

Foundation

GCSE

Biology B Twenty First Century Science

J257/01: Breadth in Biology (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2025

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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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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MARKING INSTRUCTIONS

PREPARATION FOR MARKING

RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training: OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor
3. Log-in to RM Assessor and mark the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone, email or via the RM Assessor messaging system.

5. Crossed-Out Responses

Where a candidate has crossed out a response and provided a clear alternative then the crossed-out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed-out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM Assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple-Choice Question Responses

When a multiple-choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).

When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only one mark per response)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth two or more marks)

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space).

Longer Answer Questions (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add the annotation 'SEEN' to confirm that the work has been seen and mark any responses using the annotations in section 11.
7. There is a NR (**No Response**) option. Award NR (No Response):
 - if there is nothing written at all in the answer space
 - OR if there is a comment which does not in any way relate to the question (e.g., 'can't do', 'don't know')
 - OR if there is a mark (e.g., a dash, a question mark) which is not an attempt at the question.

Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The RM Assessor **comments box** is used by your Team Leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:

Read through the whole answer from start to finish, using the Level descriptors to help you decide whether it is a strong or weak answer. The indicative scientific content in the Guidance column indicates the expected parameters for candidates' answers, but be prepared to recognise and credit unexpected approaches where they show relevance. Using a 'best-fit' approach based on the skills and science content evidenced within the answer, first decide which set of level descriptors, Level 1, Level 2 or Level 3, best describes the overall quality of the answer.

Once the level is located, award the higher or lower mark:

The higher mark should be awarded where the level descriptor has been evidenced and all aspects of the communication statement (in *italics*) have been met.

The lower mark should be awarded where the level descriptor has been evidenced but aspects of the communication statement (in *italics*) are missing.

In summary:

The skills and science content determines the level.

The communication statement determines the mark within a level.

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11. Annotations available in RM Assessor

Annotation	Meaning
	Correct response
	Incorrect response
	Omission mark
	Benefit of doubt given
	Contradiction
	Rounding error
	Error in number of significant figures
	Error carried forward
	Level 1
	Level 2
	Level 3
	Benefit of doubt not given
	Noted but no credit given
	Ignore

12. Abbreviations, annotations and conventions used in the detailed Mark Scheme (to include abbreviations and subject-specific conventions).

Annotation	Meaning
/	alternative and acceptable answers for the same marking point
✓	Separates marking points
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

13. 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.

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The breakdown of Assessment Objectives for GCSE (9-1) in Biology B:

	Assessment Objective
AO1	Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
AO2	Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.
AO2.1	Apply knowledge and understanding of scientific ideas.
AO2.2	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
AO3	Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.
AO3.1	Analyse information and ideas to interpret and evaluate.
AO3.1a	Analyse information and ideas to interpret.
AO3.1b	Analyse information and ideas to evaluate.
AO3.2	Analyse information and ideas to make judgements and draw conclusions.
AO3.2a	Analyse information and ideas to make judgements.
AO3.2b	Analyse information and ideas to draw conclusions.
AO3.3	Analyse information and ideas to develop and improve experimental procedures.
AO3.3a	Analyse information and ideas to develop experimental procedures.
AO3.3b	Analyse information and ideas to improve experimental procedures.

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Question			Answer	Marks	AO element	Guidance															
1	(a)		<table><thead><tr><th></th><th>True</th><th>False</th></tr></thead><tbody><tr><td>A healthy person has good mental and physical health.</td><td>✓</td><td></td></tr><tr><td>An unhealthy person always shows symptoms of disease.</td><td></td><td>✓</td></tr><tr><td>An unhealthy person is more likely to get other diseases.</td><td>✓</td><td></td></tr><tr><td>Only pathogens cause disease.</td><td></td><td>✓</td></tr></tbody></table> ✓✓✓		True	False	A healthy person has good mental and physical health.	✓		An unhealthy person always shows symptoms of disease.		✓	An unhealthy person is more likely to get other diseases.	✓		Only pathogens cause disease.		✓	3	1.1	All 4 boxes correct = 3 marks 3 boxes correct = 2 marks 1 or 2 boxes correct = 1 mark
	True	False																			
A healthy person has good mental and physical health.	✓																				
An unhealthy person always shows symptoms of disease.		✓																			
An unhealthy person is more likely to get other diseases.	✓																				
Only pathogens cause disease.		✓																			
	(b)		Treatment Antibiotics Insulin Named disease Cardiovascular disease HIV Salmonella Type 1 diabetes ✓✓	2	1.1	Each treatment correctly linked to named disease = 1 mark More than one line drawn from each treatment = 0 marks for that treatment															
	(c)		HIV ✓ Salmonella ✓	2	1.1																
	(d)	(i)	Protist ✓ Mosquito ✓ Blood ✓	3	1.1																

