OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



MARK SCHEME

B4.2 HOW DO WE KNOW ABOUT MITOCHONDRIA AND OTHER CELL STRUCTURES? (HIGHER)

SCORE	PERCENTAGE
/16	%

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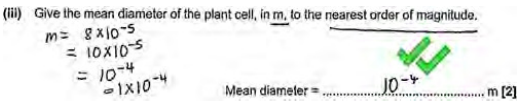
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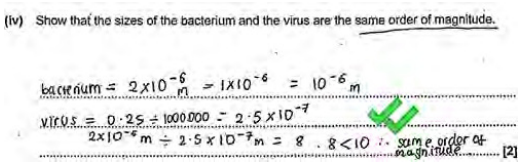
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Question			Answer/Indicative content	Marks	Guidance
1	a		Width answers i.e. 4 x larger ✓ Area answers i.e. 12 – 20 x larger ✓✓ Volume answers i.e. 60 – 70 x larger ✓✓✓	3	If estimates are incorrect allow max 2 marks for appreciation of area (1 mark) and volume (2 marks). Explanation is for using width or area or volume.
	b	i	Nucleus ✓	1	
		ii	10 ✓	1	
		iii	Only need one egg cell / makes it easier for sperm to find egg cell ✓ RBC needs to move through small spaces / need lots of RBCs ✓	2	ALLOW idea of food storage in egg cell
			Total	7	
2		i	mitochondrion	1	
		ii	circular piece of DNA	1	
		iii	cell membrane	1	Examiner's Comments About half of the candidates recognised that bacterial cells did not contain mitochondria with 'circular piece of DNA' generally being the most common misconception. Cell wall was probably the most common misconception seen for (ii) but most candidates recognised circular piece of DNA as the correct response for this question. There was no obvious pattern to the incorrect answers for (iii).
			Total	3	
3		i	80 (μm) ✓	1 (AO 2.2)	check for answer written in table Examiner's Comments This question assessed mathematical skill 1b, recognise and use expressions in standard form. Candidates appeared to be unaware of how many (μm) were in a (m) or could not deal with the number in standard form.

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Question			Answer/Indicative content	Marks	Guidance
		ii	2×10^{-6} (m) ✓	1 (AO 2.2)	check for answer written in table Examiner's Comments This question assessed mathematical skill 1b, recognise and use expressions in standard form. Only approximately 20% of candidates correctly stated that 2 μm was equivalent to 2×10^{-6} m. This is a key area for candidates to improve their knowledge.
		iii	FIRST CHECK THE ANSWER ON ANSWER LINE If answer = 10^{-4} (m) award 2 marks $8 \times 10^{-5} \approx 10 \times 10^{-5}$ ✓ $\times 10^{-4}$ (m) ✓	2 (AO 2.2 × 2)	Examiner's Comments This question assessed mathematical skill 2h, make order of magnitude calculations. Most candidates could not carry out the calculation. Exemplar 6  (iii) Give the mean diameter of the plant cell, in m, to the nearest order of magnitude. $m = 8 \times 10^{-5}$ $= 10 \times 10^{-5}$ $= 10^{-4}$ $= 1 \times 10^{-4}$ Mean diameter = 10^{-4} m [2] This response is credited with both mark points as they have shown that the diameter is 8×10^{-5} which is nearly 10×10^{-5} giving the nearest order of magnitude to be 10^{-4}.

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Question			Answer/Indicative content	Marks	Guidance
		iv	2 ÷ 0.25 = 8 / bacterium is 8 times larger ✓ which is less than 10 times larger (so they are the same) order of magnitude) ✓	2 (AO 2.2 × 2)	<u>Examiner's Comments</u> This question assessed mathematical skill 2h, make order of magnitude calculations. Most candidates could not carry out the calculation. As with parts (i) & (ii) this is an area that candidates require an improvement in their knowledge. Exemplar 7  (iv) Show that the sizes of the bacterium and the virus are the same order of magnitude. bacterium = $2x10^{-6}$ m = $1x10^{-6}$ = 10^{-6} m virus = 0·25 ÷ 1000000 = $2·5x10^{-7}$ $2x10^{-6}$ m ÷ $2·5x10^{-7}$ m = 8 . 8<10 ∴ same order of magnitude [2] This response shows that the bacterium is 8 times larger (1st mark point) and that this is less than 10 times larger, so they are of the same order of magnitude. .
			Total	6	

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