

**Paper Reference(s)     1BI0/2F**

**Pearson Edexcel Level 1/Level 2 GCSE (9–1)**

**Biology**  
**Paper 2**  
**Foundation Tier**

**Friday 7 June 2019 – Afternoon**

**Time: 1 hour 45 minutes plus your additional  
time allowance**

**INSTRUCTIONS TO CANDIDATES**  
**Write your centre number, candidate number,**  
**surname, other names and your signature in**  
**the boxes below. Check that you have the**  
**correct question paper.**

<b>Centre No.</b>					
<b>Candidate No.</b>					
<b>Surname</b>					
<b>Other names</b>					
<b>Signature</b>					
<b>Paper Reference</b>	<b>1</b>	<b>B</b>	<b>I</b>	<b>0</b>	<b>/ 2 F</b>

- **Use BLACK ink or ball-point pen.**
- **Answer ALL questions.**
- **Answer the questions in the spaces provided – there may be more space than you need.**
- **Calculators may be used.**
- **Any diagrams may NOT be accurately drawn, unless otherwise indicated.**
- **You must show all your working out with your answer clearly identified at the end of your solution.**

**MATERIALS REQUIRED FOR EXAMINATION**  
**Calculator, ruler**

**ITEMS INCLUDED WITH QUESTION PAPERS**  
**Nil**

**INFORMATION FOR CANDIDATES**

- **The total mark for this paper is 100.**
- **The marks for EACH question are shown in brackets – use this as a guide as to how much time to spend on each question.**

**(Instructions continue on next page)**

**(Turn over)**

- In questions marked with an **ASTERISK (\*)**, marks will be awarded for your ability to structure your answer logically showing how the points that you make are related or follow on from each other where appropriate.

## **ADVICE TO CANDIDATES**

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

**Answer ALL questions. Write your answers in the spaces provided.**

**Some questions must be answered with a cross in a box ☐. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☐.**

**(Questions begin on next page)**

**(Turn over)**

1 (a) Figure 1 shows the water cycle.

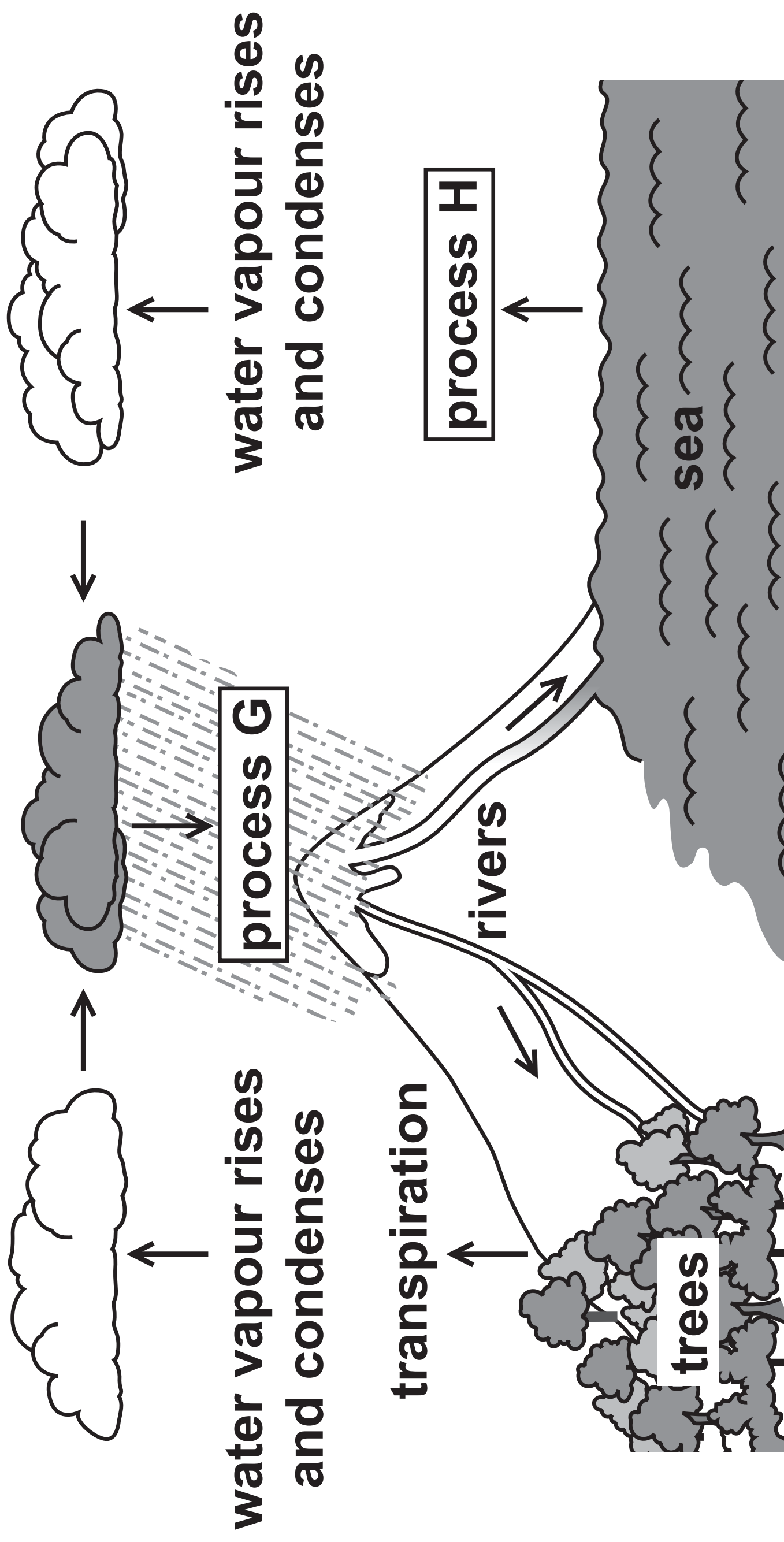


Figure 1

(Question continues on next page)

(Turn over)

- (i) Name process G and process H.  
(2 marks)**

**process G** \_\_\_\_\_

**process H** \_\_\_\_\_

- (ii) What causes the water vapour  
to condense and form clouds?  
(1 mark)**

- ☐ **A the water vapour cools down**
- ☐ **B the water vapour heats up**
- ☐ **C the temperature of the water  
vapour stays the same**
- ☐ **D the trees absorb more water**

**(Question continues on next page)**

**(Turn over)**

**(b) Water from rivers is treated before it is safe to drink.**

**Use words from the box to complete the sentences. (2 marks)**

<b>filtering</b>	<b>fish</b>	<b>heating</b>
<b>mud</b>	<b>pathogens</b>	<b>stirring</b>

