GCSE
BIOLOGY

Topic Paper: 3.1 Transport in cells
Part 1 & 2 Mark Scheme

MARK SCHEME

74 Marks

M1. (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 <u>water</u> concentration outside
*accept references to hypertonic / hypotonic solutions **or** water potential*

or
higher <u>water</u> concentration inside

1

[4]

M2. (a) guard (cell)
ignore stoma / stomata

1

(b) Species A:

stomata open in dark / at night **or** close in light / in day

1

stomata closed during warm(est) period **or** open when cool(er)

1

heat (energy) / warmth increases evaporation / transpiration
must give explicit link between heat and transpiration

1

reduces water loss / evaporation / transpiration
ignore photosynthesis
allow converse points for species B

1

[5]

M3. (a) (i) glucose **and** galactose

1

(ii) any **three** from:

Evidence:

absorption reduced by cyanide
allow converse

absorb faster (than other sugars)

Explanation:

active transport needs energy

less / no energy available / released if cyanide is there
or less / no energy if no / less respiration
allow energy produced
ignore cyanide prevents respiration

3

(b) all / the sugars / they can be absorbed when gut poisoned / with cyanide **or** when no respiration

1

(diffusion) does not need an energy supply

1

[6]

M4. only 24 students tested **or** only one test **or** reference to lack of controls eg gender / age

1

students could drink as much water as they wanted

or

some students drank more water than others

or

some students drank water and beer

1

differences only slight

ignore effects of beer or promotion of beer drinking

1

[3]

M5. (a) (i) movement of atoms / molecules / ions

accept particles
allow dissolved substances
ignore reference to membranes

1

(substance) moves from high to low concentration

allow down the gradient ignore
across / along / with a gradient

1

(ii) any **two** from:

movement of molecules / ions
accept particles
allow dissolved substances this point <u>once</u> only in (a)(i) and (a)(ii)

from low to high concentration
allow up / against the gradient
ignore across / along / with a gradient

requires energy / respiration
accept requires ATP

2

(b) **<u>filtration</u>** of blood **or**
described re small (molecules)through / large not

ignore diffusion

1

max **four** from:

reabsorption / substances taken back into blood

(reabsorption) of all of the sugar / glucose

(reabsorption) of some of ions / of ions as needed by body

(reabsorption) of some of water / of water as needed by the body

urea present in urine
accept urea not reabsorbed

reabsorption of water by osmosis / diffusion **or** reabsorption of sugar / ions by active transport

4

[9]

M6. active transport needs energy **or** diffusion is not energy-dependent

1

any **three** from:

(energy from) aerobic respiration

more respiration with O_2 **or** more energy release with O_2

(aerobic) respiration / energy release occurs in mitochondria
*do **not** allow anaerobic*

xylose / other sugars absorbed by diffusion / not by active transport
allow active transport is selective / specific
***or** active transport can distinguish glucose and xylose*

3

[4]

M7. (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) <u>and</u> 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]

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) **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) <u>many</u> ribosomes

*do **not** mix routes. If both routes given award marks for the greater.*

1

ribosomes produce <u>protein</u>

accept amylase / enzyme / carbohydrase is made of protein

or

(allow)

<u>many</u> mitochondria (1)

mitochondria provide energy to build / make <u>protein</u> (1)

accept ATP instead of energy

1

[4]

M10. (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]

M11. (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 ⅔ 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]

M12. (a) oxygen / O_2

allow O_2

do not accept O^2

or

carbon dioxide / CO_2

allow CO2

do not accept CO^2

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]