

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number					Candidate Number				
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**Pearson Edexcel Level 1/Level 2 GCSE (9–1)**

<b>Time</b> 1 hour 45 minutes	<b>Paper reference</b>	<b>1BI0/2F</b>
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**Biology**

**PAPER 2**

**Foundation Tier**

<b>You must have:</b> Calculator, ruler	<b>Total Marks</b>
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## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- 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**.

## Information

- 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.*
- 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

- 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.

Turn over ►

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Q:1/1/1/1/e2



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 ☒.

- 1 (a) Figure 1 shows part of the carbon cycle.

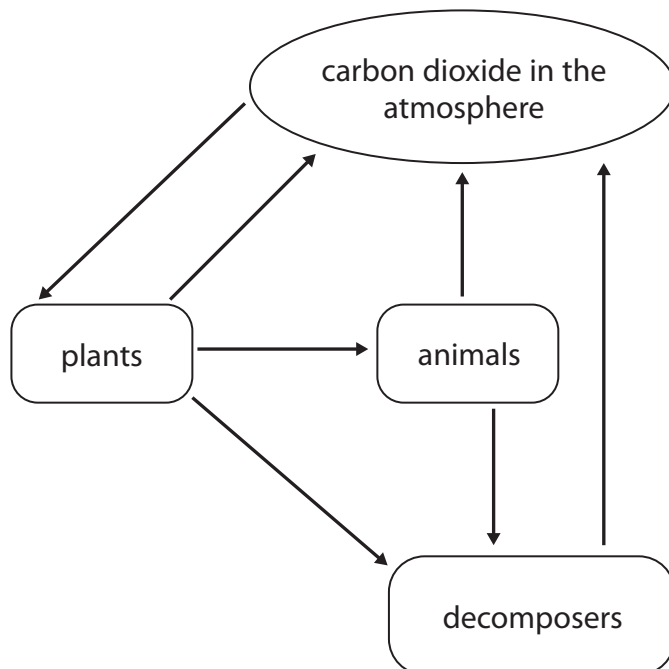


Figure 1

- (i) Name the process that transfers carbon from plants to animals.

(1)

- (ii) Use words from the box to complete the sentences.

(2)

digestion	translocation	osmosis
photosynthesis	respiration	transpiration

Plants use carbon dioxide from the atmosphere for .....

Animals release carbon dioxide and energy during .....



(iii) Which of these can be a decomposer?

(1)

- ☐ **A** mammal
- ☐ **B** producer
- ☐ **C** microorganism
- ☐ **D** tree

(b) The water cycle is the movement of water through an ecosystem.

Which process is used to obtain freshwater from seawater?

(1)

- ☐ **A** excretion
- ☐ **B** precipitation
- ☐ **C** sterilisation
- ☐ **D** desalination

(c) Water from rivers can be filtered and then treated with chemicals to make it suitable for drinking.

(i) Give **one** reason why water is filtered.

(1)

(ii) Give **one** reason why water is treated with chemicals.

(1)

**(Total for Question 1 = 7 marks)**



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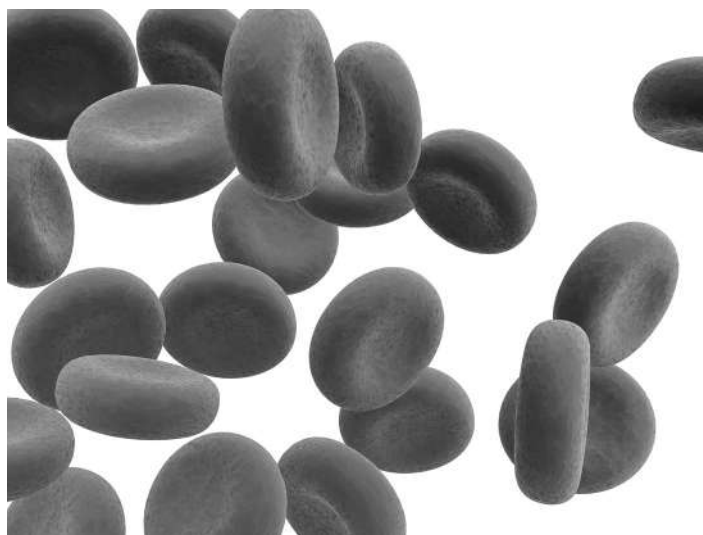
2 (a) Blood contains red blood cells, white blood cells, plasma and platelets.

(i) Draw **one** straight line from each part of the blood to its function.

(2)

part of the blood	function
plasma	<ul style="list-style-type: none"><li>produces oestrogen</li><li>transports dissolved urea</li><li>contains haemoglobin</li></ul>
red blood cell	<ul style="list-style-type: none"><li>produces antibodies</li><li>surrounds and digests foreign cells</li></ul>

Figure 2 shows some red blood cells.



(Source: © SciePro/Shutterstock)

Figure 2

(ii) State **two** features that can be seen in the red blood cells in Figure 2.

