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**kickstart
tutors**

Student number

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Name _____

Date _____

Attempt/Time taken _____

GCSE BIOLOGY

Topic Paper: 2.2 - 2.3 Plant and animal tissues, organs and systems
Part 2

Time allowed: 40 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

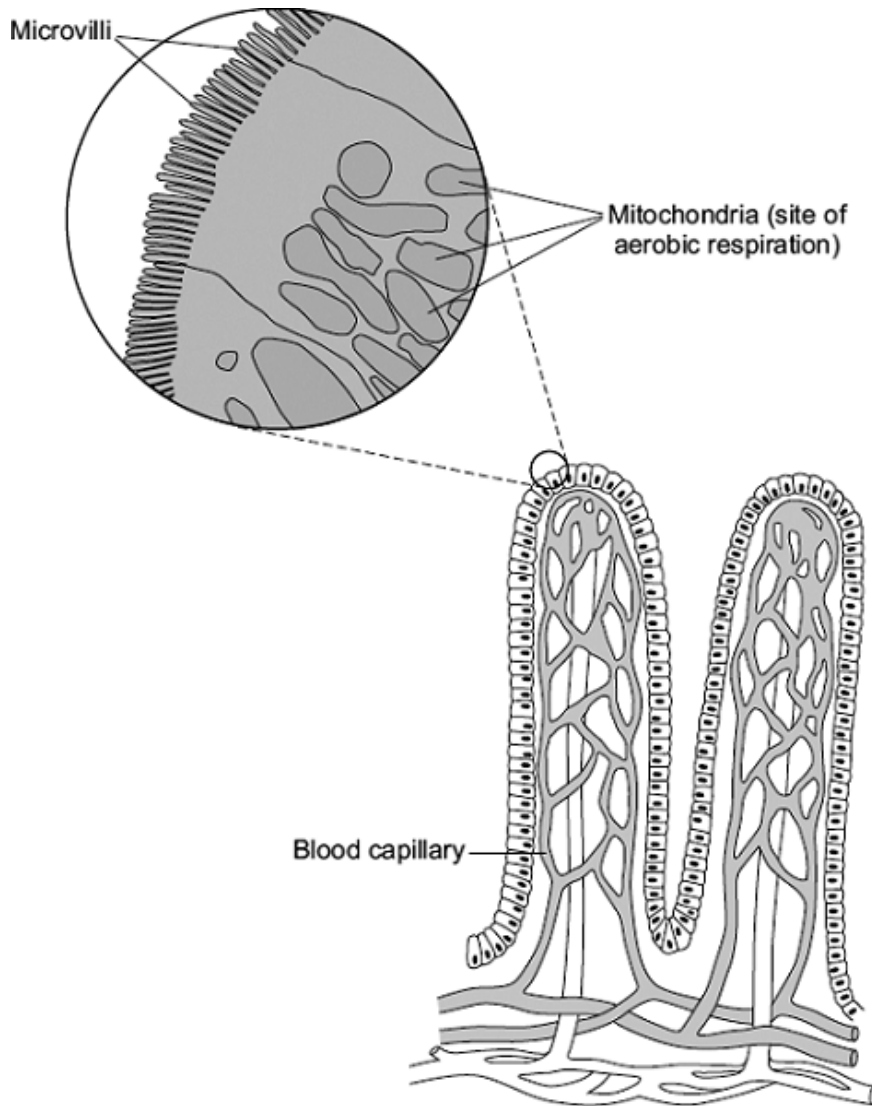
- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.



36 Marks

Q6. The villi of the small intestine absorb the products of digestion.

The diagram shows two villi. It also shows parts of some of the surface cells of a villus, as seen with an electron microscope.



Describe and explain how the villi are adapted to maximise the rate of absorption of the products of digestion.

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(5)
(Total 5 marks)

Q7. Oxygen is transported round the body by the blood.

Blood leaving the human lung can carry about 250 milligrams of oxygen per litre. However, only 7 milligrams of oxygen will dissolve in one litre of water at body temperature.

(a) Suggest an explanation for the difference.

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(2)

(b) Blood leaving the skeletal muscles during exercise may contain only 30 milligrams of oxygen per litre.

Explain what causes the difference in oxygen concentration between the blood leaving the lungs and the blood leaving the skeletal muscles.

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(4)
(Total 6 marks)



Q8. Plants exchange substances with the environment.

- (a) Plant roots absorb water mainly by osmosis.
Plant roots absorb ions mainly by active transport.

Explain why roots need to use the two different methods to absorb water and ions.

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(4)

- (b) What is meant by the *transpiration stream*?

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(3)



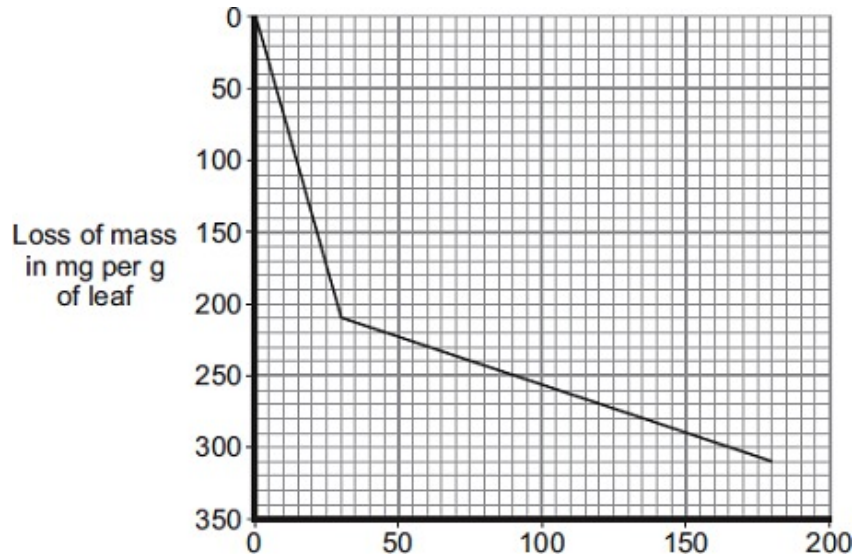
(c) Students investigated the loss of water vapour from leaves.

