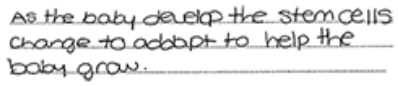
Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1			C D E A B ✓✓	2 (2 x AO 1.1)	D correct ✓ A before B ✓ **Examiner's Comments** This question discriminated well between the marks given. A third of candidates however thought the cell divided before DNA replication and the movement of chromosomes. **Assessment for learning** Knowledge gap identified in candidates' understanding of key stages in the cell cycle. The candidates would benefit from revisiting this key knowledge throughout the GCSE course.
			Total	**2**	
2		i	**Any two from:** Idea that stem cells are undifferentiated / unspecialised ✓ Idea can divide into any type of cell in the body ✓ Which form tissues and organs ✓	2 (2 ×AO 1.1)	**ALLOW** stem cells can specialise / can differentiate **Examiner's Comments** This question was challenging for the candidates. The majority of candidates gave generic responses such as 'stem cells divide to make the baby grow and develop'. They did not demonstrate understanding that they are undifferentiated cells that have the ability to divide into any type of cell that makes the baby. Very few candidates gained maximum marks.

					Assessment for learning Knowledge gap identified in AO1 knowledge and understanding of stem cells. Candidates would benefit with the reinforcement of stem cells to increase their knowledge and understanding. Exemplar 1  Exemplar 1 demonstrates the knowledge and understanding gap of the role of embryonic stem stells in the development into a baby.
		ii	**First check the answer on answer line** **If answer = 16 award 3 marks** Conversion: (2 days) = 48 (hours) ✓ (48 ÷ 12) = 4 (divisions) ✓ (4 divisions) = 16 (cells) ✓	3 (3 ×AO 2.2)	**ALLOW** 12 × 4 = 48 = 2 days for two marks **ALLOW** diagram showing 4 divisions **Examiner's Comments** This question discriminated well between candidates at different grades with an equal range of marks given from 0 through to maximum. Most candidates were able to work out that there were 48 hours in two days and some managed to apply this knowledge that four divisions would be possible. Very few candidates then went on to show their understanding of mitosis to work out there would be 16 cells over two days.
			Total	**5**	
3			**A**	1 (AO 2.1)	
			Total	**1**	
4			**B**	1 (AO 2.2)	**ALLOW** -8.8% **Examiner's Comments**

					This proved the most challenging multiple choice question by calculating percentage change. Candidates' responses ranged equally from A-D.
			Total	**1**	
5			(Stem cells) can differentiate/specialise into muscle/heart cells/tissue ✓ The heart will then beat more efficiently ✓ Idea that more oxygen/glucose supply to the body (cells) ✓	3 (3 × AO 2.1)	**ALLOW** they can replace damaged cells / develop into/change/divide/become muscle cells/tissue **IGNORE** fix/repair muscle cells **IGNORE** replace scar tissue **ALLOW** idea of stronger heartbeat **IGNORE** pump more blood **Examiner's Comments** This question proved challenging for the candidates with a high level of no response to the question. Those candidates who scored only gained one mark and very few gained full marks. The most common given mark was correctly identifying that the heart will beat more efficiently. Candidates who did not gain marks stated what stem cells are without applying it to the question and referring that those cells would specialise into muscle/heart cells.
			Total	**3**	
6			Prevent rejection ✓	1 (1 × AO 2.1)	**ALLOW** do not attack the cells/no immune response **IGNORE** same DNA **ALLOW** ORA for using donor stem cells **Examiner's Comments** This question was challenging for the candidates. The most common none scoring response was that the stem cells are their own cells.
			Total	**1**	

7	a	i	Correctly identifies the centre cell on the right-hand side ✓	1 (1 × AO 2.1)	**Examiner's Comments** This question challenged many of the candidates and the majority did not apply their understanding of mitosis to the cell images.  **Assessment for learning** Centres could use real microscope images to illustrate cell division when teaching this part of the syllabus.
		ii	Correctly identifies a nucleus ✓	1 (1 × AO 2.1)	**DO NOT ALLOW** arrow not touching the nucleus **Examiner's Comments** The majority of candidates scored this mark. Those who didn't gain the mark did a 'no response' and did not attempt the question.
	b		Contains meristem cells / cell division/mitosis occurs ✓	1 (1 × AO 2.1)	**ALLOW** stem cells **ALLOW** multiply **IGNORE** auxins / growth **Examiner's Comments** This question was challenging for the candidates. The majority of candidates gave generic answers like 'it's more visible'. They did not demonstrate their understanding that root tips are where meristem cells are located for cell division.
			Total	**3**	
8			B ✓	1 (AO 1.1)	**ALLOW** 2
			Total	**1**	
9			C ✓	1 (AO 2.2)	
			Total	**1**	