(2)

1 .....

.....

2 .....

.....

(b) Lymphocytes are white blood cells that produce large amounts of protein.

(i) Which organelle is needed to produce large amounts of protein?

(1)

☐ **A** ribosome

☐ **B** vacuole

☐ **C** chloroplast

☐ **D** flagellum

A small lymphocyte has a diameter of  $10\text{ }\mu\text{m}$  (micrometres).

A microscope magnifies this lymphocyte 400 times.

(ii) Calculate the diameter of the image of the lymphocyte seen using this microscope.

(2)

image size .....  $\mu\text{m}$

(iii) How many micrometres are in 1 mm (millimetre)?

(1)

☐ **A** 10

☐ **B** 100

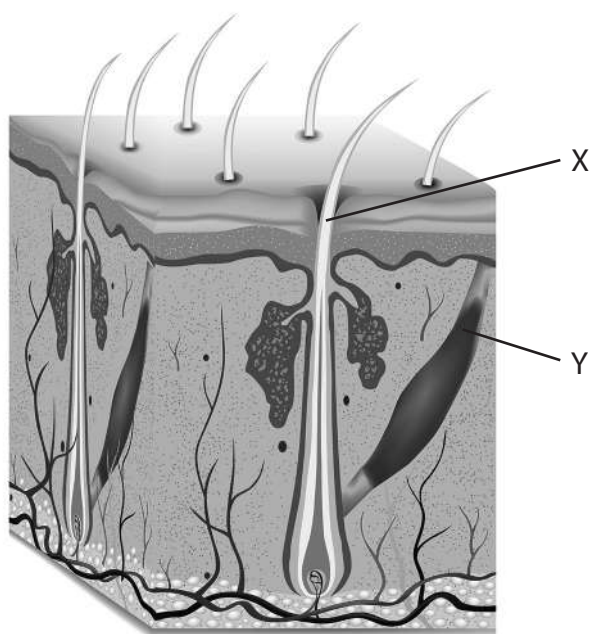
☐ **C** 1000

☐ **D** 10000

(Total for Question 2 = 8 marks)



3 (a) Figure 3 shows a section through the skin.



(Source: © mariyaermolaeva/Shutterstock)

**Figure 3**

The skin helps to keep body temperature constant.

(i) Which is the correct term for maintaining a constant internal environment?

(1)

- ☐ **A** excretion
- ☐ **B** homeostasis
- ☐ **C** respiration
- ☐ **D** sweating

(ii) Explain how structures X and Y help to regulate body temperature when the body is too cold.

(2)

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(iii) Explain how shivering can help a person regulate their body temperature.

(2)

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(b) Figure 4 shows a person's body temperature during 24 hours.

