



GCE

Biology B (Advancing Biology)

Unit **H022/01**: Foundations of biology

Advanced Subsidiary GCE

Mark Scheme for June 2018

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotation	Meaning
DO NOT ALLOW	Answers which are not worthy of credit
IGNORE	Statements which are irrelevant
ALLOW	Answers that can be accepted
()	Words which are not essential to gain credit
—	Underlined words must be present in answer to score a mark
ECF	Error carried forward
AW	Alternative wording
ORA	Or reverse argument

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt <u>not</u> given
	error carried forward
	information omitted
	ignore
	Blank page
	Marking point partially met
	Underline (for ambiguous / contradictory wording)
	contradiction

Subject-specific Marking Instructions**INTRODUCTION**

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

SECTION A

Question	Answer	Marks	Guidance
1	B	1	
2	C	1	
3	C	1	
4	D	1	
5	B	1	
6	D	1	
7	A	1	
8	C	1	
9	A	1	
10	B	1	
11	C	1	
12	D	1	
13	A	1	
14	A	1	
15	C	1	
16	C	1	
17	B	1	
18	D	1	
19	A	1	
20	B	1	
	Total	20	

Question			Answer	Marks	Guidance
21	(a)	(i)	<i>It is a measure of:</i> species richness / number of species in a habitat ✓ species evenness / relative abundance of individuals in each species ✓	2	ALLOW number of species in an (given) area ALLOW AW but must have the idea that it is the number of organisms of each species in the area
	(a)	(ii)	1 Madagascar has lost 90% of (original) habitat AND New Zealand has lost 78% of (original) habitat ✓ 2 Madagascar has 3% (of Earth's endemic) plants AND New Zealand has 0.6% (of Earth's endemic) plants ✓ 3 <u>both</u> have more than 0.5% endemic species and have lost more than 70 % of their habitat ✓ 4 (therefore) <u>both</u> could be identified as biodiversity hotspots ✓ 5 New Zealand has less habitat loss and fewer (of Earth's total endemic) plants than Madagascar ✓	4 max	ALLOW ORA e.g. only 10% for Madagascar and 22% for New Zealand of habitat remaining ALLOW 1 mark for either MP1 or 2 if only data for one region has been analysed e.g. Madagascar has lost 90% of (original) habitat AND Madagascar has 3% (of Earth's) endemic plants ALLOW ECF if calculations in MPs 1 or 2 incorrect ALLOW ECF if calculations in MPs 1 or 2 incorrect ALLOW ORA

SECTION B

Question			Answer	Marks	Guidance
	(b)		description light-coloured (leaves / hairs / spines) ✓ further detail for reflecting radiation / to prevent overheating ✓ description waxy / drip-tip / AW , leaves ✓ further detail to allow excess water to run off (due to humidity) ✓ AVP ✓✓	2 max	IGNORE adaptations relating to shortage of water as it is a humid climate Marks can be awarded for: TWO descriptions OR ONE description and ONE further detail linked to correct description ALLOW for reflecting heat from sunlight e.g. heat-resistant seeds that remain dormant until conditions are suitable for germination = 2 AVP marks
	(c)	(i)	(in) chemotherapy / cancer treatment ✓	1 max	ALLOW to stop , <u>cancer</u> cells dividing / growth of tumours
		(ii)	anaphase ✓	1	
	(d)		0.82 OR 82 % ✓✓	2	If answer incorrect or incorrect number of sig. figs used ALLOW 1 mark for: 46 ÷ 56 OR 0.8 / 0.821 / 82.1 %
			Total	13	

Question			Answer	Marks	Guidance
22	(a)	(i)	1 (methotrexate) is a competitive inhibitor ✓ 2 <i>idea that maximum rate can still be achieved:</i> as , methotrexate / inhibitor , is not bound permanently (to active site) ✓ 3 if concentration of , dihydrofolate / substrate , is much greater than , methotrexate / inhibitor ✓ 4 if in higher concentration , dihydrofolate / substrate , is more likely to bind (to active site) than , methotrexate / inhibitor ✓	3 max	IGNORE reference to enzyme concentration ALLOW (as) binding of inhibitor (to active site) is reversible ALLOW MP3 from clearly labelled graph MP3 and 4 are comparative so idea that concentration of substrate must be high relative to inhibitor ALLOW ORA for MP 3 and 4
		(ii)	Adenine AND Guanine ✓	1	BOTH required for one mark
		(iii)	purines are components of DNA / AW ✓ little / no , DNA replication / synthesis ✓ stops cell(s) from dividing ✓ little / no , protein synthesis ✓	2 max	IGNORE can't synthesise nucleotides / purines
	(b)		prevents aggregation of platelets / AW ✓	1	ALLOW prevents the formation of blood clots IGNORE inhibits enzymes IGNORE prevents fever IGNORE 'blood thinner'
			Total	7	

