

# Cell Structure

## Mark Scheme

<b>Level</b>	GCSE (9-1)
<b>Subject</b>	Combined Science: Trilogy - Biology
<b>Exam Board</b>	AQA
<b>Topic</b>	4.1 Cell Biology
<b>Sub-Topic</b>	Cell Structure
<b>Difficulty Level</b>	Gold Level
<b>Booklet</b>	Mark Scheme

**Time Allowed:** 58 minutes

**Score:** /57

**Percentage:** /100

**Grade Boundaries:**

M1.(a) D

1

any **one** from:

- has chloroplasts
- has a (large) vacuole  
*ignore has a (cell) wall*

1

(b) B

1

does **not** have a (cell) wall

*allow has only a nucleus, (cell) membrane **and** cytoplasm*

1

(c) C

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 ( $\mu\text{m}$ )

*allow 0.25 ( $\mu\text{m}$ ) with no working shown for 3 marks*

1

[9]

M2.(a) human cells have cell membrane

**or**

human cells have no cell wall

1

(b) can no longer synthesise proteins

1

(c) antibiotics are being developed at a slower rate than emergence of new resistant strains

1

resistant strains mean we cannot treat (common) infections

1

reduce (future) cost of antibiotic resistant infections

1

[5]

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) (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]

**M6.** (a) hold cells together **or** prevent flow of cells **or** trap cells

1

(b) 12500

*if correct answer, ignore working / lack of working*

$$\frac{100}{0.008} \text{ for 1 mark}$$

*ignore any units*

2

- (c) (i) size RBC approximately same size capillary **or**  
no room for more than one cell **or**  
only one can fit **or**  
RBC is too big

*allow use of numbers*

*do **not** accept capillaries are narrow*

1

- (ii) more oxygen released (to tissues) **or**  
more oxygen taken up (from lungs)

1

and any **two** from:

- slows flow **or** more time available
- shorter distance (for exchange) **or** close to cells / capillary wall
- more surface area exposed

2

[7]

- M7. (a) (i) water (molecules) enter(s) (the cell)  
**or** water (molecules) pass(es) through the (semi-permeable)  
cell membrane

1

by osmosis

**or** because the concentration of water is  
greater outside (the cell than inside it  
the vacuole)



*accept because of the concentration  
gradient provided there is no contradiction*

1

(ii) any **one** from

(it is) elastic

(it is) strong

(it is fully) permeable (to water)

*or water can pass through it*

*do not credit semi-permeable*

*do not credit cell membrane is semi-permeable*

1

(b) (the piece of) potato shrinks

*or loses its turgor*

*or becomes flabby*

*or becomes flaccid*

*or plasmolysis occur*

*or cytoplasm pulls away from the cell wall*

(because) concentration of sugar

*or because concentration of water*

1

(solution) is greater than concentration inside the cell / vacuole

*inside the cell / vacuole is greater than concentration (of  
water) outside*

1

water is drawn out of the cell

1

[6]

M8. (a) 23

1

(b)      chromosome      nucleus      gene      cell  
                 2                   3                   1                   4

1

(c)    (i)      any **one** from

(cells which are bigger) take up more space

(cells) have to get bigger **or** mature to divide

1

(ii)    chromosomes duplicate **or**  
         make exact copies of self

*accept forms pairs of chromatids*

1

nuclei divide

*accept chromatids **or***  
*chromosomes separate*

1

identical (daughter) cells formed

*accept for example, skin cells make*  
*more skin cells **or** cells are clones*

1

(d)    any **two** from

*Differentiation mark*

babies need **or** are made of different types of cells **or** cells that have different functions

*accept different cells are needed*  
*for different organs*

*Division or specialisation mark*

as fertilised egg starts to divide each cell specialises to form a part of the body

*accept specialised cells make*  
*different parts of the body*

*Growth mark*

specialised cells undergo mitosis to grow further cells

*accept cells divide **or** reproduce*  
*to form identical cells*

