

- M1. (a)** (i) variation in masses / more representative / more typical / more reliable / average / mean / reference to anomalies
- or**
- one worm to light to measure change  
*do not allow more accurate / more precise*  
*ignore fair test / valid / repeatable / reproducible* 1
- (ii) remove solution / liquid (on outside of worm)  
*allow 'water'* 1
- (iii) variable amounts removed from each worm  
*ignore reference to length of timing* 1
- (iv) equal sizes of worm / more worms (in each group) / wash off all the sand / repeats / use more accurate balance / use smaller concentration intervals  
*allow reference to improve blotting technique eg blot before / blot more thoroughly* 1
- (b) (i) different (starting) masses / sizes / weights (at different concentrations) 1
- allows comparisons / shows pattern / shows trend 1
- (ii) (+)20  
*correct answer = 2 marks, with or without working*

**or**

$$\frac{7.5 \times 100}{37.5} \quad / \quad \frac{7.5}{37.5} \quad / \quad \frac{(45.0 - 1) \times 100}{37.5}$$

for 1 mark

2

(c) (i) graph:

points correct

*allow  $\pm 1$  mm*

*-1 mark per error*

*allow ecf from part b(ii)*

2

label on x-axis including units – ie Concentration of salt in arbitrary units

1

line of best fit = smooth curve / ruled straight line

*anomaly (4.0, -52) either plotted and ignored re. line*

*or not plotted*

*do not allow point to point*

*allow best fit for ecf from 2bii*

1

(ii) on graph:

ring drawn around point at (4.0, -52)

*allow (5.0, -50) if cand. line indicates this*

1

(iii) sensible suggestion – eg used wrong solution / used 5.0% instead of 4.0% / different length of time in solutions / ref to error in blotting / balance not zeroed / error in weighing

*allow some lugworms died*

*allow error in calculation*

1

(d) (i) 2.9 to 3.0 / correct for candidate's graph  $\pm 0.1$  1

value of no change in mass / worms in equilibrium with soln / described  
*allow small(est) mass change* 1

(ii) water loss 1

by osmosis / diffusion 1

from dilute region in the worm to more concentrated solution outside  
*allow correct description in terms of high to low water  
concentration / high to low water potential  
salt solution is hypertonic  
concentration unqualified = salt concentration* 1

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- M2.**
- (a) active transport 1
- (b) by transpiration stream / pull 1
- in xylem 1
- (c) any **three** in the correct order from:
- mount epidermis on a slide
  - count stomata in one area
  - repeat in four more areas
  - repeat method on other surface of leaf
  - calculate mean
- allow nail varnish film* 3
- (d) 1 1
- allow numbers written out in a line with middle number circled*
- (e)  $(44 + 41 + 40 + 42 + 39) / 5 = 41.2$  1
- 41 1
- allow 41 with no working shown for 2 marks*
- allow 41.2 for 1 mark*
- (f) less water lost 1
- so it does not wilt

M3.(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]

M4. (a) (i)	chloroplast	1
	(ii) cell wall	1
(b) (i)	osmosis <i>accept diffusion</i>	1
	(ii) cell wall (prevents bursting)	1
(c) (i)	carbon dioxide <i>allow correct formula</i>	1
	glucose <i>allow sugar / starch</i>	1
	(ii) any <b>two</b> from:	
	<ul style="list-style-type: none"> <li>• light sensitive spot detects light</li> <li>• tells flagellum to move towards light</li> <li>• more light = more photosynthesis</li> </ul>	2
(d)	(cell has) larger SA:volume ratio	1
	short (diffusion) distance <i>allow correct description</i>	1

(diffusion) via cell membrane is sufficient / good enough

**or**

flow of water maintains concentration gradient

1

[11]

**M5.** (a) (i) nucleus

1

(ii) diffusion

1

(b) increases / larger surface area (for diffusion)

*ignore large surface area to volume ratio*

1

(c) (i) sugar / glucose

*accept amino acids / other named monosaccharides*

1

(ii) against a concentration gradient

**or**

from low to high concentration

1

(iii) (active transport requires) energy

1

(from) respiration

1

(d) minerals / ions

*accept named ion ignore nutrients*

**do not accept water**

1

[8]



