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^3)

or

allow percentage of open stomata stays the same between 0.0 and 0.1 (mol / dm^3 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^3

1

(c) use concentrations between 0.3 (mol / dm^3) and 0.4 (mol / dm^3)

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^3), 0.34 (mol / dm^3), 0.36 (mol / dm^3) etc.

1

(d) ($\pi \times 0.1875^2$) = 0.11 (mm^2)

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

1

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

1

36 (per mm^2)

*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^2 (diameter used instead of radius)*

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

- *sight of area = 0.44(mm^2) (diameter used instead of radius)*
- *sight of number of open stomata = 9.1 / 9.05 / 9.06 per mm^2 (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

[10]

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

(c) leaves <u>wilt</u> **1**

because plants lose too much water (by evaporation)

1

through the <u>stomata</u>
or
because cells become <u>plamolysed</u>
or
<u>stomata</u> close
controlled by <u>guard cells</u>
to prevent <u>wilting</u>

1

[13]

3.

(a) (i) water / H_2O

accept oxygen

allow H_2O

*do **not** allow H^2O 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) <u>hairs</u>

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_2 / O2

ignore O^2/ O

allow H_2O / H2O

ignore H^2O

1

[4]