

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 | Hard |

Time allowed: 10
Score: /5
Percentage: /100

Question 1

Which of these is **not** a function of plasmodesmata in plant cells?

- A. To allow movement of water via the symplast pathway
- B. To enable cell recognition
- C. To allow communication between cells
- D. To allow movement of nutrients between cells

[1 mark]

Question 2

Certain plants have developed a mutualistic relationship with soil fungi, in which the plant provides sugars to the fungus for respiration.

In what way does the plant receive a benefit in return?

- A. The fungus helps to stabilise the plant's root network in poor / stony soils.
- B. The fungus acts like a sponge to retain water in dry soils after (infrequent) rainfall.
- C. The fungus fixes atmospheric nitrogen and supplies nitrate ions to the plant.
- D. The fungus accesses mineral ions in mineral-deficient soils and supplies them to the plant's roots.

[1 mark]

Question 3

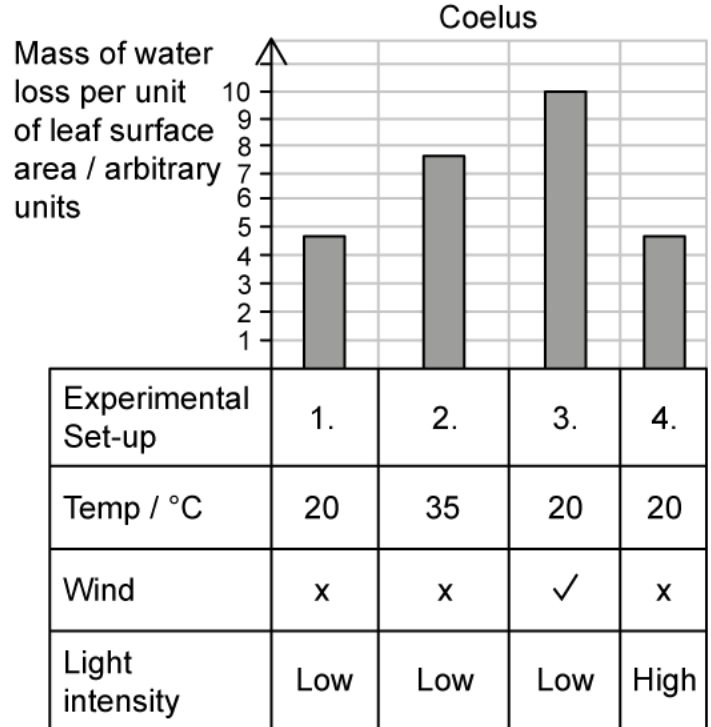
Which table gives the most accurate summary of the movement of water via the apoplast and symplast pathways?

| | | | |
|----|-----------------------------|-------------------------|-------------------------|
| A. | | Apoplast pathway | Symplast pathway |
| | Route travelled | Cell walls | Cytoplasm |
| | Speed of flow | Slow | Fast |
| | Method of flow | Mass flow | Osmosis |
| | Volume of water transported | Low | High |
| B. | | Apoplast pathway | Symplast pathway |
| | Route travelled | Cell walls | Cytoplasm |
| | Speed of flow | Fast | Slow |
| | Method of flow | Mass flow | Osmosis |
| | Volume of water transported | High | Low |
| C. | | Apoplast pathway | Symplast pathway |
| | Route travelled | Cytoplasm | Cell walls |
| | Speed of flow | Fast | Slow |
| | Method of flow | Mass flow | Osmosis |
| | Volume of water transported | High | Low |
| D. | | Apoplast pathway | Symplast pathway |
| | Route travelled | Cell walls | Cytoplasm |
| | Speed of flow | Fast | Slow |
| | Method of flow | Osmosis | Mass flow |
| | Volume of water transported | High | Low |

[1 mark]

Question 4

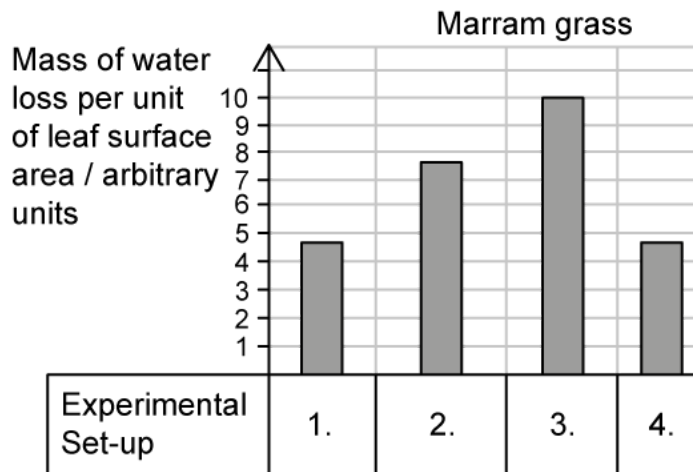
The following data were gathered from an experiment into the rate of transpiration in samples of plants in the genus *Coelus*, commonly grown by gardeners for herbaceous borders. *Coelus* grows easily in UK gardens and thrives in the relatively high rainfall that the UK experiences.



