

MARK SCHEME

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

B 1 - TEST 5

CELL BIOLOGY

Advanced

Mark schemes

1.

(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]

2.

any **four** from:

- cells used to treat diseases do not go on to produce a baby
- produces identical cells for research
- cells would not be rejected
- allow cells can form different types of cells
- (immature) egg contains only genetic information / DNA / genes / chromosomes from mother **or** there is only one parent
- asexual / no mixing of genetic material / no sperm involved / no fertilisation **or** chemical causes development
- baby is a clone
- reference to ethical / moral / religious issues
allow ethically wrong
NB cloning is illegal gains 2 marks
ignore unnatural
- risk of damage to the baby
in correct context

[4]

3.

(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]

4. D – *many microvilli (1)*
 Ex – provide large surface area (1)
five points made
max 3 descriptions
max 3 explanations

D – *many capillaries / good blood supply (1)*
 Ex – maintain concentration / diffusion gradient **or** quickly removes food (1)

D – thin wall / one cell thick surface / capillaries near surface (1)
allow villi are thin
ignore villi are one cell thick

Ex – short distance for food to travel (1)

D – *many mitochondria (1)*
 Ex – provide energy / ATP for active uptake / transport (1)

[5]

5. (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]

6. (i) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ 1
energy is neutral

formulae all correct
with no omissions / deletions

correctly balanced
credit 1 mark if the answer is the exact reverse of an incorrect answer for (a) 1

(ii) and **three** from

take up of (soluble) substances / ions against the concentration gradient

or when the concentration (of the substance / ions) is greater inside the cell / cytoplasm than outside it

through the (semi-permeable) (cell) membrane energy from mitochondria

*or energy from respiration
not just energy*

3

[5]

7.

(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]

8.	<p>(a) (i) glucose and galactose</p> <p>(ii) any three from:</p> <p>Evidence:</p> <ul style="list-style-type: none"> • absorption reduced by cyanide <i>allow converse</i> • absorb faster (than other sugars) <p>Explanation:</p> <ul style="list-style-type: none"> • active transport needs <u>energy</u> • less / no <u>energy</u> available / released if cyanide is there or less / no <u>energy</u> if no / less respiration <i>allow <u>energy produced</u></i> <i>ignore cyanide prevents respiration</i> 	1	
	<p>(b) all / the sugars / they can be absorbed <u>when gut poisoned</u> / <u>with cyanide</u> or <u>when no respiration</u></p> <p>(diffusion) does not need an <u>energy</u> supply</p>	3	
		1	
		1	[6]
9.	<p>(a) D</p> <p>any one from:</p> <ul style="list-style-type: none"> • has chloroplasts • has a (large) vacuole <i>ignore has a (cell) wall</i> 	1	
	<p>(b) B</p> <p>does not have a (cell) wall <i>allow has <u>only</u> a nucleus, (cell) membrane and cytoplasm</i></p>	1	
	<p>(c) C</p>	1	

any **one** from:

- genetic material is not in a nucleus
allow no nucleus
- has a single loop of DNA

1

(d) real size = 25 / 100 000

1

0.00025

1

(conversion to) 0.25 (μm)

allow 0.25 (μm) with no working shown for 3 marks

1

[9]

10.

(a) to control for the starting mass (of the pieces of carrot)

allow because the pieces of carrot were not all the same mass at the start

do not accept were not all the same size
do not accept as a control variable

1

(b) suitable scale **and** label for y-axis

allow 5 or 6 per 2 cm

do not accept 5 per 1 cm

1

all points plotted correctly

allow $\pm \frac{1}{2}$ a square

allow 1 mark for 4 correct points

2

line of best fit

conc. ...	percentage (%) change...
0.0	+24
0.2	+12
0.4	+1
0.6	-8
0.8	-15

1

(c) value from student's line of best fit

allow $\pm \frac{1}{2}$ a square

1

(d) mass decreased

1

(due to) **loss of water** by **osmosis**

ignore diffusion

1

through a partially / selectively / semi permeable membrane

1

*a clear reference to concentration of water or
concentration of sugar is required for the fourth mark*

(as) concentration of sugar solution is greater than concentration of sugar (solution)
inside cells / carrot

*allow (as) concentration of sugar solution inside cells /
carrot is lower than the concentration of sugar solution
(in the tube or around the carrot)*

or

(as) the concentration of water is less outside the cells / carrot than the concentration
inside the cells / carrot

*allow answers in terms of dilute and concentrated
solutions*

1

(e) the (partially permeable / cell) membrane was damaged

allow idea that cell membrane is no longer intact

or is more permeable / leaky

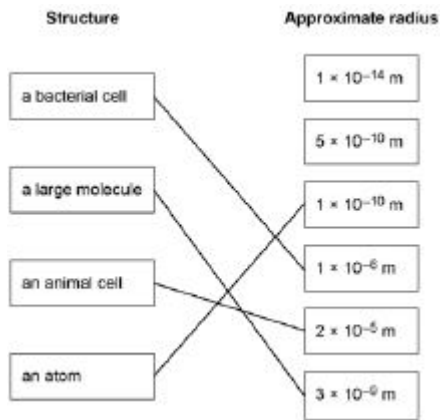
allow the membrane is denatured

ignore cells are dead

1

[11]

11. (a)



1
1
1
1

(b) 1.5:0.125 and 6:1

1

converted to same scale for example

12:1 and 6:1

or

6:0.5 and 6:1

allow 1.5:0.125 and 1.5:0.25

or

allow 1.5:0.125 and 0.75:0.125

1

as the length of the side of the cube increases the surface area to volume ratio decreases

allow size for length of side

allow converse

1

(c) animal has a small(er) surface area to volume ratio (than a bacterium)

allow converse

1

(so) diffusion distance is larger in animals

or

volume to be supplied (with gas) by each unit of surface area is greater

allow converse

1

(therefore)

diffusion would not supply enough oxygen for the volume / size

or

diffusion would not remove enough carbon dioxide for the volume / size

or

diffusion rate per unit volume is slower

allow converse

1

(d) active transport requires energy because (sugar molecule) movement is from low concentration (outside cell) to high concentration (inside cell)

allow active transport requires energy because (sugar molecule) movement is against / up concentration gradient

1

(this) energy is transferred by respiration which requires oxygen

1

(and a) higher concentration of oxygen allows a faster (rate of) respiration (or energy transfer)

1

[13]