

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL GCSE

BIOLOGY

Paper 1

Thursday 24 October 2024

07:00 GMT

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a ruler with millimetre measurements
- a scientific calculator.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- 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.

Information

- There are 90 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.

Advice

In all calculations, show clearly how you work out your answer.

For Examiner's Use

Question	Mark
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1	
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2	
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3	
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TOTAL	
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Answer **all** questions in the spaces provided.

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0 1

Respiration takes place in cells.

0 1 . 1

Which **two** substances do cells use in respiration?

[2 marks]

Tick (✓) **two** boxes.

Amino acids

☐

Fatty acids

☐

Glucose

☐

Nitrogen

☐

Oxygen

☐

0 1 . 2

Energy is released by respiration.

Describe **two** uses of the energy released by respiration.

[2 marks]

1 _____

2 _____

Question 1 continues on the next page

Turn over ►

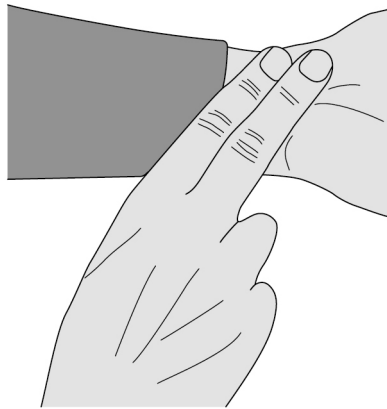


A student investigated the effect of exercise on the body.

The student measured their pulse rate before and after exercise.

Figure 1 shows how the student measured their pulse rate.

Figure 1



This is the method used.

1. Sit still for 5 minutes.
2. Count the pulse beats in 1 minute.
3. Record the result.
4. Run around until you are out of breath.
5. Repeat steps 2 and 3 to measure the pulse rate after exercise.

0 1 . 3 Name the equipment the student should have used to measure time.

[1 mark]



0 1 . 4 The student's method will **not** lead to valid results.

Suggest **two** ways the investigation could be improved.

[2 marks]

1 _____

2 _____

0 1 . 5 The student did **not** count the pulse in 1 minute correctly.

What type of error was made because the student did **not** count correctly?

[1 mark]

Tick (✓) **one** box.

Random

☐

Systematic

☐

Zero

☐

0 1 . 6 Explain why the student had to sit still at the start of the investigation.

[2 marks]

Question 1 continues on the next page

Turn over ►



01.7

The student had muscle pain during the exercise.

The pain was due to a substance produced in anaerobic respiration.

Complete the sentences.

[2 marks]

Choose answers from the box.

glucose

lactic acid

oxygen

urea

water

The substance produced in anaerobic respiration is _____.

The substance is broken down into carbon dioxide and _____.

12



0 2

Living things are made of cells, tissues, organs and organ systems.

0 2 . 1

Table 1 shows the functions of two parts of a cell.

Complete **Table 1**.

[2 marks]

Choose answers from the box.

cell membrane

chloroplast

mitochondrion

nucleus

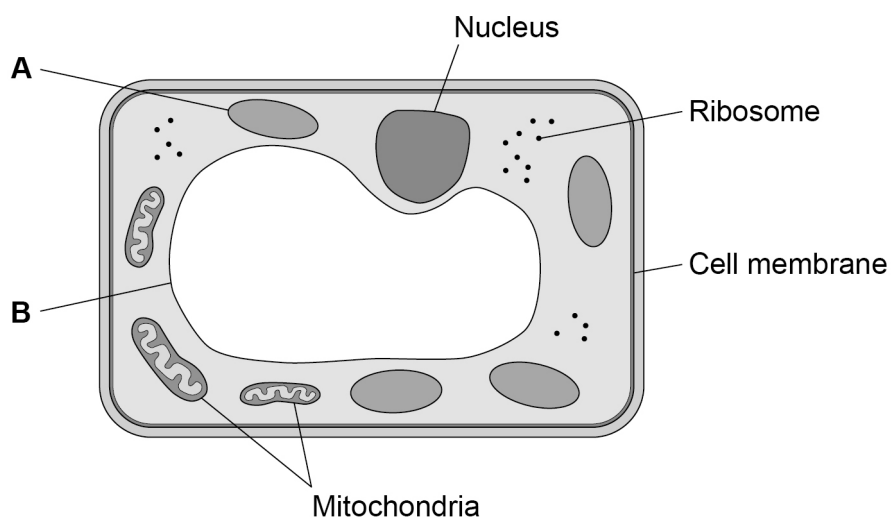
Table 1

Function	Cell part
Controls what enters and leaves a cell	
Releases energy by respiration	

0 2 . 2

Figure 2 shows a plant cell.