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Question			Answer	Marks	AO element	Guidance
		(ii)	Any one from: Bed/window nets ✓ Insect repellent / insect killing spray / insecticide / pesticide ✓ Anti-malarial drugs ✓ Vaccination ✓ Keeping body covered by clothes/long sleeves and trousers ✓ Close windows/doors ✓ Avoid areas with lots of mosquitoes ✓ Drain pools of (standing) water/ponds ✓ Kill mosquitoes ✓	1	2.1	ALLOW any sensible suggestion ALLOW mosquito or bug for insect ALLOW insect killer / spray that stops insects biting / anti-mosquito spray IGNORE just 'spray' / bug spray IGNORE disinfectant / detergent IGNORE just medication IGNORE just 'wear clothes' / thick clothes IGNORE just 'don't get bitten by mosquitoes'

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Question			Answer	Marks	AO element	Guidance
2	(a)		Producers ✓ Primary consumers ✓ Tuna ✓	3	2.1	
	(b)	(i)	Mackerel ✓ Tuna ✓	2	2.1	
		(ii)	Marlin Tuna Mackerel ✓✓	2	3.1a	All three correct = 2 marks 1 or 2 correct = 1 mark DO NOT ACCEPT organisms not from the list
	(c)	(i)	Ray- finned fish ✓	1	3.2a	
		(ii)	Rabbits ✓	1	3.2a	

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Question			Answer			Marks	AO element	Guidance
3	(a)			Nervous system	Hormonal system	2	1.1	All three statements correct = 2 marks Two statements correct = 1 mark One statement = 0 marks
			Response is faster.	✓				
			Response is longer lasting.		✓			
			Response is the result of an electrical impulse.	✓				
			✓✓					
	(b)	(i)	B ✓			1	1.1	IGNORE answers circled on diagram
		(ii)	C ✓			1	1.1	IGNORE answers circled on diagram
		(iii)	Any one from: Speeds up (transmission of electrical) impulse ✓ Insulates (the axon) ✓			1	1.1	ALLOW signal for impulse ALLOW description of insulation e.g. stops the impulse escaping/exiting/leaving or holds the impulse IGNORE protect / protect the electrical impulse
	(c)		G ✓			1	1.1	
	(d)	(i)	Brain stem ✓			1	2.1	
		(ii)	Motor ✓			1	2.1	

Question			Answer	Marks	AO element	Guidance
4	(a)	(i)	First check the answer on the answer line. If answer = 6 award 3 marks Any number between 29 and $35 \div 5$ ✓ = 6.4 ✓ = 6 ✓	3	2 x 2.2 1 x 1.2	ALLOW 2 marks for 6.4 seen with no working. ALLOW 1 mark for correct conversion of an incorrect number to a whole number
		(ii)	Mode = 7 ✓	1	2.2	
	(b)	(i)	Idea that as the height increases, the number of spikes decreases ✓ OR Idea that the closer to the ground the leaves are found the number of spikes increases ✓	1	3.2b	
		(ii)	Any one from: Less chance of being eaten (by animal) ✓ Idea that lower leaves need defence mechanism/protection ORA ✓ Less chance of animal reaching the leaves (higher up) ✓ Stop animals getting close ✓	1	3.2a	IGNORE references to berries IGNORE more leaves lower down to stop them being eaten IGNORE more leaf eating insects at the bottom of the tree

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Question			Answer	Marks	AO element	Guidance
		(iii)	Any one from: Test/repeat/sample/use/do it again on more/other holly plants/bushes/trees ✓ Let another student do the same experiment and see if result is similar ✓	1	3.3a	ALLOW different plant/bush/tree unless it is clear that the candidate does not mean holly IGNORE repeat with different leaves IGNORE test in other areas unqualified IGNORE 'repeat' unqualified DO NOT ALLOW repeat in area with fewer sheep
	(c)		Any two from: Idea that they can photosynthesise all year/through the winter/for longer ✓ Glucose/sugar/named sugar/carbohydrate/named carbohydrate produced (all year/through the winter/for longer) ✓ They don't have to regrow leaves ✓ Grow all year/keep on growing ✓ Retain nutrients (as don't lose leaves) ✓	2	2.1	ALLOW absorb light all year round/in the winter/can still take in light ALLOW photosynthesis is still happening IGNORE food
	(d)		Xylem ✓	1	1.1	

