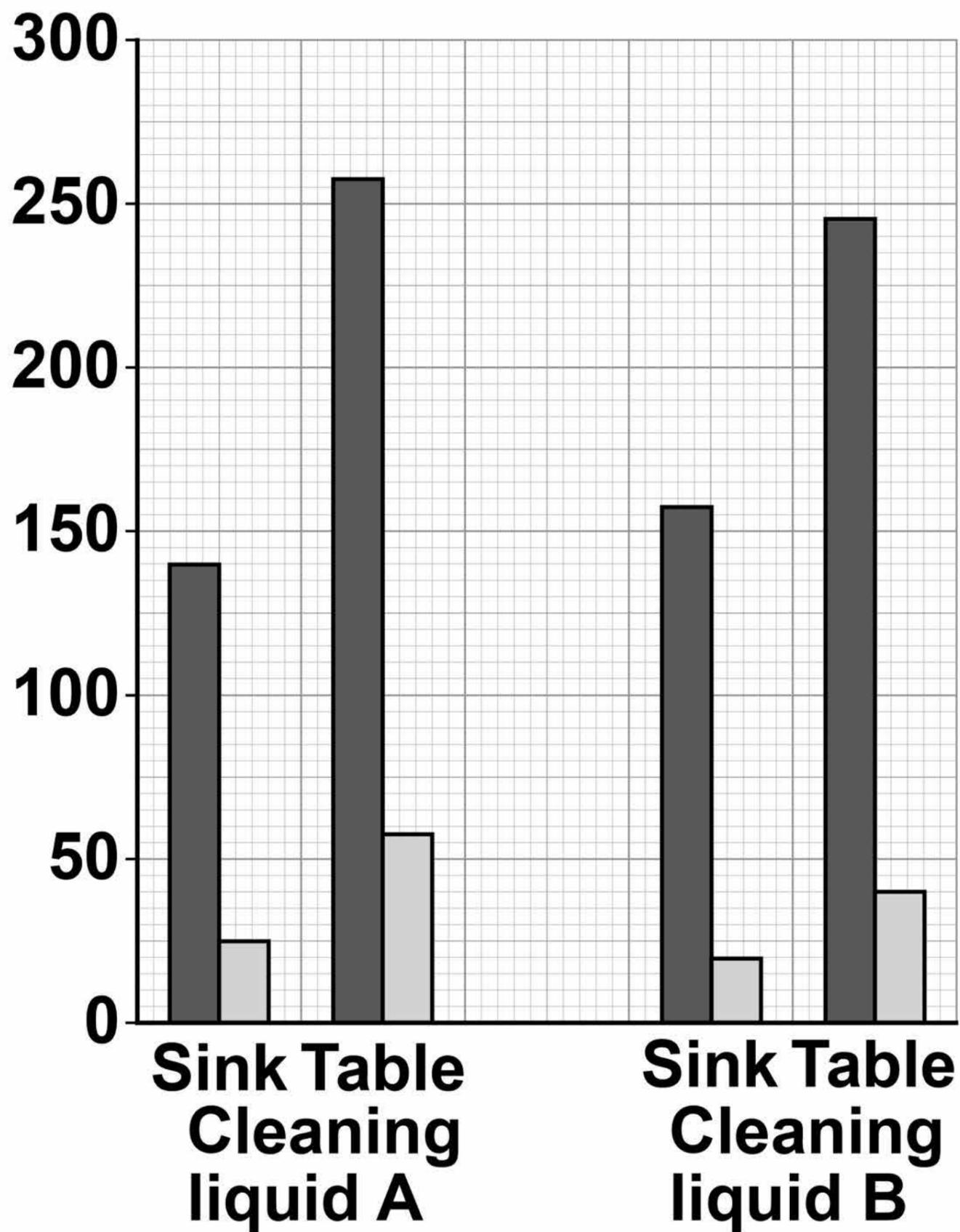
**Reason** \_\_\_\_\_

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**FIGURE 10****Number of  
bacteria  $\times 10^3$** **KEY**