The students:

cut some leaves off a plant

measured the mass of these leaves every 30 minutes for 180 minutes.

The graph shows the students' results.



(i) The rate of mass loss in the first 30 minutes was 7 milligrams per gram of leaf per minute.

Calculate the rate of mass loss between 30 minutes and 180 minutes.

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Rate of mass loss = milligrams per gram of leaf per minute

(2)

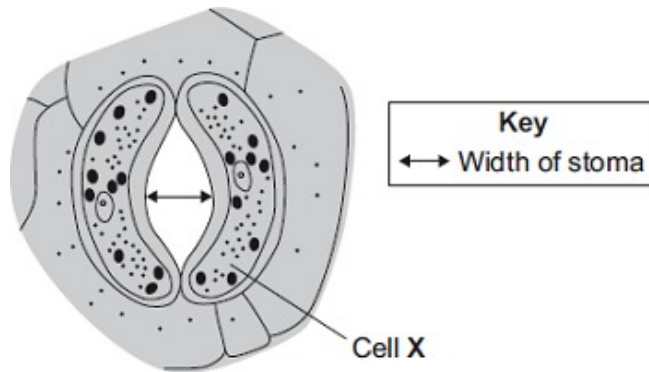
(ii) The rate of mass loss between 0 and 30 minutes was very different from the rate of mass loss between 30 and 180 minutes.

Suggest an explanation for the difference between the two rates.

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(2)
(Total 11 marks)

Q9. Plant leaves have many stomata.
The diagram shows a stoma.



(a) Name cell X

(1)

(b) The table shows the mean widths of the stomata at different times of the day for two different species of plant.
Species A grows in hot, dry deserts.
Species B grows in the UK.

	Time of day in hours	Mean width of stomata as a percentage of their maximum width	
		Species A	Species B
Dark	0	95	5
	2	86	5
	4	52	6
Light	6	6	40
	8	4	92
	10	2	98
	12	1	100
	14	0	100
	16	1	96
	18	5	54
Dark	20	86	6
	22	93	5
	24	95	5



The data in the table show that species **A** is better adapted than species **B** to living in hot, dry deserts.

Explain how.

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(4)
(Total 5 marks)

Q10. The leaves of most plants have stomata.

(a) (i) Name the cells which control the size of the stomata.

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(1)

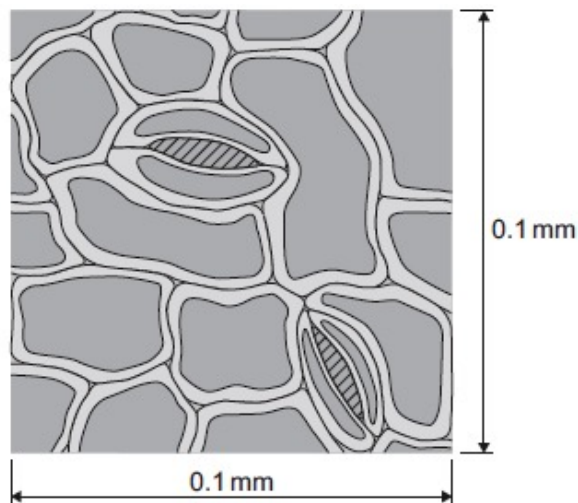
(ii) Give **one** function of stomata.

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(1)

(b) The image below shows part of the surface of a leaf.



The length and width of this piece of leaf surface are both 0.1 mm.



(i) Calculate the number of stomata per mm² of this leaf surface.

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..... per mm²

(2)

(ii) A different plant species has 400 stomata per mm² of leaf surface.

Having a large number of stomata per mm² of leaf surface can be a disadvantage to a plant.

Give **one** disadvantage.

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(1)

(c) A student investigated the loss of water from plant leaves.

The student did the following:

Step 1: took ten leaves from a plant

Step 2: weighed all ten leaves

Step 3: hung the leaves up in a classroom for 4 days

Step 4: weighed all ten leaves again

Step 5: calculated the mass of water lost by the leaves

Step 6: repeated steps **1** to **5** with grease spread on the upper surfaces of the leaves

Step 7: repeated steps **1** to **5** with grease spread on both the upper and lower surfaces of the leaves.

All the leaves were taken from the same type of plant.

The table below shows the student's results.

Treatment of leaves	Mass of water the leaves lost in g
No grease was used on the leaves	0.98
Grease on upper surfaces of the leaves	0.86
Grease on upper and lower surfaces of the leaves	0.01



(i) What mass of water was lost in 4 days through the upper surfaces of the leaves?

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Mass = g

(1)

(ii) Very little water was lost when the lower surfaces of the leaves were covered in grease.

Explain why.

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(3)

(Total 9 marks)