

GCSE (9–1)

Combined Science (Biology) A (Gateway Science)

J250/07: Paper 7 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for Autumn 2021

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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 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

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

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.

The breakdown of Assessment Objectives for GCSE (9-1) in Combined Science A:

	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.

For answers to section A if an answer box is blank ALLOW correct indication of answer e.g. circled or underlined.

Question			Answer	Marks	AO element	Guidance
1			A✓	1	2.2	
2			D✓	1	1.1	
3			D✓	1	1.2	
4			B✓	1	1.1	
5			D✓	1	1.1	
6			B✓	1	1.1	
7			B✓	1	1.1	
8			B✓	1	2.2	
9			C✓	1	1.1	
10			C✓	1	1.1	

BLANK PAGES MUST BE ANNOTATED TO SHOW THEY HAVE BEEN SEEN

Question			Answer	Marks	AO element	Guidance
11	(a)	(i)	idea that hydrogen peroxide is used up in the experiment ✓ need to maintain the concentration of hydrogen peroxide each time they repeat ✓	2	2 x 2.2	ALLOW hydrogen peroxide has reacted
	(a)	(ii)	idea that enzymes are not used up (in the reaction) ✓	1	2.2	ALLOW catalase is not used up (in the reaction)
	(b)	(ii)	suitable scale on correctly chosen axes ✓ both axis labelled with units ✓ plotting accurate ✓ suitable line of best fit through most points ✓	4	3 x 2.2 1.2	place ticks and crosses on right hand side of grid minimum 50% of grid used scale must be in ascending order with volume on Y axis labels are: number of pieces of potato volume of gas (collected) cm ³ ALLOW +or – half square ALLOW line of best fit for candidate's plotting IGNORE any extrapolation of line
	(b)	(ii)	answer matches candidate graph ✓	1	3.2a	

	(b)	(iii)	FIRST CHECK ANSWER ON THE ANSWER LINE If answer = 0.25 (cm³/min) award 3 marks $\frac{3.8}{15} \checkmark$ $0.253333 \checkmark$ $= 0.25 \text{ (cm}^3\text{/min)} \checkmark$	3	3 x 2.2	ALLOW incorrect rounding/number of significant figures for two marks ALLOW evidence of rounding numbers to 2SF for one mark
	(c)		use a water bath $\checkmark$	1	3.3b	IGNORE use a thermometer / heat regulator

Question			Answer	Marks	AO element	Guidance
12	(a)		idea that it will prevent heat from warming up the contents of the beaker ✓	1	2.2	ALLOW acts as a heat sink ALLOW absorb heat from the lamp IGNORE just maintain temperature
	(b)	(i)	FIRST CHECK ANSWER ON THE ANSWER LINE If answer = 6.3 award 2 marks $\frac{1}{0.16}$ ✓ = 6.3 ✓ (to 1 d.p.)	2	2.2 1.2	ALLOW $\frac{1}{0.4^2}$ or 6.25 ALLOW evidence of rounding numbers to 1DP for one mark
	(b)	(ii)	Any two from: as light intensity decreases number of bubbles decrease/ora ✓ as light intensity decreases rate of photosynthesis decreases /ora✓ less light energy available/chloroplasts can absorb less light energy (when lamp is further away)/ora✓ THEN (after 0.2 levels off because) idea that light intensity is not the limiting factor / some other limiting factor is affecting rate other than light intensity ✓	3	2 x1.1 1 x 3.2b	ALLOW as distance increases number of bubbles decrease/ora ✓ ALLOW as distance increases rate of photosynthesis decreases/ora ✓