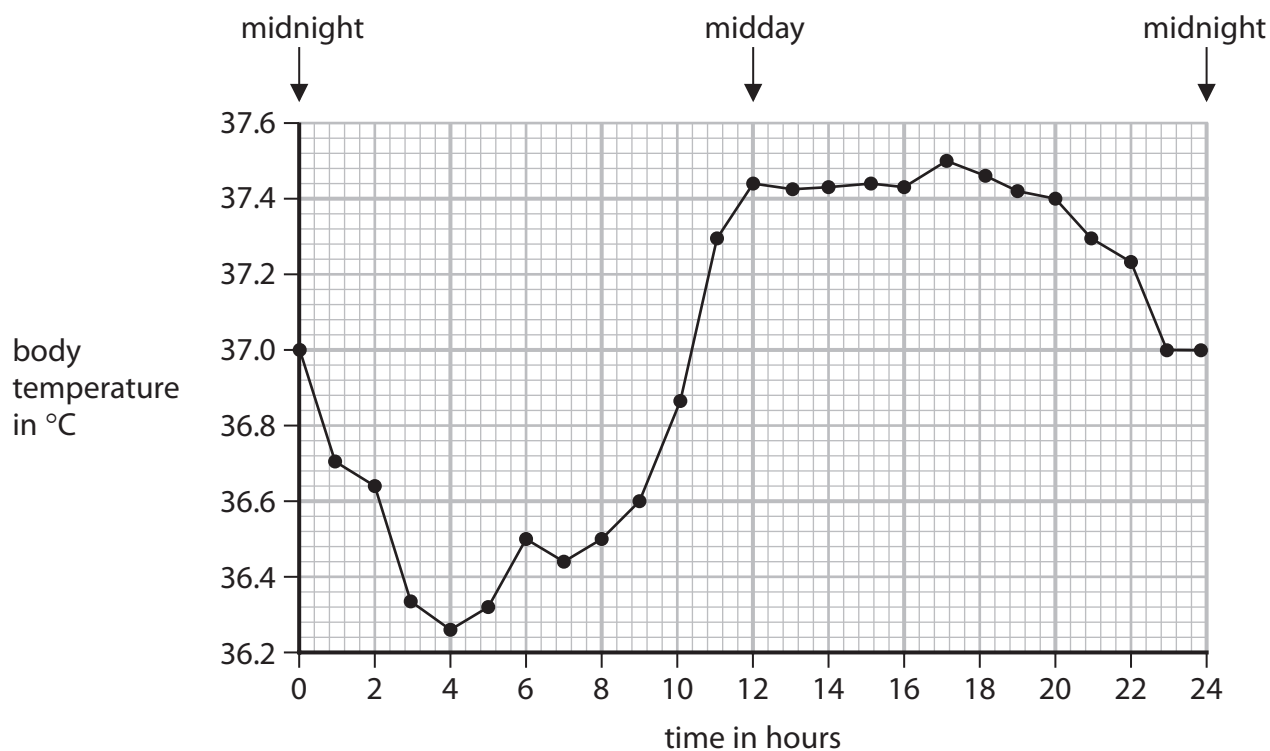


Figure 4

(i) State this person's highest body temperature.

(1)

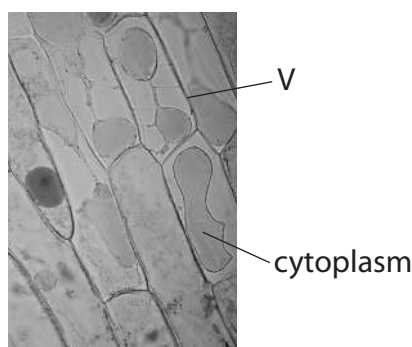
(ii) Explain the change in body temperature from 0 hours to 4 hours.

(3)

(Total for Question 3 = 9 marks)



- 4 (a) Figure 5 shows some onion cells that have been soaked in a concentrated salt solution.



(Source: © Rattiya Thongdumhyu/Shutterstock)

**Figure 5**

- (i) The cells in Figure 5 have been stained.

Give **one** reason why the cells have been stained.

(1)

- (ii) Which is the name of the structure labelled V?

(1)

- ☐ A chloroplast
- ☐ B vacuole
- ☐ C nucleus
- ☐ D cell wall

- (iii) The salt solution outside the cell has a higher concentration than the solution inside the cell.

Explain why the cytoplasm shrinks away from the sides of the cell when the cells are in salt solution.

(2)

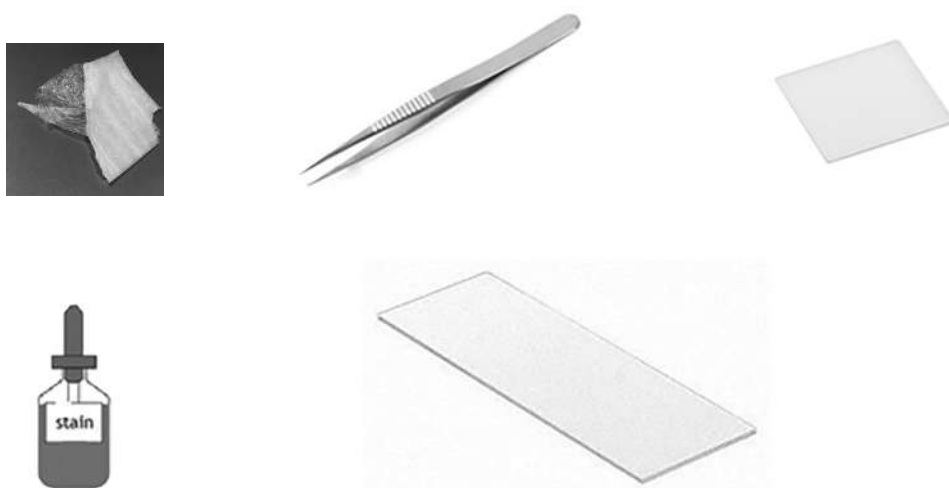
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(b) Figure 6 shows the equipment used to prepare a microscope slide of onion cells.



**Figure 6**

Describe how this equipment could be used to prepare a slide of onion cells to view under a microscope.

(3)

