OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



MARK SCHEME

B2.2 HOW DO ORGANISMS PROTECT THEMSELVES AGAINST PATHOGENS? (FOUNDATION)

SCORE	PERCENTAGE
/43	%

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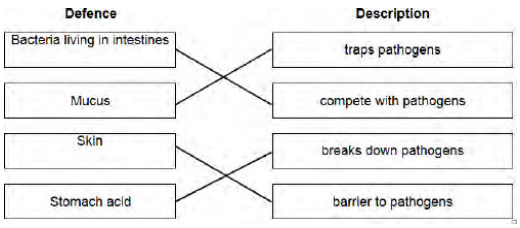
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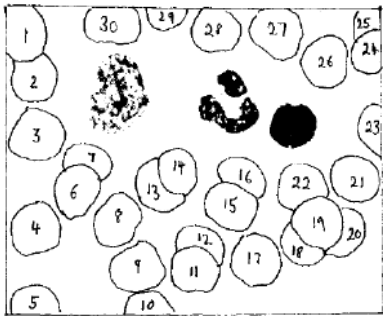
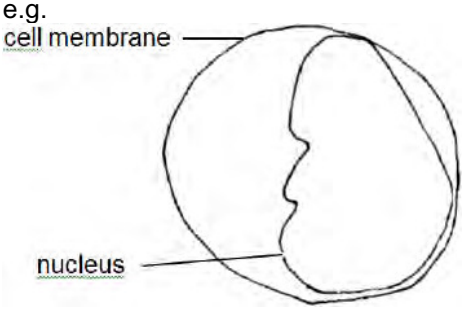
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Question			Answer/Indicative content	Marks	Guidance
1		i	Less photosynthesis ✓	1	ALLOW less light absorbed / plant stops growing
		ii	Any one from Physical e.g. cuticle / cell wall ✓ Antimicrobial chemicals ✓	1	
			Total	2	
2			Antibodies ✓	1	If more than one box is ticked, do not award the mark even if the correct box is also ticked
			Total	1	
3	a		Leaf cuticle ✓ Cell wall ✓	2	
	b			2	Three lines correct = 2 marks One or two lines correct = 1 mark
			Total	4	
4	a		Fights infection Clots blood Transports (dissolved) substances / example of dissolved substance / cells	3	Idea of transport required not what it contains Ignore oxygen Examiner's Comments Most candidates were aware of the function of white blood cells, however, this was not the case with platelets and plasma.
	b		No nucleus Concave / bi concave / large surface area	2	Examiner's Comments The simple cell structure of the nucleus was not recognised by many candidates, however the biconcave nature of red blood cells was better known, however over half the candidates failed to gain any marks in this part.
			Total	2	

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Question			Answer/Indicative content	Marks	Guidance
5	a		10 : 1 / 8 : 1 ✓	1	 If all red blood cells are estimated as whole cells as shown above, then ratio is 10 : 1  If partial or overlapping red blood cells are estimated as half cells as shown above, then ratio is 8 : 1
	b		Correct cell drawn **AND** taking up 50% or more of space ✓ Continuous, unfeathery lines, no shading ✓ Label lines drawn with a ruler ✓ Nucleus **AND** cell membrane correctly labelled ✓	4	Drawing should take up approximately 50% of space e.g. 
			Total	**5**	

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Question			Answer/Indicative content	Marks	Guidance
6			Level 3 (5–6 marks) Includes some basic and some higher components with an explanation of what they do. Quality of written communication does not impede communication of science at this level. Level 2 (3–4 marks) Include some structural components with an explanation of what they do. Quality of written communication partly impedes communication of science at this level. Level 1 (1–2 marks) Include some basic structural component(s) OR one component explained Quality of written communication impedes communication of science at this level. Level 0 Insufficient or irrelevant science. Answer not worthy of credit.	6	This question is targeted at grades up to G Indicative scientific points may include: *Specific* Higher • hormones – chemical messengers • glucose – for respiration • carbon dioxide – from respiration • urea – waste • plasma (explained) carries substances Basic • red blood cells – haemoglobin – transport oxygen • white blood cells – destroy micro-organisms • platelets – clot blood • plasma (identified) – liquid part of blood *General* • Level 2 and 3 should include an explanation of what the components do. Use the L1, L2, L3 annotations in Scoris; do not use ticks. Examiner's Comments This six-mark extended-writing question differentiated well with many candidates showing that they had learned the basic structures associated with blood. However a number of candidates were confused with the functions of the red and white blood cells.
			Total	0	

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Question			Answer/Indicative content	Marks	Guidance
7	a		damage; toxins	2	**accept** any indication of correct choice eg lines from words **Examiner's Comments** This was a well answered question, many candidates knew both damage and toxins.
	b		idea of doubling; 6400	2	**accept** doubling even if does not start from 100, for 1 mark or **allow** 1 numerical mistake with correct method for 1 mark Doubling must be **bacteria numbers** not time correct answer scores 2 marks **Examiner's Comments** This question asked the candidates to calculate the number of bacteria present in Jake's cut after 2 hours and required them to be able to show how they arrived at their answer. Very few of the candidates were awarded 1 mark for demonstrating that they knew that doubling had occurred and this mark was awarded for their working. Centres need to remind candidates that showing the working is important and may lead to marks being awarded even if the answer is incorrect.
	c		bacteria multiply **rapidly;** dead / damaged cells and / or toxins will increase **rapidly;** antibodies kill bacteria / lock onto; the sooner the antibodies are produced, the **less** damage will be caused **Total**	3 **7**	first, second, fourth points must be qualified **ignore** grow **ignore** spread **ignore** “fight” **reject** antibodies engulf (and kill) bacteria **Examiner's Comments** This question required candidates to use the information from parts (a) and (b) to explain why it was important to produce antibodies quickly. It was disappointing to see that many had not followed the guidance in the stem of the question.