- Before cleaning
- After cleaning

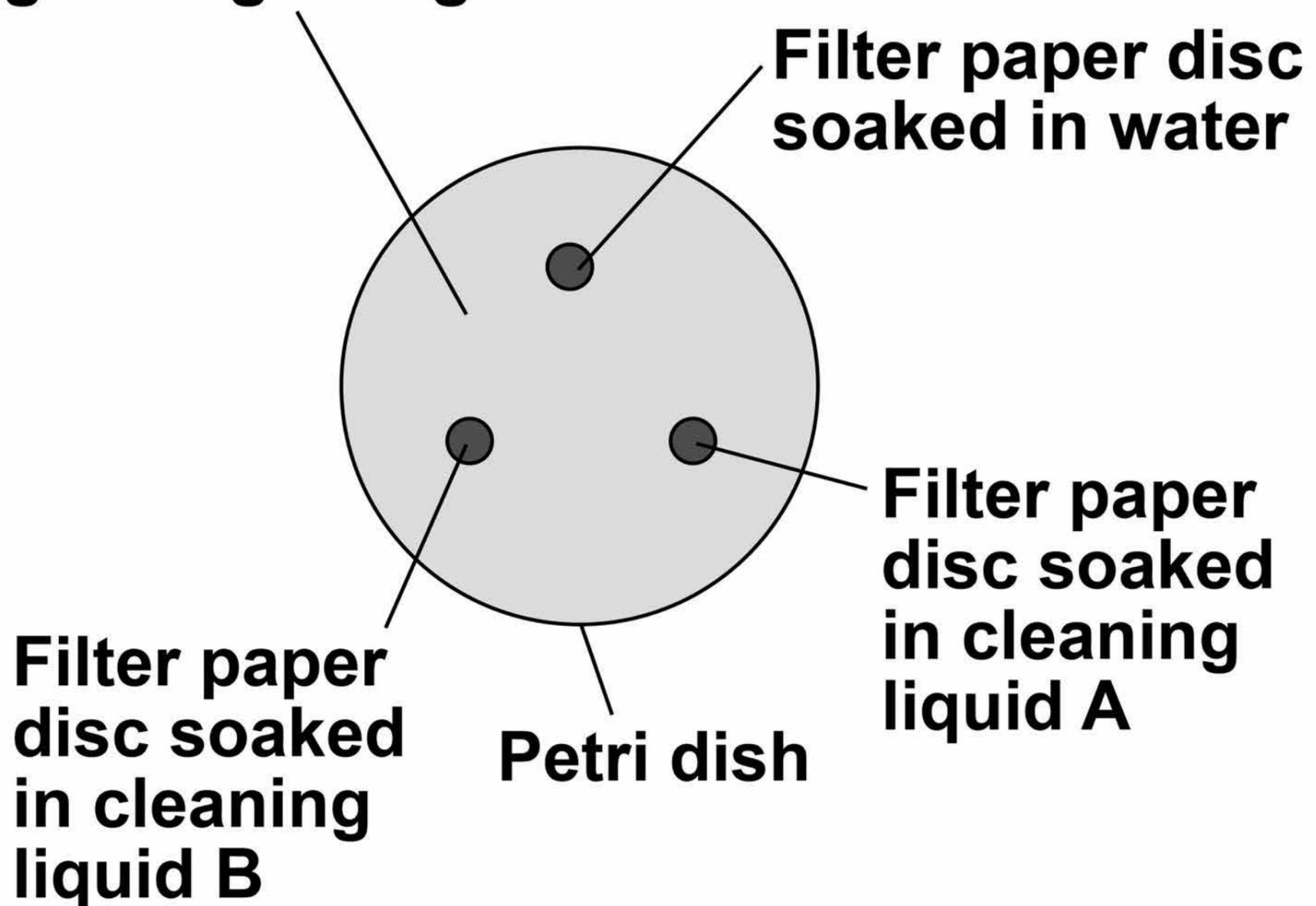
**[Turn over]**

The scientist investigated the effect of cleaning liquid A and cleaning liquid B on *Salmonella* bacteria grown in a laboratory.

FIGURE 11 shows the way the investigation was set up.

FIGURE 11

**Salmonella bacteria growing on agar**



71

The Petri dish was placed in an incubator at 25 °C for 48 hours.

After 48 hours, the scientist calculated the area around each paper disc where no bacteria were growing.