**During water treatment, the solids in river water are removed**

**by \_\_\_\_\_ .**

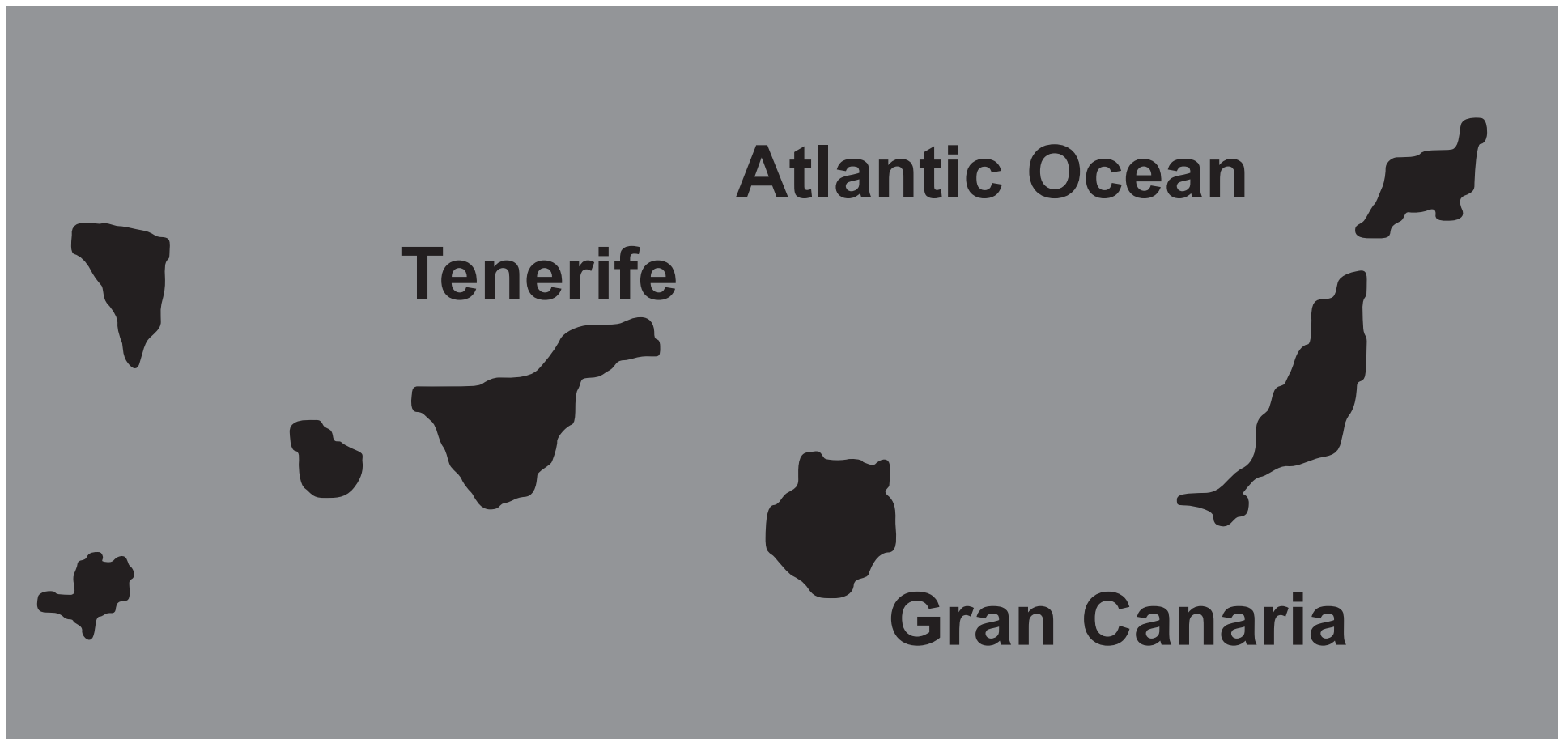
**Chlorine is then added to the water**

**to kill \_\_\_\_\_ .**

**(Question continues on next page)**

**(Turn over)**

**(c) Figure 2 shows the Canary Islands.**



**Figure 2**

**The Canary Islands do not have enough fresh water.**

**Describe how seawater can be turned into drinking water. (2 marks)**

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**(Continue your answer on next page)**

**(Turn over)**



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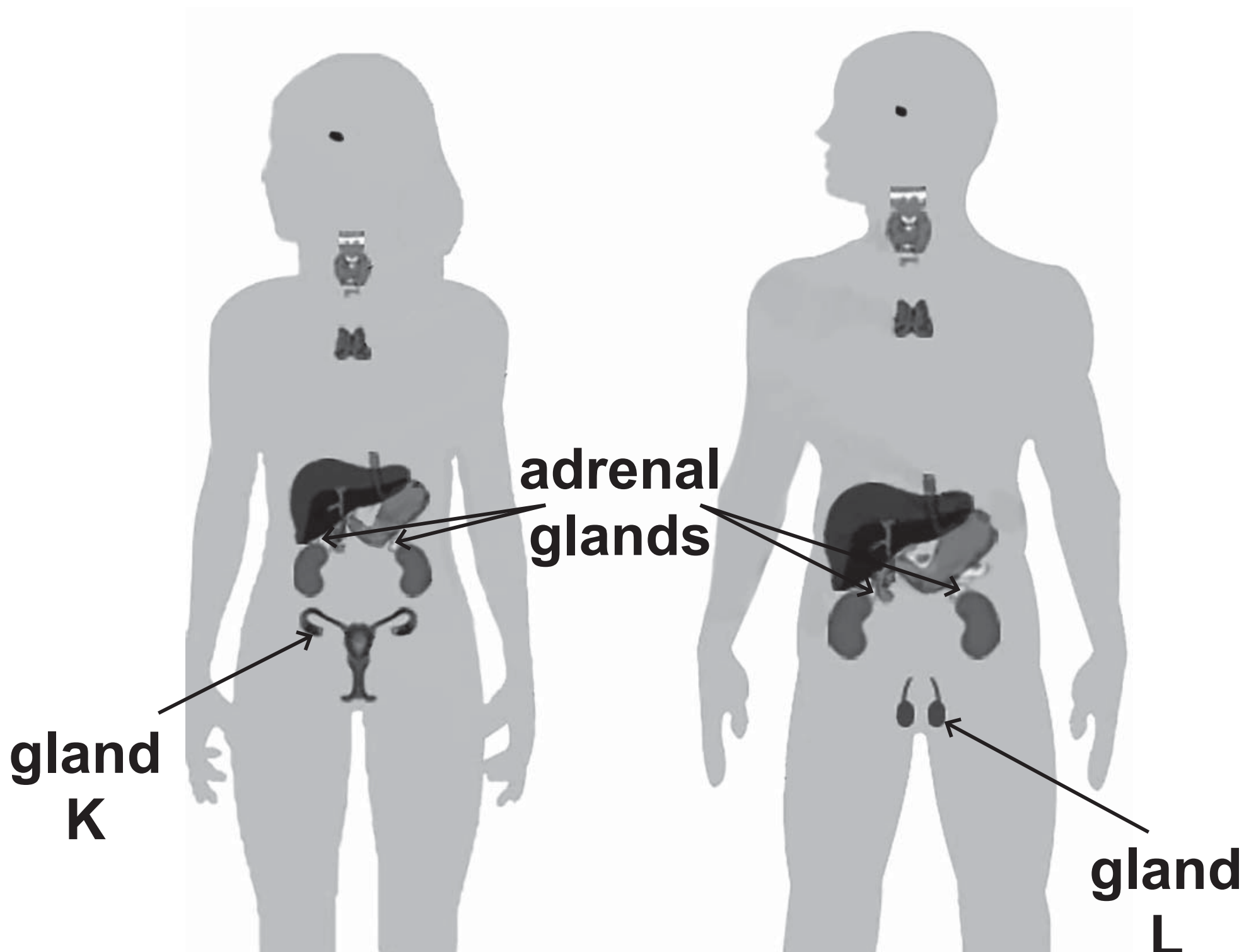
**(TOTAL FOR QUESTION 1 = 7 MARKS)**

