Transport in Plants

Question Paper 3

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Transport in Plants
Paper Type	(Extended) Theory Paper
Booklet	Question Paper 3

Time Allowed: **57 minutes**

Score: **/47**

Percentage: **/100**

1 A student measured the uptake and release of carbon dioxide from a plant during 24 hours. It was a very bright, sunny day between sunrise and sunset.

Fig. 2.1 shows the student's results.

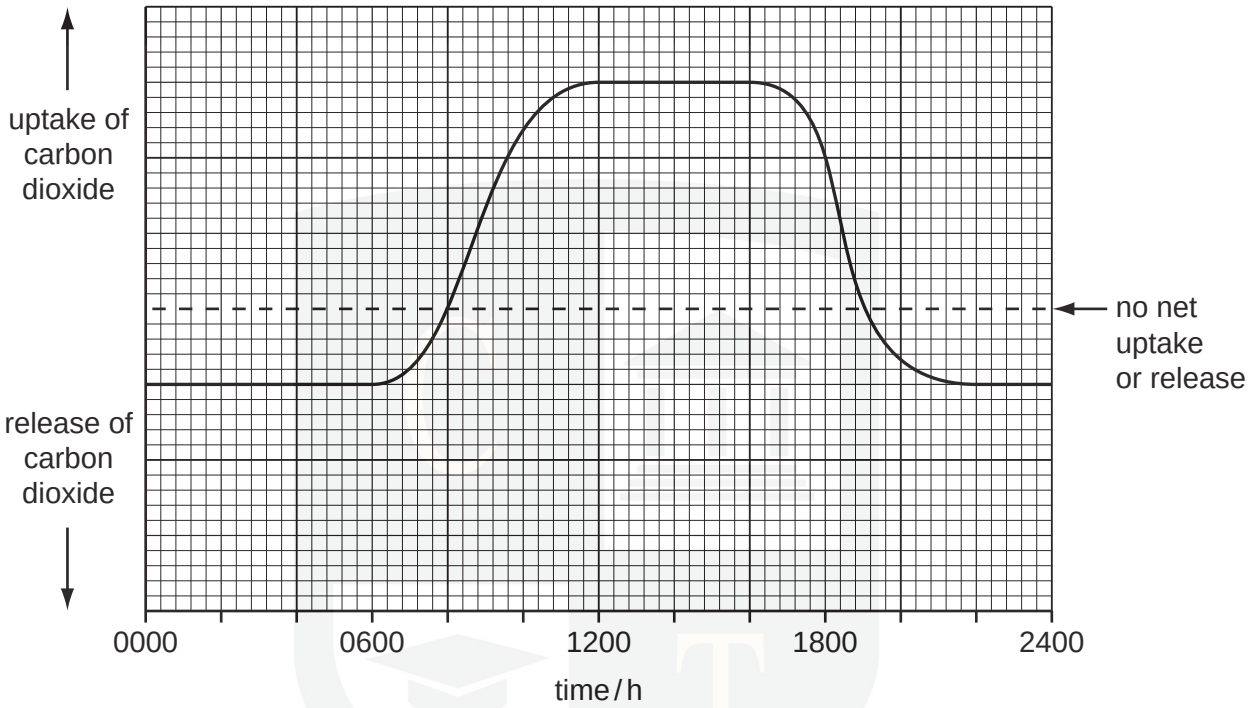

Fig. 2.1

(a) Use the information in Fig. 2.1 to state the time that sunrise occurred.

.....[1]

(ii) Using Fig. 2.1, state the times when there is no uptake or release of carbon dioxide.

1. .....

2. ..... [1]

(iii) State why plants release carbon dioxide at night.

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..... [1]

(iv) Explain why it is important for plants that carbon dioxide uptake during the day is greater than carbon dioxide released at night.

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..... [2]

The yields of tomatoes grown in open fields in India are very low compared with yields of tomatoes grown in glasshouses in Europe.

In a study, scientists in India grew tomato plants in glasshouses and in open fields nearby. The growth of the plants and the yields of tomatoes were recorded.

The results are shown in Table 2.1.

