Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

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

Time 1 hour 45 minutes

Paper reference **1BI0/2F**

Biology
PAPER 2
Foundation Tier

You must have:
Calculator, ruler

Total Marks

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 ▶

P69320A

Q:1/1/1/1/e2

P 6 9 3 2 0 A 0 1 3 6

Pearson

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.

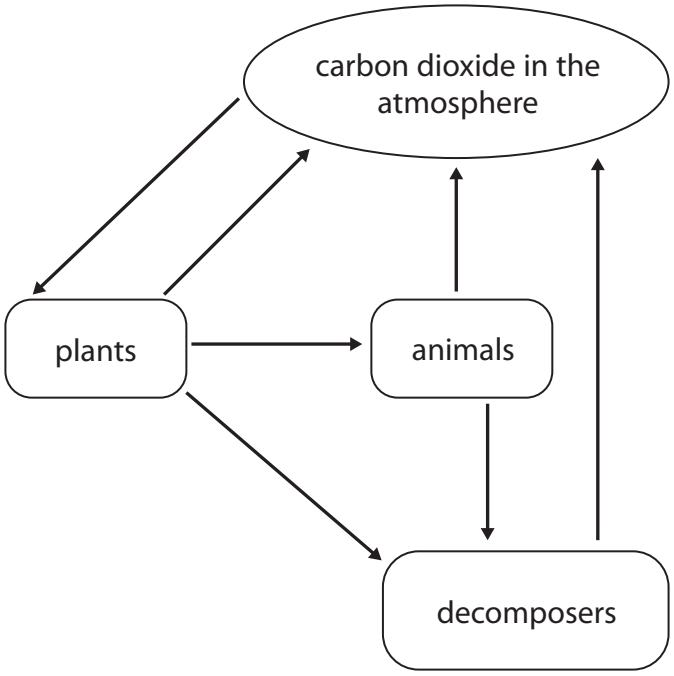

Figure 1

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

(1)

feeding / eating

(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 photosynthesis (1)

Animals release carbon dioxide and energy during respiration (1)

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(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)

To remove objects / debris / named objects

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

(1)

to destroy pathogens / remove {other chemicals / named chemicals / ions / named ions}

(Total for Question 1 = 7 marks)

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)

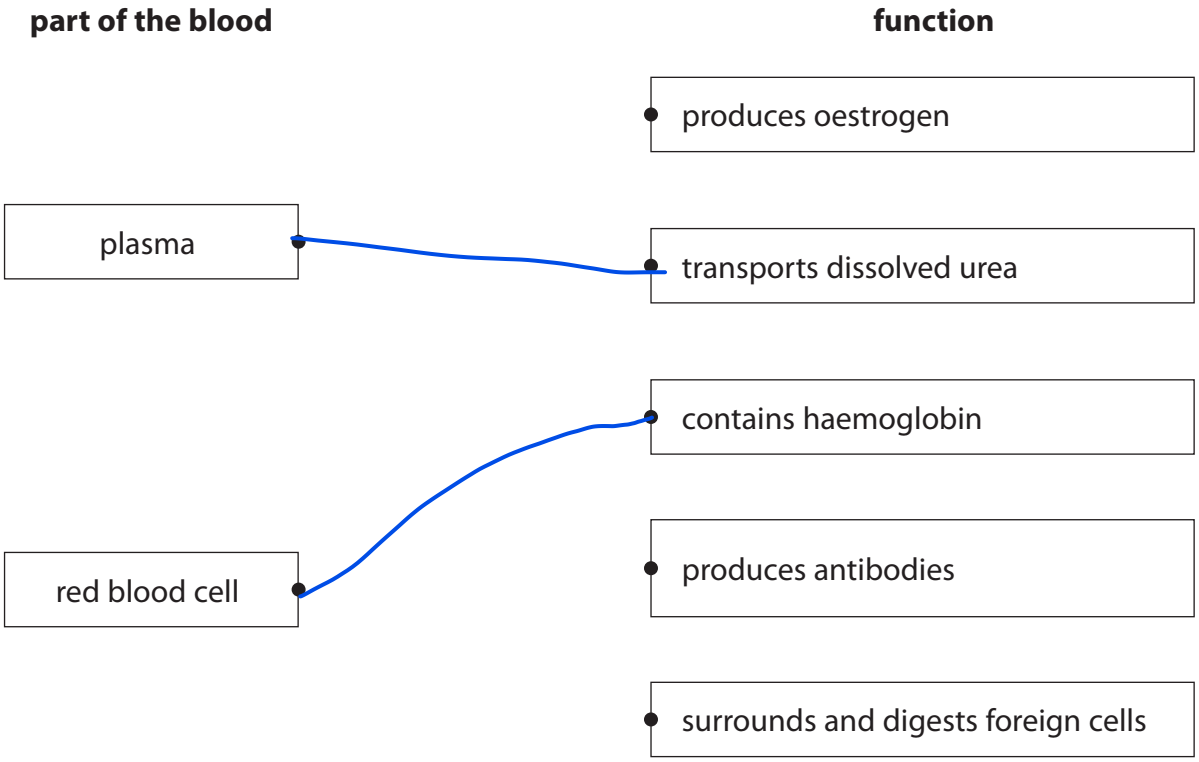
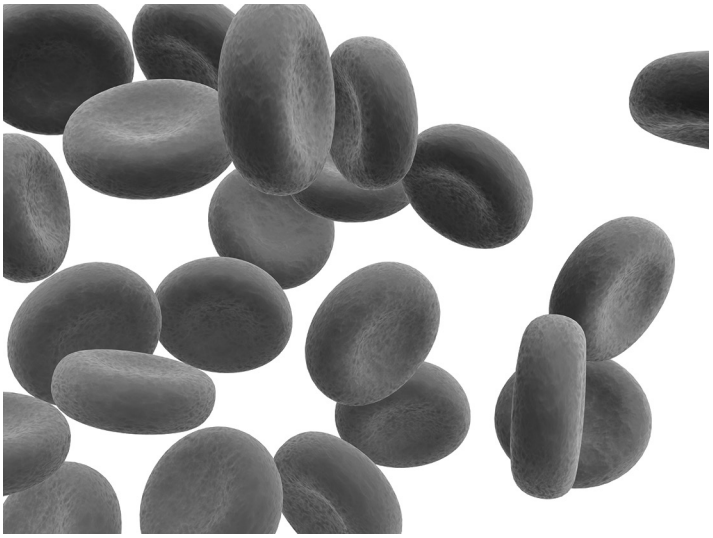