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**(Questions continue on next page)**

**(Turn over)**

- 2 **Figure 3 shows the positions of the endocrine glands in a woman and a man.**



**Figure 3**

**(Question continues on next page)**

**(Turn over)**

**(a) Draw ONE straight line from each hormone to the effect of the hormone on the body. (2 marks)**

**hormone**

**effect of hormone**

hormone from  
gland K in the  
woman

hormone from  
gland L in the  
man

increases  
glucose levels

prepares the  
uterus lining for  
a fertilised egg

causes facial  
hair to grow

controls the  
water content of  
the body

decreases  
sweating

**(Question continues on next page)**

**(Turn over)**

**(b) How is adrenalin transported from the adrenal glands to its target organs? (1 mark)**

- ☐ **A by transpiration**
- ☐ **B by osmosis**
- ☐ **C dissolved in blood plasma**
- ☐ **D carried by red blood cells**

**(c) What name is given to the process of maintaining the internal body conditions? (1 mark)**

- ☐ **A respiration**
- ☐ **B diffusion**
- ☐ **C digestion**
- ☐ **D homeostasis**

**(Question continues on next page)**

**(Turn over)**

(d) Figure 4 shows the concentration of glucose in the blood of a person.

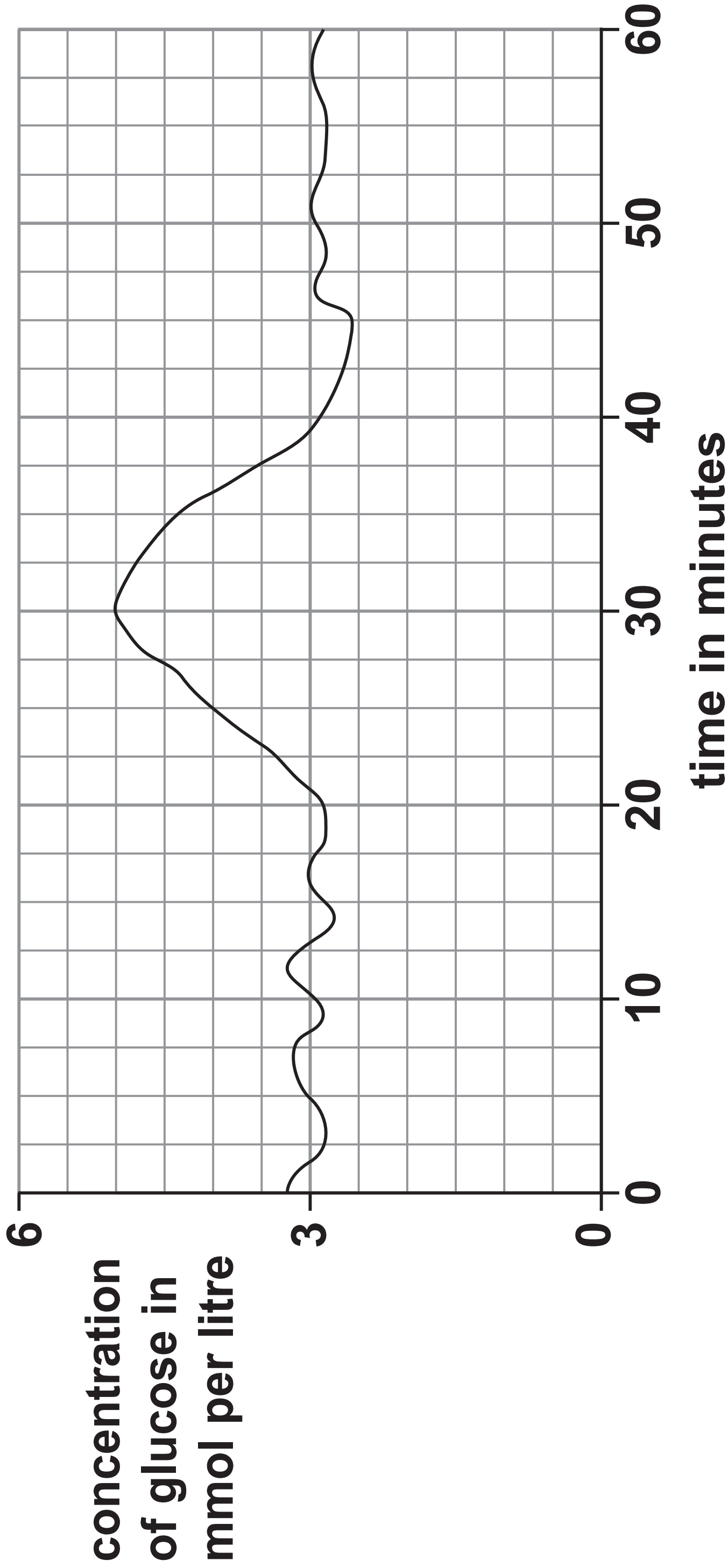


Figure 4

(Question continues on next page)

(Turn over)

- (i) Describe the trends shown in Figure 4 from 0 minutes to 30 minutes. (2 marks)

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(Question continues on next page)

(Turn over)

- (ii) Explain why the concentration of glucose decreases from 30 minutes to 40 minutes.  
(2 marks)

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**(TOTAL FOR QUESTION 2 = 8 MARKS)**

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**(Questions continue on next page)**

**(Turn over)**

**3 (a) Photosynthesis occurs in leaves.**

**(i) Which substance is needed for photosynthesis? (1 mark)**

☐ **A carbon dioxide**

☐ **B glucose**

☐ **C oxygen**

☐ **D nitrogen**

**(Question continues on next page)**

**(Turn over)**



**(ii) A leaf cell is 0.08 mm long.**

**Calculate the length of the image of this cell after it has been magnified 50 times using a microscope. (2 marks)**

\_\_\_\_\_ mm

**(Question continues on next page)**

**(Turn over)**

**Pine trees can live in dry soil.**

**(b) Use words from the box to complete the sentences. (2 marks)**

<b>thickness</b>	<b>water</b>	<b>light</b>
<b>area</b>	<b>chlorophyll</b>	<b>volume</b>

**The pine leaf has stomata in pits to reduce the loss of**

\_\_\_\_\_ .

**The pine leaf is needle-shaped to reduce the surface**

\_\_\_\_\_ .