The results are shown in TABLE 4.

**TABLE 4**

<b>Filter paper disc</b>	<b>Area around disc with no bacteria growing in cm<sup>2</sup></b>
<b>Water</b>	<b>0</b>
<b>Cleaning liquid A</b>	<b>11</b>
<b>Cleaning liquid B</b>	<b>13</b>

**[Turn over]**



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**07.7** What measurement would the scientist need to take to calculate the area where no bacteria were growing? [1 mark]

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**07.8** Give ONE change to the investigation that would allow the scientist to check if the results are repeatable. [1 mark]

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**[Turn over]**



**07.9** The scientist showed the results to the restaurant owner.

**Both cleaning liquids cost the same per  $\text{dm}^3$ .**

**Suggest ONE other factor the restaurant owner should consider when choosing which cleaning liquid to use. [1 mark]**

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**0 8**

**Metabolism is the sum of all the chemical reactions in the cells of the body.**

**One metabolic reaction is the formation of lipids.**

**0 8 . 1**

**Give ONE other metabolic reaction in cells. [1 mark]**

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**[Turn over]**

**TABLE 5 shows the mean metabolic rate of humans of different ages.**

**TABLE 5**

<b>Age in years</b>	<b>Mean metabolic rate in kJ/m<sup>2</sup>/hour</b>	
	<b>Males</b>	<b>Females</b>
<b>5</b>	<b>53</b>	<b>53</b>
<b>15</b>	<b>45</b>	<b>42</b>
<b>25</b>	<b>39</b>	<b>35</b>
<b>35</b>	<b>37</b>	<b>35</b>
<b>45</b>	<b>36</b>	<b>35</b>



**08.2** What TWO conclusions can be made from the data in TABLE 5?  
[2 marks]

**Tick TWO boxes.**

- As age increases, mean metabolic rate of males and females increases.
- Males have a higher metabolic rate than females after five years of age.
- The mean metabolic rate of females decreases faster than males up to 25 years of age.
- The mean metabolic rate of males and females decreases more quickly after the age of 35.
- There is no relationship between age and mean metabolic rate.

**[Turn over]**



**08.3** Calculate the percentage decrease in the mean metabolic rate of males between 5 years and 45 years of age.

Use the equation:

$$\text{percentage decrease} = \frac{\text{decrease in metabolic rate}}{\text{original metabolic rate}} \times 100$$



**Give your answer to 3 significant figures.  
[3 marks]**

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**Percentage decrease = \_\_\_\_\_**

**[Turn over]**



**Regular exercise can increase metabolic rate.**

**Two people did five minutes of gentle exercise from rest.**

**TABLE 6 shows the effect of the exercise on their heart rates.**

**TABLE 6**

<b>TIME IN MINUTES</b>	<b>Heart rate in beats per minute</b>	
	<b>PERSON R</b>	<b>PERSON S</b>
<b>0 (at rest)</b>	<b>60</b>	<b>78</b>
<b>1</b>	<b>76</b>	<b>100</b>
<b>2</b>	<b>85</b>	<b>110</b>
<b>3</b>	<b>91</b>	<b>119</b>
<b>4</b>	<b>99</b>	<b>129</b>
<b>5</b>	<b>99</b>	<b>132</b>