Figure 2 shows some red blood cells.



(Source: © SciePro/Shutterstock)

Figure 2

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

(2)

1 round (1)

2 • disc shaped (1)

(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 μm (micrometres).

A microscope magnifies this lymphocyte 400 times.

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

(2)

10 x 400 (1)

4000 (μm)

image size ..... μm

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

(1)

☒ **A** 10

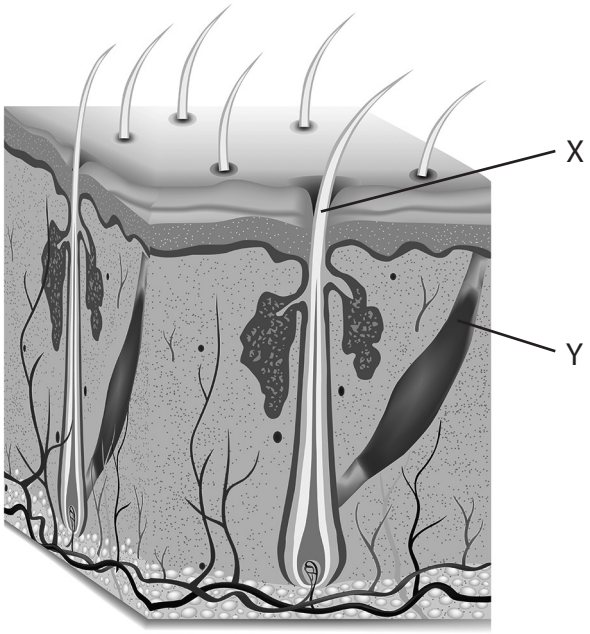
☒ **B** 100

☒ **C** 1 000

☒ **D** 10 000

(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)

Y / muscle contracts (1)

• X / hair stands up (1)

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

(2)

(uncontrolled) muscle contraction (1)

• heat generated (1)

