

GCE

Biology B

H022/01: Foundations of biology

Advanced Subsidiary GCE

2021 Mark Scheme (DRAFT)

This is a DRAFT mark scheme. It has not been used for marking as this paper did not receive any entries in the series it was scheduled for. It is therefore possible that not all valid approaches to a question may be captured in this version. You should give credit to such responses when marking learner's work.

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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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
Mark Scheme

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1. 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

Marking Annotations

Annotation	Use
	Benefit of Doubt
	Contradiction
	Cross
	Error Carried Forward
	Given Mark
	Extendable horizontal wavy line (to indicate errors / incorrect science terminology)
	Ignore
	Large dot (various uses as defined in mark scheme)
	Highlight (various uses as defined in mark scheme)
	Benefit of the doubt not given
	Tick
	Omission Mark
	Blank Page
	Level 1 answer in Level of Response question
	Level 2 answer in Level of Response question
	Level 3 answer in Level of Response question

2. Subject Specific Marking Instructions

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.

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Question	Answer	Marks	AO element	Guidance
1	C	1	AO2.8	
2	C	1	AO1.2	
3	B	1	AO1.1	
4	B	1	AO1.1	
5	D	1	AO2.2	$40-10-12=22$. $22/40 = 0.55$. $1-0.55=0.45$
6	A	1	AO1.1	
7	A	1	AO1.2	$30-6=24$. $(24/30) \times 100$
8	D	1	AO1.1	
9	C	1	AO1.1	
10	A	1	AO1.2	
11	A	1	AO1.1	
12	A	1	AO1.2	
13	A	1	AO1.2	
14	C	1	AO2.6	$0.15\text{mm} = 150\mu\text{m}$. $(150\mu\text{m}/30\mu\text{m}) \times 60$
15	B	1	AO1.1	
16	D	1	AO1.2	
17	C	1	AO1,1	
18	C	1	AO2.5	
19	B	1	AO2.8	2×2 (relative uncertainty) = 4. $(4/23) \times 100$
20	B	1	AO2.1	
	Total	20		

Question			Answer	Mark	AO element	Guidance
21	(a)	(i)	(revision note) 4 / sister chromatids are separated ✓	1	AO1.2	ALLOW 1 / chromosomes attach to spindle fibres by their centromeres If more than one revision note is given mark the first answer and IGNORE subsequent
		(ii)	prophase I ✓	1	AO1.2	
		(iii)	2 AND diploid cells become haploid ✓	1	AO2.5	IGNORE prompt lines BOTH revision note and correction needed for 1 mark
	(b)		formation of chiasmata ✓ exchange of , genetic material / DNA ✓ new combination of alleles created ✓	2 max	AO1.2	
	(c)	(i)	(fetus is) female ✓ no Y chromosome / (only) X chromosomes ✓ 3 sets of chromosomes / 69 chromosomes ✓ <i>idea that</i> normal number is two sets or 46 chromosomes ✓	3 max	AO3.1	ALLOW triploidy
		(ii)	(in one of the cells / gametes) homologous chromosomes / sister chromatids , didn't separate (during anaphase) ✓ <i>idea that</i> a haploid cell has fertilised a diploid cell ✓	1	AO2.5	ALLOW <i>idea that</i> non-disjunction had occurred (in one of the cells/gametes)
		(iii)	FIRST CHECK ANSWER ON ANSWER LINE If answer = 15 000 award 2 marks 1% = 3 (live births) OR 2% = 300 (pregnancies with abnormality) OR	2	AO2.6	

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			(300 ÷ 2) x 100 ✓ 15 000 ✓✓			
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Question			Answer	Mark	AO element	Guidance
22	(a)	(i)	tight seal around gas pressure sensor ✓ dialysis tubing fully submerged in beaker of water ✓ temperature of water maintained at set value ✓ AVP ✓✓	2 max	AO3.3	Same volume of sucrose solution Same volume of water
		(ii)	air / gas , could leak from the apparatus ✓ readings would be less than expected ✓ OR osmosis can only occur where tubing is , submerged / under water ✓ if not fully submerged then readings would be less than expected ✓ OR increasing temperature could increase pressure so results would be higher than expected ✓ rate of , osmosis / movement of water molecules , would increase with increasing temperature ✓	2 max	AO3.3	Reason must be linked to choice in (i) ALLOW ORA
	(b)	(i)	pressure increases (in both concentrations) due to net movement of water molecules <u>into</u> dialysis tubing ✓ pressure increase in 1.0 moldm ⁻³ solution over time is greater than in 0.6 moldm ⁻³ solution ✓ (because) water potential of 0.6 moldm ⁻³ solution is greater than 1.0 moldm ⁻³ solution ✓ there is a greater difference in water potential between (distilled) water and 1.0 moldm ⁻³ solution ✓	3 max	AO2.7	ALLOW ORA ALLOW ORA