**(Question continues on next page)**

**(Turn over)**

**(c) Figure 5 shows young tomato plants growing in a glasshouse.**



**Figure 5**

**The young tomato plants are growing towards the light.**

**(Question continues on next page)**

**(Turn over)**

**Explain how a plant hormone causes these shoots to grow towards the light. (2 marks)**

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**(TOTAL FOR QUESTION 3 = 7 MARKS)**

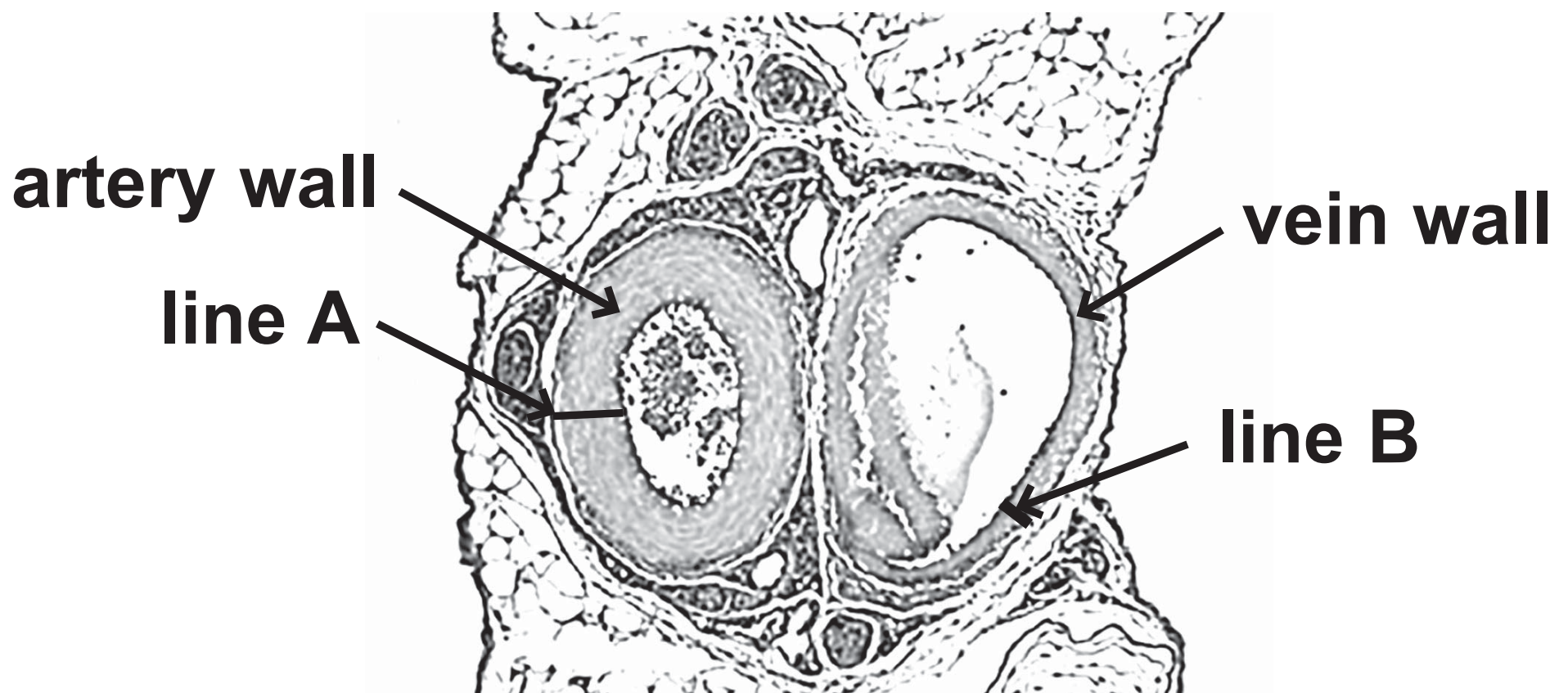
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**(Questions continue on next page)**

**(Turn over)**



- 4 (a) Figure 6 shows a cross section of an artery and a vein.



**Figure 6**

- (i) Measure the length of line A and the length of line B in mm.  
(1 mark)

line A \_\_\_\_\_ mm

line B \_\_\_\_\_ mm

**(Question continues on next page)**

**(Turn over)**

- (ii) State the ratio of the thickness of the artery wall to the thickness of the vein wall. (1 mark)

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- (b) (i) Give a reason why veins have valves. (1 mark)

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(Question continues on next page)

(Turn over)

- (ii) Name the artery that transports oxygenated blood from the heart to the body. (1 mark)**
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- (c) A scientist investigated the relationship between exercise and the ability to run at 3 metres per second for 20 minutes.**

**The scientist collected data from six groups of people.**

**Each group exercised for a different number of hours per week for six months.**

**There were 100 people in each group.**

**(Question continues on next page)**

**(Turn over)**

**Figure 7 shows their results.**

<b>group</b>	<b>number of hours of exercise per week</b>	<b>number of people who could run at 3 metres per second for 20 minutes</b>
<b>A</b>	<b>0</b>	<b>9</b>
<b>B</b>	<b>2</b>	<b>20</b>
<b>C</b>	<b>4</b>	<b>33</b>
<b>D</b>	<b>6</b>	<b>52</b>
<b>E</b>	<b>8</b>	<b>61</b>
<b>F</b>	<b>10</b>	<b>62</b>

**Figure 7**

**(Question continues on next page)**

**(Turn over)**



**(i) Describe the relationship shown by this data. (2 marks)**

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**(Question continues on next page)**

**(Turn over)**

- (ii) Explain why some people's leg muscles tired quickly and developed cramp when they were running. (3 marks)**

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**(Continue your answer on next page)**

**(Turn over)**

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**(TOTAL FOR QUESTION 4 = 9 MARKS)**

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**(Questions continue on next page)**

**(Turn over)**



**5 Figure 8 shows an area of nettle plants.**



**Figure 8**

**Grass does not grow among the nettles.**

**(a) Explain why grass does not grow where there are nettles. (2 marks)**

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**(Continue your answer on next page)**  
**(Turn over)**



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**(Question continues on next page)**

**(b) Figure 9 shows caterpillars eating nettle leaves.**



**Figure 9**

**A caterpillar has a body mass of 6.0 grams.  
One week later, its body mass had  
increased to 7.5 grams.**

**Caterpillars convert 10% of food eaten into  
body mass.**

**(Question continues on next page)**

**(Turn over)**

- (i) Calculate the mass of nettles that the caterpillar ate. (2 marks)

\_\_\_\_\_ grams

(Question continues on next page)

(Turn over)

- (ii) Describe what happens to food eaten that is not converted into the body mass of the caterpillar. (2 marks)**

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**(Question continues on next page)**