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

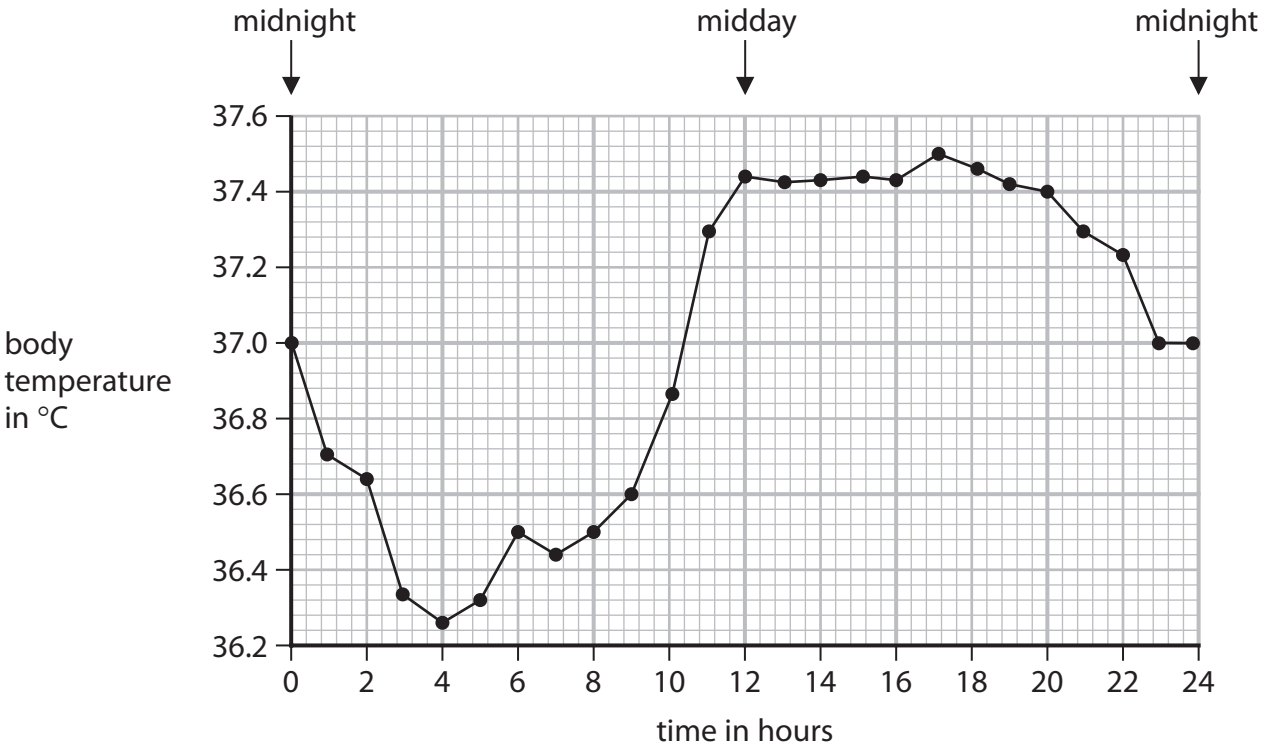

Figure 4

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

37.5 °C

(1)

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

(3)

there is a decrease in temperature (between 0 – 4 hours) (1)

• because the body is at rest / asleep (1)

• lower rate of respiration / less heat energy (generated / released) (1)

(Total for Question 3 = 9 marks)

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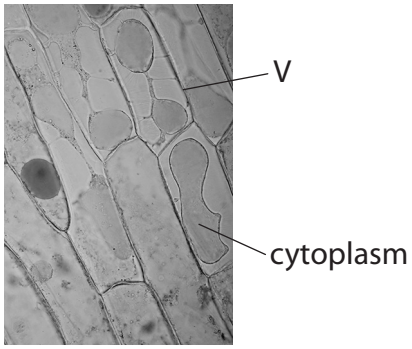
4 (a) Figure 5 shows some onion cells that have been soaked in a concentrated salt solution.



(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)

To make the {cell / nucleus} more visible

(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)

water moved out of cell / cytoplasm (1)

• by osmosis / definition of osmosis (1)

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

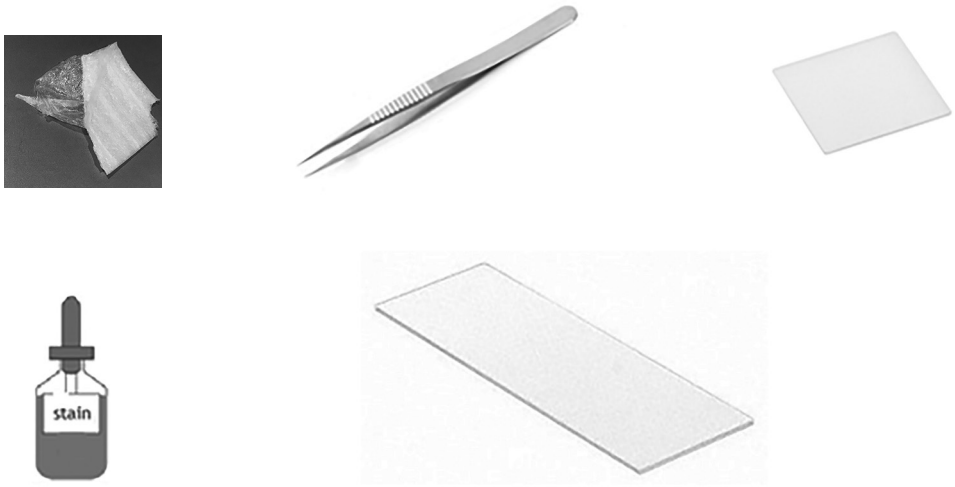

Figure 6

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

(3)

use forceps to {pick up / peel} a (thin layer of) onion (cells) (1)

• place (onion cells) onto microscope slide (1)
• add a drop of stain / named stain (1)

(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.