Figure 2



What are the names of part **A** and part **B** on **Figure 2**?

[2 marks]

A _____

B _____

Turn over ►



0 2 . 3

Bacterial cells and plant cells have some of the same cell parts.

Which row lists the parts present in both bacterial cells **and** plant cells?

[1 mark]

Tick (✓) **one** box.

Cell membrane, plasmids, mitochondria

☐

Cell wall, cytoplasm, cell membrane

☐

Mitochondria, nucleus, cell wall

☐

Nucleus, cytoplasm, plasmids

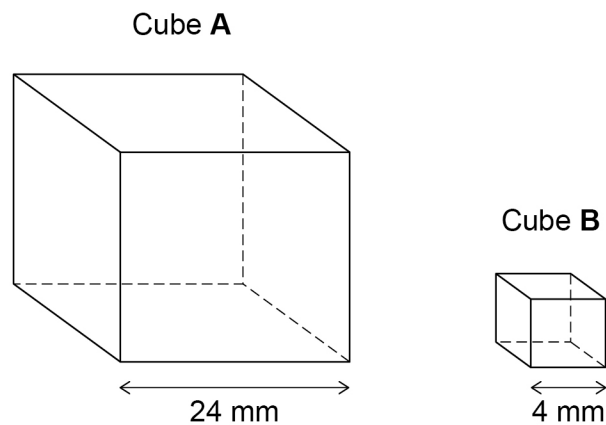
☐

Cubes can be used to show the effect of size on surface area to volume ratio.

Cube **A** represents a plant cell and cube **B** represents a bacterial cell.

Figure 3 shows cube **A** and cube **B**.

Figure 3



0 2 . 4

Calculate the volume of cube **A**.

[2 marks]

Volume of cube **A** = _____ mm³



0 2 . 5 Cube **B** has a surface area of 96 mm^2 and a volume of 64 mm^3 .

Calculate the surface area to volume ratio of cube **B**.

[2 marks]

Surface area to volume ratio = _____ : 1

0 2 . 6 Bacteria have a large surface area to volume ratio.

Why is a large surface area to volume ratio useful for a bacterial cell?

[1 mark]

0 2 . 7 Palisade mesophyll is a type of tissue found in plants.

What is the function of palisade mesophyll?

[1 mark]

Question 2 continues on the next page

Turn over ►



0 2 . 8 Plants have many organs.

Which of the following is a plant organ?

[1 mark]

Tick (✓) **one** box.

Leaf

☐

Stomata

☐

Xylem

☐

0 2 . 9 The stomach is an animal organ.

Name **one** type of tissue found in the stomach.

[1 mark]



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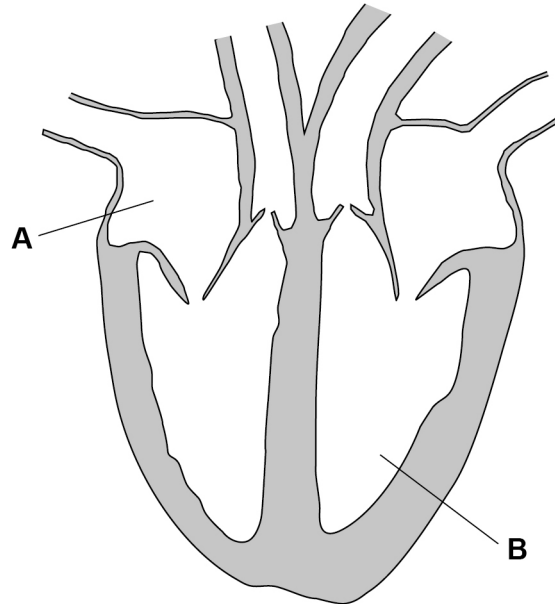
0 3

The human circulatory system includes the heart, blood vessels and blood.

0 3 . 1

Figure 4 shows a human heart.

Figure 4



Name **A** and **B**.

[2 marks]

A _____

B _____

0 3 . 2

Name the type of blood vessel that returns blood to the heart.

[1 mark]



0 3 . 3

The heart contains a group of cells that act as a pacemaker.

Which structure contains the pacemaker?

[1 mark]

Tick (✓) **one** box.

Aorta

☐

Right atrium

☐

Right ventricle

☐

Valve

☐

0 3 . 4

Substances are absorbed into the blood and carried around the body.