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Question			Answer	Marks	AO element	Guidance
5	(a)	(i)	B D A C ✓✓✓	3	2.1	B before D = 1 D before A = 1 A before C = 1
		(ii)	78 ✓	1	2.2	
		(iii)	Mitosis ✓	1	1.1	
		(iv)	Genes switching on/off ✓	1	1.1	ALLOW (cell) differentiation
	(b)	(i)	Lens ✓	1	1.1	
		(ii)	Benefit – restores/improves sight/sight less blurry ✓ Risk – could go blind / idea surgery could go wrong / infection risk / risk of death / could cause other eye conditions / could damage (other parts of) the eye / lens may regrow / lens may be rejected / could come back ✓	2	2.1	ALLOW any other correct risks and benefits ALLOW vision may get worse IGNORE just surgery is risky IGNORE just 'it might not be successful' IGNORE just 'the dog won't have cataracts' IGNORE just 'side effects' IGNORE just 'it will make it worse' IGNORE just 'it might cause further damage' IGNORE references to accuracy or reliability IGNORE stops the dog being affected IGNORE idea that animal surgery is inferior to human surgery

Question			Answer	Marks	AO element	Guidance
6	(a)	(i)	Out of Osmosis Shrink ✓✓	2	1.1	3 correct = 2 marks 2 correct = 1 mark 1 correct = 0 marks
		(ii)	Any one from: Drinking too little ✓ (Excessive) sweating / exercising ✓ Vomiting / diarrhoea ✓ Low insulin ✓ High (blood) glucose/sugar ✓ Diabetes (mellitus) ✓ High salt intake ✓ High (blood) urea ✓	1	2.1	ALLOW any sensible suggestion IGNORE dehydration or not enough water in the body IGNORE just high sugar intake
	(b)	(i)	Urea ✓	1	1.1	IGNORE waste products ALLOW salts/minerals/mineral ions/electrolytes/named mineral ion ALLOW hormones/named hormone ALLOW alcohol/drugs ALLOW glucose
		(ii)	First check the answer on the answer line. If answer = 60 award 2 marks 180 ÷ 3 ✓	2	2.2	

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Question			Answer	Marks	AO element	Guidance															
			= 60 ✓																		
	(c)		Any one from: Idea that less likely to be rejected / more likely to be compatible ✓ Relatives want to help / idea of altruism ✓ Not enough kidneys available ✓ Similar DNA/similar genetics ✓	1	2.1	ALLOW any sensible suggestion ALLOW close match / be accepted ALLOW idea of same blood group/type ALLOW they have 2 kidneys so they can survive with just one IGNORE religion unqualified ALLOW idea that because the person is alive they know the kidney is working well IGNORE share DNA IGNORE same DNA unless qualified															
	(d)		<table><tr><td></td><td>True</td><td>False</td></tr><tr><td>The number of kidney transplants received each year is greater than the number of liver, heart and lung transplants received altogether.</td><td>✓</td><td></td></tr><tr><td>The proportion of transplants received compared to the number of people remaining on the waiting list is smallest for kidney transplants.</td><td>✓</td><td></td></tr><tr><td>The waiting list is highest for kidney transplants.</td><td>✓</td><td></td></tr><tr><td>The waiting list is lowest for heart transplants.</td><td></td><td>✓</td></tr></table> ✓✓		True	False	The number of kidney transplants received each year is greater than the number of liver, heart and lung transplants received altogether.	✓		The proportion of transplants received compared to the number of people remaining on the waiting list is smallest for kidney transplants.	✓		The waiting list is highest for kidney transplants.	✓		The waiting list is lowest for heart transplants.		✓	2	3.2a	4 correct = 2 marks 2 or 3 correct = 1 mark 1 correct = 0 marks
	True	False																			
The number of kidney transplants received each year is greater than the number of liver, heart and lung transplants received altogether.	✓																				
The proportion of transplants received compared to the number of people remaining on the waiting list is smallest for kidney transplants.	✓																				
The waiting list is highest for kidney transplants.	✓																				
The waiting list is lowest for heart transplants.		✓																			

