OCR
Oxford Cambridge and RSA

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.

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 **not** 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	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)		*idea that* 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) *idea that* there is more than one codon for (most) amino acids ✓ triplet (code) ✓ **AND** (because) *idea that* three bases are needed to code for one amino acid ✓ non-overlapping ✓ **AND** *idea that* 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)	*idea that* proteins that are no longer required do not continue to be synthesised ✓	1	**ALLOW** *idea that* 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)	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) ✓	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 *idea that* the discs have the same dimensions is required for mp1 **ALLOW** micrometer or laser sensor or callipers to measure thickness or length
		(ii)	*description* as pH increases , absorption decreases ✓ data quote from graph ✓ *explanation* at low pH the solution , is more acidic / has more, protons / H+ ions ✓ *idea that* H+ ions / protons , denature proteins so disrupt the (cell) membranes ✓ *idea that* H+ ions / protons , affect ionic bonds in (membrane) proteins ✓ (so) permeability of the (cell) membranes to betanin increases ✓ ***max 3 for explanation***	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
	(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 ✓ *idea that* these proteins are specific so control movement of , betanin / water soluble substances ✓		**ALLOW** ora
	(d)	**(i)**	*idea that* 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)	*idea that* 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)	ultrasound (scan)✓ *idea that* image of fetus is produced on , monitor / screen ✓ description of how image is produced ✓ ***max 2*** head of fetus is measured at widest point (for BPD) ✓	3 max	**Max 2 for description of technique** 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)
		(ii)	34 ± 1 ✓✓	2	**ALLOW** white line measurements of 44-46mm If answer not given to two significant figures allow 1 mark for: *44mm* 33.1 / 33.08 *45mm* 33.8 / 33.83 *46mm* 34.6 / 34.59 **OR** Correct working e.g. 45 divided by magnification of 1.33
		(iii)	9.5 -11 weeks ✓	1	**ALLOW** ECF from Q23aii **ALLOW** any estimate within this range e.g. 10.2 weeks
		(iv)	*idea that* (fetus **B)** is a twin so could be smaller ✓ gender ✓ maternal lifestyle ✓ genetics ✓	2	e.g. smoking / nutrition / caffeine / drug use
	(b)		prophase ✓ homologous ✓ chromatids ✓ chiasma / chiasmata ✓ independent / random , assortment / segregation ✓	5	
			Total	13	

Question			Answer	Marks	Guidance
24	(a)		*PEFR* the maximum rate at which air is forcibly exhaled✓ *FEV_1* the volume of air that can be forcibly breathed out in , one second / first second ✓	2	**IGNORE** amount of air
	(b)		4.4 (dm^3) ✓✓ *conclusion* FEV_1 is lower than predicted value so could have respiratory problem ✓	3	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 **ALLOW** named respiratory problem e.g. asthma
	(c)		small puffs of air ✓ **OR** head not tilted back as far ✓	1	**IGNORE** references to CPR on a small child
			Total	6	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>25</td><td>(a)</td><td></td><td>
<table>
<tr><th>Type of vaccine</th><th>Features of the vaccine</th><th>Advantage</th><th></th></tr>
<tr><td>Live / attenuated</td><td>Non-pathogenic modified strains of , the bacteria / virus , are used</td><td>Stronger immune response
OR
long lasting immunity</td><td>✓</td></tr>
<tr><td>Isolated extracted antigens</td><td>specific antigens are used (that trigger immune response)</td><td>Can produce vaccines for different strains of bacteria / viruses</td><td>✓</td></tr>
<tr><td>Killed inactivated pathogens</td><td>pathogens killed by , heat / chemicals
OR
antigens still present (to trigger immune response)</td><td>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</td><td>✓</td></tr>
</table>
</td><td>3</td><td>Award one mark per row
Green dot to indicate a correct box (partial answer) within a row.</td></tr>
</table>

	(b)	**(i)**	*idea that* group two could be used as a comparison **OR** control group ✓	**1**	
		(ii)	*idea that* healthy participants were being given untested vaccine ✓ *idea that* group 2 were being given the vaccine later than group 1✓ *idea that* group 2 were given the vaccine after known incubation time for the Ebola virus ✓ *idea that* only communities with new cases of Ebola could participate in the trial ✓ *idea that* 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 ✓ *idea that* 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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