

# Mark schemes

**1** (a)

	Mitosis only	Meiosis only	Both mitosis and meiosis
How cells are replaced	✓		
How gametes are made		✓	
How a fertilised egg undergoes cell division	✓		
How copies of the genetic information are made			✓
How genetically identical cells are produced	✓		

*if more than one tick per row then no mark  
ignore first row*

1  
1  
1  
1

(b) (i) (adult) bone marrow

*accept (umbilical) cord blood, skin, amniotic fluid / membrane*

1

(ii) cells will not be rejected by the patient's body (if they have been produced by therapeutic cloning)

*allow easier to obtain linked to embryo stem cells*

**or**

(embryo stem cells) can develop into many different types of cells

*allow doesn't need an operation linked to bone marrow*

**or**

(embryo stem cells) not yet differentiated / specialised or undifferentiated

*accept embryo cells are pluripotent*

1

**[6]**

<b>2</b>	(a) (i) nucleus	1		
	(ii) diffusion	1		
	(b) increases / larger surface area (for diffusion) <i>ignore large surface area to volume ratio</i>	1		
	(c) (i) sugar / glucose <i>accept amino acids / other named monosaccharides</i>	1		
	(ii) against a concentration gradient <b>or</b> from low to high concentration	1		
	(iii) (active transport requires) energy  (from) respiration	1		
	(d) minerals / ions <i>accept named ion ignore nutrients</i> <b>do not accept</b> water	1	<b>[8]</b>	
	<b>3</b>	(a) <b>A</b> = nucleus <i>allow phonetic spelling</i>	1	
		<b>B</b> = (cell) membrane	1	
(b) for repair / growth <b>or</b> to replace cells <i>ignore new cells / skin</i>		1		
(c) (i) embryos		1		
(ii) paralysis		1	<b>[5]</b>	

**4**

(a)

Structure	Organ	Organ system	Tissue
Stomach	✓		
Cells lining the stomach			✓
Mouth, oesophagus, stomach, liver, pancreas, small and large intestine		✓	

all 3 correct = 2 marks

2 correct = 1 mark

1 or 0 correct = 0 marks

2

(b) (i) diffusion

*allow phonetic spelling*

1

(ii) glucose

1

(iii) mitochondria

1

**[5]****5**

(a) contract / shorten

*ignore relax**do **not** allow expand*

1

to churn / move / mix food

*accept peristalsis / mechanical digestion**ignore movement unqualified*

1

(b) 400

*acceptable range 390-410**allow 1 mark for answer in range of 39 to 41**allow 1 mark for answer in range of 3900 to 4100*

2

(c) to transfer energy for use

*allow to release / give / supply / provide energy**do **not** allow to 'make' / 'produce' / 'create' energy**allow to make ATP**ignore to store energy*

1

by (aerobic) respiration **or** from glucose  
*do not allow anaerobic*  
*energy released for respiration = max 1 mark*

1

(d) (i) to make protein / enzyme  
*ignore 'antibody' or other named protein*

1

(ii) too small / very small  
*allow light microscope does not have sufficient magnification / resolution*  
*allow ribosomes are smaller than mitochondria*  
*ignore not sensitive enough*  
*ignore ribosomes are transparent*

1

[8]

6

(a) (i) alveoli / alveolus  
*allow air sacs*  
*allow phonetic spelling*

1

(ii) any **one** from:  
• protection (of lungs / heart)  
• help you breathe / inflate lungs.

1

(b) (i) diffusion

1

(ii) capillaries

1

(iii) any **two** from:  
• (have many) alveoli  
*allow air sacs*  
• large surface / area  
• thin (exchange) surface **or** short diffusion pathway  
*accept only one / two cell(s) thick*  
• good blood supply / many capillaries  
*allow (kept) ventilated or maintained concentration gradient.*

2

[6]

- 7** (a) (i) water / H<sub>2</sub>O  
*accept oxygen*  
*allow H<sub>2</sub>O*  
*do **not** allow H<sup>2</sup>O or H2O* 1
- (ii) the mineral ions are absorbed by active transport 1  
the absorption of mineral ions needs energy 1
- (iii) have (many root) hairs 1  
(which) give a large surface area (for absorption) 1
- (b) carbon dioxide in  
**or**  
oxygen out  
**or**  
control water loss  
*accept gas exchange*  
*ignore gases in and out*  
*ignore gain / lose water* 1
- (c) (i) guard cells 1
- (ii) (stomata are) closed  
*allow there is no gap / space* 1
- (iii) plant will wilt / droop  
*ignore die* 1
- [9]
- 8** (a) (i) diffusion 1
- (ii) carbon dioxide  
*accept CO<sub>2</sub> / CO2*  
*do **not** accept CO<sup>2</sup>* 1
- (iii) red blood cells 1

(b) 70

*if no / incorrect answer then*

*70 000 000*

**or**

*280 x 0.25 gains 1 mark*

*ignore doubling the answer*

2

(c) allows more gas / oxygen / CO<sub>2</sub>  
(exchange)

*do **not** accept air*

1

**[6]**

**9**

(a) (i) chloroplast

1

(ii) cell wall

1

(b) (i) osmosis

*accept diffusion*

1

(ii) cell wall (prevents bursting)

1

(c) (i) carbon dioxide

*allow correct formula*

1

glucose

*allow sugar / starch*

1

(ii) any **two** from:

- light sensitive spot detects light
- tells flagellum to move towards light
- more light = more photosynthesis

2

(d) (cell has) larger SA:volume ratio

1

short (diffusion) distance

*allow correct description*

1

(diffusion) via cell membrane is sufficient / good enough

or

flow of water maintains concentration gradient

1  
[11]

10

(a) (i) xylem

1

(ii) water

1

minerals / ions / named example(s)

*ignore nutrients*

1

(b) (i) movement of (dissolved) sugar

*allow additional substances, eg amino acids / correct named sugar  
(allow sucrose / glucose)*

*allow nutrients / substances / food molecules if sufficiently qualified*

*ignore food alone*

1

(ii) sugars are made in the leaves

1

so they need to be moved to other parts of the plant for respiration / growth / storage

1

(c) (i) mitochondria

1

(ii) for movement of minerals / ions

*Do not accept 'water'*

1

against their concentration gradient

1

[9]

11

(a) any **two** from:

- only one 'chromosome'  
*allow one strand of DNA*
- circular  
*allow loop*
- may have plasmids
- not in a nucleus / no nucleus

2

- (b) (i) any **one** from:
- London is much higher  
*or converse*
  - more variable / wider range  
*allow 'on average it is 5 / 6 times greater'*
- 1
- (ii) increases  
*Included figures must be correct*
- 1
- (iii) overall slight increase  
*accept 'doesn't change much'*
- 1
- variable / goes up and down
- 1
- (c) (i) both axes correctly labelled
- x = Year
- y = Number of cases
- 1
- correct points
- all correct = 2 marks*
- 1-2 errors = 1 mark*
- > 2 errors = 0 marks*
- 2
- suitable line of best fit  
*accept straight line or smooth curve*
- 1
- (ii) doesn't fit the pattern / line of best fit
- 1
- (d) provides immunity / protection (to TB)  
*ignore 'stops people catching it'*  
*ignore 'resistance'*
- 1
- prevents TB spreading  
*accept ref to herd immunity*
- 1

[13]