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GCE

Biology B

H022/01: Foundations of biology

Advanced Subsidiary GCE

Mark Scheme for June 2019

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

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

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

SECTION B

Question			Answer	Marks	Guidance
21	(a)		(lenticels) to allow diffusion of gases between atmosphere and intercellular spaces (of stem) ✓ (because) stems , become woody / develop bark ✓ not enough leaves therefore insufficient stomata ✓	2 max	
	(b)	(i)	<i>idea that</i> changes in water table levels would affect the validity of the results ✓ changes in the water table level can be accounted for when analysing results ✓	1 max	When crediting examples below wording about the three zones on the question paper can be used e.g. (if water table rises) seedlings in Zone , A / B , could also be waterlogged so results would not be valid e.g. (if water table drops) seedlings in Zone , B / C , could also be in dry soil so results would not be valid IGNORE results won't be , reliable / repeatable / fair IGNORE reference to controlling water levels

Question			Answer	Marks	Guidance
	(c)	(ii)	no , data (for zones B and C) / conclusions can be drawn , at start of investigation / at week 0 ✓ (mean) number of lenticels for zone B increases (over period of the investigation) ✓ (mean) number of lenticels is greater in zone C at 3 and 7 weeks ✓ (mean) number of lenticels for zone C increases up to 7 weeks and then levels out ✓ range bars show there is no difference , in (mean) number of lenticels at 13 weeks ✓ comparative figures used ✓	2 max	IGNORE reference to zone A ALLOW descriptions for zones B and C e.g. wet or saturated and waterlogged or wetland ALLOW ORA e.g. there is only data available from week 3 ALLOW error bars ALLOW correct reference to overlap of range bars For zone B: week 3 is 1.5 week 7 is 11 and week 13 is 14.5 For zone C: week 3 is 6.5 week 7 is 14.25 and week 13 is 14
	(d)	(i)	mitosis / cell division / tissue development ✓ response to infection by plant pathogen ✓	1 max	ALLOW e.g. increase in the number of cells e.g. bark formation
	(d)	(ii)	active transport cannot take place ✓ lack of oxygen (due to waterlogging) ✓ (means) less , aerobic respiration / ATP production ✓ leaching of nutrients ✓	2 max	ALLOW nutrients are taken up by active transport IGNORE air ALLOW named nutrient e.g. nitrates
			Total	11	

Question		Answer	Marks	Guidance
22	(a)	<i>Adaptation</i> increased brain size ✓ <i>Advantage</i> enabled problem solving ✓ OR <i>Adaptation</i> change / increase , in leg length ✓ <i>Advantage</i> (allowed) bipedalism / walking on two legs ✓ OR <i>Adaptation</i> bipedalism / walking on two legs ✓ <i>Advantage</i> more efficient way of walking / use of hands e.g. tools or hunting ✓ OR <i>Adaptation</i> body became (more) upright / AW ✓ <i>Advantage</i> (allowed) use of hands e.g. tool use or hunting ✓	2 max	IGNORE prompt lines ALLOW other <u>anatomical</u> adaptations e.g. enlarged heels for , weight-bearing / energy conservation during movement Advantage must be linked to adaptation ALLOW bipedalism only ONCE as an adaptation OR advantage ALLOW e.g. sign language communication ALLOW e.g. exposed smaller surface area of body to sun so enabled hominids to live on plains.
	(b)	named theory e.g. 'gossip' / 'mother tongue' ✓	3 max	

Question			Answer	Marks	Guidance
			<i>(methods)</i> example of using fossil , evidence / records ✓ example of archeological evidence ✓ example of genetics linked to language development ✓ comparisons with other , species / hominids ✓ use of computer simulation ✓		e.g. hyoid bone e.g. artefacts e.g. FOXP2 gene / genes linked to autism e.g. descended larynx in humans / observing primates
	(c)		polynucleotide / antiparallel ✓ phosphodiester ✓ condensation ✓ pyrimidine ✓ guanine ✓	5	ALLOW phonetic spelling e.g. piramidine
			Total	10	