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Question			Answer	Marks	AO element	Guidance
7	(a)	(i)	active site ✓ substrate ✓ respire ✓	3	2.1	
		(ii)	Amino acids ✓	1	1.1	
	(b)	(i)	Any two from: Idea of diversity of living organisms ✓ e.g. species diversity OR number of/different species OR variety/range of/different/differences between living things/organisms/animals AND plants AND microorganisms Idea of genetic diversity ✓ e.g. range/diversity of genes/genetic material Idea of ecosystem diversity ✓ e.g. many/different/diverse habitats/ecosystems	2	1.1	IGNORE references to just animals and/or plants IGNORE just types of organisms

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Question			Answer	Marks	AO element	Guidance
		(ii)	Any two suggestions from these ideas, even if from the same idea: Idea of provision e.g. (biodiversity provides) materials / medicines / resources Idea of interdependence e.g. food chain/web stability / shelter / habitat provision/protection / prevent extinction or endangerment / more resilience to change Idea of nutrient cycling e.g. breaking down waste / carbon sink / photosynthesis / reduction of greenhouse gases / positive impact on climate change / long term stability of planet Idea of agriculture e.g. food production / soil fertility / spreading seeds / pollination Idea of aesthetic value e.g. tourism / well-being ✓✓	2	1.1	ALLOW 1 mark for one correct suggestion ALLOW any sensible suggestion

Question			Answer	Marks	AO element	Guidance									
8	(a)		1 ✓	1	3.1a										
	(b)	(i)	Heterozygous ✓	1	2.1										
		(ii)	Male <table><tr><td></td><td>T</td><td>t</td></tr><tr><td>T</td><td>TT</td><td>Tt</td></tr><tr><td>t</td><td>Tt</td><td>tt</td></tr></table> Female Both parents identified as Tt ✓ Offspring in punnet square TT, Tt, Tt, tt ✓ Probability = 0.25 / 25% / ¼ ✓		T	t	T	TT	Tt	t	Tt	tt	3	2 x 2.1	ALLOW alternative upper- and lower-case letters used instead of Tt ALLOW ECF for offspring and probability if genotype of parents is incorrect DO NOT ALLOW correct offspring from incorrect gametes
	T	t													
T	TT	Tt													
t	Tt	tt													
					1 x 3.1a	ALLOW any equivalent fraction e.g. 25/100 ALLOW 1 in 4 IGNORE ratios ALLOW correct interpretation of probability from diagram shown									

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Question			Answer	Marks	AO element	Guidance
	(c)		Any three from: Idea fluid contains cells from the fetus ✓ Idea that cells contain DNA/genetic material/genes/alleles ✓ Test the DNA/genetic material/alleles/genes / perform a genetic test ✓ (Look to see the fetus has) dominant and/or recessive (alleles) / if they are TT/Tt or tt ✓ <u>Two</u> recessive alleles/homozygous recessive/tt (confirms thalassaemia in the fetus) ✓	3	1.1	ALLOW test the genotype IGNORE just 'test the cells' without reference to what is being tested IGNORE test the fluid IGNORE look for the recessive gene IGNORE look for the genes for thalassaemia ALLOW TT/two dominant alleles or Tt/ one dominant and one recessive allele/heterozygous means the fetus will not have thalassaemia

Question			Answer	Marks	AO element	Guidance
9	(a)		1/3 ✓	1	1.2	
	(b)		Any one from: Idea of restricting/banning hunting/poaching ✓ Idea of nature reserves/national parks/creating protected areas ✓ Idea of preserving/protecting/restoring habitats / protecting food sources/supplementary feeding ✓ Idea of breeding programmes ✓ Idea of reducing predation ✓ Stop illegal trade in ivory ✓ Reduce (named examples of) human elephant conflict ✓ Idea of veterinary care e.g. vaccination ✓ Idea of ecotourism ✓	1	2.1	ALLOW any sensible suggestion ALLOW suggested methods e.g. rangers and tracking ALLOW conservation park ALLOW zoo ALLOW named examples of habitat protection e.g. reducing deforestation ALLOW idea of protecting water supply IGNORE climate change ALLOW selective breeding, (named) assisted reproductive techniques, breed them ALLOW collect sperm and eggs, idea of gene bank IGNORE increasing reproduction unqualified