**0 8 . 4** Describe TWO differences in the response of person R and person S to the exercise.

**Use information from TABLE 6.  
[2 marks]**

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

**[Turn over]**

**0 8 . 5** Complete the line graph in **FIGURE 12**, on the opposite page, for person S.

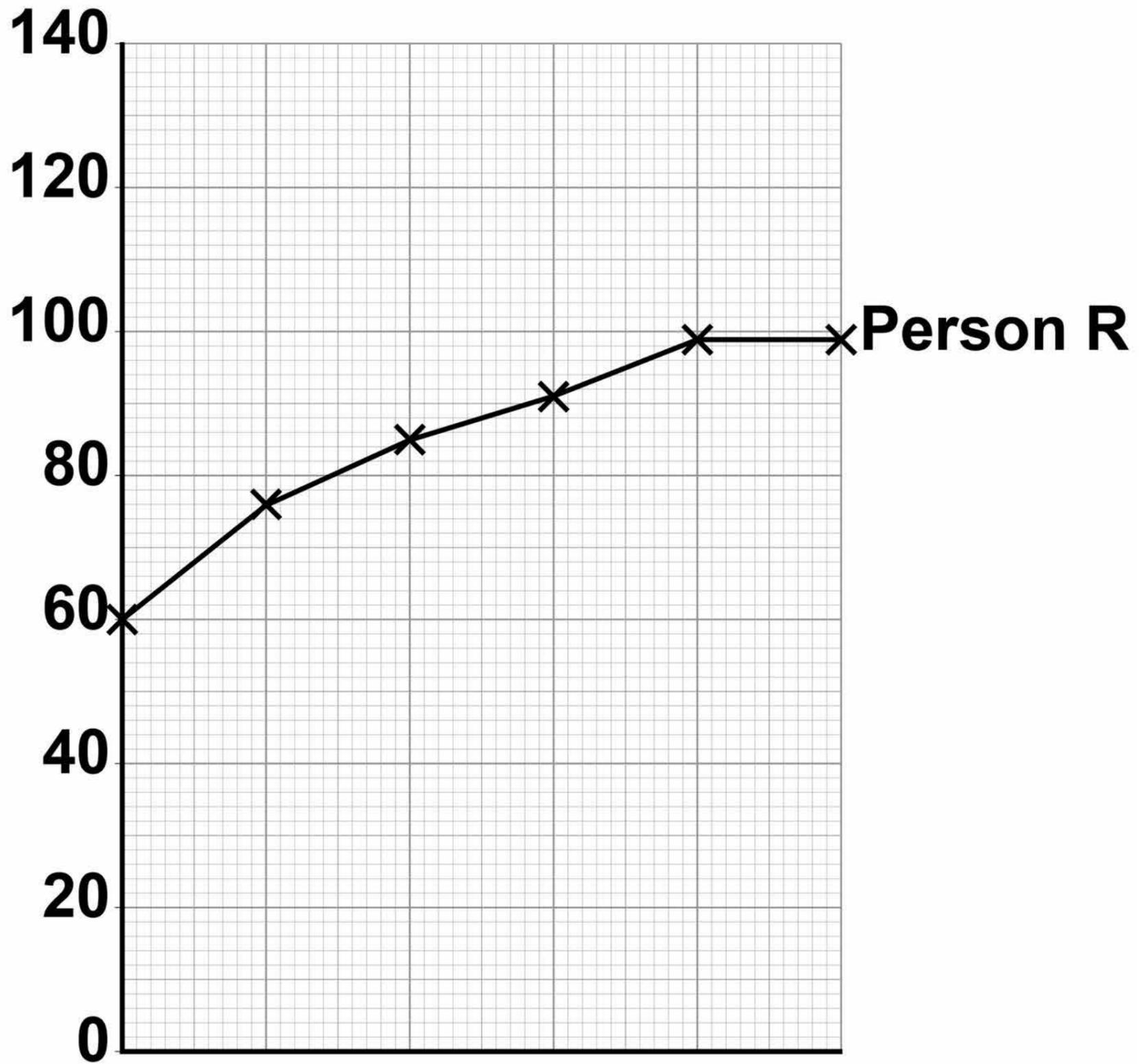
**You should:**

- **add the scale to the x axis**
- **label the x axis.**

**[4 marks]**

**FIGURE 12**

**Heart rate  
in beats  
per minute**



**[Turn over]**



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85

**08.6** After five minutes of exercise, the heart rate of person S was 132 beats per minute. When person S rested, his heart rate decreased steadily at a rate of 12 beats every minute.

**Calculate how much time it would take the heart rate of person S to return to its resting rate.  
[2 marks]**

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**Time = \_\_\_\_\_ minutes**

**[Turn over]**



**08.7** A student made the following hypothesis about the heart rate of smokers and non-smokers during exercise.

**“During exercise, the heart rate of smokers increases more than the heart rate of non-smokers.”**

**Design an investigation that would allow you to test this hypothesis. [6 marks]**

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For Examiner's Use	
Question	Mark
1	
2	
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6	
7	
8	
<b>TOTAL</b>	

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