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		(ii)	FIRST CHECK ANSWER ON ANSWER LINE If answer = 0.5 (kPa min⁻¹) award 2 marks 0.5 (kPa min ⁻¹) ✓ ✓	2	AO2.8	ALLOW value in range 0.4 to 0.5

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		(iii)	<p>x-axis with units i.e. sucrose concentration (mol dm^{-3}) AND Y axis with units i.e. rate of pressure change (kPa min^{-1}) ✓</p> <p>at least 50% of grid used AND appropriate scale ✓</p> <p>points plotted accurately AND appropriate line of best fit ✓</p>	3	AO3.1	<p>ALLOW ECF from (ii) for 1.0 mol dm^{-3} value DO NOT ALLOW line starting at zero</p>
		(iv)	<p>0.4 mol dm^{-3} ✓</p>	1	AO3.2	<p>ALLOW ECF from (iii)</p>

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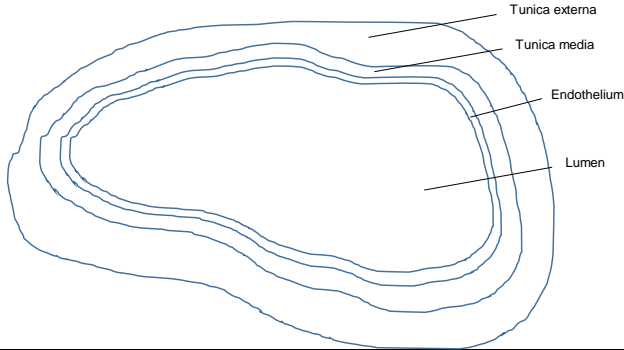
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Question		Answer	Mark	AO element	Guidance
23	(a)	(i)			
		<p><i>advantage</i> can delay onset of symptoms ✓ supports immune system in destroying bacteria / pathogens ✓</p> <p>AVP ✓</p> <p><i>disadvantage</i> (named) side effects ✓ overuse can lead to resistant strains ✓ AVP ✓</p>	2 max	AO2.5	1 max for advantage 1 max for disadvantage
		(ii)			
		(bacterial) colony / cell , morphology ✓	1 max	AO1.2	ALLOW shape of cell / colony
		(iii)			
		diffusion antibiotic sensitivity (test) ✓ <i>idea of using</i> discs impregnated with antibiotics ✓ bacterial sample spread on agar plate with antibiotic discs and incubated ✓ antibiotic diffuses through agar ✓ measure the size of the zone of inhibition ✓ <i>idea that</i> bacterial colonies will not grow around discs containing antibiotic they are sensitive to ✓ <i>idea that</i> the greater the zone of inhibition the , more effective the antibiotic / sensitive the bacteria ✓	4 max	AO1.2	ALLOW Kirby-Bauer (method) ALLOW clear zone for zone of inhibition
	(b)				
		no (peptidoglycan) cell walls ✓ no metabolism ✓ no ribosomes ✓ no protein synthesis ✓	2 max	AO2.1	<i>Responses must refer to viruses</i>

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Question		Answer	Mark	AO element	Guidance
24	(a)	(blood vessels) can maintain blood pressure in the body ✓ different vessels can vary blood pressure ✓ can vary blood , volume / supply , to , tissues / organs ✓ lower blood volume needed ✓	2 max	AO1.2	
	(b)	(i) another line drawn inside to form another layer AND layer labelled smooth muscle ✓ additional labelling e.g. tunica media / elastic fibres ✓ inner line or another thin layer formed AND labelled endothelium ✓ additional labelling e.g. tunica intima ✓ lumen labelled ✓	3 max	AO2.3	
		(ii) holds vein in position / anchors vein to connective tissue ✓ protection from damage ✓ prevents collapse ✓	1 max	AO2.3	
		(iii) <i>artery has</i> smaller lumen ✓ thicker wall ✓ more , smooth muscle / elastic , tissue ✓ both have endothelium ✓	3 max	AO1.2	Must be comparative IGNORE valves (not present in Fig.24.2) MPs 1-3 ALLOW ORA for vein
	(c)	(i) (spirals of) lignin / lignification ✓	1	AO1.1	
		(ii) column of water under negative pressure ✓ (so) prevents collapse of the xylem vessels ✓	2	AO2.2	

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Question		Answer	Mark	AO element	Guidance
25		metastasis / metastases ✓ CT / computerised tomography (scans) ✓ behavioural / lifestyle ✓ ageing / genetics ✓ chemotherapy ✓	5	AO1.2	

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