

- 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 ± 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 ± 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 two from: <ul style="list-style-type: none"> • light sensitive spot detects light • tells flagellum to move towards light • more light = more photosynthesis 	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]