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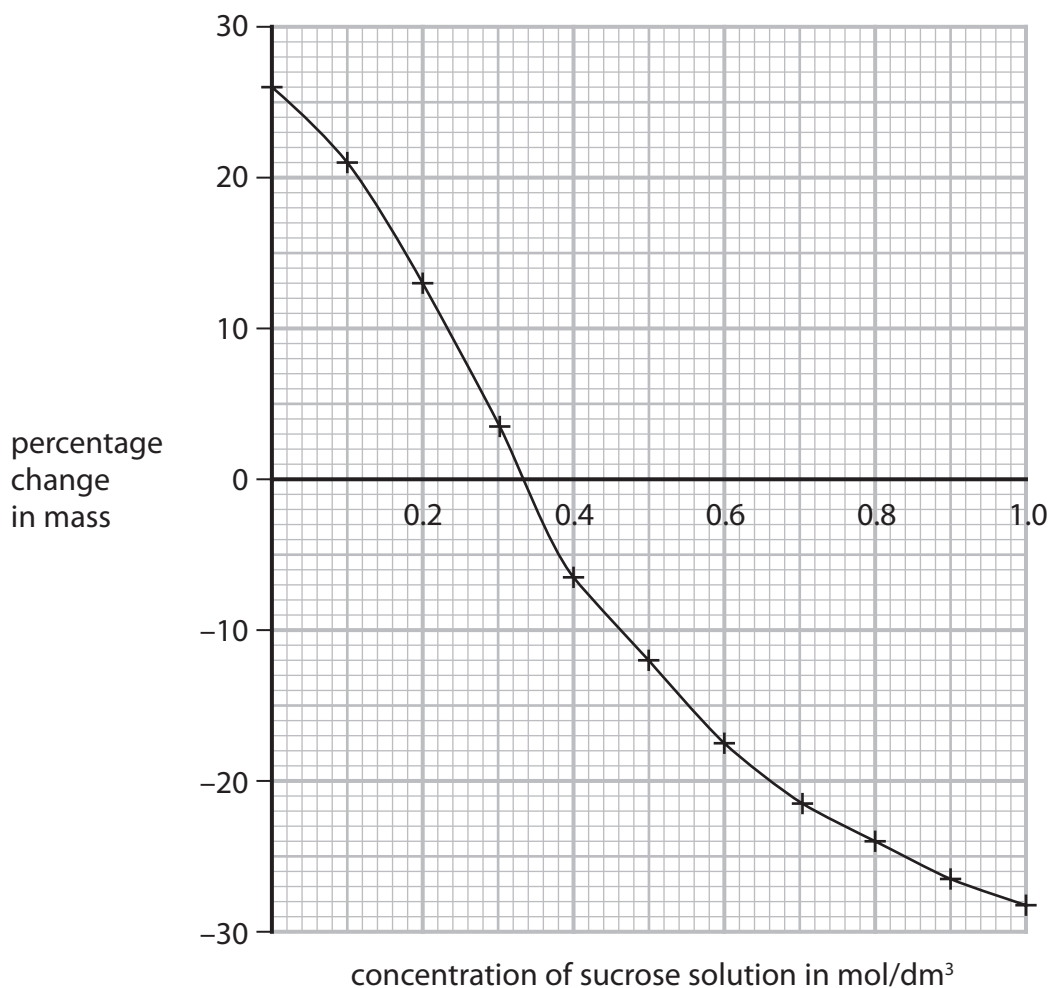
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- (c) A student investigated the percentage change in mass of potato cylinders placed in sucrose solutions of different concentrations.

Figure 7 shows the results of the student's investigation.



**Figure 7**

State **two** conclusions that can be made from these results.

(2)

1 .....

2 .....

(Total for Question 4 = 9 marks)

- 5 (a) Figure 8 shows a compost bin.



(Source: © Evan Lorne/Shutterstock)

**Figure 8**

- (i) Give **one** reason why the compost bin has gaps at the sides.

(1)

- (ii) A student placed 2.0 kg of vegetable waste in a compost bin.

After 20 days, the student reweighed the vegetable waste and found that its mass was 1.7 kg.

Calculate the rate of decomposition of the vegetable waste.

Use the equation

$$\text{rate of decomposition} = \frac{\text{change in mass}}{\text{time taken}} \quad (3)$$

rate of decomposition = ..... kg per day



(iii) The temperature in the compost bin increased from 20 °C to 25 °C.

Explain how this increase in temperature would affect the rate of decomposition in the compost bin.

(2)

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(b) Figure 9 shows some preserved food that can be bought in a supermarket.



Dried food



Vacuum packed food

(Source: © Sarah Marchant/Shutterstock © Cultura Motion/Shutterstock)

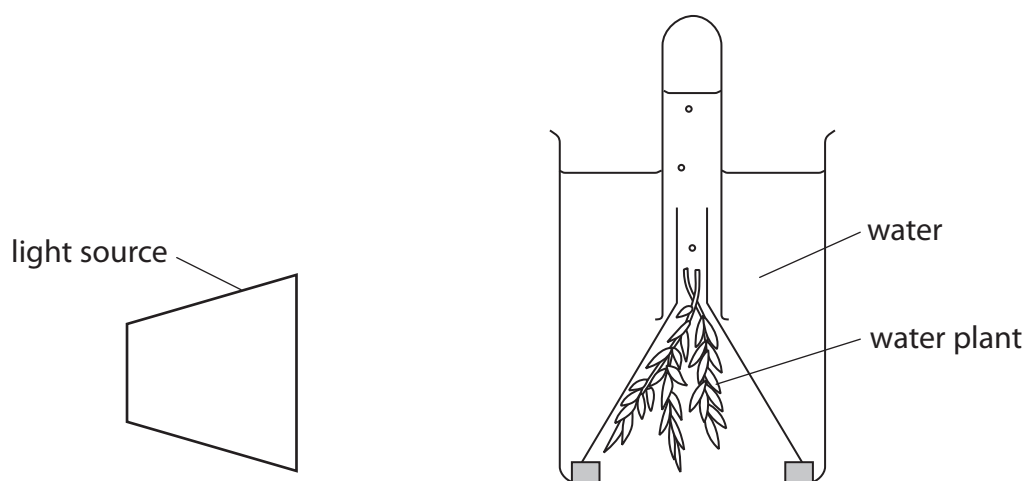
**Figure 9**

Explain why these two types of preserved foods do not decompose.

