

SECTION A: (40 MARKS)

- a) Figure 1 shows the rate of transpiration and rate of water uptake of a sunflower plant at different times of the day.

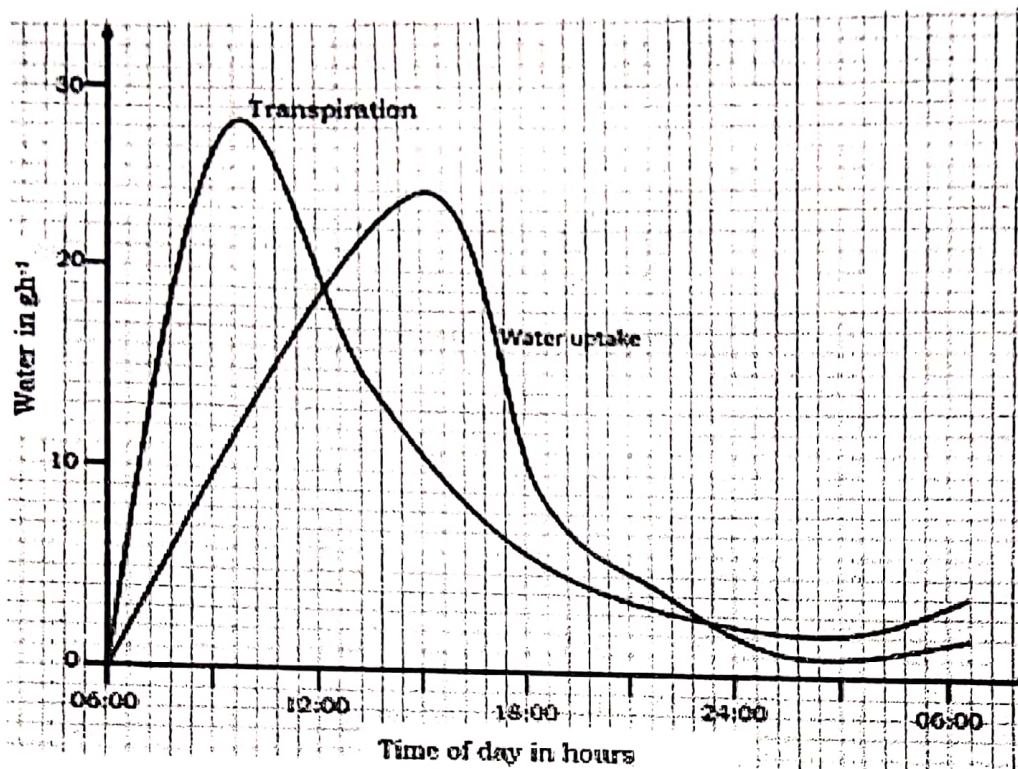


Figure 1

- Compare the rate of transpiration and water uptake. (06 marks)
 - Describe the relationship between the rate of transpiration and rate of water uptake. (03 marks)
 - Explain the relationship described in a) (ii) above. (09 marks)
 - Suggest three factors which could have influenced the changes in rate of transpiration after 12:00 hours. (03 marks)
- b) Table 1 shows the relative number of stomata and relative rate of transpiration, in four different plants species.

Table 1

Plant species	A	B	C	D
Relative number of stomata mm^{-2} of leaf (upper: lower surface)	5:30	0:80	10:15	0:50
Relative transpiration rate (upper: lower surface)	10:12	0:4	15:30	20:50

- rate of a su
- (i) Comment on the distribution of stomata in four species.
 - (ii) Explain the relationship between the distribution of stomata and the rate of transpiration in
 - Species B (04 marks)
 - Species D (03 marks)
 - (iii) From the data, what conclusions can be drawn about the difference between the upper leaf surface of species B and D. (02 marks)
 - (iv) What is the importance of stomata in a plant leaf? (02 marks)

SECTION B (60 marks)

2. (a) Describe chemical digestion of food in the duodenum. (11 marks)
 (b) How are herbivorous mammals adapted to their mode of feeding? (09 marks)
3. (a) Distinguish between the key and lock, and induced fit hypothesis of enzyme action. (05 marks)
 (b) Explain how temperature affects the activity of an enzyme. (10 marks)
 (c) How are enzymes activities regulated in organisms. (05 marks)
- 4 (a) Describe how the structure and distribution of the mitochondria are related to their function in living cells. (10 marks)
 (b) Explain the process by which proteins are transported from the site of synthesis to export sites in cells. (10 marks)
5. (a) What is meant by the term **Osmoregulation**? (03 marks)
 (b) What is the significance of osmotic control in animals? (03 marks)
 (c) Explain how the;
 - (i) Counter-current heat flow conserves heat energy in the body (09 marks)
 - (ii) nephron regulates blood pH (05 marks)
6. (a) Describe the factors that have led to the success of plants in colonizing a terrestrial habitat. (10 marks)
 (b) Explain the major challenges of transition from aquatic to the terrestrial habitat. (10 marks)

END