Table 2 shows the direction of travel for some substances.

Complete **Table 2**.

[3 marks]

Write **one** substance in each row.

Choose answers from the box.

carbon dioxide glucose nitrogen oxygen protein starch

Table 2

Absorbed from	Carried to	Substance
Lungs	Organs in the body	
Organs in the body	Lungs	
Small intestine	Organs in the body	

Turn over ►



Coronary arteries carry blood to heart muscles.

A buildup of fatty material inside coronary arteries causes them to become narrower.

0 3 . 5 What can be used to keep a coronary artery open?

[1 mark]

Tick (✓) **one** box.

An antibiotic

☐

A stent

☐

A valve

☐

0 3 . 6 Explain why a buildup of fatty material inside a coronary artery can cause heart muscle cells to die.

[2 marks]

0 3 . 7 Arteries carry blood at high pressure.

Explain how the structure of an artery makes it suitable for carrying blood at high pressure.

[2 marks]



0	3	.	8
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Capillaries exchange substances between blood and cells in the body.

Capillaries have a large surface area for efficient exchange of substances.

Explain **one other** way capillaries are adapted for efficient exchange of substances.

[2 marks]

14

Turn over for the next question

Turn over ►



0 4

This question is about cell division.

0 4 . 1

Which part of a cell contains chromosomes before cell division?

[1 mark]Tick (✓) **one** box.

Cell membrane

☐

Cytoplasm

☐

Nucleus

☐**0 4 . 2**

What is an allele?

[1 mark]Tick (✓) **one** box.

All the DNA in a cell

☐

An observable characteristic

☐

One form of a gene

☐

One of a pair of chromosomes

☐

0 4 . 3 Meiosis is a type of cell division.

What does meiosis produce?

[1 mark]

Tick (✓) **one** box.

A fertilised egg cell

☐

Four gametes

☐

Two body cells

☐

0 4 . 4 Mitosis is another type of cell division.

Describe **two** reasons why mitosis is important for organisms.

[2 marks]

1 _____

2 _____

0 4 . 5 Animal and plant cells produced by mitosis differentiate to form different types of cells.

When do plant cells and animal cells differentiate?

[1 mark]

Tick (✓) **one** box.

Both plant cells and animal cells differentiate at random intervals.

☐

Many plant cells differentiate at an early stage of development but most animal cells differentiate throughout life.

☐

Most animal cells differentiate at an early stage of development but many plant cells differentiate throughout life.

☐

Turn over ►



0 4 . 6

Table 3 shows the number of chromosomes in two different cells of organisms **P** and **Q**.

Table 3

Organism	Number of chromosomes in a skin cell	Number of chromosomes in a gamete
P	42	21
Q	38	X

What is value **X**?

[1 mark]

X = _____

Stem cells are unspecialised cells which can be made to differentiate into many different types of cells.

There are two types of stem cell in humans:

- adult stem cells
- embryonic stem cells.

0 4 . 7

Give **one** place in a human body where adult stem cells are found.

[1 mark]

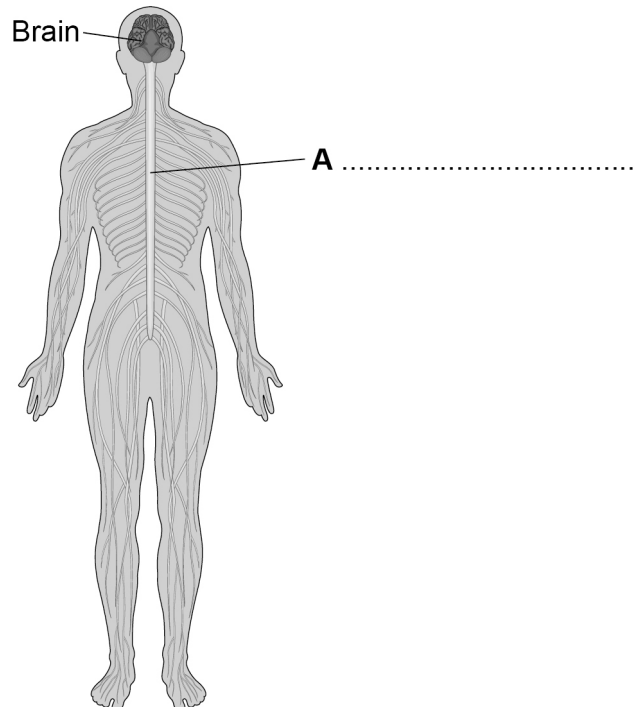
0	5
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Humans have a central nervous system (CNS).