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Question			Answer	Marks	AO element	Guidance
	(c)	(i)	Any one from: Idea that it could spread (to other individuals/other species/kill more elephants) ✓ Idea that it may be present in other species and could cause their death ✓ Idea that bacteria will/more likely to enter blood as temperature gets warmer/increases/global warming ✓ Idea that we are not able to (easily) control the temperature/environment/conditions to reduce likelihood of bacteria entering blood ✓ Idea of more elephant deaths/more elephants affected as temperature increases/global warming ✓ Becoming more endangered/extinct ✓ Idea that the bacteria might evolve/mutate ✓ Idea there is no vaccine/antibiotics may not work ✓ Idea that once in the blood it may be too late to treat ✓	1	2.1	ALLOW any sensible suggestion ALLOW it is communicable/contagious IGNORE it is infectious DO NOT ALLOW inherited by offspring IGNORE climate change unqualified ALLOW critically endangered IGNORE no cure/treatment ALLOW idea of high risk/danger because elephants only need to get the disease <u>once</u> and it causes death
		(ii)	White blood cells ✓	1	1.1	

Question			Answer	Marks	AO element	Guidance
		(iii)	Antibodies ✓	1	1.1	
	(d)		Any two from: Use disinfectant/alcohol/named disinfectant/antibacterial to prepare/sterilise/sanitise the area ✓ Wash hands with antibacterial/wear gloves/PPE/lab coat/visor ✓ Use sterile agar ✓ Use sterile/autoclaved equipment ✓ Flame the top of the bottle ✓ Keep lid on petri dish when not spreading bacteria ✓ Only open the lid of the petri dish a little bit/open the lid facing away from you/open the lid quickly/AW ✓ Working close to a Bunsen burner/flame/ work in extractor cabinet ✓	2	3.3b	IGNORE sterilise/sanitise unqualified IGNORE clean the area or spray disinfectant unqualified ALLOW mask ALLOW gamma radiation qualified ALLOW flame the glass spreader ALLOW heat/burn/fire for flame IGNORE put ethanol on the spreader IGNORE refs to taping of dish, putting dish upside down, labelling, incubation temperature
	(e)		E B ✓ D C ✓	2	1.1	Order must be correct
	(f)		(Alfred Russel) Wallace ✓	1	1.1	

Question			Answer	Marks	AO element	Guidance														
10	(a)	(i)	4 correct plots ✓	1	2.1	Tolerance +/- half a square <table><tr><th>Temperature (°C)</th><th>Concentration of ethanol (g/l)</th></tr><tr><td>25</td><td>13</td></tr><tr><td>30</td><td>28</td></tr><tr><td>35</td><td>30</td></tr><tr><td>40</td><td>35</td></tr><tr><td>45</td><td>33</td></tr><tr><td>50</td><td>30</td></tr></table>	Temperature (°C)	Concentration of ethanol (g/l)	25	13	30	28	35	30	40	35	45	33	50	30
Temperature (°C)	Concentration of ethanol (g/l)																			
25	13																			
30	28																			
35	30																			
40	35																			
45	33																			
50	30																			
		(ii)	Curve of best fit ✓	1	1.2	Line must be a curve. Line should be a smooth solid single line that: • passes exactly through the plots at 30°C or 35 °C OR between the plots at 30°C and 35 °C, • through the plot at the optimum (ALLOW half a square tolerance), • then curves down through final two plots (ALLOW 1 full square tolerance). DO NOT ALLOW extrapolation DO NOT ALLOW multiple lines DO NOT ALLOW plot-to-plot lines														
	(b)		Any two from: As temperature increases the concentration/production/ethanol increases and then decreases ✓ Identifies 40 (°C) as the optimum/the peak/point at which it decreases ✓ Explanation that enzymes begin to denature above 40 (°C) ✓	2	3.1a	IGNORE heat IGNORE amount ALLOW the highest concentration of ethanol was produced at 40 (°C) / 40 (°C) is the best temperature for fermentation ALLOW for 2 marks - As the temperature increases														

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Question			Answer	Marks	AO element	Guidance
						the concentration of ethanol increases up to 40 (°C) and then it decreases
	(c)		Carbon dioxide ✓	1	1.1	ALLOW CO ₂
	(d)		(dependent variable) Volume of gas/carbon dioxide produced ✓ (independent variable) Sugars/type of sugar/sugar solution/sucrose and glucose and galactose ✓ (control variable) Any one from: Temperature ✓ Volume of sugar solution ✓ Concentration of sugar solution ✓ pH ✓ Mass/concentration of yeast, species/type of yeast ✓ Length of time allowed to respire ✓ Thickness of layer of oil ✓	3	1.2	ALLOW ml/cm ³ ALLOW ECF from part (c) (if a gas is identified) DO NOT ALLOW amount for volume of gas ALLOW any other correct control variables DO NOT ALLOW volume of gas/carbon dioxide or type of sugar IGNORE keep the equipment the same IGNORE room temperature ALLOW volume/amount/depth of water in the water bath ALLOW mass of sugar

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