(3)

**(Total for Question 5 = 9 marks)**

- 6 (a) Figure 10 shows a method of investigating the rate of photosynthesis in a water plant.



(Source: © ghrzuzudu/Shutterstock)

**Figure 10**

- (i) What are the products of photosynthesis?

(1)

- ☐ **A** carbon dioxide and water
- ☐ **B** water and glucose
- ☐ **C** glucose and oxygen
- ☐ **D** oxygen and carbon dioxide

- (ii) The rate of photosynthesis can be measured by counting the number of bubbles of gas produced in one minute.

Figure 11 shows some results from this investigation in different light intensities.

Light intensity was changed by moving the lamp towards or away from the water plant.

light intensity in arbitrary units	rate of photosynthesis in bubbles per minute
25	19
31	43
39	46
50	95
69	125
100	222

**Figure 11**

Describe the effect of light intensity on the rate of photosynthesis. Use information from Figure 11 to help you.

(2)

- (iii) The bubbles are different sizes and can be difficult to count.

Describe how the quality of the results from this investigation could be improved.

(2)





(iv) Describe how this investigation could be changed to find the effect of temperature on the rate of photosynthesis.

(3)

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(b) Increased nitrates can cause eutrophication in lakes.

Explain how eutrophication will affect the fish living in the lakes.

(3)

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**(Total for Question 6 = 11 marks)**

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7 Figure 12 shows the urinary system of a mammal.

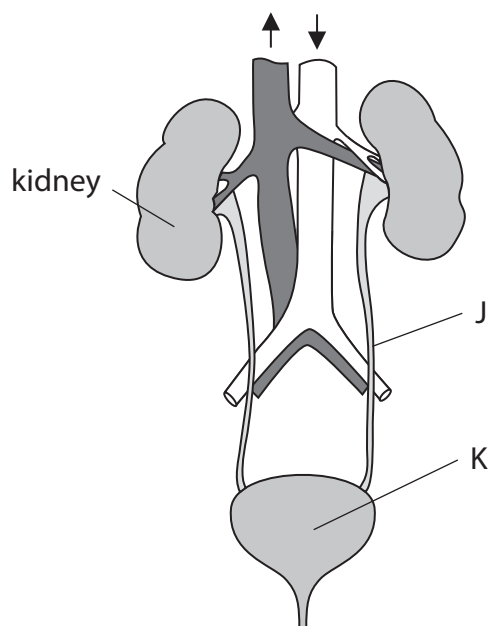


Figure 12

(a) Name structure J and structure K.

(2)

Structure J .....

Structure K .....

(b) Nephrons in the kidney filter the blood to produce urine.

Urine contains urea.

(i) What is urea made from?

(1)

- ☐ **A** excess amino acids
- ☐ **B** excess carbohydrates
- ☐ **C** excess vitamins
- ☐ **D** excess lipids

(ii) Figure 13 shows which components of the blood are filtered into the nephron.

blood component	is the component filtered into the nephron?
blood cells	no
large proteins	no
glucose	yes
sodium ions	yes

**Figure 13**

Explain the conclusions that can be made from this information.

(2)

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- \*(c) It is estimated that about 3 million people in the UK are at risk of developing chronic kidney disease (CKD).

The most severe stages of CKD can result in kidney failure.

Discuss the use of different treatments for kidney failure.

(6)

(Total for Question 7 = 11 marks)



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- 8 (a) Figure 14 shows a diagram of a plant root hair cell.

