

9.1 Transport in the Xylem of Plants

Question Paper

Course	DP IB Biology
Section	9. Plant Biology (HL Only)
Topic	9.1 Transport in the Xylem of Plants
Difficulty	Medium

Time allowed: 60
Score: /44
Percentage: /100

Question 1a

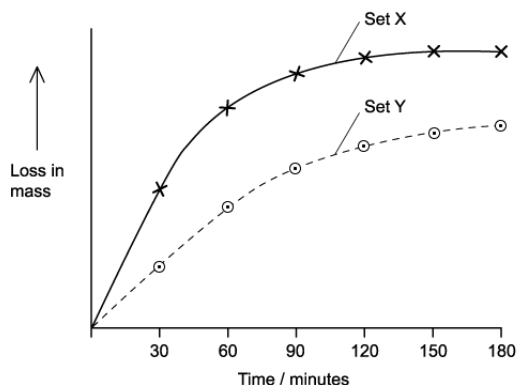
a)
Define the term *transpiration*.

[1 mark]

Question 1b

b)
Holly is a common type of evergreen plant that can be found in British gardens. The leaves of holly bushes possess particularly thick waxy cuticles. A student investigated the rate of transpiration in holly leaves. They cut 10 leaves for set X and 10 leaves for set Y. The student then covered the leaves in set Y in petroleum jelly. After weighing each set of leaves, they attached the leaves in each set to a separate wire. The student then weighed each set of leaves at 30-minute intervals for a duration of 3 hours.

Their results are seen in the graph below.



Environmental conditions can affect the rate of transpiration in plants. State **two** environmental variables that should be controlled in this investigation.

[2 marks]

Question 1c

c)
As seen in the graph in part b), between 90 minutes and 120 minutes the rate of transpiration begins to slow in both sets of leaves.

Explain why this happens.

[3 marks]

Question 1d

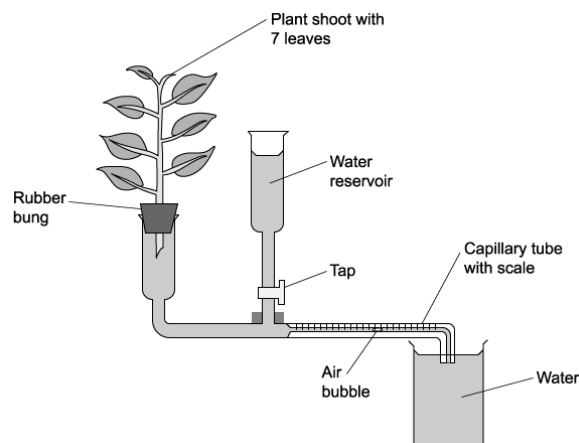
d)
The results for the leaves in set X are different from the leaves in set Y.

Suggest an explanation for this.

[2 marks]

Question 2a

a)
A potometer can be used to investigate the water uptake of plants under different conditions. The diagram below shows how a student set up a potometer to investigate the rate of water uptake in a plant shoot.



When setting up the potometer one of the precautions the student took to ensure reliable measurements of water uptake was to dry off the leaves before taking any measurements.

Suggest a reason for this.

[1 mark]

Question 2b

b)

Identify **two** other precautions the student should take when setting up the potometer apparatus to ensure they obtain reliable results.

[2 marks]

Question 2c

c)

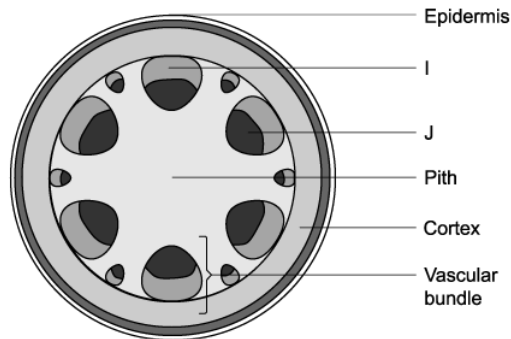
A potometer measures the water uptake of a plant in a given time.

Suggest **three** reasons why the measurements taken from a potometer do not represent the true rate of transpiration in a plant.

[3 marks]

Question 3a

a)
The diagram below shows a transverse section (TS) of a plant stem.



Identify the structure found at **J** and state its function.

[2 marks]

Question 3b

b)
In xylem vessels, hydrogen bonds form between polar water molecules.

Describe the role that hydrogen bonding plays in the cohesion-tension theory of water transport in the xylem of plants.

[3 marks]

Question 3c

c)
Marram grass is commonly found on sand dunes, an example of a dry environment where plants have evolved to survive.

Explain how marram grass leaves are adapted to minimise water loss.

[3 marks]

Question 4a

a)

Explain how a plant replaces the water it loses via transpiration.

[4 marks]

Question 4b

b)

Explain what is meant by the term *halophyte*.

[1 mark]

Question 4c

c)

Give **two** adaptations that a typical halophyte might have to help it survive in these conditions.

[2 marks]

Question 5a

One mark is available for clarity of communication throughout this question.

- a)
Describe how a porous pot can be used to model the evaporation of water that occurs from the leaves of a plant.

[3 marks]

Question 5b

- b)
Angiosperms (commonly known as flowering plants) are a group of plants that have vascular tissue, whereas bryophytes (mosses, liverworts and hornworts) are a group of plants that lack vascular tissue.

Suggest some advantages of possessing vascular tissue.

[4 marks]

Question 5c

- c)
Explain how minerals are absorbed into plant roots from the soil.

[8 marks]