



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
BOD	benefit of the doubt
NBOD	benefit of the doubt <u>not</u> given
ECF	error carried forward
▲	information omitted
I	ignore
BP	Blank page
●	Marking point partially met
~~~~	Underline (for ambiguous / contradictory wording)
CON	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)	<p><i>It is a measure of:</i></p> <p>species richness / number of species in a habitat ✓</p> <p>species evenness / relative abundance of individuals in each species ✓</p>	2	<p><b>ALLOW</b> number of species in an (given) area</p> <p><b>ALLOW</b> AW but must have the idea that it is the number of organisms of each species in the area</p>
	(a)	(ii)	<p>1 Madagascar has lost 90% of (original) habitat <b>AND</b> New Zealand has lost 78% of (original) habitat ✓</p> <p>2 Madagascar has 3% (of Earth's endemic) plants <b>AND</b> New Zealand has 0.6% (of Earth's endemic) plants ✓</p> <p>3 <u>both</u> have more than 0.5% endemic species and have lost more than 70 % of their habitat ✓</p> <p>4 (therefore) <u>both</u> could be identified as biodiversity hotspots ✓</p> <p>5 New Zealand has less habitat loss and fewer (of Earth's total endemic) plants than Madagascar ✓</p>	4 max	<p><b>ALLOW</b> ORA e.g. only 10% for Madagascar and 22% for New Zealand of habitat remaining</p> <p><b>ALLOW</b> 1 mark for <b>either</b> MP1 <b>or</b> 2 if only data for one region has been analysed e.g. Madagascar has lost 90% of (original) habitat <b>AND</b> Madagascar has 3% (of Earth's) endemic plants</p> <p><b>ALLOW</b> ECF if calculations in MPs 1 or 2 incorrect</p> <p><b>ALLOW</b> ECF if calculations in MPs 1 or 2 incorrect</p> <p><b>ALLOW</b> ORA</p>

## SECTION B

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

Question		Answer		Marks	Guidance
22	(a)	(i)	<p>1 (methotrexate) is a competitive inhibitor ✓</p> <p><b>idea that maximum rate can still be achieved:</b> as , methotrexate / inhibitor , is not bound permanently (to active site) ✓</p> <p>3 if concentration of , dihydrofolate / substrate , is much greater than , methotrexate / inhibitor ✓</p> <p>4 if in higher concentration , dihydrofolate / substrate , is more likely to bind (to active site) than , methotrexate / inhibitor ✓</p>	3 max	<p><b>IGNORE</b> reference to enzyme concentration</p> <p><b>ALLOW</b> (as) binding of inhibitor (to active site) is reversible</p> <p><b>ALLOW</b> MP3 from clearly labelled graph MP3 and 4 are comparative so idea that concentration of substrate must be high relative to inhibitor</p> <p><b>ALLOW</b> ORA for MP 3 and 4</p>
		(ii)	Adenine <b>AND</b> Guanine ✓	1	<b>BOTH</b> 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	<b>IGNORE</b> can't synthesise nucleotides / purines
		(b)	prevents aggregation of platelets / AW ✓	1	<p><b>ALLOW</b> prevents the formation of blood clots</p> <p><b>IGNORE</b> inhibits enzymes</p> <p><b>IGNORE</b> prevents fever</p> <p><b>IGNORE</b> 'blood thinner'</p>
			<b>Total</b>	7	

Question		Answer		Marks	Guidance										
23	(a)		<table border="1"> <thead> <tr> <th>Property of water</th> <th>Importance to living organism</th> </tr> </thead> <tbody> <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 <b>OR</b> temperature of aquatic environments remains stable / AW ✓</td> </tr> </tbody> </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 <b>OR</b> temperature of aquatic environments remains stable / AW ✓	4	<p>ONE mark per row.</p> <p><b>ALLOW</b> dissolves , polar molecules / ions</p> <p><b>IGNORE</b> adhesion</p> <p><b>ALLOW</b> helps maintain stable body temperature</p>
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 <b>OR</b> temperature of aquatic environments remains stable / AW ✓														
	(b)	(i)	X condensation <b>AND</b> Y hydrolysis ✓	1	<b>BOTH</b> required for one mark										
		(ii)	triglyceride <b>AND</b> (three) water ✓	1	<b>BOTH</b> required for one mark										