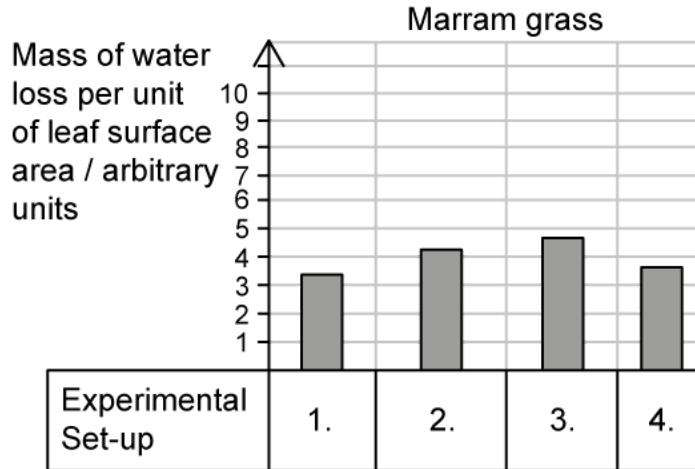
Marram grass is a xerophyte that is found on sand dunes and other fast-draining soils in coastal areas. The same experimental set-up was repeated with marram grass.

Which graph of **A – D** would be the most likely graph for a comparable experiment carried out on marram grass?

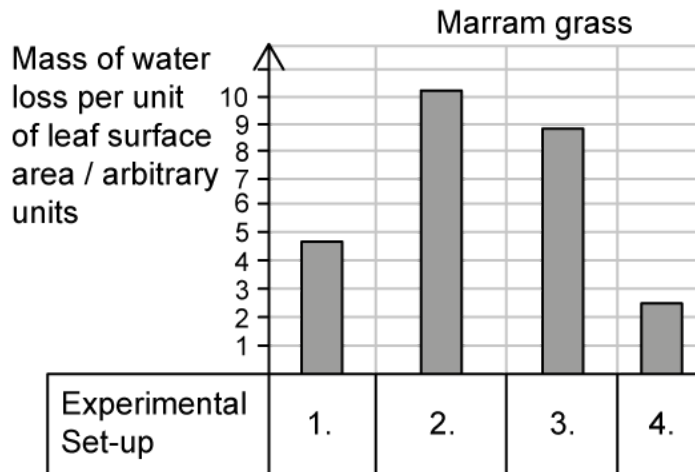
A.



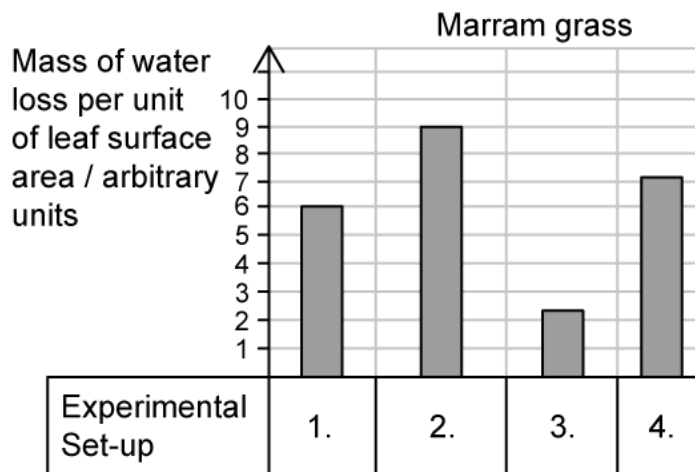
B.



C.



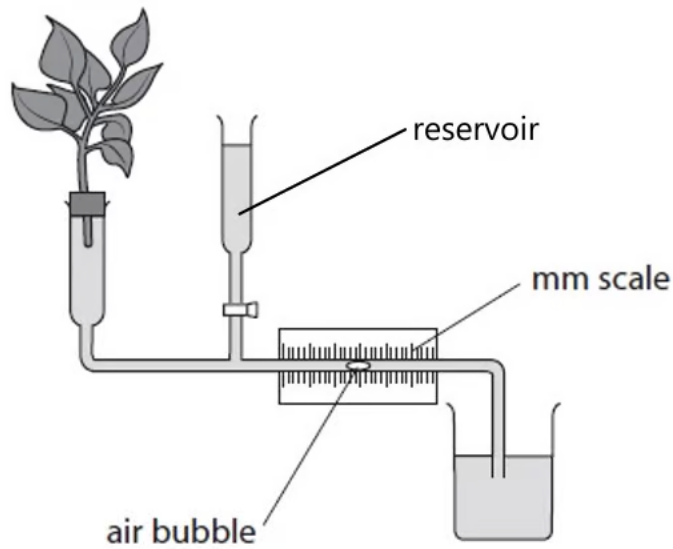
D.



[1 mark]

Question 5

The diagram shows a potometer set up to measure the rate of transpiration in a piece of cut plant.



For a potometer with a cylindrical capillary of the internal diameter of d mm, the bubble was measured to travel h mm in an experimental time of s seconds.

Which is the correct formula to calculate the rate of transpiration (as a volume of water uptake per unit time) in this experiment?

- A. $\frac{\pi \left(\frac{d}{2}\right)^2 h}{s}$
- B. $\frac{\pi d^2 h}{s}$
- C. $\pi \left(\frac{d}{2}\right)^2 h s$
- D. $\pi d^2 h s$

[1 mark]