

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

The table shows the concentrations of three mineral ions in the roots of a plant and in the water in the surrounding soil.

Mineral ion	Concentration in millimoles per kilogram	
	Plant root	Soil
Calcium	120	2.0
Magnesium	80	3.1
Potassium	250	1.2

- (a) (i) The plant roots could **not** have absorbed these mineral ions by diffusion.

Explain why.

(2)

- (ii) Name the process by which the plant roots absorb mineral ions.

(1)

- (b) How do the following features of plant roots help the plant to absorb mineral ions from the soil?

- (i) A plant root has thousands of root hairs.

(1)

- (ii) A root hair cell contains many mitochondria.

(2)

(iii) Many of the cells in the root store starch.

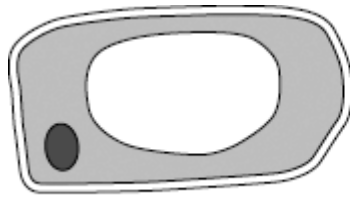
(1)

(Total 7 marks)

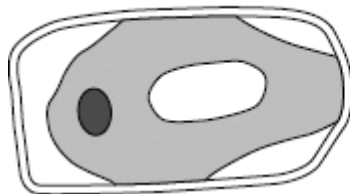
Q2.

The diagram shows the same plant cell:

- after 1 hour in distilled water
- after 1 hour in strong sugar solution.



After 1 hour in
distilled water



After 1 hour in
strong sugar solution

- (a) Describe **two** ways in which the cell in the strong sugar solution is different from the cell in distilled water.

1. _____

2. _____

(2)

- (b) Explain how the differences between the cell in the strong sugar solution and the cell in distilled water were caused.

(2)

(Total 4 marks)

Q3.

Read the following information about how the small intestine absorbs sugars.

- The blood absorbs glucose and some other sugars, like xylose, from the small intestine.
- Glucose molecules are the same size as xylose molecules, but glucose is absorbed more quickly than xylose.
- Experiments with pieces of intestine show that the uptake of oxygen by the intestine is 50 % higher in the presence of glucose than in the absence of glucose. Xylose does not have this effect on the uptake of oxygen.
- The cells lining the small intestine have many mitochondria.

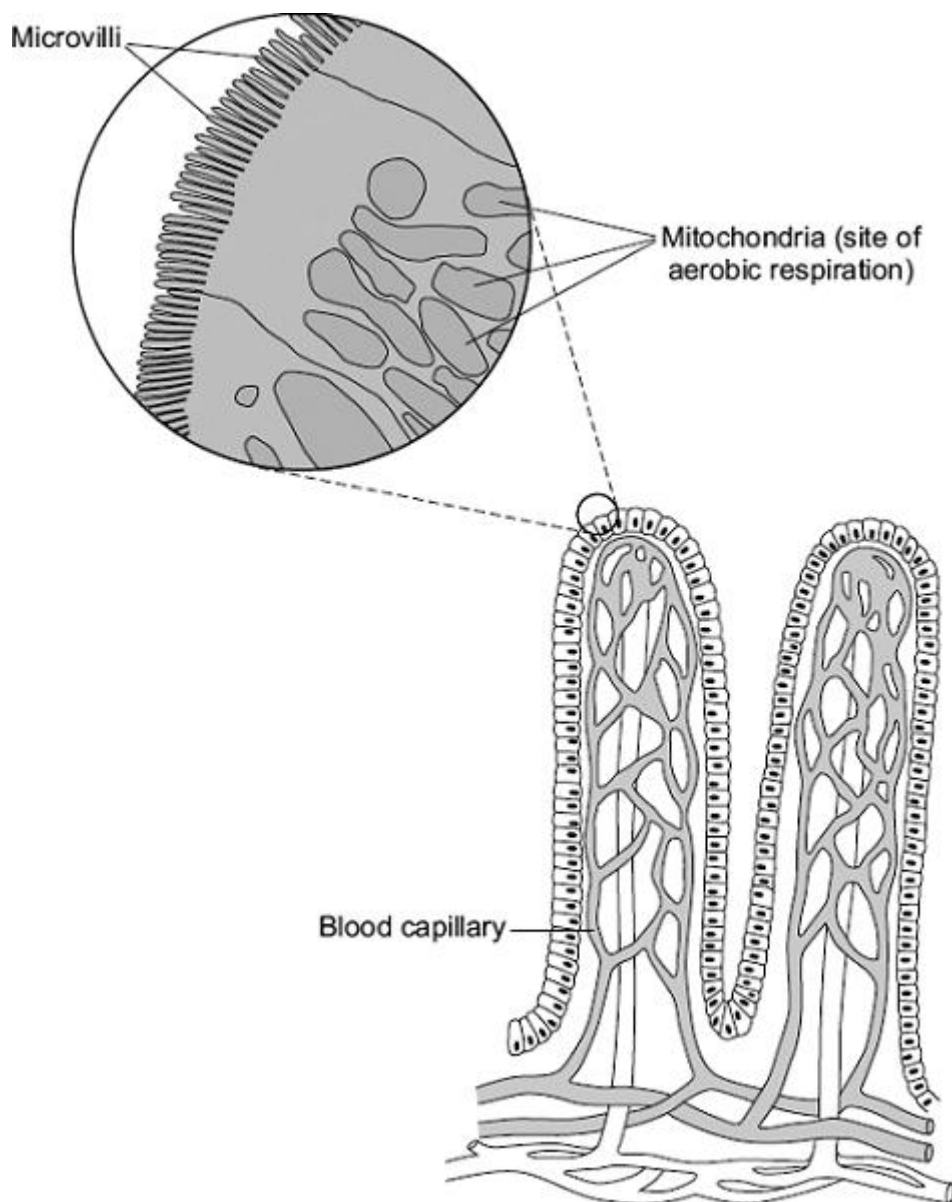
Explain how this information provides evidence that glucose is absorbed by the small intestine using *active transport*.

(Total 4 marks)

Q4.

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.

(Total 5 marks)