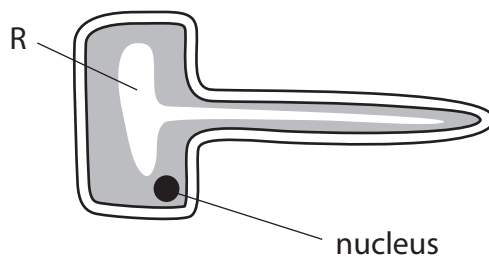


Figure 14

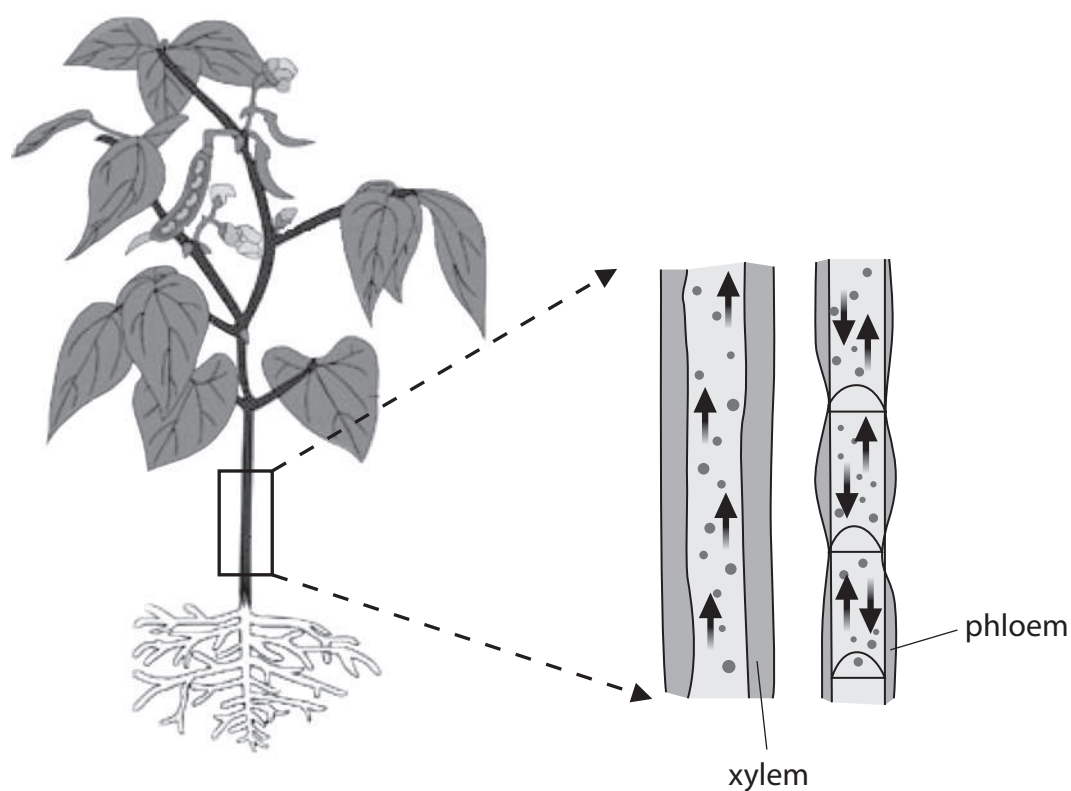
- (i) Name the part labelled R.

(1)

- (ii) Explain **one** adaptation of a root hair cell that increases the absorption of water and mineral ions.

(2)

(b) Figure 15 shows xylem and phloem from the stem of a plant.



**Figure 15**

- (i) Living cells in phloem use energy to transport sucrose.

Which organelles release energy in living cells?

(1)

- ☐ **A** vacuoles
- ☐ **B** mitochondria
- ☐ **C** nuclei
- ☐ **D** ribosomes

- (ii) Describe **two** features of the structure of xylem vessels that can be seen in Figure 15.

(2)

1 .....

