OCR
Oxford Cambridge and RSA

AS Level Biology A

H020/02 Depth in biology

Question Set 16

1. An investigation was carried out into the loss of water from a leafy shoot. The apparatus used is shown in Fig. 1.1.

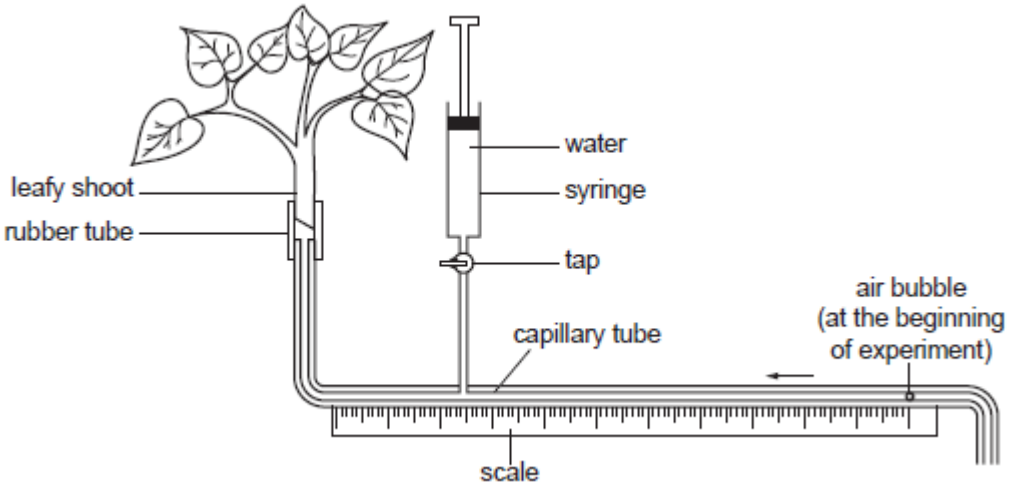

Fig. 1.1

(a) **(i)** State what assumption is made when using this apparatus to measure the rate of transpiration. **[1]**

(ii)* There must be no air in the apparatus in Fig. 1.1 for it to work correctly.

Describe and explain the precautions that need to be taken when setting up and using the apparatus in Fig. 1.1 to ensure that no air is present. **[6]**

(b) A student obtained replicate readings for the movement of the air bubble during five minutes in three different conditions. The results are shown in Table 1.1.

Condition	Distance moved by bubble in 5 minutes (mm)						
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Mean
In still air	89	84	86	87	85	86	86.2
With an electric fan	142	139	144	138	139	141	140.5
In still air and lower leaf surface covered with petroleum jelly	32	28	31	57	27	29	34.0

Table 1.1

(i) Identify an anomalous reading in the data **and** evaluate the extent to which it has affected the mean that has been calculated.

[3]

(ii) Suggest a reason for the reading that you identified as anomalous in **(i)**. **[1]**

(iii) The internal diameter of the capillary tubing was 0.7 mm.

Table 1.2 shows the mean rate of transpiration in each of the experimental conditions.

Condition	Mean rate of transpiration ($mm^3\,min^{-1}$)
In still air	
With an electric fan	10.81
In still air and lower leaf surface covered with petroleum jelly	2.62

Table 1.2

Calculate the mean rate of transpiration for the leafy shoot in still air.

Use the formula: Volume of a cylinder $= \pi r^2 l$

rate of transpiration = ... $mm^3\,min^{-1}$ **[3]**

(iv) The control experiment in this investigation was to measure the mean rate of transpiration in still air.

Explain why the control experiment is carried out in this investigation. **[1]**

(c) Another student suggested using an alternative apparatus for measuring the rate of transpiration of a leafy shoot. Fig. 1.2 shows this apparatus.

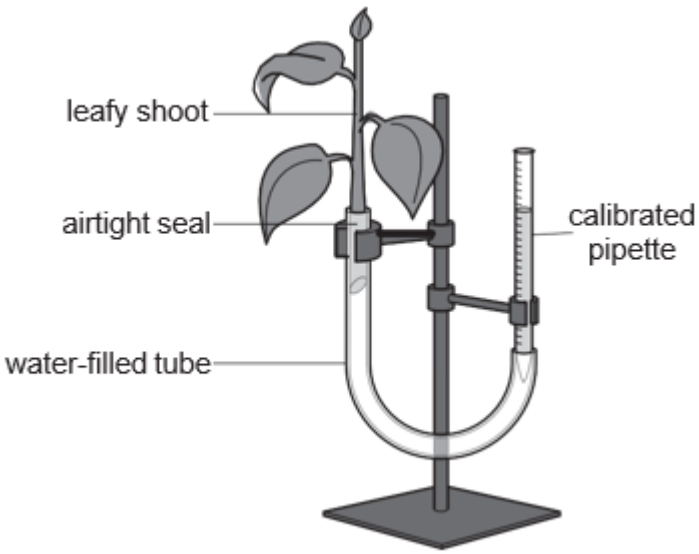

Fig. 1.2

The student stated that this apparatus would be an improvement on the apparatus shown in **Fig. 1.1** because the volume of water taken up could be measured directly.

Suggest why it might be considered better to use a capillary tube rather than a calibrated pipette to measure water uptake.

[1]

(d) The student wanted to compare the rates of transpiration of the two leafy shoots shown in Fig. 1.3.

Fig. 1.3

Describe how the student could ensure that a valid comparison could be made between the two leafy shoots.

[2]

Total Marks for Question Set 16: 18