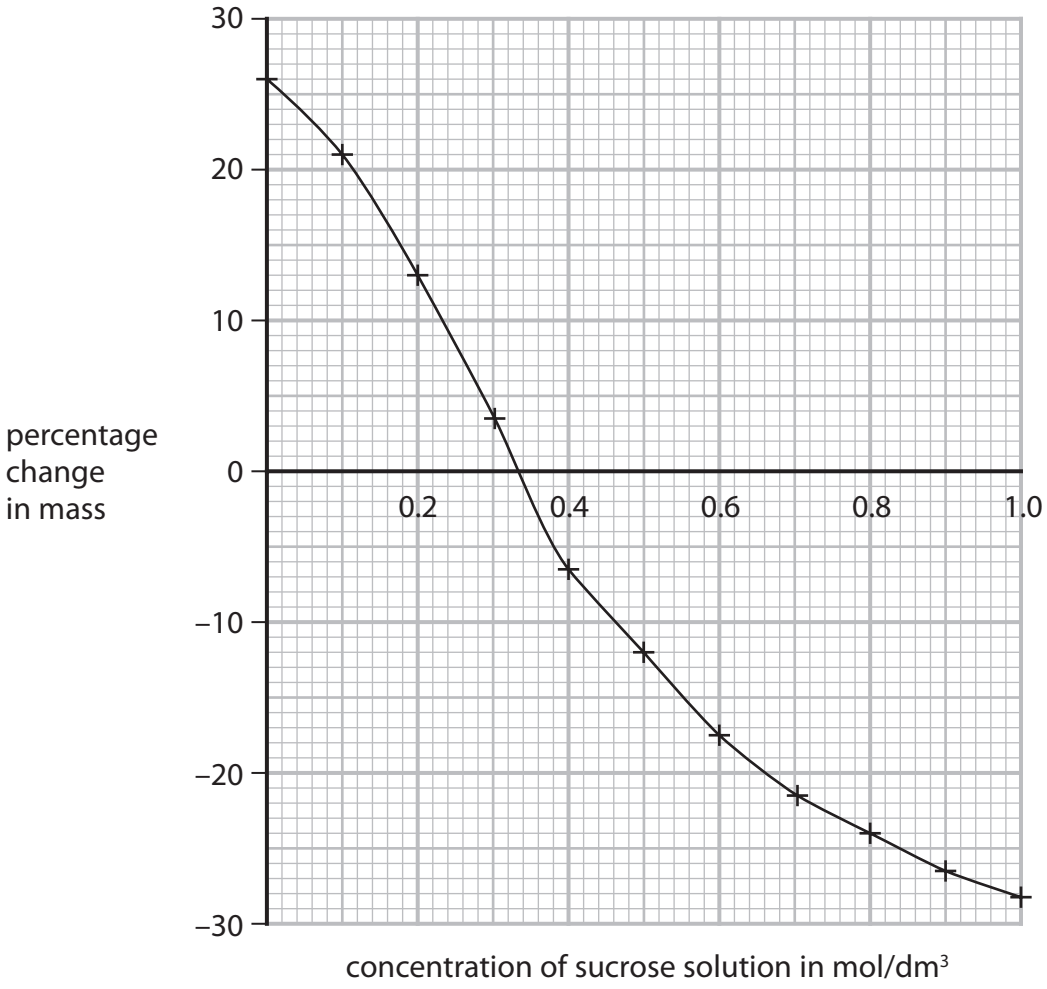

Figure 7

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

(2)

1 at any point between 0 to 0.33 {mass / water} is gained (1)

2 • from 0 to 0.33 the change in mass decreases (1)

(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)

To allow {air / oxygen} to enter / water to drain out

(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

$$\text{rate of decomposition} = \frac{\text{change in mass}}{\text{time taken}}$$

(3)

(2.0 – 1.7 =) 0.3 (1)

(0.3) ÷ 20 =

0.015 (kg per day) / (15g per day)

rate of decomposition = ... kg per day

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(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)

increased rate of decomposition (1)

• because particles have more (kinetic) energy (1

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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)

Dried food

• dehydrated / no water in dried food (1) • decomposers cannot grow / survive without water (1)

Vacuum packed food

• vacuum packed food has no {air/ oxygen} (inside) (1)

(Total for Question 5 = 9 marks)

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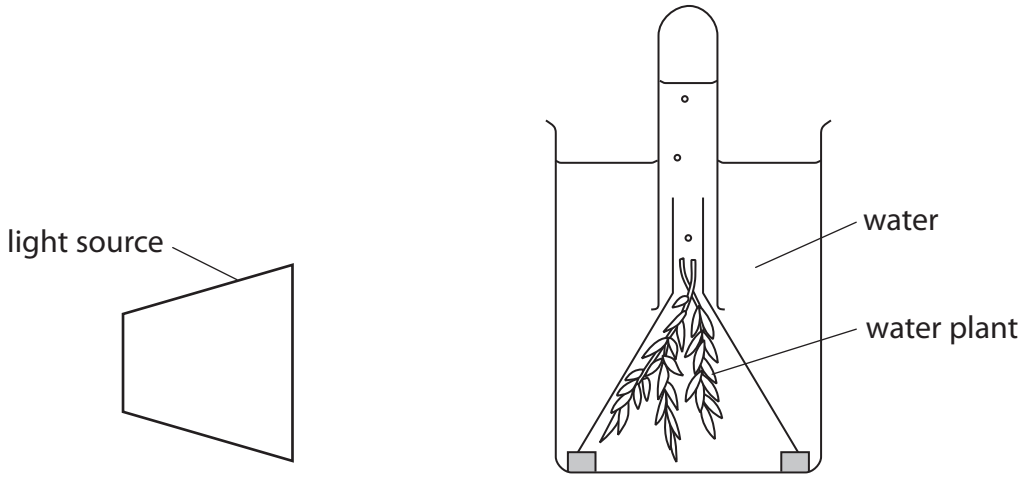
6 (a) Figure 10 shows a method of investigating the rate of photosynthesis in a water plant.