Table 2.1

	tomato plants grown in	
	glasshouses	open fields
mean final height of tomato plants / cm	84.1	69.0
mean number of leaves per tomato plant	123.0	82.0
mean fresh mass of tomato plants / g	988.3	491.7
mass of tomatoes per plant / g	2986.0	818.9
mean fresh mass of tomatoes / g	95.0	84.4

(b) The mean fresh mass of tomatoes grown in glasshouses was greater than the mean fresh mass of tomatoes grown in open fields.

Calculate the difference in mean fresh mass as a percentage of the mean fresh mass of tomatoes grown in open fields.

Show your working.

Answer = ... % [2]

(ii) Suggest how an increase in the height of the plants and the number of leaves on each plant affects the yield of tomatoes.

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..... [3]

(c) The scientists made sure that the only differences between the two groups of plants were the result of the protection provided by the glasshouses.

Suggest the factors that the scientists should have kept the same for the two groups of plants in this investigation.

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..... [3]

(d) The growth and final yields of crops grown in open fields are often limited by environmental factors.

Describe how these factors are controlled in commercial glasshouses to give high yields of crops such as tomatoes.

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..... [4]

[Total: 17]

2 Fig. 4.1 is an electron micrograph of part of the lower surface of a leaf. Three stomata are visible.

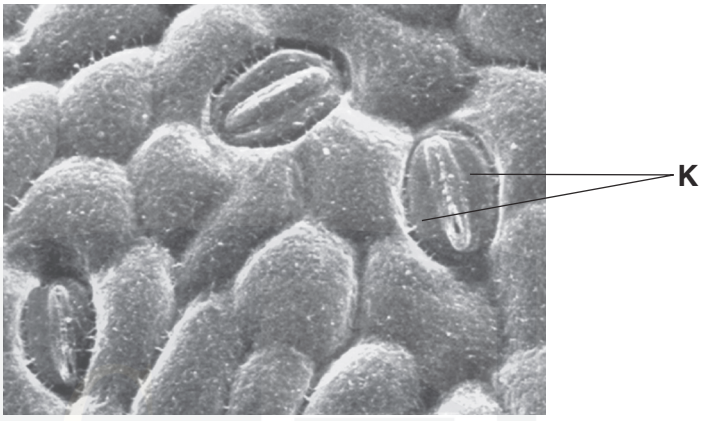

Fig. 4.1

(a) Name the cells labelled **K**.

.....[1]

(b) Stomata allow the movement of gases into and out of the leaf. During the daytime oxygen passes out and carbon dioxide passes in.

(i) Explain why oxygen passes out of the leaf during the daytime.

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.....[3]

(ii) Describe the path taken by a carbon dioxide molecule **after** it has passed through the stomata during the daytime until it becomes part of a glucose molecule.

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.....[3]

(c) Plants that live in different types of habitat have leaves that show adaptations for survival.

Table 4.1 shows some features of the leaves of three species of plant from different types of habitat.

Table 4.1

species	habitat	orientation of the leaves	individual leaf area / cm^2	mean stomatal density / number of stomata per mm^2	
				upper epidermis	lower epidermis
annual meadow grass, *Poa annua*	grassland	vertical	1 – 10	125	135
white water lily, *Nymphaea alba*	the surface of ponds and lakes	horizontal	more than 1000	460	none
common myrtle, *Myrtus communis*	dry scrubland	horizontal	2 – 4	none	508

(i) State how the stomatal density of annual meadow grass differs from the stomatal densities of the other two species in Table 4.1.

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.....[2]

(ii) Suggest explanations for the distribution and density of stomata in white water lily and common myrtle as shown in Table 4.1.

white water lily .....

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common myrtle .....

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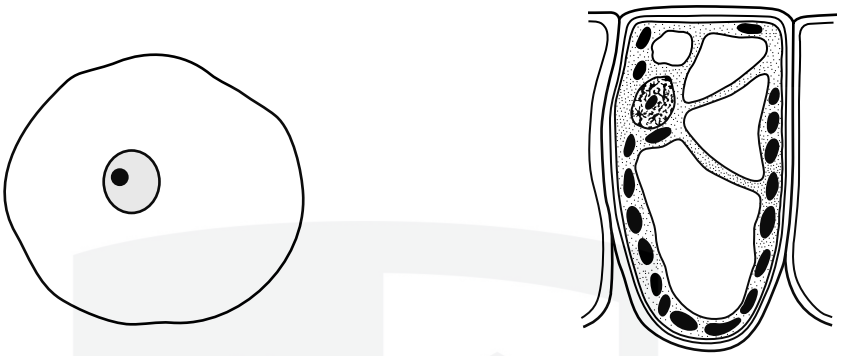
[5]

[Total: 14]

3 Fig. 1.1 shows an animal cell and a plant cell as seen with a light microscope.



animal cell plant cell

Fig. 1.1

(a) Table 1.1 shows some structural features of the animal cell and the plant cell in Fig. 1.1.

