

Transport in Cells

Mark Scheme 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Biology
Exam Board	AQA
Topic	4.1 Cell Biology
Sub-Topic	Transport in Cells
Difficulty Level	Gold Level
Booklet	Mark Scheme 1

Time Allowed: 58 minutes

Score: /58

Percentage: /100

Grade Boundaries:

M1.(nitrate) ions are absorbed by active transport

1

(active transport) is the movement of ions against the concentration gradient
allow (active transport) is the movement of ions from a dilute to a more concentrated solution

1

(active transport) requires energy from respiration

1

(respiration) requires oxygen

1

no / little oxygen / air in water-logged soil

1

[5]

M2.(a) motor

allow efferent / postsynaptic
*allow **another** relay (neurone)*

1

(b) release of chemical (from relay neurone)

allow ecf for 'motor' neurone from (a)
allow release of neurotransmitter / named example

1

chemical crosses gap / junction / synapse
allow diffuses across
allow chemical moves to X

1

chemical attaches to X / motor / next neurone (causing impulse)

1

- (c) (curare) decrease / no contraction
accept (muscle) relaxes

1

(strychnine) increase / more contraction
*if no other mark awarded allow 1 mark for (curare) decrease
/ no response **and** (strychnine) increase / more response*

1

[6]

M3.(a) B

*no mark for “B” alone, the mark is for B **and** the explanation.*

large(r) surface / area **or** large(r) membrane
*accept reference to microvilli
ignore villi / hairs / cilia
accept reasonable descriptions of the surface eg folded
membrane / surface
do **not** accept wall / cell wall*

1

- (b) (i) any **one** from:
- (salivary) amylase
 - carbohydrase

1

- (ii) many ribosomes
*do **not** mix routes. If both routes given award marks for the greater.*

1

ribosomes produce protein

accept amylase / enzyme / carbohydrase is made of protein

or

(allow)

many mitochondria (1)

mitochondria provide energy to build / make protein (1)

accept ATP instead of energy

1

[4]

M4.(a) both parents **Aa**

*accept other upper and lower case letter without key **or**
symbols with a key*

allow as gametes shown in Punnett square

1

aa in offspring correctly derived from parents

or

aa correctly derived from the parents given

ignore other offspring / gametes

for this mark parents do not have to be correct

1

offspring **aa** identified as having cystic fibrosis

*may be the only offspring shown **or** circled / highlighted /
described*

1

(b) (i) any **one** from:

*accept converse if clear, eg if you (only) took one it might
have cystic fibrosis / might not be fertilised*

- (more) sure / greater chance of healthy / non-cystic fibrosis egg /
embryo / child

accept some may have the allele
reference to 'suitable / good embryo' is insufficient

- greater chance of fertilisation

1

(ii) **advantages**

to gain 3 marks both advantage(s) and disadvantage(s) must be given

max 3

any **two** from:

ignore references to abortion unless qualified by later screening

- greater / certain chance of having child / embryo without cystic fibrosis / healthy
- child with cystic fibrosis difficult / expensive to bring up
- cystic fibrosis (gene / allele) not passed on to future generations

disadvantages

any **two** from:

- operation dangers / named eg infection
ignore risk unqualified
- ethical or religious issues linked with killing embryos
accept wrong / cruel to embryos accept right to life argument
ignore embryos are destroyed
- (high) cost of procedure
- possible damage to embryo (during testing for cystic fibrosis / operation)

plus

conclusion

a statement that implies a qualified value judgement
eg it is right because the child will (probably) not have cystic fibrosis even though it is expensive

or

eg it is wrong because embryos are killed despite a greater chance of having a healthy baby

note: the conclusion mark cannot be given unless a reasonable attempt to give both an advantage and a disadvantage is made

do **not** award the mark if the conclusion only states that advantages outweigh the disadvantages

1

(c) any **three** from:

- osmosis / diffusion
*do **not** accept movement of ions / solution by osmosis / diffusion*
- more concentrated solution outside cell / in mucus
assume concentration is concentration of solute unless answer indicates otherwise or accept correct description of 'water concentration'
- water moves from dilute to more concentrated solution
allow correct references to movement of water in relation to concentration gradient
- partially permeable membrane (of cell)
allow semi / selectively permeable

3

[11]

M5.(a) solution in soil is more dilute (than in root cells)

concentration of water higher in the soil (than in root cells)