(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)

increasing light intensity increases rate of photosynthesis / number of bubbles per minute (1)

• credit specific examples using manipulated data from the table (1)

(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)

video the investigation / plant (1) • play back (in slow motion) and count the bubbles (1)

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

(3)

use thermometer / temp probe (to monitor temperature of water) (1)

• use a water bath (to keep each temperature constant) (1)

• count the bubbles at each temperature (for set time) (1)

(b) Increased nitrates can cause eutrophication in lakes.

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

(3)

nitrates cause algal bloom / {rapid / excessive / over} growth of algae (1)

• algae / water plants (lower in the water) are deprived of light (1)

• these algae / water plants die (1)

(Total for Question 6 = 11 marks)

7 Figure 12 shows the urinary system of a mammal.

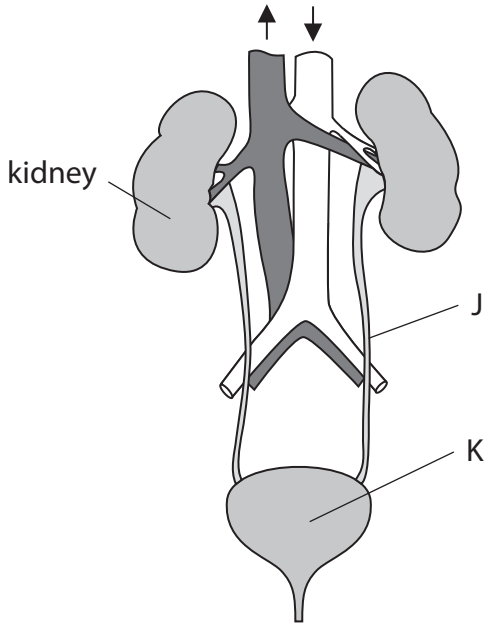


Figure 12

(a) Name structure J and structure K.

(2)

Structure J - ureter (1)

Structure K bladder (1)

(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)

blood cells / large proteins (are not found in the filtrate because they) are too large (1)

• to pass through nephron wall / capillary / Bowman's capsule (1)

*(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)

General
- Kidney failure is when you can no longer move sufficient urea out of the body.
- Improve health / diet eg less salt / take more exercise
- You can live on just one kidney

Treatment 1 dialysis
- waste substances removed / filtered from blood by dialysis machine
- blood and dialysis fluid separated by partially permeable membrane

Consequences / requirements
- urea / other substances removed / water balance of body restored to normal
- medication can be administered at the same time
- increased risk of eg infection / low blood pressure
- regular trips to hospital / need a (dialysis) machine at home
- patients return to good health / live a normal life

Treatment 2 organ donation
- a healthy kidney is used to replace the damaged kidney by an operation

Consequences / requirements
- not enough healthy kidneys available / may have to wait a kidney becomes available
- requires a suitable donor / risk of rejection / tissue matching
- not appropriate if patient is too weak
- need to take immunosuppressant drugs
- patients return to good health / live a normal life

(Total for Question 7 = 11 marks)

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

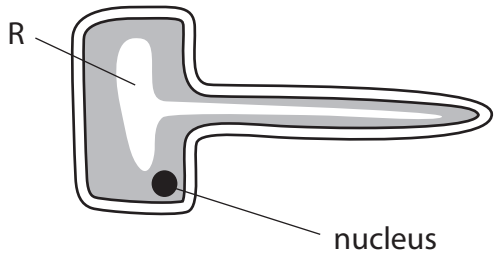


Figure 14

(i) Name the part labelled R.

(1)

vacuole / cell sap / sap

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

(2)

being long (1)

• has a large surface area / gives more area (1)