**(Turn over)**



**(c) Devise a method a scientist could use to investigate how temperature affects nettle growth. (4 marks)**

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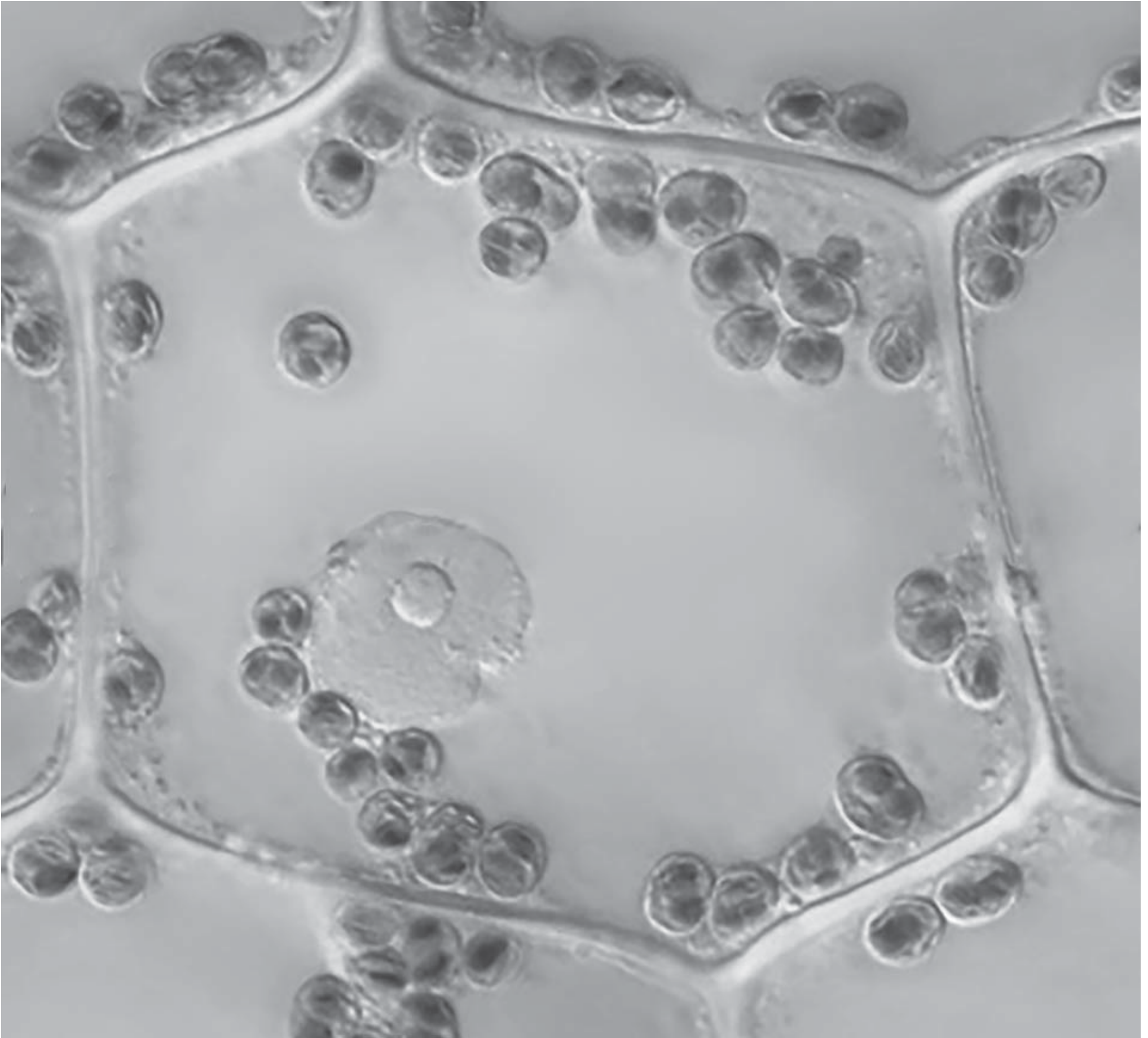
**(TOTAL FOR QUESTION 5 = 10 MARKS)**

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**(Questions continue on next page)**

**(Turn over)**

**6 Figure 10 shows a plant cell as seen under a light microscope.**



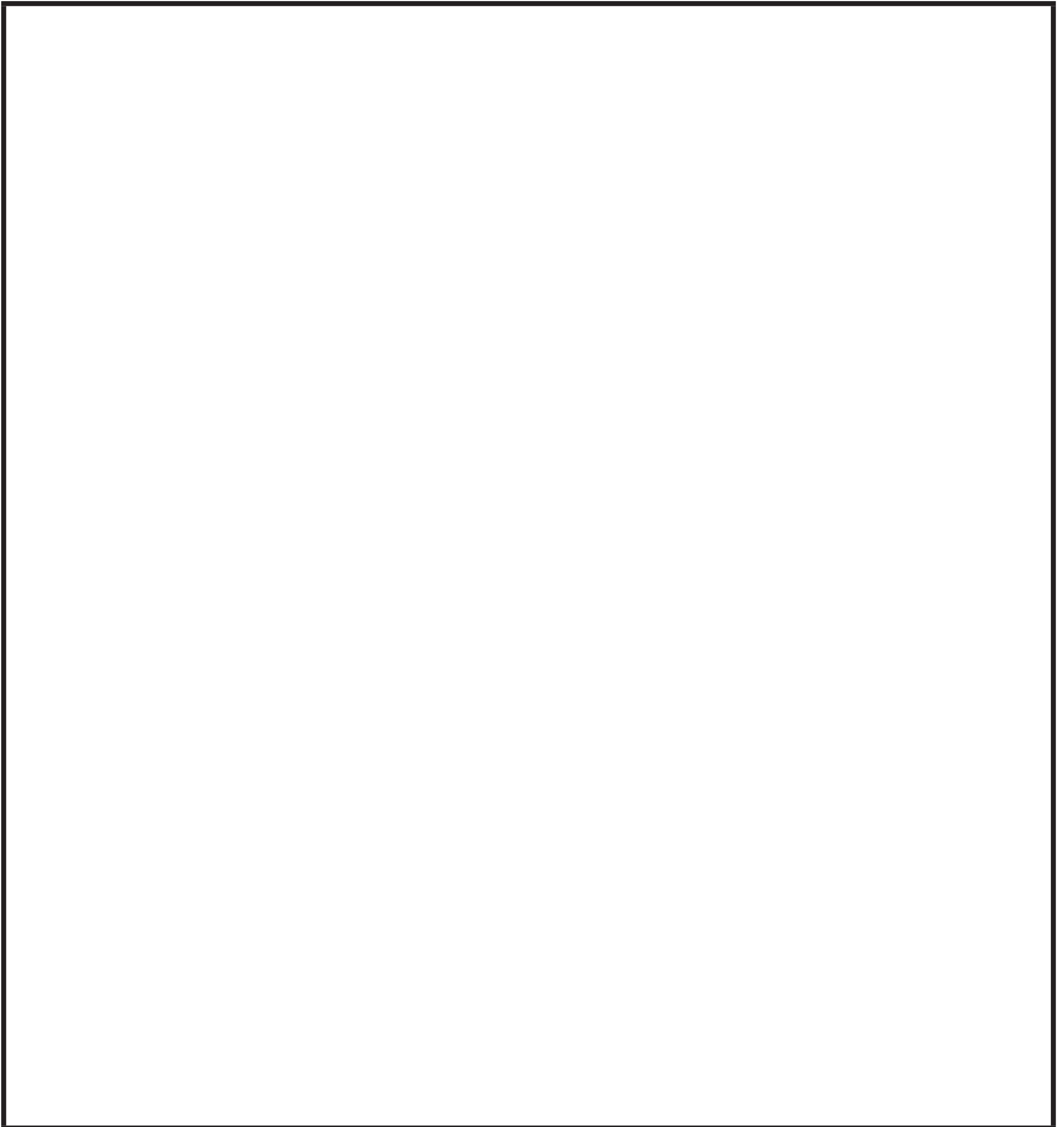
**Figure 10**

**(Question continues on next page)**

**(Turn over)**

**(a) Draw this plant cell in the box below.**

**Label THREE parts of this cell.  
(4 marks)**

A large, empty rectangular box with a black border, intended for drawing a plant cell. The box is currently blank.

