

**UNIT 2: VARIATION, HOMEOSTASIS AND MICRO-ORGANISMS
HIGHER TIER**

MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statements.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)			It makes the reaction faster / speeds up reaction		1		1		
	(b)			Concentration of coffee / mass of coffee / volume of water		1		1		1
	(c)			Any 3 (x 1) from: Gender / sex Age Fasting before test Time interval between drinking and testing.			3	3		3
				Question 1 total	0	2	3	5	0	4

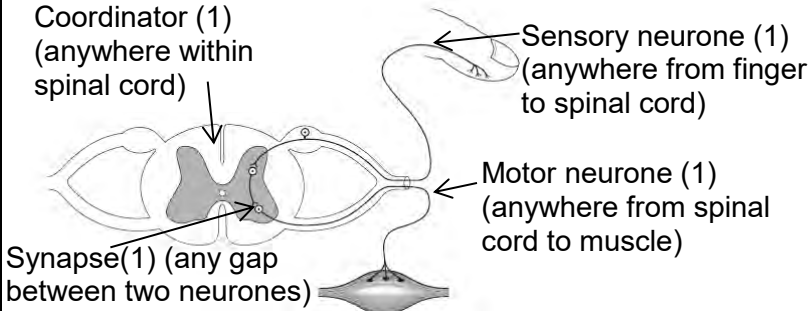
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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			Increases chances of survival (1) Because increase in size means it will have fewer predators/ can run faster (1)			2	2		
	(b)	(i)		Reduction of number/ From four to one (1) Bones become thicker(1)		2		2		
		(ii)		Greater surface area prevents sinking in marsh land		1		1		
				Question 2 total	0	3	2	5	0	0

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			They can differentiate into many types of cells	1			1		
	(b)			Cells will not be rejected (1) No ethical objections (1)	2			2		
				Question 3 total	3	0	0	3	0	0

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)		The bacteria enter via drinking water			1	1		
		(ii)		The bacteria were being killed by chlorine		1		1		
	(b)	(i)		To act as a control			1	1		1
		(ii)		Ionising radiation increases chance of mutation in bacteria (1) so they become resistant to antibiotics (1) New antibiotics are needed to replace resistant ones (1)			3	3		
				Question 4 total	0	1	5	6	0	1

Question				Marking details	Marks Available						
					AO1	AO2	AO3	Total	Maths	Prac	
5	(a)			<p>Correct labels = 4x1</p> <p>Coordinator (1) (anywhere within spinal cord)</p> <p>Synapse(1) (any gap between two neurones)</p>  <p>Sensory neurone (1) (anywhere from finger to spinal cord)</p> <p>Motor neurone (1) (anywhere from spinal cord to muscle)</p>	4						
	(b)	(i)		Reflex arc	1						
		(ii)		Three arrows correct (one on each neurone)	1						
		(iii)		Temperature / heat		1					
				Question 5 total	6	1	0	7	0	0	

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Question			Marking details			Marks Available														
						AO1	AO2	AO3	Total	Maths	Prac									
6	(a)	(i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>N</td> <td>n</td> </tr> <tr> <td>N</td> <td>NN</td> <td>Nn</td> </tr> <tr> <td>n</td> <td>Nn</td> <td>nn</td> </tr> </table> <p>Gametes (1) Correct mechanics of square (1)</p>				N	n	N	NN	Nn	n	Nn	nn		2		2		
			N	n																
N	NN	Nn																		
n	Nn	nn																		
		(ii)	3/4 / 6/8				1		1	1										
	(b)	(i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>N</td> <td>n</td> </tr> <tr> <td>n</td> <td>Nn</td> <td>nn</td> </tr> <tr> <td>n</td> <td>Nn</td> <td>nn</td> </tr> </table> <p>Gametes (1) Correct mechanics of square (1)</p>				N	n	n	Nn	nn	n	Nn	nn		2		2		
			N	n																
n	Nn	nn																		
n	Nn	nn																		
		(ii)	50%				1		1	1										
	(c)		Discontinuous			1			1											
			Question 6 total			1	6	0	7	2	0									

Question			Marking details	Marks Available						
				AO1	AO2	AO3	Total	Maths	Prac	
7	(a)		Grow crop of GM flax and add herbicide (1) If plants survive, they are resistant and also have fish oil genes (1)		2					2
	(b)		Cheaper than using fish (1) Conserves fish stocks (1)			2				
	(c)	(i)	Attitudes more positive / GM crops accepted by more people			1				
		(ii)	$\frac{(36 - 12)}{12} \times 100$ (1) 200% (1)		2			2		
			Question 7 total	0	4	3	7	2		2

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)			All the wild rats are resistant		1		1		
	(b)			Any 2 (x1) from: Use rats of same age Increase size of sample Use rats of known resistance			2	2		2
	(c)			Very small decrease in survival with increase in concentration for wild rats/ very high decrease in laboratory-bred rats (1) Neither wild rats nor laboratory-bred rats are all killed by highest concentration of Warfarin (1).		1	1	2		
	(d)			$85 - 5 = 80$		1		1	1	
	(e)			Any 4 (x1) from: Mutation (1) in a gene caused resistance (1) Allowed them to survive/ Non-resistant died (1) Natural selection took place (1) They bred to pass on gene (1).	4			4		
	(f)			Scientists knew that they were all non-resistant to Warfarin / certain of the genotypes (1).		1		1		1
				Question 8 total	4	4	3	11	1	3

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(a)	(i)		B		1		1		
		(ii)		C		1		1		
		(iii)		C		1		1	1	
		(iv)		A		1		1	1	
		(v)		B		1		1		
		(vi)		C		1		1	1	
	(b)			8		1		1	1	
	(c)	(i)		Plasmodium	1			1		
		(ii)		mosquito	1			1		
				Question 9 total	2	7	0	9	4	0

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Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
10	(a)			Boiling denatures / destroys protein		1		1		
	(b)			Cheaper		1		1		
	(c)	(i)		Memory cell	1			1		
		(ii)		Antibodies	1			1		
		(iii)		Mitosis	1			1		
	(d)			Human rights / religious beliefs / fear of side effects	1			1		
				Question 10 total	4	2	0	6	0	0

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
11	(a)	(i)		They have been introduced from another country		1		1		
		(ii)		The variety of species (1) number of each species (1)	2			2		
	(b)	(i)		$\frac{45 \times 47}{29}$ (1) 73 (1)	1	1		2	2	2
		(ii)		Any 3 (x1) from: Immigration Births Emigration Predation/ deaths not enough samples	3			3		3
				Question 11 total	6	2	0	8	2	5

Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
12	<p>Indicative content: ADH production by brain / hypothalamus. Less ADH produced when water intake is high. This results in higher volume of less concentrated urine because less water is re-absorbed into the blood by the nephrons. More ADH produced when water intake is low. This results in lower volumes of more concentrated urine because more water is re-absorbed into the blood by the nephrons.</p> <p>5 – 6 marks: Detailed correct explanation of ADH production and effect in both high and low water intake. <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i></p> <p>3 – 4 marks: Less ADH produced when water intake is high. This results in large volumes of dilute urine because less water is re-absorbed. <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i></p> <p>1-2 marks: Some attempt to link the production of hormone with water intake and urine production. <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i></p> <p>0 marks: No attempt made or no response worthy of credit.</p>	6			6		
	Question 12 total	6	0	0	6	0	0

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