

WJEC (Wales) Biology GCSE
Topic 2.2 Cell Division and
Stem Cells
Questions by Topic - Mark
Scheme

1.

Question		Marking details	Marks Available					
(a)	(i)	Nucleus;	1					
	(ii)	<table border="1"> <tr> <td>46,46;</td> <td>23,23,23,23;</td> </tr> <tr> <td>Growth/replacement of {worn out/damaged/old} cells/repair damaged tissue; NOT producing new cells</td> <td></td> </tr> <tr> <td></td> <td>Different/ non identical;</td> </tr> </table>	46,46;	23,23,23,23;	Growth/replacement of {worn out/damaged/old} cells/repair damaged tissue; NOT producing new cells			Different/ non identical;
46,46;	23,23,23,23;							
Growth/replacement of {worn out/damaged/old} cells/repair damaged tissue; NOT producing new cells								
	Different/ non identical;							
(b)	(iii)	Gametes;	1					
	(i)	Repair tissue/replace damaged tissues/{treat/cure} disease(named disease e.g. bone marrow transplants/ Parkinson's/blindness/repairing {tendon/joint injury}/spinal cord repair);	1					
	(ii)	Involves {destruction of/damaging} embryos/loss of potential life; Leading to ethical/religious/moral objection; 2 nd point linked to 1 st point	2					
Question 1 Total			[9]					

2.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(a)	2	<ul style="list-style-type: none"> Same number of chromosomes; {Identical/same} genes/genetically identical/ same DNA/ genetically the same; 	they have 46 chromosomes/ they are diploid/ same amount of chromosomes	Clone/	Full set of chromosomes / same genetics
(b)	(i)	1	Gametes;		
	(ii)	2	Meiosis; correct spelling Half (the number)/ haploid;	23 chromosomes/ half the amount of chromosomes	Reference to number of cells
(c)	(i)	1	<u>new corals</u> remain attached to parent		
	(ii)	2	1.34 (written on answer line) = 2 marks 1.34 m (not written on answer line) = 2 marks Allow 1 mark if answer expressed in cm (134) Allow 1 mark for (8.5x14) +15 but incorrect answer Allow 1 mark for 1.34 (not written on the answer line and without any units		
Total Mark		8			

3.	Mark	Answer
	6	Indicative content:
	QWC	<p>Mitosis: - 2 cells produced Daughter cells genetically identical to parent/ each other/ clones Same number of chromosomes as parent cell/ diploid Used for growth and cell replacement/ asexual reproduction.</p> <p>Meiosis:- 4 cells produced Daughter cells genetically different to parent/ each other/ not clones Half the chromosomes of parent cell/ haploid Used for sexual reproduction/ fertilisation/ gamete production Leading to variation (allowing natural selection)</p> <p>5-6 marks The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</p> <p>3-4 marks The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</p> <p>1-2 marks The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant inaccuracies in spelling, punctuation and grammar.</p> <p>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit.</p>

4.	Question	Marking details	Marks Available
4	(a)	(i) On diagram 46 and 46;	1
		(ii) Replace worn out cells/ repair damages tissue;	1
	(b)	(i) Four; Identical/ same;	2
		(ii) Gametes;	1
		Question 4 Total	[5]

5.	Question	Marking details	Marks Available
	(a)	Meiosis (correct spelling required);	1
	(b)	STAGE 2 - 23, 23, 46, 46; STAGE 3 – 4 cells each containing 23;	1 1
	(c)	Gametes/sex cells/sperm/eggs/ova; NOT daughter cells	1
	(d)	Different;	1
	(e)	Growth/cell replacement/repair (of damaged) <u>tissues/cells</u> ; NOT asexual reproduction/mitosis/bacterial reproduction/ replication/ cloning	1
	Question 5 Total		[6]

6.	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
	(a)	1 1	Mitosis; correct spelling Any one from: <ul style="list-style-type: none"> two <u>daughter/ new</u> cells/ <u>daughter</u> cells have same chromosome number as the mother cell; 	There is only one division	Genetically identical to mother cell/ there are only two cells	
	(b) (i)	1	Column 1 80 Column 2 23 Both correct for 1 mark			
	(ii)	2	4; Gametes/ sperm/ egg;			
	(c)	1	Correctly (must include 2 stages and name of at			

7.