0	5	.	1
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Figure 5 shows the nervous system of a human.

Figure 5



A is one part of the CNS.

Label part **A** on **Figure 5**.

[1 mark]

0	5	.	2
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What is the function of the CNS?

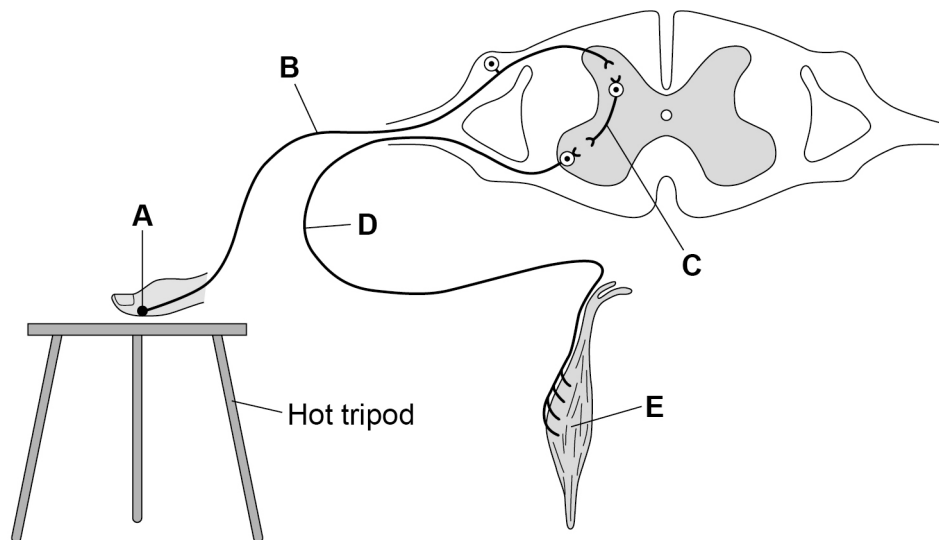
[1 mark]



0 5 3

Figure 6 shows the structures involved in a reflex action when a student touches a hot tripod.

Figure 6



Describe how the structures shown in **Figure 6** coordinate the reflex action.

Include the names of **A**, **B**, **C**, **D** and **E** in your answer.

[4 marks]

Question 5 continues on the next page

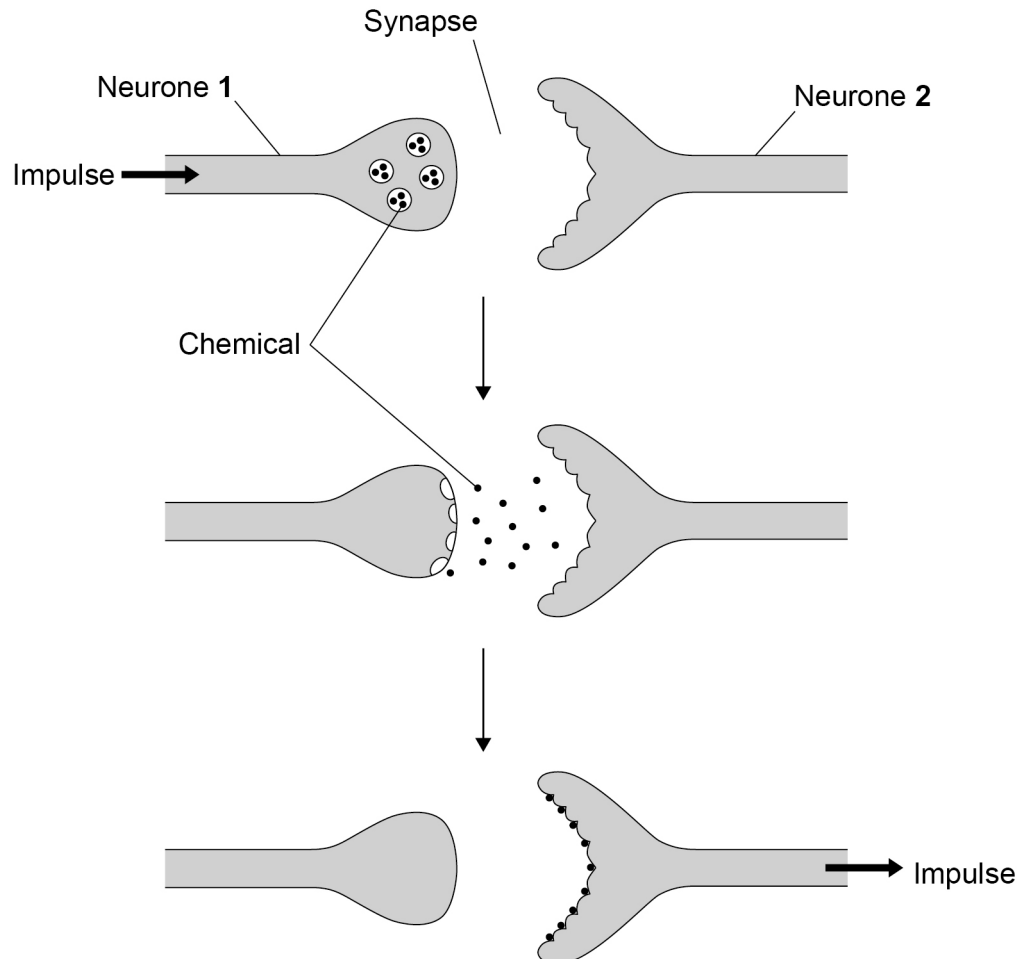
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A synapse is a gap between two neurones.