Question			Answer	Marks	Guidance
23	(a)	(i)	thrombin / enzyme , converts fibrinogen to fibrin ✓ (variegin) has a similar shape to fibrinogen ✓ (so) can occupy the <u>active site</u> of , thrombin / enzyme ✓ (variegin) prevents , fibrinogen binding to <u>active site</u> / enzyme-substrate complex formation ✓ slower rate of conversion of fibrinogen to fibrin ✓ (action of variegin) not permanent / temporary ✓	3 max	DO NOT ALLOW incorrect enzyme ALLOW substrate for fibrinogen where it has already been mentioned in MP1 DO NOT ALLOW same shape ALLOW 'fit into' or 'binds to' for occupy For MPs 3 and 4 active site only needs to be mentioned once ALLOW ESC If MP1 has been awarded accept slower rate of reaction or slower rate of product formation for MP5
	(a)	(ii)	(curve) Y AND (at high substrate concentrations) reaches same maximum rate of reaction as (curve) X / AW OR (curve) Z shows non-competitive inhibition ✓	1	e.g. the rate of enzyme activity reaches that of enzyme without inhibitor Y must have been given as the response but then this ORA can be awarded for a reason
	(a)	(iii)	51 (%) ✓ ✓	2	IGNORE ± ALLOW one mark for correct response but incorrect sig. figs. e.g. 51.4% OR $\frac{87.5 - 42.5}{87.5} \times 100$

Question			Answer	Marks	Guidance
24	(a)	(i)	<i>A.fumigatus</i> does not normally cause disease but remains in soil / AW ✓ <i>A. fumigatus</i> causes disease only when host immune system is weakened / AW ✓	1 max	
	(a)	(ii)	(fungus) releases , enzymes / toxins ✓ enzymes break down , tissues / cells ✓ (fungus) produces , spores / hyphae, that invade tissues ✓	2	ALLOW secretes enzymes / excretes toxins ALLOW named enzymes e.g. proteases
	(b)	(i)	sputum is spread thinly on a microscope slide ✓ use of fixative ✓ use of (differential) stain to distinguish fungal cells ✓	2 max	ALLOW e.g. use another slide to scrape across to produce , smear / thin layer ALLOW named fixative e.g. methanol ALLOW e.g. fungal cells being visible in the sputum by staining technique / AW

Question			Answer	Marks	Guidance															
24	(b)	(ii)	x 200 ✓✓	2	If answer incorrect accept the following for 1 mark: <u>1cm</u> OR <u>10mm</u> OR <u>10000</u> 50µm 50µm 50															
	(c)		<table><tr><th>Feature</th><th>Scanning electron microscope</th><th>Transmission electron microscope</th></tr><tr><td>The electron beam reflects off the surface of the specimen</td><td>✓</td><td></td></tr><tr><td>A 3-D image is produced</td><td>✓</td><td></td></tr><tr><td>Heavy metals are used to stain or coat the specimen</td><td>✓</td><td>✓</td></tr><tr><td>Specimens must be extremely thin</td><td></td><td>✓</td></tr></table> ✓✓✓✓	Feature	Scanning electron microscope	Transmission electron microscope	The electron beam reflects off the surface of the specimen	✓		A 3-D image is produced	✓		Heavy metals are used to stain or coat the specimen	✓	✓	Specimens must be extremely thin		✓	4	1 mark for each correct row
Feature	Scanning electron microscope	Transmission electron microscope																		
The electron beam reflects off the surface of the specimen	✓																			
A 3-D image is produced	✓																			
Heavy metals are used to stain or coat the specimen	✓	✓																		
Specimens must be extremely thin		✓																		
			Total	11																

Question			Answer	Marks	Guidance
25	(a)	(i)	need to know how many women and men have non-gender related cancers ✓	1	ALLOW number of women and men who have the other cancers ALLOW anus, mouth and throat cancers for non-gender related cancers
	(a)	(ii)	(young men) do not suffer from cervical cancer ✓ (young men) may not be sexually active ✓ financial implications / AW ✓ lack of awareness of benefits of vaccinating (young men) ✓	2 max	IGNORE effect on health / risks of vaccine / ALLOW don't have a cervix e.g. could be unnecessary cost as they don't need to be vaccinated
	(b)	(i)	active (immunity) and passive (immunity) ✓ active (immunity) e.g. antibody production following , infection /exposure to antigen OR active (immunity) e.g. protected by memory cells produced following infection ✓ passive (immunity) e.g. where antibodies passed from mother to fetus through placenta OR passive (immunity) e.g. where antibodies passed from mother to baby through , breast milk / colostrum ✓	3	Only credit responses involving <u>natural</u> immunity ALLOW mp1 within examples even if examples are incorrect

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