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

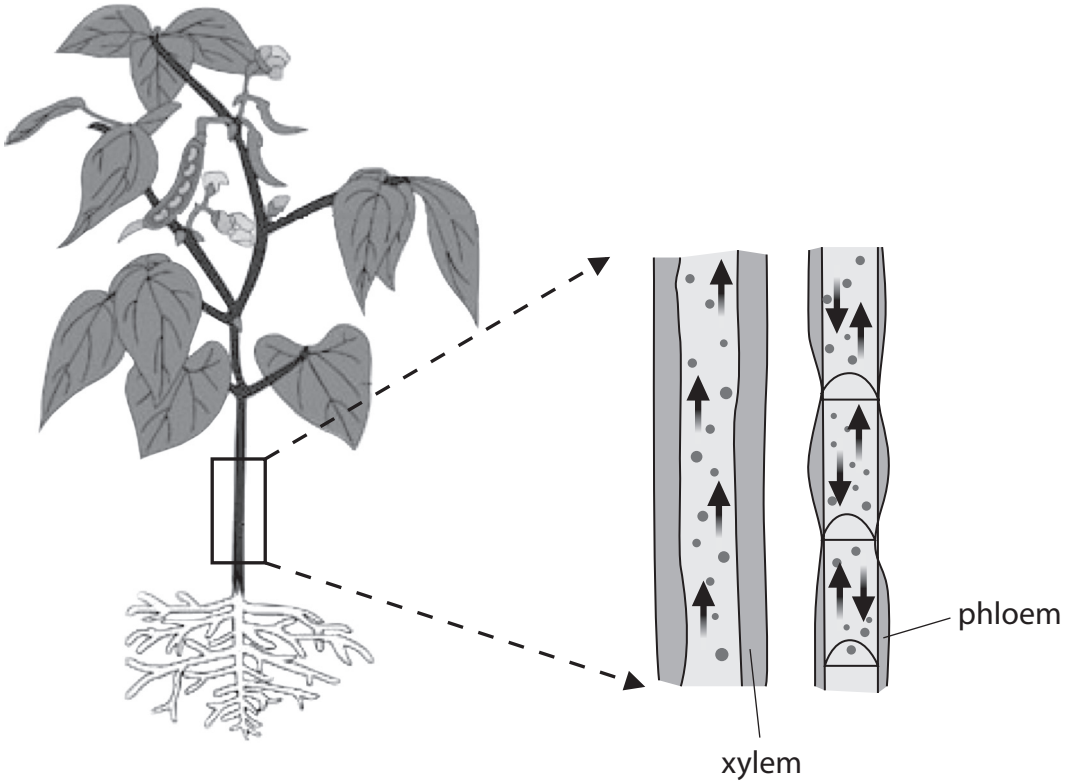


Figure 15

(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 thick walls (1)

2 • continuous / hollow tubes/no end walls (1)

(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.