Marking details	Marks available					
	AO1	AO2	AO3	Total	Maths	Prac
<p><i>Indicative content</i></p> <ul style="list-style-type: none"> Correctly identify A as mitosis and B as meiosis <p><u>Mitosis</u></p> <ul style="list-style-type: none"> produces two (daughter) cells, each with 4 chromosomes/ same number of chromosomes as {first/ mother} cell genetically identical/ clones growth/ repair /replacement of cells /asexual reproduction <p><u>Meiosis</u></p> <ul style="list-style-type: none"> produces 4 cells, each with 2 chromosomes/half number of chromosomes genetically different/ not clones gametes/sexual reproduction <p>5 – 6 marks At least seven correct statements from indicative content <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.</i></p> <p>3 – 4 marks At least four correct statements from indicative content <i>There is a line of reasoning which is partially coherent, largely relevant, and with some structure.</i></p> <p>1 – 2 marks At least one correct statement from indicative content <i>There is a basic line of reasoning which is not coherent, largely irrelevant, and with very little structure.</i></p> <p>0 marks <i>No attempt made or no response worthy of credit.</i></p>						
Question 7 total	3	3	0	6	0	0

8.

Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
(c)	(i)	1	Mitosis (correct spelling)		
(c)	(ii)	1	Meiosis (correct spelling)		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
9	(a)		Traditional: can stand sooner/ after two days (1) Reject stand sooner because bone healed Stem cell: faster healing/ higher percentage of bone healing / less invasive (1)		2		2		
	(b)	(i)	2 (1) 46 (1)	2			2		
		(ii)	Differentiate/ specialise/ become bone cells	1			1		
		(iii)	cancer	1			1		
	(c)		(The belief that) {taking/destroying} a {(potential) life/ embryo} (is wrong) Reject references to babies/the foetus/emotive expressions	1			1		
	Question 9 Total			5	2	0	7	0	0

Question			Marking details	Marks Available												
10	(a)	(i)	Stem (cells);	1												
		(b)	<table border="1"> <thead> <tr> <th>Function of cell division</th> <th>Part of cell which controls cell division</th> <th>Number of chromosomes in each cell</th> </tr> </thead> <tbody> <tr> <td>increases the number of cells; ✓</td> <td>cytoplasm</td> <td>twice as many as in the cells in Stage 1</td> </tr> <tr> <td>increases the size of each cell</td> <td>nucleus; ✓</td> <td>same number as in the cells in Stage 1; ✓</td> </tr> <tr> <td>keeps the number of cells the same</td> <td>cell membrane</td> <td>half as many as in the cells in Stage 1</td> </tr> </tbody> </table>	Function of cell division	Part of cell which controls cell division	Number of chromosomes in each cell	increases the number of cells; ✓	cytoplasm	twice as many as in the cells in Stage 1	increases the size of each cell	nucleus; ✓	same number as in the cells in Stage 1; ✓	keeps the number of cells the same	cell membrane	half as many as in the cells in Stage 1	3
			Function of cell division	Part of cell which controls cell division	Number of chromosomes in each cell											
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	increases the size of each cell	nucleus; ✓	same number as in the cells in Stage 1; ✓													
keeps the number of cells the same	cell membrane	half as many as in the cells in Stage 1														
(c)	Destruction of {embryonic cells/ embryos/ potential life} ;	1														
Question 10 total			[5]													

11.	Question	Marking details	Marks Available
11	(a)	(Obama) believes that embryonic stem cell research will lead to the {treatment/ cure} of many diseases/ treat {damaged tissue/ or correct example}. (OWTTE);	1
		(Gingrich) – reference to the ethical issues involved eg destruction of {embryos/ foetus/ <u>unborn</u> children}/ life is lost/ destroying (potential human) life; NOT - playing God	1
	(b)	(i) <u>stem</u> cells;	1
		(ii) avoids ethical issues of {using/killing} {unborn children/ embryos/ foetus}/ cells more likely to be accepted by the body/less likelihood of rejection; NOT less chance of transfer of disease/ nothing is killed/ less controversial unqualified	1
Question 11 Total			[4]

12.	Sub-section	Mark	Answer	Accept	Neutral answer	Do not accept
	(a)	2	undifferentiated/ not specialised; can turn into/grow into/ change into/ can differentiate into different kinds of {cells/tissues/organs};	Named cell/ tissue/ organ		
	(b)	1	Any one from: <ul style="list-style-type: none"> • Destruction of life/ destruction of embryos/ • {reduced/no} {ethical/ moral} issues / {less/no} public disquiet; 	Religious issues/ embryos do not have a choice		playing god
	(c)	1	1 and 5;			
	Total Mark	4				