Mark schemes

Q1.

(a) any **two** from:

- size of piece of potato

  ignore size of potato
- the (type of) potato
- volume / 100 cm^3 of salt solution

  allow amount of salt solution
- time (pieces of potato are kept) in the solution / beaker

  allow 20 minutes (the pieces of potato are kept) in the solution / beaker

  ignore time unqualified
- the potato was uncooked

2

(b) blot
or
dry (the surface)

allow descriptions of blotting

allow descriptions of drying (the surface)

1

(c) balance **or** weighing scale

1

(d) 0.1 g

1

(e) D

1

(f) $\frac{1.1}{6.0} \times 100$

ignore minus sign throughout

1

18.333…

1

18.3(%)

allow correct conversion to 1 decimal place from student's

*incorrect calculation using figures from potato piece **D***

1

(g) line graph

1

(h) water

must be in this order

1

osmosis

allow diffusion

1

permeable (membrane)

1

(i) answer in the range 0.15 to 0.25 (mol/dm^3)

1

[14]

Q2.

(a) a leaf

1

(b)

$$\frac{1.1 + 1.1 + 1.4}{3}$$

1

or

$$\frac{3.6}{3}$$

1.2 (grams)

if no answer given on answer lines, allow an answer in the table

1

(c) ring around −32.4 (grams)

table takes precedence

allow (−) 32.4 (grams) written by question

1

(d) did not include it

allow ignored it

1

(e) control variable

1

(f) time in the salt solution

1

(g) osmosis

1

(h) some particles

1

(i) use more concentrations of salt solution

1

[10]

Q3.

(a) **View with the table**

$$\frac{3\,600}{1\,200}$$

1

3

allow 3:1

*do **not** accept if a unit is given*

1

if no answer in answer space allow answer in the table

(b) as size increases, (surface area to volume) ratio decreases

allow as one increases, the other decreases

allow as size decreases, (surface area to volume) ratio increases

1

(c) any **one** from:

- carbon dioxide
- glucose / sugar
- water
- ions / minerals / salts

allow a correct chemical formula

allow named ions

allow other correct substances eg amino acids / fatty acids / glycerol

ignore nutrients / food

1

(d) any **two** from:

- concentration gradient

  allow description
- surface area

  allow surface area : volume ratio

  ignore size unqualified
- thickness of exchange surface

  allow thickness of skin
- presence of a blood / circulatory system
- temperature (of surroundings)

2

(e) gills

1

(f) **Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

5–6

Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

3–4

Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

1–2

No relevant content

0

Indicative content

- large number of alveoli
- large surface area

- alveolus and blood vessel / capillary are in close proximity
- alveoli / capillaries have thin walls **or** alveoli / capillaries have walls that are one cell thick
- to reduce diffusion distance

- has a good blood supply **or** has a capillary network
- to maintain concentration gradient
- to remove oxygen quickly **or** to deliver carbon dioxide quickly
- (capillary network) increases surface area (for diffusion)

- lungs are ventilated **or** lungs continually move air in and out
- (ventilation) brings in oxygen **or** removes carbon dioxide
- to maintain concentration gradient

Types of adaptation of the lungs are required for **Level 3.**

[13]

Q4.

(a) nucleus

must be in this order
allow chromosomes
allow plasmid

1

(site of aerobic) respiration

allow makes ATP
***or** releases energy*
*do **not** accept produces / makes / creates energy*
*do **not** accept anaerobic respiration*

1

(cell) membrane

1

(b) photosynthesis

allow produces glucose / sugar
allow to absorb (sun) light
ignore contains chlorophyll

1

(c) root (hair)

allow xylem / phloem / epidermis / meristem

1

(d) concentration of salt solution

1

(e) to make sure **only** the potato mass was measured

*allow (to) remove **excess** water / solution / liquid*

or
if water / solution / liquid was left on (the potato), the mass would be higher / affected

*do **not** accept if water / solution / liquid was left on (potato) the mass would be lower*
ignore to remove water / solution / liquid on the outside / surface (of potato)

1

(f) $\frac{0.2}{2.5} \times 100$

allow $\frac{2.7 \times 2.5}{2.5} \times 100$

1

8(%)

*if no other mark awarded allow **1** mark for*

$\frac{2.5 - 2.7}{2.5} \times 100 = -8$ *(%)*

1

(g) **Mark with (h)**

correct scale **and** axis labelled (concentration (of salt solution) in mol/dm^3)

scale must take up at least 50% of grid

1

all points plotted correctly

allow a tolerance of ± ½ small square

*allow 3 or 4 correct plots for **1** mark*

2

curved line of best fit

ignore line extended beyond 0.4 mol/dm^3

ignore line joined point to point with straight lines

1

*max **3** marks for bar chart*

(h) **Mark with (g)**

correct answer from their line drawn on the graph

allow a tolerance of ± ½ small square

ignore line joined point to point with straight lines if a line of best fit is drawn

if no line of best fit is drawn, allow an answer in the range 0.31 − 0.33 (mol/dm^3)

1

(i) <u>water</u> moves out of cells / potato

1

by osmosis

allow by diffusion of water through a partially / selectively / semi permeable membrane

1

(because) the solution in the cells / potato is less concentrated than outside

or

(because) the solution in the cells / potato is more dilute than outside

allow (because) the solution outside the cells / potato is more concentrated than inside

allow (because) the solution outside the cells / potato is less dilute than inside

allow correct references to <u>water</u> <u>concentration</u> / <u>potential</u>

ignore reference to amount of water or salt

*do **not** accept water moves from an area of high (solute) concentration to an area of low (solute) concentration*

1

allow 'pieces' for potato throughout

[17]