

## Mark schemes

1.

(a) 86

*allow this answer only*

*do **not** accept 85.7*

*if no answer given, check for answer in the table*

1

(b) as salt concentration increases, percentage of open stomata (in field of view) decreases (above 0.1 mol / dm<sup>3</sup>)

**or**

allow percentage of open stomata stays the same between 0.0 and 0.1 (mol / dm<sup>3</sup> then decreases as salt concentration increases)

*ignore references to number of open stomata*

*allow converse*

*allow idea that mean concentration (of salt) in guard cells is between 0.3 and 0.4 mol per dm<sup>3</sup>*

1

(c) use concentrations between 0.3 (mol / dm<sup>3</sup>) and 0.4 (mol / dm<sup>3</sup>)

**or**

draw a graph of the data and read off the value at 50% (open stomata)

*allow a list of appropriate concentrations i.e. 0.32 mol / dm<sup>3</sup>, 0.34 (mol / dm<sup>3</sup>), 0.36 (mol / dm<sup>3</sup>) etc.*

1

(d)  $(\pi \times 0.1875^2) = 0.11$  (mm<sup>2</sup>)

*an answer of 36 scores **3** marks*

1

$$\frac{4}{0.11}$$

1

36 (per mm<sup>2</sup>)

*allow 36.22 / 36.23 **or** 36.2*

*if answer is incorrect allow for **2** marks for sight of number of open stomata = 9 per mm<sup>2</sup> (diameter used instead of radius)*

*if no other marks awarded allow for **1** mark any **one** from:*

- sight of area = 0.44(mm<sup>2</sup>) (diameter used instead of radius)*
- sight of number of open stomata = 9.1 / 9.05 / 9.06 per mm<sup>2</sup> (diameter used instead of radius and no rounding)*

1

- (e) (potassium) ions increase the concentration of the solution (inside guard cells)  
**or**  
 (potassium) ions make cell more concentrated / less dilute  
*allow (potassium) ions decrease concentration of water / water potential (of guard cells)*

1

water moves into the (guard) cell by osmosis

1

cell swells unevenly (so stoma opens)

1

as inner wall is less flexible than outer wall **or** thick part of the wall is less flexible than the thin part (of the wall)

1

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2.

- (a) (i) 5.0

1

(5 × 0.8) **or** 4

*allow ecf from distance*

1

0.4

*allow ecf from 10-min volume*

1

- (ii) increased (rate of uptake)

1

more transpiration / evaporation

1

- (b) correct scales

*allow reversed axes*

1

correctly labelled axes with units

1

correct points

*one plot error = max 1 mark*

2

curved line of best fit

*allow correct straight line*

1

1

(c) leaves wilt

because plants lose too much water (by evaporation)

1

through the stomata

**or**

because cells become plasmolysed

**or**

stomata close

controlled by guard cells

to prevent wilting

1

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3.

(a) (i) water / H<sub>2</sub>O

*accept oxygen*

*allow H<sub>2</sub>O*

*do **not** allow H<sup>2</sup>O or H2O*

1

(ii) the mineral ions are absorbed by active transport

1

the absorption of mineral ions needs energy

1

(iii) have (many root) hairs

1

(which) give a large surface area (for absorption)

1

(b) carbon dioxide in

**or**

oxygen out

**or**

control water loss

*accept gas exchange*

*ignore gases in and out*

*ignore gain / lose water*

1

(c) (i) guard cells

1

(ii) (stomata are) closed  
*allow there is no gap / space*

1

(iii) plant will wilt / droop  
*ignore die*

1

[9]

4.

(a) (i) xylem

1

(ii) water

1

minerals / ions / named example(s)  
*ignore nutrients*

1

(b) (i) movement of (dissolved) sugar

*allow additional substances, eg amino acids / correct named sugar  
(allow sucrose / glucose)*

*allow nutrients / substances / food molecules if sufficiently qualified  
ignore food alone*

1

(ii) sugars are made in the leaves

1

so they need to be moved to other parts of the plant for respiration / growth / storage

1

(c) (i) mitochondria

1

(ii) for movement of minerals / ions

*Do not accept 'water'*

1

against their concentration gradient

1

[9]

5.

(a) xylem **and** phloem

*either order*

*allow words ringed in box*

*allow mis-spelling if unambiguous*

1

- (b) (i) movement / spreading out of particles / molecules / ions / atoms  
*ignore names of substances / 'gases'*

1

from high to low concentration  
*accept down concentration gradient*  
*ignore 'along' / 'across' gradient*  
*ignore 'with' gradient*

1

- (ii) oxygen / water (vapour)  
*allow O<sub>2</sub> / O<sub>2</sub>*  
*ignore O<sup>2</sup> / O*  
*allow H<sub>2</sub>O / H<sub>2</sub>O*  
*ignore H<sup>2</sup>O*

1

[4]