# GCSE Biology

## Plant Organ Systems

### Mark Scheme

**Time available: 50 minutes**
**Marks available: 45 marks**

**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]**