Figure 7 shows a synapse and how it works.

Figure 7



0 5 . 4

Explain how the arrival of an impulse at the end of neurone 1 causes an impulse in neurone 2.

[3 marks]



0	5	.	5
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Pain is experienced when a pain receptor causes a neurone to send an impulse to the brain.

Drug **A** is given by doctors to reduce pain.

Scientists believe drug **A** acts at synapses.

Suggest **one** way drug **A** might work to reduce pain.

[2 marks]

11

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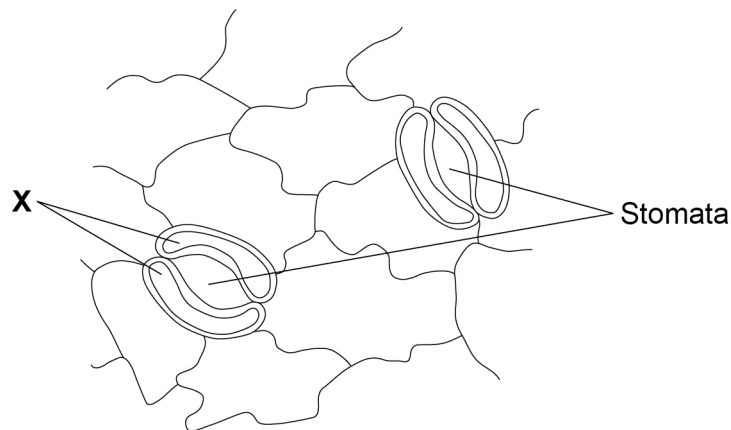
0 6

Plants exchange gases through stomata.

The number of stomata on the upper surface and the lower surface of a leaf is different.

Figure 8 shows the surface of a leaf.

Figure 8

**0 6 . 1**

Name the specialised plant cells labelled **X**.

[1 mark]

0 6 . 2

Explain why stomata in a leaf close when the environment is hot and dry.

[3 marks]

0 6 . 3

A student viewed stomata through a microscope.

Figure 9 shows the image observed.

Figure 9



The diameter of the image is **8 cm**.

Calculate the **area** of the image in **Figure 9**.

Use $\pi = 3.14$

Give your answer in mm^2 .

[4 marks]

Area = _____ mm^2

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0 6 . 4

The student carried out an investigation on four plant species.

The student counted the number of stomata on the lower surface of each leaf.

Table 5 shows the results.

Table 5

Plant species	Number of stomata on the lower surface of the leaf per mm ²			
	Test 1	Test 2	Test 3	Mean
A	33	35	34	34
B	64	60	62	62
C	45	20	47	X
D	44	45	46	45

Calculate value **X**.

[2 marks]

Value **X** = _____



0 6 . 5

The student compared leaves from a rose plant and leaves from a water lily plant.

The leaves of a water lily plant float on the surface of water.

Figure 10 shows a rose plant and a water lily plant.

Figure 10



Rose plant growing on land



Water lily plant growing in water

Table 6 shows the number of stomata on each plant.

Table 6

Plant species	Mean number of stomata per mm ² of leaf	
	Lower surface	Upper surface
Rose	300	0
Water lily	0	400

Explain the differences in the number of stomata on the lower and upper surfaces of each plant.