**(Question continues on next page)**

**(Turn over)**

**(b) Mitochondria cannot be seen with a light microscope.**

**What is the function of mitochondria in a plant cell? (1 mark)**

- ☐ **A respiration**
- ☐ **B make proteins**
- ☐ **C photosynthesis**
- ☐ **D store water**

**(Question continues on next page)**

**(c) A student wanted to investigate the movement of water into and out of cells in potatoes.**

**The student had the equipment shown in Figure 11.**



**Figure 11**

**The test tubes in the rack contain different concentrations of sodium chloride solution.**

**(Question continues on next page)**

**(Turn over)**



**The solutions were 0·1 M, 0·2 M, 0·3 M, 0·4 M and 0·5 M sodium chloride solution.**

**The test tube in the beaker contains distilled water.**

**There are three potato chips in each of the six test tubes.**

- (i) State why the test tube in the beaker only contains distilled water and three potato chips.  
(1 mark)**

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**(Question continues on next page)**

**(Turn over)**

- (ii) State TWO variables that need to be controlled in this investigation.  
(2 marks)

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Question continues on next page)

(Turn over)



**(iii) Explain why the chips in the 0.5 M sodium chloride solution lost mass. (3 marks)**

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**(TOTAL FOR QUESTION 6 = 11 MARKS)**

**(Questions continue on next page)**

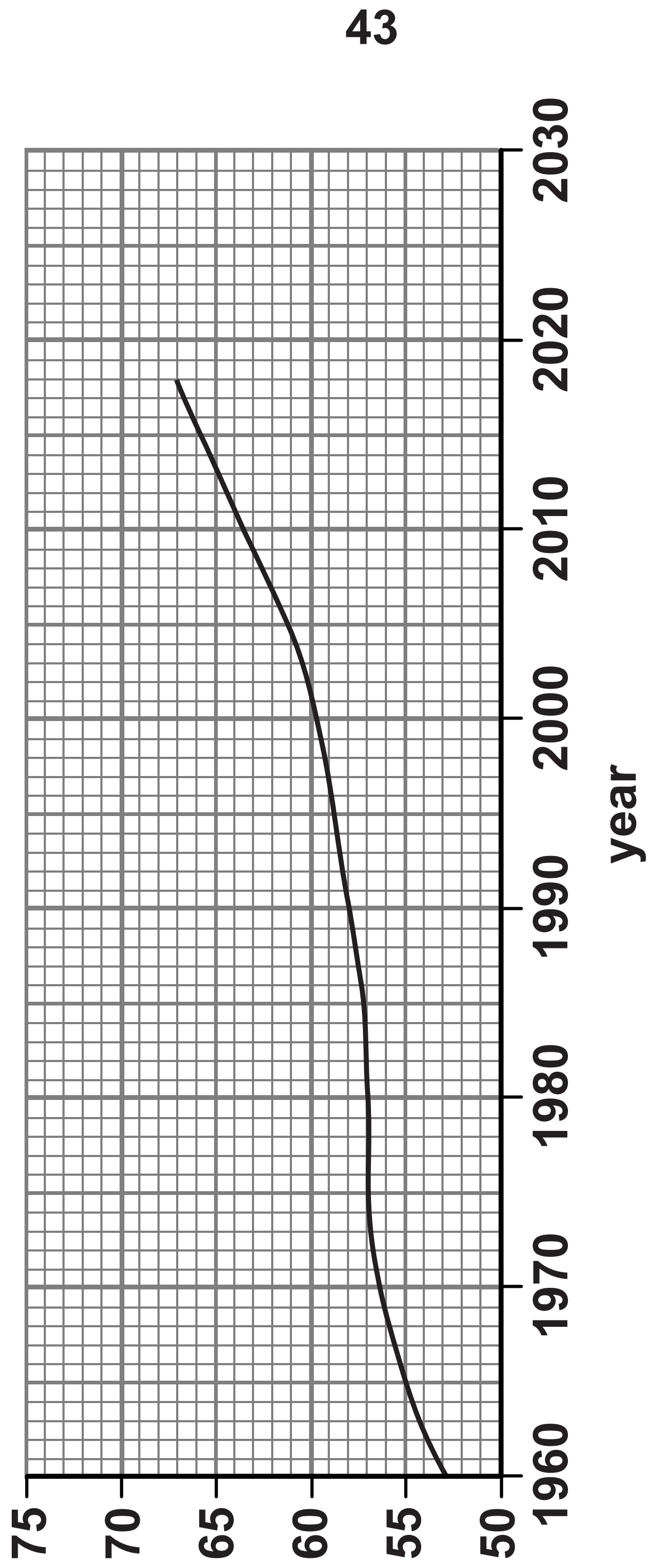
**(Turn over)**

- 7 The increasing human population is affecting farming and the habitats of animals.**

**Figure 12 on page 43 shows the human population of the UK from 1960 to 2018.**

**(Question continues on next page)**

**human population  
in millions**



**Figure 12**

**(Question continues on next page)**

**(Turn over)**

- (a) Extend the line to estimate the human population of the UK in 2030 if this trend continues. (1 mark)**

\_\_\_\_\_ million

**(Question continues on next page)**

**(Turn over)**

**(b) Food security means that a population has enough safe and healthy food.**

**Which of these would improve food security? (1 mark)**

- ☐ **A increased reforestation**
- ☐ **B increased animal farming**
- ☐ **C increased human population**
- ☐ **D increased crop yield**

**(Question continues on next page)**

**(c) A scientist tested three samples of different foods.**

**Figure 13 shows the results.**

<b>food sample</b>	<b>result of adding iodine solution</b>	<b>result of boiling with Benedict's solution</b>	<b>result of adding Biuret solution</b>	<b>result of emulsion test</b>
<b>E</b>	<b>black</b>	<b>blue</b>	<b>blue</b>	<b>clear</b>
<b>F</b>	<b>brown</b>	<b>orange</b>	<b>purple</b>	<b>clear</b>
<b>G</b>	<b>brown</b>	<b>orange</b>	<b>purple</b>	<b>cloudy</b>

**Figure 13**

**(Question continues on next page)**

**(Turn over)**

**(i) Name the food group in sample E.  
(1 mark)**

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**(ii) Name the food groups in  
sample F. (1 mark)**

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**(Question continues on next page)**

**(Turn over)**



- (iii) The emulsion test shows that food sample G contained fat.