		(iii)	ester ✓	1	<b>IGNORE</b> covalent										
	(c)	(i)	<table border="1"> <tr> <td>1</td> <td>(<i>C.jejuni</i>) 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	( <i>C.jejuni</i> ) 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	<p>e.g. peaks at 33% in July dropping to 16% in December = MPs 3,4 and 5</p> <p><b>ALLOW</b> +/- 0.5 for percentage figures.</p>
1	( <i>C.jejuni</i> ) 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)	<p><i>support suggestion</i>  <b>idea that there is</b> no / little , infection present then sudden increase (during these months) ✓</p> <p><i>against suggestion</i>  <b>idea that</b> the data does not show number of people with the infection ✓</p> <p><b>idea that</b> the size of the population would be needed ✓</p>	2 max	<p><b>ALLOW</b> no / little , infection present but rises quickly to 38 % by July</p> <p>e.g. there may only be a small number of people with the infection that year</p>
(d)	(i)	(M-N measured at 43mm)10 800 (x) ✓✓	2	<p><b>ALLOW</b> 2 marks for correct calculation if M-N is measured between 42 and 43mm</p> <p>If answer incorrect:</p> <p><b>ALLOW</b> 1 mark for</p> <p>e.g. (using 43mm)</p> $43\text{mm} \div 4 \mu\text{m} / 4.3\text{cm} \div 4\mu\text{m}$ <p><b>OR</b></p> $43000 \div 4$ <p><b>OR</b></p> $10\ 750$
	(ii)	<p>(<i>C. jejuni</i>) would stain , pink / red (with Gram stain) ✓</p> <p>(because) peptidoglycan cell wall is covered by lipopolysaccharide layer</p> <p><b>OR</b></p> <p>(because) the peptidoglycan cell wall is very thin ✓</p> <p>(so) purple stain / crystal violet , is washed out (by alcohol) ✓</p> <p>safranin / counter-stain / pink stain , binds to peptidoglycan cell wall ✓</p>	3 max	<b>ALLOW</b> ( <i>C. jejuni</i> ) is Gram -ve
			Total	16

Question		Answer	Marks	Guidance
24	(a)	(i) readings appear on screen ✓ easier for person to take their own blood pressure ✓  data can be collected remotely ✓ blood pressure can be monitored over longer periods of time ✓ easier to take repeat readings / AW ✓ less misinterpretation of data ✓	1 max	<b>ALLOW</b> easier to read <b>ALLOW</b> can be used at home / non-trained person can use it  <b>ALLOW</b> can be monitored more regularly
		(ii) person may be , active / moving / not sitting down ✓  <i>idea that</i> cuff may be wrong size for the person ✓ AVP ✓	2 max	<b>IGNORE</b> any references to improper technique or observer bias <b>IGNORE</b> references that relate to only digital monitors or faulty monitors <b>ALLOW</b> person not been at rest before starting  e.g. cuff does not inflate correctly e.g. patient is nervous e.g. patient is stressed e.g. patient has 'white coat syndrome'
		(iii) <i>less suitable because:</i> <i>idea that</i> (systolic) , pressure / reading taken , would be higher ✓ <i>idea that</i> (systolic) , pressure / reading taken , would be most different to that in aorta / AW ✓ <i>idea that</i> radial artery is furthest away from aorta / AW ✓  <i>more suitable because:</i> easier to use on the wrist ✓	2 max	<b>ALLOW</b> ORA  <b>ALLOW</b> ORA  <b>ALLOW</b> ORA
	(b)	(i) less tissue fluid is formed ✓  (because) less (hydrostatic) pressure at arteriole end of capillary ✓	2	<b>ALLOW</b> less blood plasma forced , out of capillaries / into tissues

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

Question		Answer				Marks	Guidance												
25	(a)	mast (cells) ✓ histamine ✓ exocytosis ✓ capillary (walls) ✓				4	IGNORE blood vessels												
	(b)	<table border="1"> <thead> <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> </thead> <tbody> <tr> <td>Corticosteroids</td> <td>✓</td> <td>✗</td> <td>✗</td> </tr> <tr> <td>Beta-agonists</td> <td>✗</td> <td>✓</td> <td>✓</td> </tr> </tbody> </table> <span style="font-size: 2em;">✓✓</span>				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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