[4 marks]

Rose _____

Water lily _____

Turn over ►



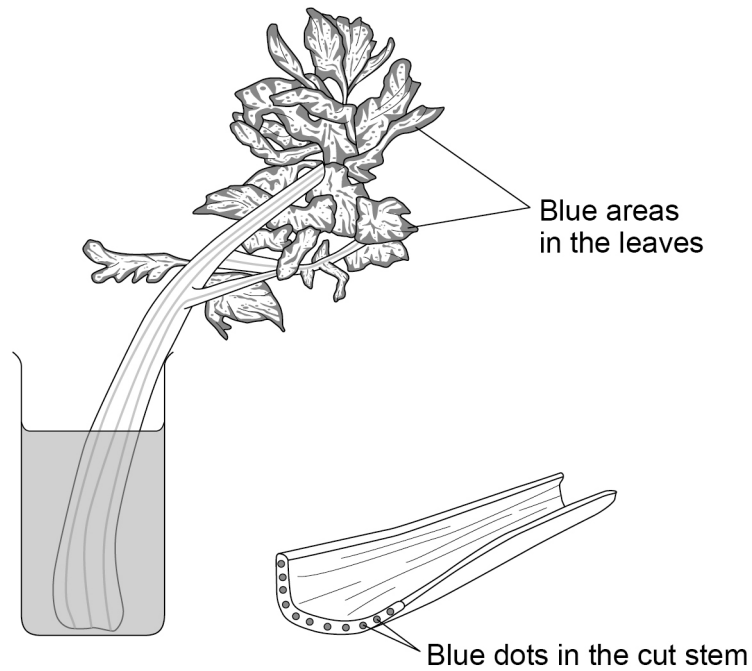
0 6 . 6

A plant was placed in water containing blue food colouring.

Figure 11 shows the results after 3 hours:

- parts of the leaves were stained blue
- there were blue dots in the cut stem.

Figure 11



Explain how transpiration caused these results.

[3 marks]

0 6 . 7 Plants also use a process called translocation.

Describe what happens in translocation.

You should name the tissue involved.

[2 marks]

19

Turn over for the next question

Turn over ►



0 7

In 2022, an estimated 900 million tonnes of food were wasted worldwide.

Some food waste is left at waste sites and attracts flies and rats.

Waste sites produce methane.

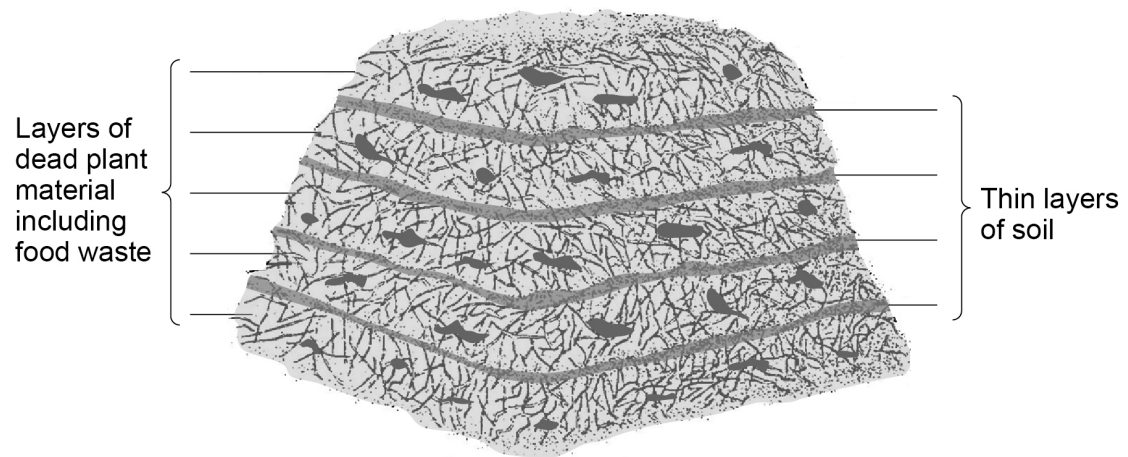
Methane is a greenhouse gas that is linked to climate change.

Some people have a compost heap in their vegetable garden.

A compost heap can recycle food waste and reduce the impact of food waste on the environment.

Figure 12 shows a compost heap.

Figure 12



The food waste decays to produce compost.

The compost can be used as a natural fertiliser for vegetables.



[4 marks]

[illegible]

[5 marks]

[illegible]

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