Describe how fat is digested in the body. (2 marks)

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(Question continues on next page)

(Turn over)

**\*(d) Figure 14 shows a field of a crop in one area of Africa.**

**The crop cannot be eaten by people.**

**The crop is used to produce biofuel.**



**Figure 14**

**(Question continues on next page)**

**(Turn over)**

**50**

**Describe the advantages and disadvantages of growing this crop to produce biofuel. (6 marks)**

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**(Continue your answer on next page)**

**(Turn over)**

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- 8 (a) A student was investigating the populations of organisms in a garden.

Figure 15 shows the estimates of the number and biomass of some of the organisms in the garden.

organism	number	mean biomass of each organism in grams	biomass of population in grams
cabbages (plants)	80	70	5600
earthworms	620	3·4	?
slugs	30	4·1	123
hedgehogs	1	620	620
squirrels	2	600	1200

Figure 15

(Question continues on next page)

(Turn over)

- (i) Calculate the biomass of the population of earthworms in the garden. (1 mark)**

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**(Question continues on next page)**

**(Turn over)**

**(ii) Hedgehogs eat slugs and earthworms.**

**Slug pellets were used to kill the slugs.**

**Explain how killing the slugs would affect the population of earthworms in this garden.  
(2 marks)**

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**(Question continues on next page)**

**(Turn over)**



**(iii) Describe a method that could be used to estimate the population of slugs in the garden. (3 marks)**

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**(b) Explain how cabbages, earthworms and squirrels contribute to the carbon cycle. (3 marks)**

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**(Question continues on next page)**

**(Turn over)**

**(c) State THREE ways the concentration of nitrates in soil can be increased.  
(3 marks)**

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

**(TOTAL FOR QUESTION 8 = 12 MARKS)**

**(Questions continue on next page)**

**(Turn over)**

- 9 (a) A student investigated respiration in three different organisms.**

**Red hydrogencarbonate indicator was placed in each of three test tubes.**

**Gauze was placed in each test tube to hold the organisms.**

**In test tube 1 the student placed four germinating peas.**

**In test tube 2 the student placed four dried peas.**

**In test tube 3 the student placed four mealworms.**

**Bungs were added to each of the test tubes.**

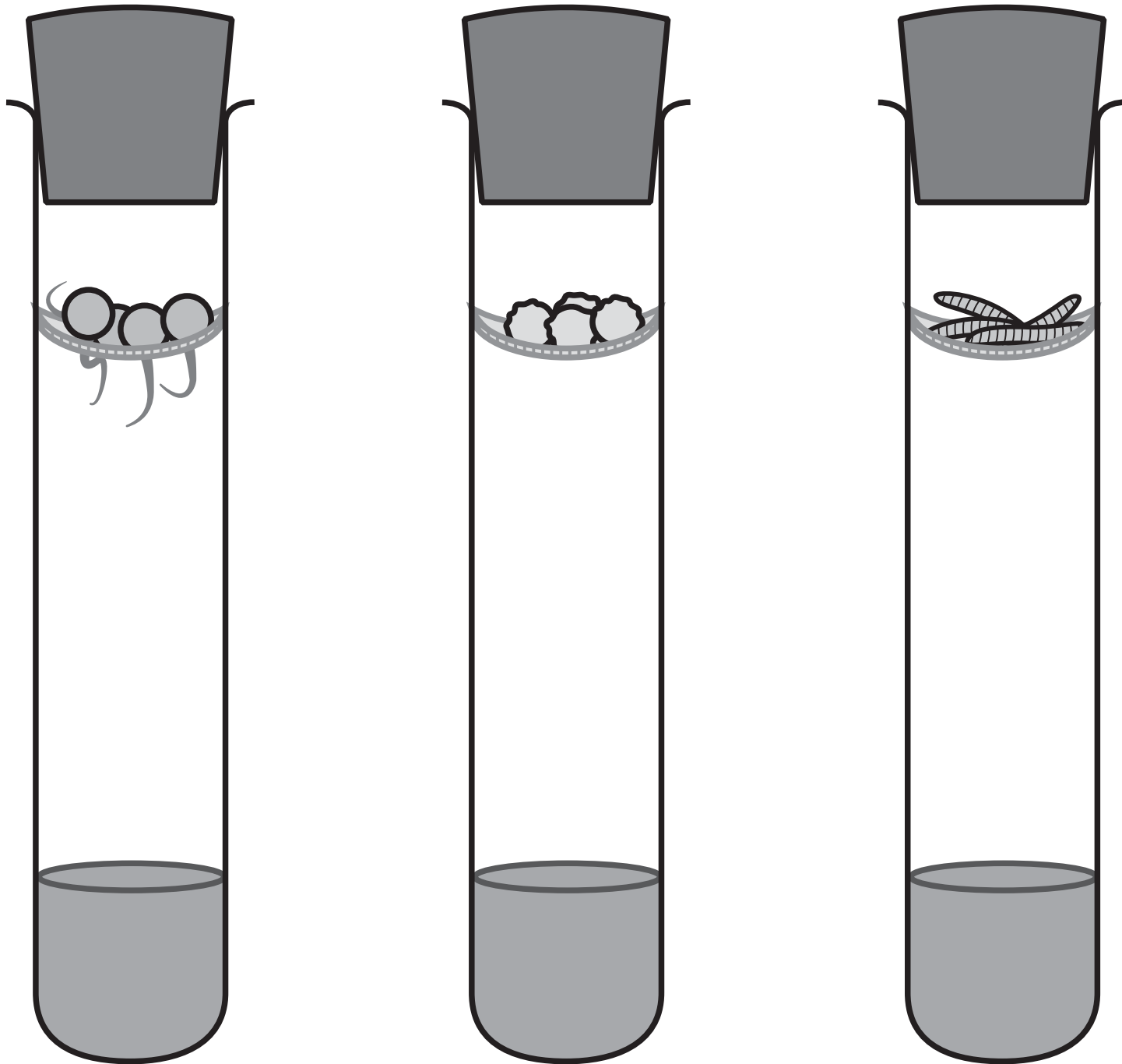
**The three test tubes were left for one hour.**

**The equipment used is shown in Figure 16 on page 59.**

**(Question continues on next page)**

**(Turn over)**

59



test  
tube 1

test  
tube 2

test  
tube 3

Figure 16

(Question continues on next page)

(Turn over)

- (i) State TWO ways this method could be improved to make the results for these three organisms more comparable. (2 marks)

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

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(Question continues on next page)

(Turn over)

**(ii) Describe a suitable control for this investigation. (2 marks)**

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**(Question continues on next page)**



- (b) Hydrogencarbonate indicator changes from red to yellow when more carbon dioxide is present.**

**The results for this investigation are shown in Figure 17.**

<b>organisms</b>	<b>colour of hydrogencarbonate indicator</b>
<b>germinating peas</b>	<b>yellow</b>
<b>dried peas</b>	<b>red</b>
<b>mealworms</b>	<b>yellow</b>

**Figure 17**

**(Question continues on next page)**

**(Turn over)**

- (i) Explain why the result for the germinating peas is different from the result for the dried peas. (2 marks)

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(Question continues on next page)

