

GCE

Biology B (Advancing Biology)

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

Advanced Subsidiary GCE

Mark Scheme for June 2017

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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.





OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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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 not 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	D	1	
2	B	1	
3	D	1	
4	A	1	
5	B	1	
6	C	1	
7	D	1	
8	A	1	
9	A	1	
10	A	1	
11	B	1	
12	B	1	
13	D	1	
14	C	1	
15	A	1	
16	C	1	
17	B	1	
18	C	1	
19	D	1	
20	C	1	
	Total	20	

SECTION B

Question			Answer	Marks	Guidance
21	(a)	(i)	Q and R ✓	1	Both required for 1 mark
		(ii)	R ✓	1	
		(iii)	S ✓	1	
	(b)		<i>idea that</i> an oxygen atom would be removed from , the OH group / part of molecule labelled Q ✓	1	IGNORE different nitrogenous base ALLOW would contain deoxyribose instead of ribose
	(c)		degenerate ✓ AND (because) <i>idea that</i> there is more than one codon for (most) amino acids ✓ triplet (code) ✓ AND (because) <i>idea that</i> three bases are needed to code for one amino acid ✓ non-overlapping ✓ AND <i>idea that</i> the sequence is read so that each base is only part of one , codon / triplet ✓	4 max	IGNORE reference to universal (code) The description must be linked to the correct named feature ALLOW description without feature provided it is not contradicted ALLOW triplet (code) anywhere in response for 1 mark if mentioned in correct context
	(d)	(i)	double helix ✓ (polynucleotide) strand / sugar-phosphate backbone , held by strong , covalent / phosphodiester , bonds ✓	1 max	IGNORE reference to addition of histones DO NOT ALLOW alpha (α) helix DO NOT ALLOW strong hydrogen bonds
		(ii)	<i>idea that</i> proteins that are no longer required do not continue to be synthesised ✓	1	ALLOW <i>idea that</i> mRNA can be broken down quickly to stop over production of protein IGNORE reference to RNA mutations
			Total	10	

Question		Answer	Marks	Guidance
22	(a)	tonoplast ✓	1	
	(b)	(i)	2 max	Control measure must be linked to variable described. IGNORE same volume of solution in test tubes IGNORE time in solution ALLOW e.g. SA or diameter or thickness or length of beetroot discs for size <i>idea that</i> the discs have the same dimensions is required for mp1 ALLOW micrometer or laser sensor or callipers to measure thickness or length
		Any two variables with control measure same size of beetroot discs AND use (cork) borer to cut discs OR use , gauge / ruler , to measure , thickness / length ✓ temperature AND use a water bath ✓ colour of beetroot discs AND cut discs from same beetroot (plant) ✓		
		(ii)	4 max	ALLOW as pH increases, transmission increases e.g. at pH 10 the absorbance is , very low / less than 0.1 ALLOW ora if high pH is explained
		<i>description</i> as pH increases , absorption decreases ✓ data quote from graph ✓ <i>explanation</i> at low pH the solution , is more acidic / has more, protons / H ⁺ ions ✓ <i>idea that</i> H ⁺ ions / protons , denature proteins so disrupt the (cell) membranes ✓ <i>idea that</i> H ⁺ ions / protons , affect ionic bonds in (membrane) proteins ✓ (so) permeability of the (cell) membranes to betanin increases ✓ max 3 for explanation		
	(c)	(has) phospholipid bilayer ✓	2 max	

Question		Answer	Marks	Guidance
		(so) hydrophobic region prevents betanin passing OR (so) prevents diffusion of water soluble substances ✓ (has) channel / carrier , proteins ✓ <i>idea that</i> these proteins are specific so control movement of , betanin / water soluble substances ✓		ALLOW ora
	(d)	(i) <i>idea that</i> it is triggered by , damaged cells / entry of pathogens ✓ mast cells release histamine ✓ (histamine causes) vasodilation ✓ (so) increases blood flow to area ✓ capillary walls become more permeable ✓ (so) easier for phagocytes to leave the blood ✓	3 max	ALLOW dilation of , blood vessels / arterioles
		(ii) <i>idea that</i> betanin prevents cytokines binding to cell surface receptors of target cells ✓	1	IGNORE reference to enzyme / active site / inhibition e.g. betanin binds to cytokines betanin binds to cell surface receptors betanin competes with cytokines for receptor binding site
		Total	13	

Question		Answer	Marks	Guidance
23	(a)	(i)	3 max	<p>Max 2 for description of technique</p> <p>e.g. sound waves emitted into mother's body are reflected back by fetus e.g. transducer can be used to provide different angles (to view BPD)</p>
		(ii)	2	<p>ALLOW white line measurements of 44-46mm</p> <p>If answer not given to two significant figures allow 1 mark for: <i>44mm</i> 33.1 / 33.08 <i>45mm</i> 33.8 / 33.83 <i>46mm</i> 34.6 / 34.59 OR Correct working e.g. 45 divided by magnification of 1.33</p>
		(iii)	1	<p>ALLOW ECF from Q23aii ALLOW any estimate within this range e.g. 10.2 weeks</p>
		(iv)	2	<p>e.g. smoking / nutrition / caffeine / drug use</p>
	(b)		5	
			Total	13

Question		Answer	Marks	Guidance
24	(a)	<p><i>PEFR</i> the maximum rate at which air is forcibly exhaled ✓</p> <p><i>FEV₁</i> the volume of air that can be forcibly breathed out in , one second / first second ✓</p>	2	IGNORE amount of air
	(b)	<p>4.4 (dm³) ✓✓</p> <p><i>conclusion</i> FEV₁ is lower than predicted value so could have respiratory problem ✓</p>	3	<p>If answer not given to one decimal place allow 1 mark for correct working i.e. (7.525 – 0.638) - 2.49 OR 4.397</p> <p>ALLOW named respiratory problem e.g. asthma</p>
	(c)	<p>small puffs of air ✓ OR head not tilted back as far ✓</p>	1	IGNORE references to CPR on a small child
		Total	6	

Question		Answer			Marks	Guidance
25	(a)				3	Award one mark per row Green dot to indicate a correct box (partial answer) within a row.
		Type of vaccine	Features of the vaccine	Advantage		
		Live / attenuated	Non-pathogenic modified strains of , the bacteria / virus , are used	Stronger immune response OR long lasting immunity	✓	
		Isolated extracted antigens	specific antigens are used (that trigger immune response)	Can produce vaccines for different strains of bacteria / viruses	✓	
		Killed inactivated pathogens	pathogens killed by , heat / chemicals OR antigens still present (to trigger immune response)	more stable than live vaccine OR Safer than live vaccine OR doesn't need refrigeration OR can be given to patients with weakened immune systems	✓	

	(b)	(i)	<i>idea that</i> group two could be used as a comparison OR control group ✓	1	
		(ii)	<i>idea that</i> healthy participants were being given untested vaccine ✓ <i>idea that</i> group 2 were being given the vaccine later than group 1 ✓ <i>idea that</i> group 2 were given the vaccine after known incubation time for the Ebola virus ✓ <i>idea that</i> only communities with new cases of Ebola could participate in the trial ✓ <i>idea that</i> group 2 may think that they , would be immune to / wouldn't become infected with , Ebola ✓	2 max	IGNORE participants not having a choice e.g. healthy people may suffer side effects e.g. unethical to split into two groups as group 2 still exposed to Ebola
		(iii)	100% effective if given immediately / AW ✓ <i>idea that</i> it is still effective after incubation period ✓	2 max	ALLOW data processing for mp 2 e.g. only 0.5% new cases in group 2
			Total	8	

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