

## Mark schemes

**1**

(a) (i) diffusion  
*apply list principle*

1

(ii) **A**  
*apply list principle*

1

(b) (i) osmosis  
*apply list principle*

1

(ii) **R**  
*apply list principle*

1

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**2**

(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

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(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  
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(a) (i) capillary

1

(ii) diffusion

1

(b) (i) Z

*ignore any names*

1

(ii) large / increased surface / area

*allow all food absorbed*

**or** to absorb more food

**or** improved diffusion

1

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(a) (i) A = (cell) wall

*ignore cellulose*

1

B = cytoplasm

1

(ii) any **one** from:  
*accept has DNA instead of a nucleus, but not just has DNA*

- bacterial cell / it has no nucleus  
*allow no mitochondria*
- DNA free in cytoplasm  
*ignore size*
- has no vacuole / no vesicles  
*ignore strands of DNA*

1

(b) (i) yeast grows best / better / well **or** optimum temperature for yeast / more yeast present

*allow yeast works best / better / well*

1

(yeast) makes CO<sub>2</sub> **or** respire / respiration

*allow fermentation*

1

(ii) bacterium grows best / better / well / more bacteria present **or** optimum temperature for bacterium

*ignore microorganisms / microbes*

*allow works / respire best / better / well*

1

(bacterium) makes (lactic) acid

*do **not** allow wrong acid*

1

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(a) (i) **A** – (cell) wall

1

**B** – cytoplasm

1

**C** – plasmid

1

(ii) bacterium cell has cell wall / no nucleus / no mitochondria / plasmids present

*accept its DNA / genetic material is not enclosed / it has no nuclear membrane*

*it = bacterium cell*

*accept converse for animal cell*

*ignore flagella*

1

(iii) any **one** from:

- chloroplast  
*ignore chlorophyll*
- (permanent) vacuole

1

(b) (Long tail) moves the sperm / allows the sperm to swim

1

towards the egg

*allow correct reference to other named parts of the female reproductive system*

1

(Mitochondria) release energy (for movement / swimming)

*allow supply / produce / provide*

1

in respiration

1

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(a) (i) A = cytoplasm

1

B = (cell) membrane

1

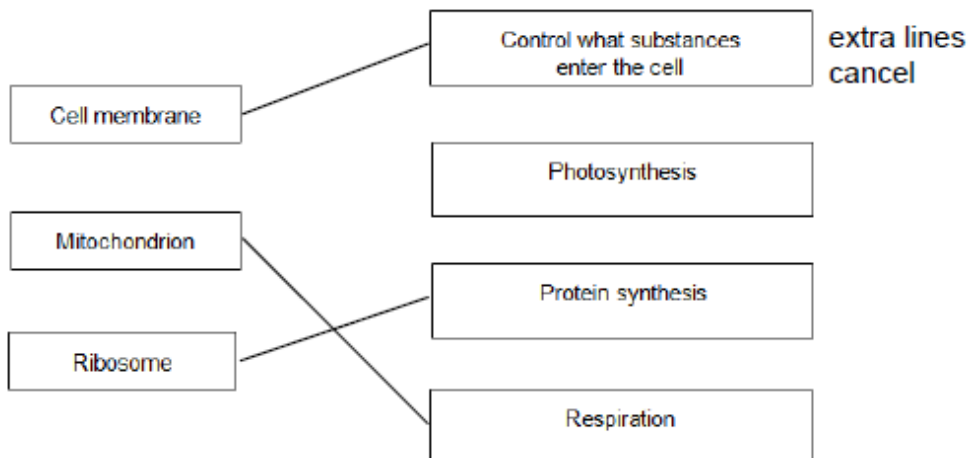
(ii) nucleus

*accept chromosome / DNA / genes*

*accept phonetic*

1

(b)



3

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(a) (i)

Feature	Mitosis only	Meiosis only
Produces new cells during growth and repair	✓	
Produces gametes (sex cells)		✓
Produces genetically identical cells	✓	

All 3 correct = 2 marks

2 correct = 1 mark

0 or 1 correct = 0 marks

2

(ii) (a man) testis / testes

*accept testicle(s)*

1

(a woman) ovary / ovaries

*do not accept 'ova' / ovule*

1

(b) (i) XY / YX

**or**

X and Y

1

(ii) XX

**or**

X and X or 2 X's

*accept X*

1

(c) ½ / 0.5 / 50% / 1:1 / 1 in 2

*do not accept 1:2 / 50/50*

*allow 50:50*

*allow 2 in 4*

1

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(a) xylem **and** phloem

*either order*

*allow words ringed in box*

*allow mis-spelling if unambiguous*

1

(b) (i) movement / spreading out of particles / molecules / ions / atoms

*ignore names of substances / 'gases'*

1

from high to low concentration  
*accept down concentration gradient*  
*ignore 'along' / 'across' gradient*  
*ignore 'with' gradient*

1

(ii) oxygen / water (vapour)

*allow O<sub>2</sub> / O<sub>2</sub>*

*ignore O<sup>2</sup> / O*

*allow H<sub>2</sub>O / H<sub>2</sub>O*

*ignore H<sup>2</sup>O*

1

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(a) (i) DNA replication / copies of genetic material were made

*'it' = a chromosome*

*allow chromosomes replicate / duplicate / are copied*

*ignore chromosomes divide / split / double*

1

(ii) one copy of each (chromosome / chromatid / strand) to each offspring cell

*ignore ref. to gametes and fertilisation*

1

each offspring cell receives a complete set of / the same genetic material

*allow 'so offspring (cells) are identical'*

1

(b) (i) meiosis

*allow mieosis as the only alternative spelling*

1

(ii) Species A = 4 **and** Species B = 8

1

(iii) sum of A + B from (b)(ii) e.g. 12

1

(c) (i) similarities between chromosomes

**or**

similarities between flowers described

*e.g. shape of petals / pattern on petals / colour / stamens*

1

can breed / can sexually reproduce

*allow can reproduce with each other / they can produce offspring*

1



(ii) any **two** from:

- offspring contain 3 copies of each gene / of each chromosome / odd number of each of the chromosomes
- some chromosomes unable to pair (in meiosis)
- (viable) gametes not formed / some gametes with extra / too many genes / chromosomes

**or**

some gametes with missing genes / chromosomes

2

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(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, 0.666666... 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

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