(Turn over)

**(ii) How was the carbon dioxide produced in this investigation?  
(1 mark)**

- ☐ **A by photosynthesis**
- ☐ **B when glucose is broken down in the presence of oxygen**
- ☐ **C when glucose is broken down in the absence of oxygen**
- ☐ **D by the reaction between oxygen and water**

**(Question continues on next page)**

**(Turn over)**

**\*(c) Carbon dioxide is carried in blood plasma.**

**Human blood also contains red blood cells and white blood cells.**

**Explain how the structure of red blood cells and white blood cells is related to their function. (6 marks)**

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**(Continue your answer on next page)**

**(Turn over)**

**(Continue your answer on next page)**

**(Turn over)**

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**(Continue your answer on next page)**

**(Turn over)**

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**(TOTAL FOR QUESTION 9 = 13 MARKS)**

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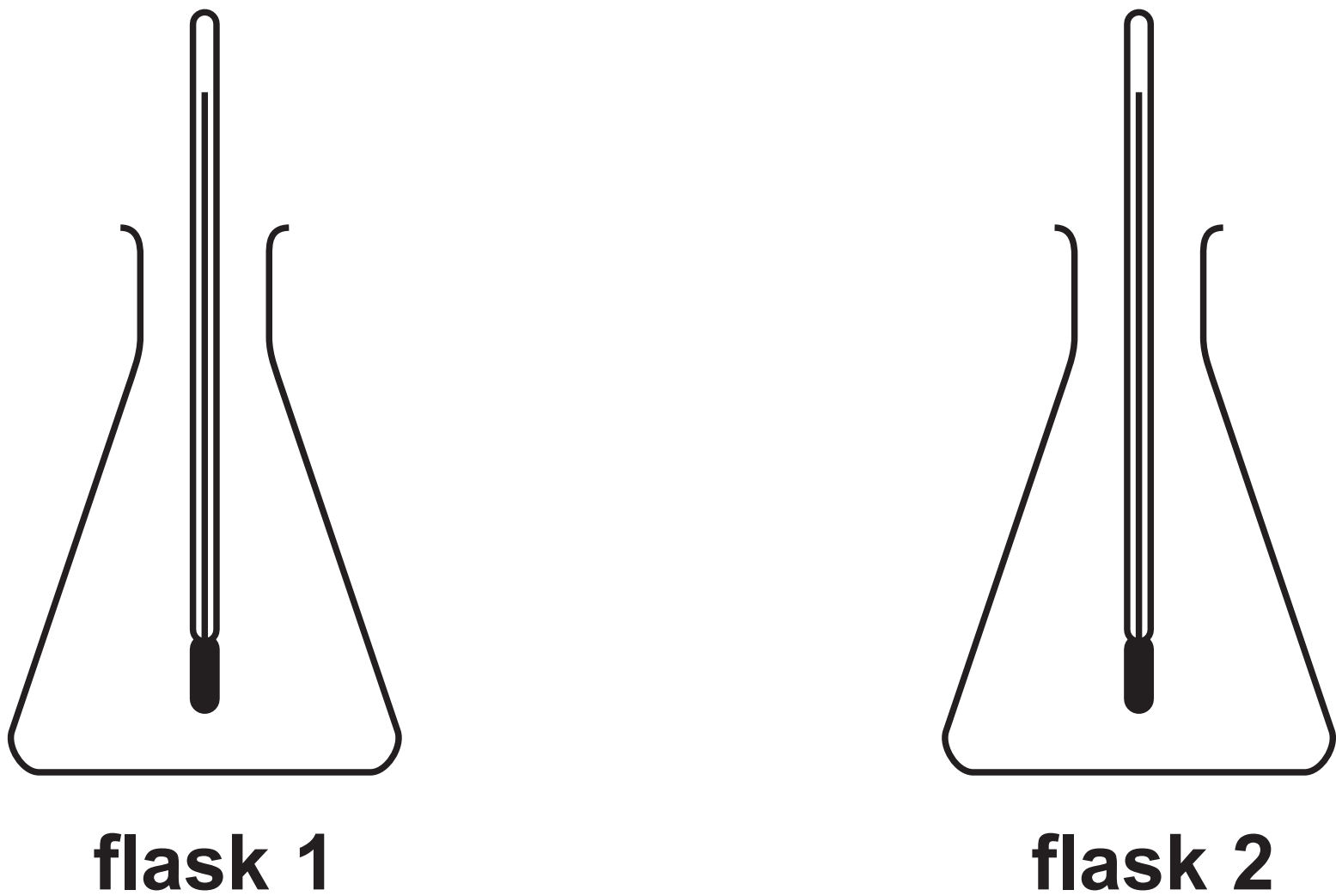
**(Questions continue on next page)**

**(Turn over)**



**10 A student was investigating the effect of sweating.**

**The student set up two conical flasks each with a thermometer as shown in Figure 18.**



**Figure 18**

**Flask 1 was covered in WET tissue paper.**

**Flask 2 was covered with DRY tissue paper.**

**(Question continues on next page)**

**(Turn over)**

**Hot water was added to each of the flasks.**

**The temperature of the water in each flask was recorded every minute for 10 minutes.**

**(a) State TWO variables that would need to be controlled in this investigation.  
(2 marks)**

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

**(Question continues on next page)**

**(Turn over)**

**(b) The results of this investigation are shown in Figure 19.**

<b>time in minutes</b>	<b>flask 1 (wet tissue paper) temperature in °C</b>	<b>flask 2 (dry tissue paper) temperature in °C</b>
<b>1</b>	<b>98</b>	<b>98</b>
<b>2</b>	<b>82</b>	<b>91</b>
<b>3</b>	<b>71</b>	<b>84</b>
<b>4</b>	<b>60</b>	<b>76</b>
<b>5</b>	<b>50</b>	<b>69</b>
<b>6</b>	<b>39</b>	<b>61</b>
<b>7</b>	<b>31</b>	<b>56</b>
<b>8</b>	<b>22</b>	<b>49</b>
<b>9</b>	<b>22</b>	<b>42</b>
<b>10</b>	<b>22</b>	<b>37</b>

**Figure 19**

**(Question continues on next page)**

**(Turn over)**

- (i) Calculate the rate of temperature change in flask 1 from 1 to 8 minutes. (2 marks)

\_\_\_\_\_ °C per minute

(Question continues on next page)

(Turn over)

- (ii) Compare the trends shown in the data for flask 1 and flask 2. (2 marks)**

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**(Question continues on next page)**

**(Turn over)**

**(c) Explain how sweating helps to cool the body. (2 marks)**

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**(Question continues on next page)**

**(Turn over)**

**(d) Which part of the brain controls internal body temperature? (1 mark)**

- ☐ **A cerebellum**
- ☐ **B medulla oblongata**
- ☐ **C hypothalamus**
- ☐ **D pituitary gland**

**(Question continues on next page)**

**(e) Explain why it is important to control the internal temperature of the human body. (2 marks)**

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**(TOTAL FOR QUESTION 10 = 11 MARKS)**

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**TOTAL FOR PAPER = 100 MARKS  
END**