Complete the table by

- finishing the row for nucleus
- adding **three** structural features, visible in Fig. 1.1, and indicating whether they are present (✓) or absent (✗) in the animal cell and in the plant cell.

Table 1.1

structural feature	animal cell	plant cell
cell wall	✗	✓
nucleus		

[4]

(b) The cells were kept in a dilute salt solution. They were then transferred to distilled water.

Explain what will happen to each of these two cells when they are placed into distilled water.

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.....[4]

(c) Magnesium is a plant nutrient. Scientists think that magnesium is involved in the transport of sucrose from the leaves to the rest of a plant.

(i) Name the tissue that transports sucrose in plants.

.....[1]

The scientists grew some tomato plants with their roots in a solution that contained all the mineral nutrients that plants require. After a while, the plants were divided into two groups.

- Group **A** continued to receive the solution containing all the nutrients.
- Group **B** received a solution that did not contain any magnesium.

After 12 days, measurements were made on the leaves and the results are shown in Fig. 1.2.

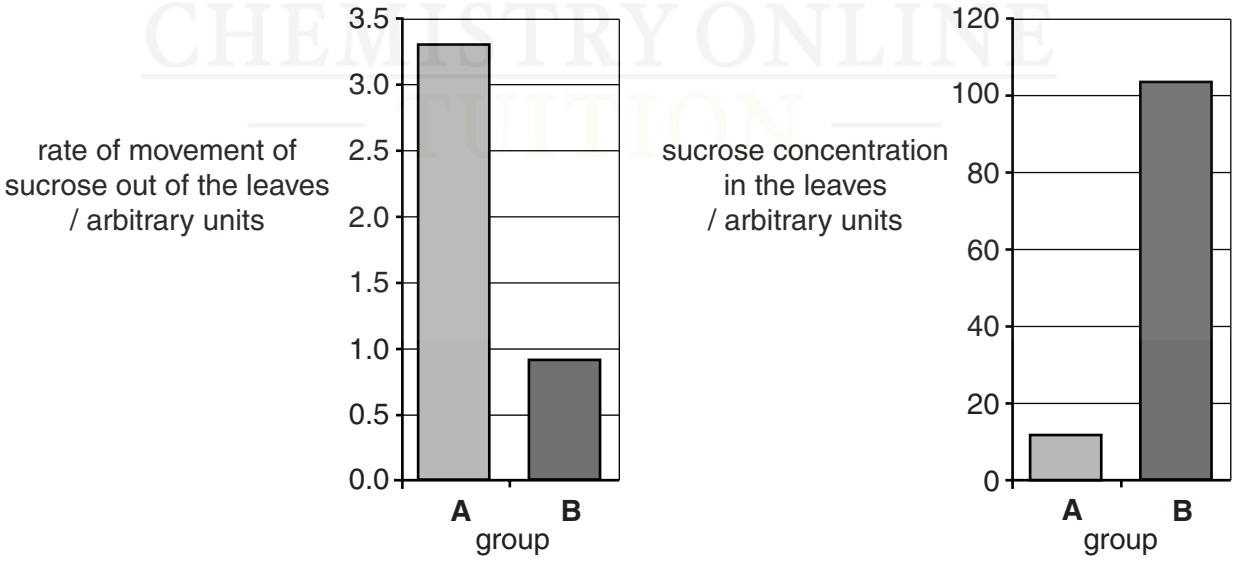

Fig. 1.2

(ii) Describe the effect of magnesium deficiency on the transport of sucrose out of the leaves and the sucrose concentration in the leaves.

transport of sucrose out of the leaves .....

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concentration of sucrose in the leaves .....

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(iii) The plants in Group **B** remained in the magnesium-deficient solution for longer than 12 days. At the end of this time they showed symptoms of magnesium deficiency.

Describe and explain the symptoms that the plants would show.

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.....[3]

[Total: 16]