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Question			Answer/Indicative content	Marks	Guidance
8	a		**Any one from:** infection ✓ death ✓ bleeding ✓ damage to other cells, tissues or organs ✓	1 (AO 2.1) 2 (AO 3.2b × 2)	**IGNORE** won't be able to have children / the operation could go wrong / cancer could spread / scarring Examiner's Comments This AO2 question was designed to test how candidates applied their understanding of the Ideas about Science chapter B7. Candidates, including those who obtained higher marks overall, found this question difficult. The majority suggested the risk to be the inability to have children or that the cancer could spread.
	b	i	**Any one from:**from day 1 to day 6 there is no change innumber of white blood cells ✓ number of white blood cells **starts to** fall on day 6 (after treatment) ✓ number of white blood cells falls (rapidly) on day 7 (after treatment) ✓ the number of white blood cells falls 7-14 days (after treatment) ✓ **AND** **Any one from:** the number of white blood cells is at its lowest 14 days (after treatment) ✓ the number of white blood cells (starts to) rise on or from 14 days (after treatment) ✓ the number of white blood cells increases **rapidly** on or from day 15 (after treatment) ✓		**ALLOW** lowest between days 13-14 (after treatment) **IGNORE** number of white blood cells starts to rise on day 15

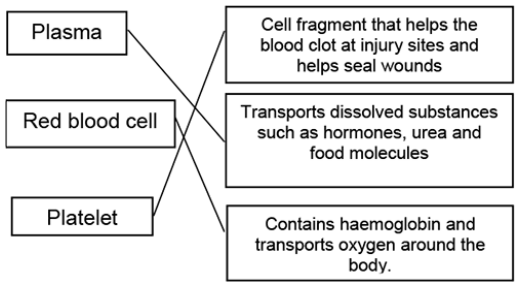
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Question			Answer/Indicative content	Marks	Guidance
			the number of white blood cells has returned to normal 21 days (after treatment) ✓		IGNORE answers that refer to weeks Examiner's Comments Candidates found this AO3 question challenging because they mis-read what they were asked to do. Half of candidates were able to score one or both marks by using information from the graph to describe what happened to the number of white blood cells after chemotherapy. Marks were lost for a number of reasons, namely – not using information from the graph to describe the trend – attempting to identify key days on the graph but drawing slanting or inaccurate lines from the line to the x axis – attempting to explain why the number of white blood cells changed – using vague descriptions such as "after a couple of weeks the white blood cells slowly start to increase to a suitable amount"

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Question			Answer/Indicative content	Marks	Guidance
		ii	**Any two from:** white blood cells engulf or ingest **and** digest pathogens ✓ white blood cells produce antibodies ✓ white blood cells become memory cells in case of re-infection ✓ **AND** **Any one from:** white blood cells contain enzymes to digest pathogens ✓ white blood cells have receptors that recognise antigens on pathogens ✓ the antibodies produced by white blood cells are specific to pathogens ✓	2 (AO 1.1 × 2)	**ALLOW** carry out phagocytosis **NOT** white blood cells produce antigens **Examiner's Comments** This is an AO1 question. It was clear that candidates had been taught about white blood cells but because they did not use scientific language they lost marks. There were many references to "fighting" and "attacking" pathogens and some candidates were confused between the terms antigen and antibody and on occasion between antibody and pathogen. Very few candidates knew how white blood cells are adapted to their function and were therefore limited to two marks.
		iii		2 (AO 1.1 × 2)	two or three correct lines = 2 marks one correct line = 1 mark Examiner's Comments This is an AO1 questions. Candidates scored well on this question with most scoring full marks.
		iv	Eve ✓ Mia ✓	2 (AO 2.1 × 2)	Examiner's Comments Almost all candidates were able to score at least one mark here (most often for identifying Eve), with many correctly identifying both candidates. This question assessed objective AO2.
			Total	10	

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Question			Answer/Indicative content	Marks	Guidance
9			antimicrobial substances kill / protect plants from (death/damage caused by) pathogens/disease(s) ✓ Plus any two from: we depend on plants for food ✓ (photosynthesising) plants add oxygen to the air / remove carbon dioxide from the air / provide breathable air ✓ plants are an essential part of the carbon cycle ✓ all organisms (in an ecosystem) are <u>interdependent</u> ✓	3 (AO 1.1 × 3)	DO NOT ALLOW idea of plants being "immune" to diseases/pathogens <u>Examiner's Comments</u> Higher ability candidates were able to answer this synoptic question well, by linking understanding of plant defences against disease (B2.2.6) to ideas about the interdependence of organisms (B3.3.5) and why humans depend on plants (B3.1.1, B3.3.2 and B3.3.9).
			Total	3	

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