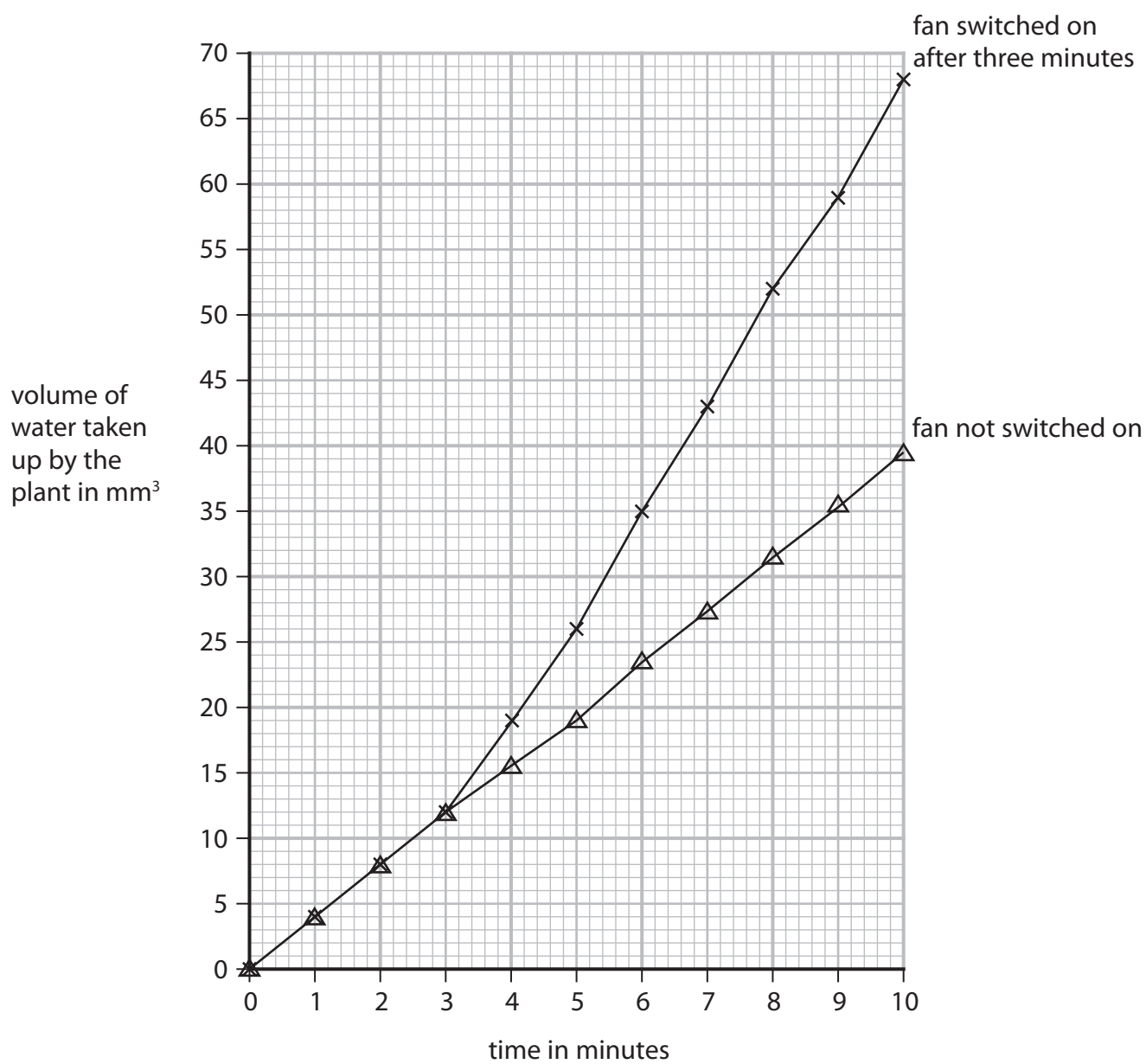
2 .....

- (c) A scientist investigated how the flow of air affected the rate of transpiration in a plant.

A fan was used to change the flow of air.

The volume of water taken up by the plant was measured.

Figure 16 shows the results of this investigation.



**Figure 16**



- (i) Explain why switching on the fan caused a change in the volume of water taken up by the plant.

(3)

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- (ii) Give **one** reason why the volume of water taken up by the plant was also measured when the fan was not switched on.

(1)

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- (iii) Calculate the rate of water uptake from 8 minutes to 10 minutes when the fan was switched on.

Use the equation

$$\text{rate of water uptake} = \frac{\text{volume of water taken up}}{\text{time taken}}$$

(2)

..... mm<sup>3</sup> per minute

**(Total for Question 8 = 12 marks)**

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- 9 (a) Figure 17 shows a cross-section of an artery and a vein.



(Source: © The University of Kansas Medical Center)

**Figure 17**

- (i) Explain **one** difference between the artery wall and the vein wall shown in Figure 17.

(2)

- (ii) Name **one** structure that is found in veins but not found in arteries.

(1)

(b) A human body has  $5 \text{ dm}^3$  of blood.

At rest 20% of the blood travels to the muscles.

During exercise 60% of the blood travels to the muscles.

(i) Calculate the volume of blood travelling to the muscles during exercise.

(2)

.....  $\text{dm}^3$

(ii) Explain **one** reason why there is an increase in blood flow to muscles during exercise.

(2)

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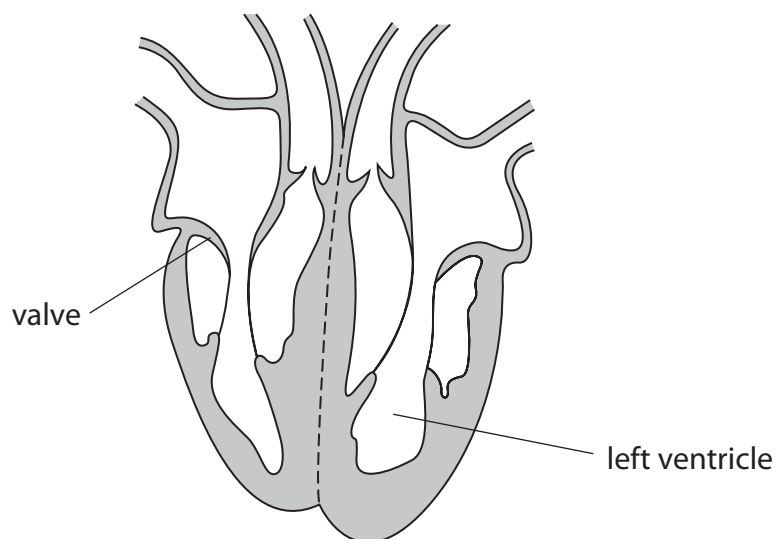
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\*(c) Figure 18 shows the structure of the human heart.



**Figure 18**

Explain how the structure of the heart is related to its function.