1

so water moves from the dilute to the more concentrated region

*so water moves down (its) concentration gradient **or** water moves from a high concentration of water to a lower concentration*

1

concentration of ions in soil less (than that in root cells)

1

so energy needed to move ions

or

ions are moved against concentration gradient

the direction of the concentration gradient must be expressed clearly

accept correct reference to water potential or to concentrations of water

1

(b) any **three** from:

- movement of water from roots / root hairs (up stem)
- via xylem
- to the leaves
- (water) evaporates
- via stomata

3

(c) (i) 0.67/0.7

accept 0.66, 0.6666666... or $\frac{2}{3}$ or 0.6

*correct answer gains **2** marks with or without working*

*if answer incorrect allow evidence of $\frac{100}{150}$ for **1** mark*
*do **not** accept 0.6 or 0.70*

2

(ii) during the first 30 minutes

any **one** from:

- it was warmer
- it was windier
- it was less humid
- there was more water (vapour) in the leaves

1

so there was more evaporation

ignore 'water loss'

or

stomata open during first 30 minutes **or** closed after 30 minutes (1)

so faster (rate of) evaporation in first 30 min **or** reducing (rate of) evaporation after 30 min (1)

1

[11]

M6.(a) oxygen / O₂

allow O₂

do not accept O²

or

carbon dioxide / CO₂

allow CO₂

do not accept CO²

1

(b) any **four** from:

ignore references to tail used for locomotion

ignore reference to nostrils

- because structure X / gills has threads / filaments **or** is thin **or** tadpole has longer tail
- there is an increased surface area
- there is a shorter diffusion pathway
- therefore an increase in exchange
ignore food
- eyes (now visible in older tadpole)
- so that food / danger etc can be seen
accept reference to a good blood supply
accept increased water flow over gills / tail will increase diffusion of gases

4

[5]

- M7.** (a) water enters (funnel / sugar solution) **or** water diffuses in (to the funnel)
*do **not** accept if diffusion of sugar*

1

membrane partially / selectively / semi permeable **or** by osmosis
allow description

1

because concentration (of sugar) greater
inside funnel than outside / water / in beaker
*assume 'concentration' refers to sugar unless candidate
indicates otherwise
the position of the solutions may be implied*

1

- (b) (level / it) rises more slowly **or** levels out earlier **or** does not rise as much
*accept inference of less steep gradient (of graph)
allow less / slower osmosis / diffusion / less water passes
through or less water enters funnel
allow water enters / passes through slower*

1

less difference in concentration (between solution / funnel and water / beaker)
*accept due to lower diffusion / concentration gradient /
described*

1

[5]

- M8.** (a) (i) diffusion is down the concentration gradient
*for a description of diffusion
ignore along / across gradients*

1

to enter must go up / against the concentration gradient
accept by diffusion ions would leave the root

or

concentration higher in the root / plant

or

concentration lower in the soil

1

(ii) active transport
allow active uptake

1

(b) (i) (root hairs →) large surface / area

1

(ii) (aerobic) respiration
*do **not** allow anaerobic*

1

releases / supplies / provides / gives energy
accept make ATP (for active transport)
*do **not** allow 'makes / produces / creates' energy*

1

(iii) starch is energy source / store (for active transport)
allow starch can be used in respiration
*do **not** allow 'makes / produces / creates' energy*

1

[7]

- M9.** (a) *correct names of cell components are required*
it = cell in sugar solution

any **two** from:

accept reverse only if clearly stated answer refers to cell in distilled water

- smaller vacuole
- smaller / less cytoplasm
allow protoplasm for cytoplasm
- cell membrane / cytoplasm not (fully) against cell wall
accept plasmolysed / flaccid / less turgid

or

cell membrane / cytoplasm (partly) pulled away from cell wall
ignore reference to nucleus / water
ignore explanations

or

space / liquid / sugar solution between cell membrane / cytoplasm and cell wall

2

- (b) water passed / moved out (of cell) by osmosis / diffusion
accept reverse answer if clearly refers to cell in distilled water

1

more concentrated (solution) outside

assume reference to

concentration refers to solute

concentration unless answer refers to water concentration

or less concentrated (solution) inside

or

lower water concentration outside

*accept references to hypertonic / hypotonic solutions **or** water potential*

or

higher water concentration inside

1