Question			Answer	Marks	Guidance										
23	(a)		<table><tr><th>Property of water</th><th>Importance to living organism</th></tr><tr><td>is a solvent ✓</td><td>allows chemical reactions to take place inside cells</td></tr><tr><td>has a high latent heat of vaporisation</td><td>cooling effect by evaporation of , water / sweat ✓</td></tr><tr><td>cohesion ✓</td><td>allows a continuous column of water to move through xylem vessels without breaking</td></tr><tr><td>has a high specific heat capacity</td><td>prevents internal temperature changing quickly / AW OR temperature of aquatic environments remains stable / AW ✓</td></tr></table>	Property of water	Importance to living organism	is a solvent ✓	allows chemical reactions to take place inside cells	has a high latent heat of vaporisation	cooling effect by evaporation of , water / sweat ✓	cohesion ✓	allows a continuous column of water to move through xylem vessels without breaking	has a high specific heat capacity	prevents internal temperature changing quickly / AW OR temperature of aquatic environments remains stable / AW ✓	4	ONE mark per row. ALLOW dissolves , polar molecules / ions IGNORE adhesion ALLOW helps maintain stable body temperature
Property of water	Importance to living organism														
is a solvent ✓	allows chemical reactions to take place inside cells														
has a high latent heat of vaporisation	cooling effect by evaporation of , water / sweat ✓														
cohesion ✓	allows a continuous column of water to move through xylem vessels without breaking														
has a high specific heat capacity	prevents internal temperature changing quickly / AW OR temperature of aquatic environments remains stable / AW ✓														
	(b)	(i)	X condensation AND Y hydrolysis ✓	1	BOTH required for one mark										
		(ii)	triglyceride AND (three) water ✓	1	BOTH required for one mark										
		(iii)	ester ✓	1	IGNORE covalent										
	(c)	(i)	<table><tr><td>1</td><td>(C.jejuni) always present (in the population) / AW ✓</td></tr><tr><td>2</td><td>increasing infections between February and July ✓</td></tr><tr><td>3</td><td>peaks in July ✓</td></tr><tr><td>4</td><td>decline in infections from July to December ✓</td></tr><tr><td>5</td><td>comparative data quoted ✓</td></tr></table>	1	(C.jejuni) always present (in the population) / AW ✓	2	increasing infections between February and July ✓	3	peaks in July ✓	4	decline in infections from July to December ✓	5	comparative data quoted ✓	2 max	e.g. peaks at 33% in July dropping to 16% in December = MPs 3,4 and 5 ALLOW +/- 0.5 for percentage figures.
1	(C.jejuni) always present (in the population) / AW ✓														
2	increasing infections between February and July ✓														
3	peaks in July ✓														
4	decline in infections from July to December ✓														
5	comparative data quoted ✓														

Question			Answer	Marks	Guidance
	(c)	(ii)	<i>support suggestion</i> idea that there is no / little , infection present then sudden increase (during these months) ✓ <i>against suggestion</i> idea that the data does not show number of people with the infection ✓ idea that the size of the population would be needed ✓	2 max	ALLOW no / little , infection present but rises quickly to 38 % by July e.g. there may only be a small number of people with the infection that year
	(d)	(i)	(M-N measured at 43mm)10 800 (x) ✓✓	2	ALLOW 2 marks for correct calculation if M-N is measured between 42 and 43mm If answer incorrect: ALLOW 1 mark for e.g. (using 43mm) $43\text{mm} \div 4 \mu\text{m} / 4.3\text{cm} \div 4\mu\text{m}$ OR $43000 \div 4$ OR 10 750
		(ii)	(<i>C. jejuni</i>) would stain , pink / red (with Gram stain) ✓ (because) peptidoglycan cell wall is covered by lipopolysaccharide layer OR (because) the peptidoglycan cell wall is very thin ✓ (so) purple stain / crystal violet , is washed out (by alcohol) ✓ safranin / counter-stain / pink stain , binds to peptidoglycan cell wall ✓	3 max	ALLOW (<i>C. jejuni</i>) is Gram -ve
			Total	16	

Question			Answer	Marks	Guidance
		(ii)	<i>restored blood would have</i> fewer blood cells ✓ lower concentration of (plasma) proteins ✓ lower concentration of glucose / oxygen ✓ higher concentration of carbon dioxide ✓	2 max	ALLOW ORA for <i>blood that has been lost</i> ALLOW named blood cells / platelets ALLOW named plasma protein e.g. albumin NOTE: 'concentration' need only be seen once for MPs 2-4 e.g. 'lower concentration of plasma proteins and higher carbon dioxide' = 2 marks If 'concentration' has not been used in MPs 2-4 one mark can be awarded for two correct 'ideas' e.g. fewer proteins and less oxygen = 1 mark
			Total	9	

Question			Answer	Marks	Guidance												
25	(a)		mast (cells) ✓ histamine ✓ exocytosis ✓ capillary (walls) ✓	4	IGNORE blood vessels												
	(b)		<table><tr><th>Drug</th><th>Reduce inflammation of the bronchi</th><th>Widen the lumen of the bronchi</th><th>Can be used during an acute asthma attack</th></tr><tr><td>Corticosteroids</td><td>✓</td><td>✗</td><td>✗</td></tr><tr><td>Beta-agonists</td><td>✗</td><td>✓</td><td>✓</td></tr></table> ✓✓	Drug	Reduce inflammation of the bronchi	Widen the lumen of the bronchi	Can be used during an acute asthma attack	Corticosteroids	✓	✗	✗	Beta-agonists	✗	✓	✓	2	ONE mark per row
Drug	Reduce inflammation of the bronchi	Widen the lumen of the bronchi	Can be used during an acute asthma attack														
Corticosteroids	✓	✗	✗														
Beta-agonists	✗	✓	✓														
			Total	6													

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