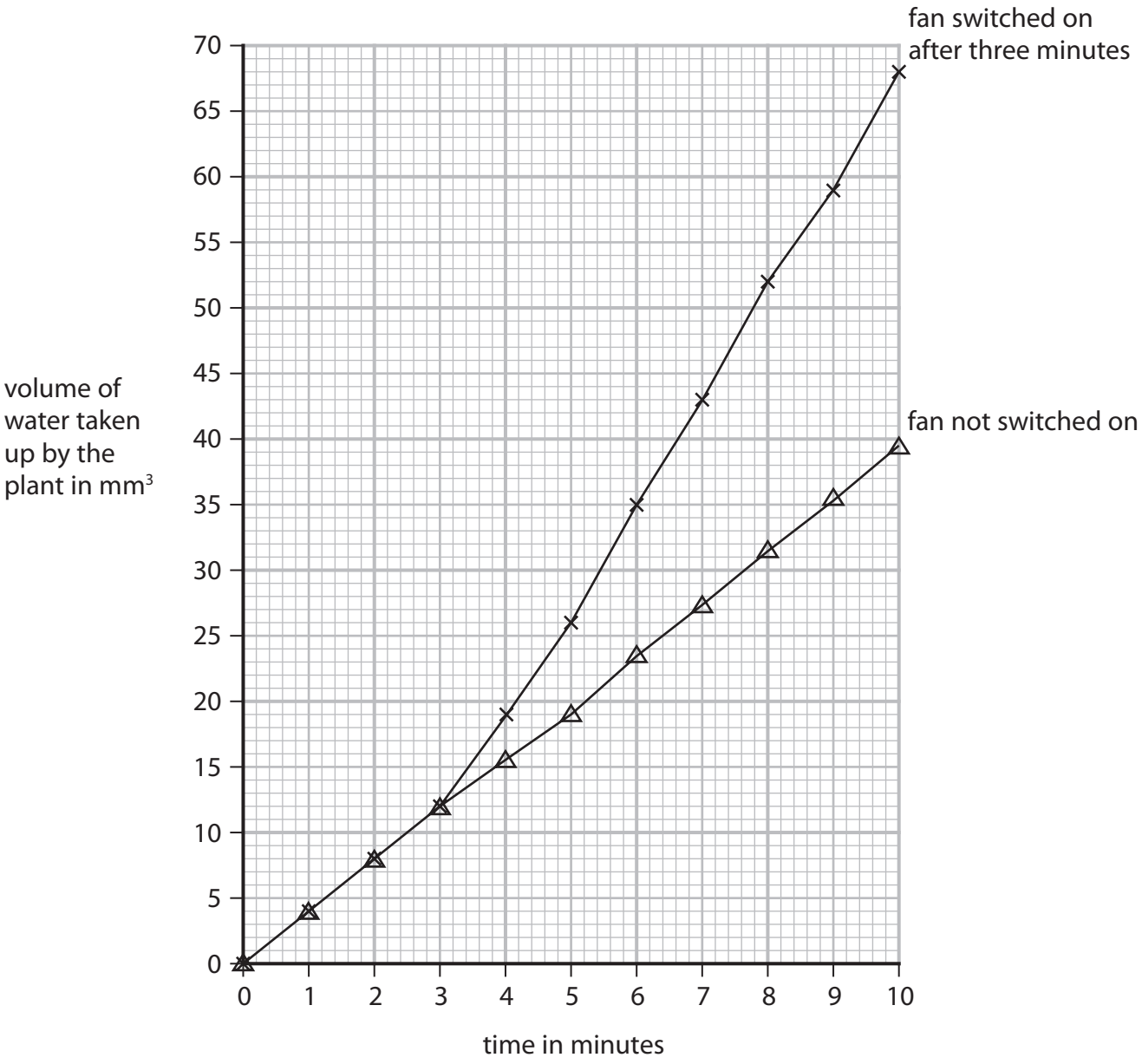


Figure 16

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

(3)

fan causes air to move / creates wind / increased air flow (1)

• water (vapour) removed (from around leaf) (1)

• increased {rate of diffusion/evaporation/transpiration} (of water vapour from leaf) (1)

(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)

to compare (the effect) / as a control

(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)

68 – 52 / 16 (1)

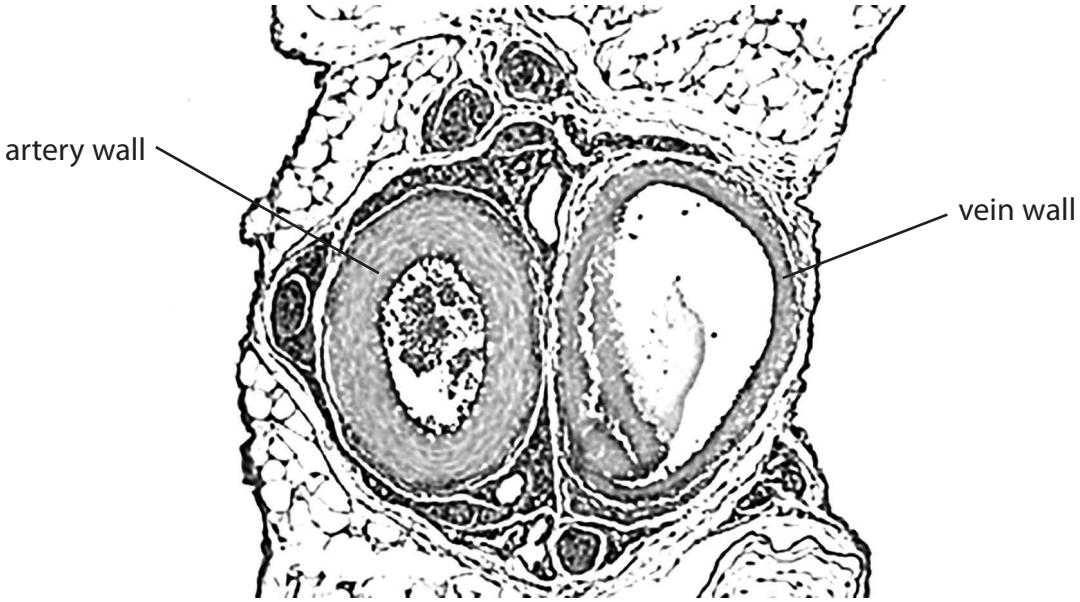
(16 ÷ 2)

8 (mm3 per minute)

..... mm^3 per minute

(Total for Question 8 = 12 marks)

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)

artery has a {thicker /more muscular} wall (1)

• because of the (blood) pressure (higher in artery than in vein) (1)

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

(1)

valve/valves

(b) A human body has 5 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)

60 ÷ 100 = 0.6 (1)

(300 ÷ 100) = 3 (dm3)

..... dm^3

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

(2)

because (during exercise muscles) require more {oxygen / glucose} (1)

• for respiration / to release energy (1)

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

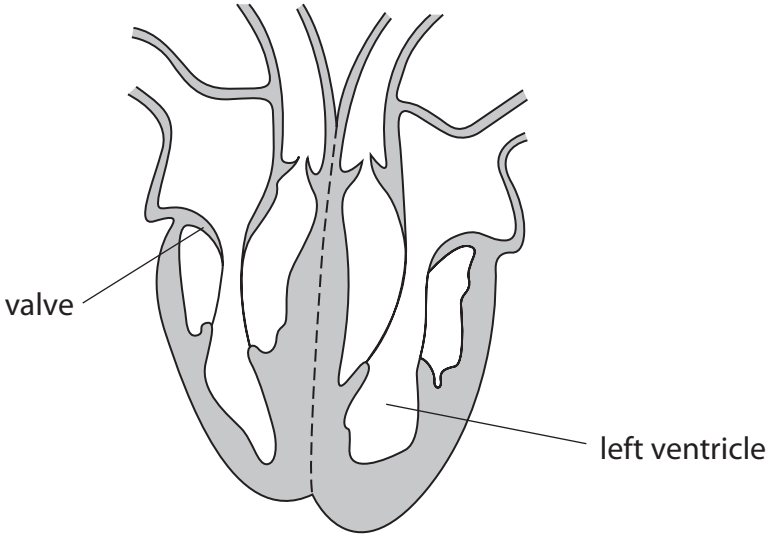

Figure 18

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

(6)