(6)

(Total for Question 9 = 13 marks)

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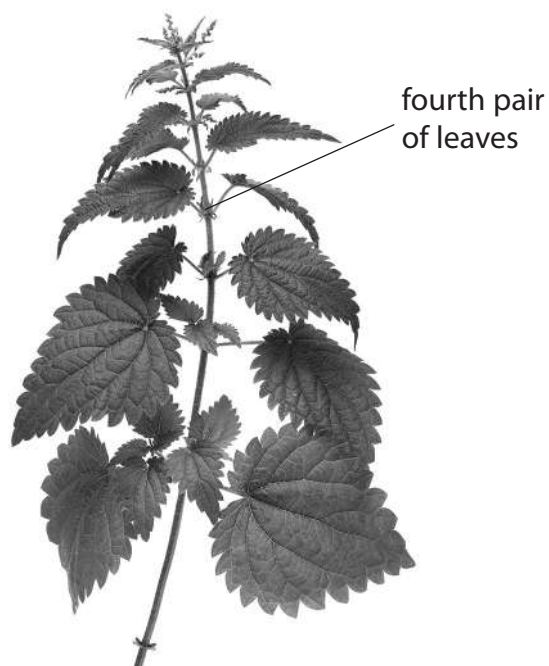
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- 10 A student investigated the width of leaves on nettle plants growing in two areas next to a woodland.

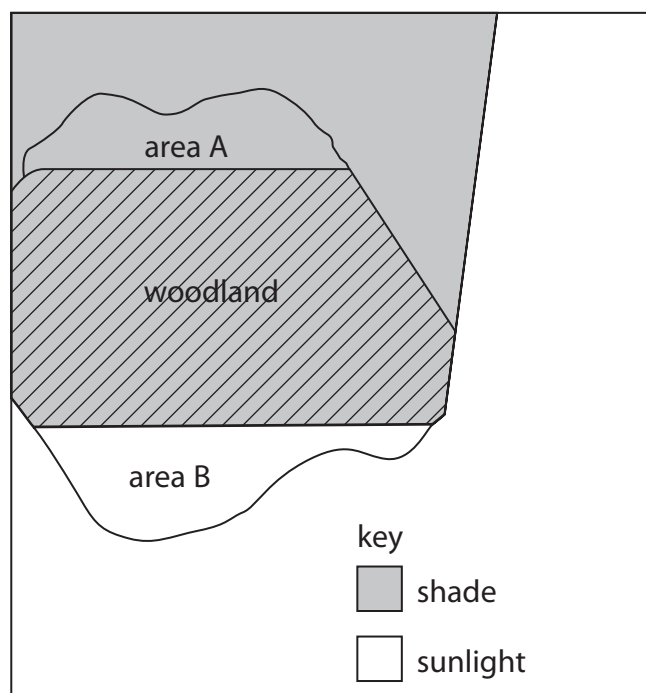
Figure 19a shows a nettle plant and Figure 19b shows a map of the woodland showing area A and area B.

The woodland caused area A to be in the shade.



(Source: © Alila Medical Media/Shutterstock)

**Figure 19a**



**Figure 19b**

The student measured the maximum width of leaves on five plants from each area.

The student always measured one leaf from the fourth pair of leaves.

- (a) Give **one** reason why the student always measured a leaf from the fourth pair of leaves.

(1)

(b) Figure 20 shows the results.

nettle plant	width of the leaf in millimetres (mm)	
	area A	area B
1	45	33
2	50	25
3	48	27
4	52	48
5	47	28
mean	48	28

Figure 20

(i) Why did the student **not** include the circled width when calculating the mean for area B?

(1)

- ☐ A it has not been measured in millimetres
- ☐ B it is an anomalous result
- ☐ C it is a repeat result
- ☐ D it is the mode value

(ii) Explain the difference in the mean width of leaves in the shade and those in the sunlight.

(2)

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(c) The student also studied some of the animals in areas A and B.

The student saw caterpillars eating the leaves of some nettles.

The student also saw a toad eating a large beetle.

Large beetles eat ladybirds.

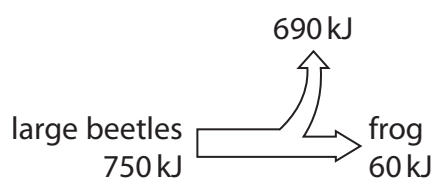
Ladybirds eat caterpillars.

(i) Give the food chain for these feeding relationships.

(3)

(ii) Frogs also eat large beetles.

Figure 21 shows the energy transferred between these animals.



**Figure 21**

Calculate the percentage efficiency of energy transfer from the large beetles to the frog.

(2)

.....%



(iii) Give **two** reasons why only some of the energy in the biomass of the large beetles is transferred to the biomass of the frog.

(2)

1 .....

.....

2 .....

.....

(Total for Question 10 = 11 marks)

**TOTAL FOR PAPER = 100 MARKS**

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