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

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

*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 <u>water</u> concentration / high to low water potential

salt solution is hypertonic

concentration unqualified = salt concentration

1

[19]

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

allow numbers written out in a line with middle number circled

1

(e) (44 + 41 + 40 + 42 + 39) / 5 = 41.2

1

41

*allow 41 with no working shown for **2** marks*

1

*allow 41.2 for **1** mark*

(f) less water lost

1

so it does not wilt

1

[11]

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

accept diffusion

1

(ii) cell wall (prevents bursting)

1

(c) (i) carbon dioxide

allow correct formula

1

glucose

allow sugar / starch

1

(ii) any **two** from:

- 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

allow correct description

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]