Functions linked to structures

- walls contract / the heart pumps blood
- atria push blood down into the ventricles
- ventricles pumps blood out of heart
- left ventricle / side pumps {blood to the body / oxygenated blood}
- right ventricle/ side pumps {blood to the lungs / deoxygenated blood}
- left ventricle wall thicker (than right ventricle wall) / produces more pressure to pump blood
- right ventricle is thinner / produces less pressure to pump blood
- valves prevent backflow /named valves prevent backflow between specific parts ofthe heart
- the muscles can contract faster / harder so that blood is pushed around the body faster
- the septum stops (oxygenated blood mixing with deoxygenated blood)
- named arteries / veins related to where blood is going to/coming from

(Total for Question 9 = 13 marks)

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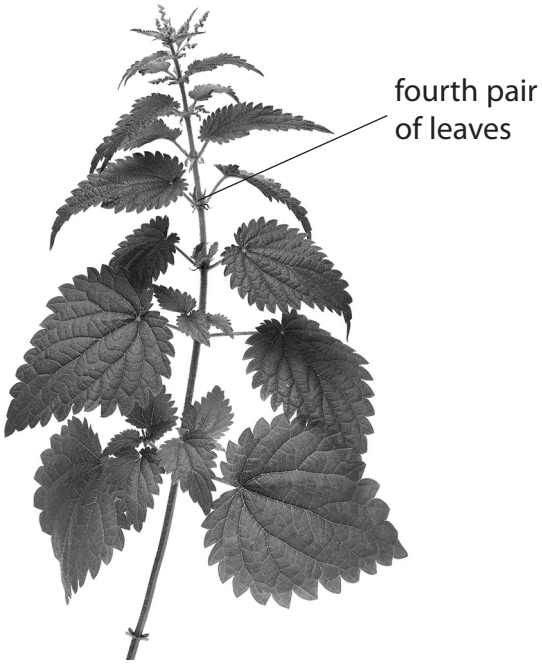
10 A student investigated the width of leaves on nettle plants growing in two areas next to a woodland.

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

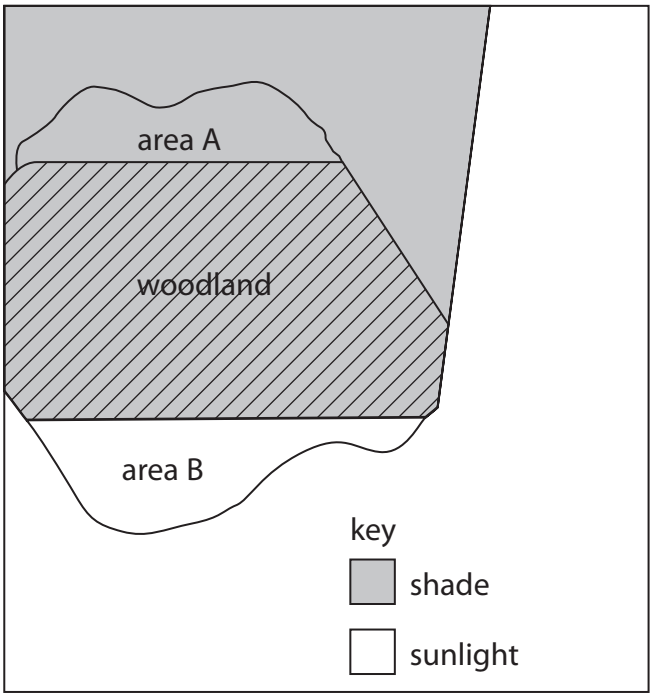


Figure 19b

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)

so the leaves are the same age (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)

the leaves in the {shade / area A} are wider (1)

• to give a larger surface
area / to absorb more light
(1)

(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.

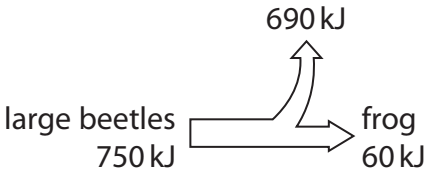


Figure 21

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

(2)

substitution

60 ÷ 750 = 0.08 (1)

x100

8 (%)

..... %

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(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 not all the beetle is eaten (1)

2 • not all the beetle can be digested (1)

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

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