

GCSE (9–1)

Combined Science (Biology) A

(Gateway Science)

J250/07: Paper 7 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2019

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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

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			C	1	2.2	
2			C	1	1.1	
3			C	1	1.1	
4			B	1	2.1	
5			B	1	1.1	
6			D	1	1.1	
7			D	1	2.2	
8			D	1	2.2	
9			C	1	1.1	
10			D	1	2.2	

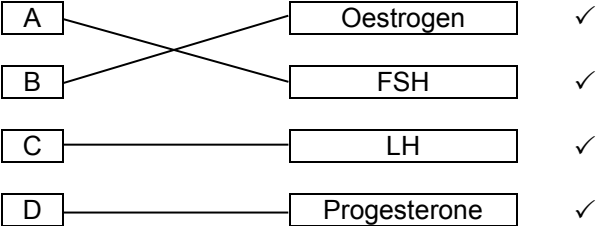
BLANK PAGES MUST BE ANNOTATED TO SHOW THEY HAVE BEEN SEEN

Question			Answer	Marks	AO element	Guidance
11	(a)	(i)	7 ✓	1	1.2	If answer line is blank open up the whole script to check for answer in table. IGNORE units
		(ii)	Any two from: it is an anomaly / does not fit the pattern ✓ much lower/faster than the other two results ✓ makes the mean more accurate ✓	2	3.1b	ALLOW (considerably) different to the other results / too far away from the rest of the results / outlier IGNORE incorrect result ALLOW is only/just 8 ALLOW it is small compared to other results / should take longer / should be 17-19 IGNORE just 'it is small' / 'it is 8' ALLOW not using it brings mean closer to true value ALLOW using it would lower the mean IGNORE not fair test / they measured it wrong
	(b)		10 - spread (of data) is least / smallest range ✓	1	3.2a	ALLOW only two minutes between highest and lowest / all within one (minute) of each other ALLOW numbers are closer (than the others) IGNORE results are similar to each other / mean is close to the other numbers / no anomalies / highest values

	(c)	to show that the algae/algal/beads was causing the effect / as a control ✓	1	2.2	ALLOW to see if the indicator changes colour without algae/algal/beads present ALLOW examples of being used as a control e.g. to see if the carbon dioxide is used up without any algae/algal/beads present make sure the hydrogen carbonate does not react with anything else (other than the algal beads) to see if anything changes without the algae (beads) to make sure indicator does not change on its own ALLOW as a comparison (to the normal)
	(d)	Max. two from: idea that (more algae beads there are) the more chlorophyll/chloroplasts ✓ (more algae beads) absorbs more light ✓ larger surface area to take up more carbon dioxide ✓ Max. one from: the more algae/algal/beads present the faster the rate of photosynthesis / ora ✓	3	2x 3.2b 3.1a	ALLOW more enzymes available (that are involved in photosynthesis) ALLOW (more algae beads) absorb more energy ALLOW the more algae/algal/beads the more photosynthesis / ora ALLOW the more algae/algal/beads present the faster or more carbon dioxide is used / ora IGNORE faster rate of reaction IGNORE carbon dioxide is a limiting factor/needed for photosynthesis

	(e)	(i)	idea of water bath to maintain the temperature ✓	1	2.2	ALLOW change the temperature / idea of using it as a water bath / control the temperature
		(ii)	put the algae beads at different temperatures ✓ Max. two from: states the need for controlling other variables ✓ identifies at least one variable they need to control ✓ measure time to turn purple (at different temperatures) ✓	3	2.2 2x3.3a	ALLOW keep everything else the same e.g. keeping the number of beads the same each time / always use 20 beads / same concentration of hydrogen carbonate indicator solution / control light intensity ALLOW time how long it takes IGNORE find the rate (of photosynthesis)

Question			Answer	Marks	AO element	Guidance
12	(a)		FIRST CHECK ANSWER ON ANSWER LINE If answer = 0.8 : 1 award 3 marks surface area and volume calculated as 384 and 512 ✓ = 0.75 ✓ = 0.8 : 1 ✓	3	2.2 2.2 1.2	ALLOW 384 and 512 anywhere in the answer ALLOW 0.7 / 0.80 for 2 marks ALLOW 3 : 4 for 2 marks ALLOW 0.8 for 3 marks
	(b)	(i)	(root hair cells) large surface area (to volume ratio) for mineral or water uptake ✓ idea adaptation increases rate of uptake ✓	2	1.1	IGNORE thin walls / nutrients / xylem / phloem ALLOW (larger surface area) increases rate of diffusion/active transport/osmosis IGNORE more diffusion/active transport/osmosis /uptake
		(ii)	meristem ✓ (divide) to provide specialised cells ✓	2	1.1	ALLOW stem cells / undifferentiated cells IGNORE they are specialised cells ALLOW (divide) to provide different types of cells ALLOW they specialise/differentiate