Question	Answer	Marks	AO element	Guidance
* (c)	Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question. Level 3 (5–6 marks) Detailed evaluation of method to suggest improvements in the investigation with explanations that cover accuracy AND precision. <i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i> Level 2 (3–4 marks) Simply evaluation of method to suggest improvements in the investigation with explanations that cover accuracy OR precision. <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i> Level 1 (1–2 marks) Simply evaluation of method to suggest improvements in the investigation. OR Attempts explanations that cover accuracy OR precision. <i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i> 0 marks <i>No response or no response worthy of credit.</i>	6	2 x 3.1b 4 x 3.3b	AO3.1b Analyse information and ideas to evaluate the method. - no repeats / needs to repeat each distance - counting bubbles is not accurate way to measure / idea of collecting volume rather than counting bubbles ALLOW get a second person or instrument to count bubbles AO3.3b Analyse information and ideas to develop investigation to improve the investigation - collect the gas in a measuring cylinder or gas syringe to measure volume and obtain more accurate measurements - idea of need to obtain at least three sets of results to see if they are precise or to eliminate any anomalies IGNORE references to calculating means

Question			Answer	Marks	AO element	Guidance
14	(a)	(i)	Any two from: idea does not close correctly or open as wide ✓ blood pressure reduced / less blood flow (to the lungs) ✓ less oxygenation in the lungs ✓ less oxygen will be transported around the body ✓	2	2 x 2.1	ALLOW backflow will not be prevented ALLOW less oxygen enters blood (in lungs) ALLOW organs/cells do not receive enough oxygen
	(b)	(i)	differentiate to form different types of cells OR become specialised cells ✓	1	1.1	ALLOW undifferentiated cells that can turn into any cell in the body
	(b)	(ii)	Any two from: less chance of rejection ✓ will have the same DNA ✓ less ethical objections ✓	2	2 x 2.1	ALLOW not attacked by white blood cells ALLOW embryo not destroyed

Question			Answer	Marks	AO element	Guidance
15	(a)		Any two from: allow metabolic reactions to take place at an appropriate rate ✓ idea of optimum temperature for enzymes ✓ idea of high temperatures denaturing enzymes ✓ idea of low temperatures may decrease enzyme action ✓	2	2 x 1.1	ALLOW enzymes do not work at optimum if temperature is too high/low ALLOW so enzymes do not denature DO NOT ALLOW cells denature ALLOW idea of low temperatures may reduce diffusion rates
	(b)		Any four from: receptors (in the skin) detect the change in temperature ✓ <u>impulse</u> is sent along neurones ✓ correct pathway of neurones - sensory, relay, motor ✓ effector/muscle brings about response of lifting hand away ✓ mention of synapse between neurones ✓	4	4 x 1.1	ALLOW receptors (in the skin) are stimulated IGNORE receptors detect pain ALLOW interneuron/intermediate for relay ALLOW correct pathway labelled on diagram ALLOW muscle (in hand) contracts ALLOW as extra marking point idea of impulse reaching brain after response to register the pain

	(c)	(i)	idea that the small groups sizes may result in insufficient data ✓	1	3.1b	IGNORE people have different reaction times
	(c)	(ii)	Any two from: reaction time before the drink is faster/less/lower for Group A /ora ✓ Group B have a greater decrease in reaction time (for 10 and 20min) /ora ✓ reaction time after 10 minutes is faster/less/lower for Group A /ora ✓ reaction time after 20 minutes is the same for both Groups ✓ reaction time for Group A only decreases in the first 10 min but Group B decreases over 20 min ✓	2	2 x 3.1a	ANSWERS MUST BE COMPARATIVE IGNORE just quoting data ALLOW reaction time after drinking is faster/less/lower for Group A /ora ALLOW (after drinking) both groups showed a decrease in reaction times / reaction times were faster for both groups

Question			Answer	Marks	AO element	Guidance
16	(a)		success rate increases <u>and</u> then decreases as woman gets older ✓ peak success rate is 27-28 years of age ✓	2	2 x 2.1	ALLOW success rate increases as woman gets older till 27-28 years and then decreases = 2 marks
	(b)	(i)	(high levels) of FSH will cause (multiple) eggs to mature ✓ LH then causes ovulation ✓	2	2 x 1.1	ALLOW stimulates the production of oestrogen which will help to build up the uterus wall ALLOW LH then causes eggs to be released
		(ii)	Any one from: increased cost of bringing up more than one child ✓ high blood pressure ✓ premature birth ✓ anaemia ✓ (increased chance of) miscarriage ✓ complications with birth / preeclampsia / gestational diabetes ✓	1	2.1	IGNORE stress on heart / ethical issues

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