Question			Answer	Marks	AO element	Guidance
13	(a)	(i)		4	2.1	ALLOW any indication of the correct linking when candidates have crossed out lines e.g. letters next to the hormones
		(ii)	A/follicle stimulating hormone/FSH causes egg or ovum to mature/develop ✓ C/luteinising hormone/LH causes ovulation ✓	2	1.1	ALLOW stimulates oestrogen production / stimulates ovaries to release oestrogen / stimulates development of follicles DO NOT ALLOW releases the egg or ovum ALLOW C/luteinising hormone/LH causes egg to be released (from ovary) DO NOT ALLOW prepares/develops the egg for ovulation IGNORE references to uterus lining and progesterone / inhibits FSH If no other mark then one mark for FSH and LH cause the egg to be matured and released

	(b)	Any two from: (contraceptive pills contain) oestrogen and progesterone/ progesterone ✓ (hormones) prevents FSH/LH release ✓ (lack of FSH/LH) prevent development or maturing of egg or ovulation ✓ (hormones) thickens mucus from cervix (stops sperm) ✓ (hormones) thins uterus lining preventing implantation ✓	2	1.1	IGNORE just oestrogen DO NOT ALLOW FSH or LH in contraceptive pill DO NOT ALLOW increased levels of FSH/LH ALLOW (lack of FSH/LH) prevent release of egg ALLOW (hormones) produces a mucus that stops sperm entering the uterus DO NOT ALLOW stops sperm entering egg IGNORE thickens or maintains the uterus lining
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Question			Answer	Marks	AO element	Guidance
14	(a)	(i)	independent variable – attempt(s) ✓ dependent variables - time (to draw round star) and (number of) errors ✓	2	2.2	IGNORE distance between lines on the star both needed for mark in either order
		(ii)	FIRST CHECK ANSWER ON ANSWER LINE If answer = 73(%) award 3 marks (15 – 4) = 11 ✓ ((11 ÷ 15) × 100) = 73.3333 ✓ = 73 (%) (2 sig. figs) ✓	3	2.2	ALLOW 11 anywhere in answer for one mark IGNORE negative signs anywhere in answer
	(b)		Any two from: no repeats / only one person tested / not tested with different people ✓ small sample size ✓ only investigates one task ✓	2	3.2a	ALLOW only did the experiment once ALLOW results might be different if tested on more/different people ALLOW needs bigger sample size ALLOW idea that results were specific to this task / may not be true for all tasks e.g. drawing between lines is not comparable to most things e.g. it's not a complex task so it is easy to learn IGNORE references to chance / flukes / circumstances

* (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 explanation of how the body coordinates this specific response, including a detailed outline of the correct pathway, in the correct order. AND Suggests why the time and number of errors decrease. <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) Attempts to explain how the body coordinates this specific response, including an outline of the correct pathway, in the correct order. AND Suggest why the time and number of errors decrease. <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) Attempts to explain how the body coordinates this specific response. OR Outlines the correct pathway, in the correct order. OR Suggests why the time and number of errors decrease. <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	2x 1.1 2x 2.1 2x3.2a	AO1.1 Demonstrates knowledge and understanding of scientific ideas to identify the correct pathway - receptors detect the stimulus and sends impulse to the sensory neurone - sensory neurone sends impulse to CNS or relay neurone - CNS or relay neurone sends impulse to motor neurone - motor neurone causes muscles or effectors to respond AO2.1 Applies knowledge and understanding of scientific ideas to explain how the body coordinates the response - image in mirror detected by receptors in the eye - CNS/brain coordinates the response - motor neurone takes impulse from spinal cord down the arm to the muscles of the hands - muscles in the hands bring about the response Detailed explanation at level 3 - if image in mirror is between stars then CNS/brain coordinates response to continue - if image in mirror outside the space between the stars, CNS/brain coordinates to adjust response in muscles in hand AO3.2a Analyse information and ideas to make judgements about the pattern in the results - idea that the response is learned so fewer errors or faster time / becomes more used to the task so fewer errors or faster time / brain remembers so fewer errors or faster time Detailed explanation at level 3 - new pathways form in CNS/brain (to speed up response) so fewer errors or faster time IGNORE reference to muscle memory
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Question			Answer	Marks	AO element	Guidance
15	(a)		Q - glycerol and R - fatty acid ✓	1	1.1	
	(b)	(i)	optimum pH or peak or highest activity is pH9/is above pH7.5✓	1	2.1	ALLOW human lipase denatures after pH7.5 this one is after pH9 ALLOW lipase activity still increases above pH7.5 IGNORE the graph goes above pH7.5
		(ii)	Any two from: each enzyme can only bind to one/a (single) substrate ✓ the substrate fits into/binds the active site of the enzyme ✓ the shape of the active site fits perfectly/matches the shape of its substrate molecules ✓	2	1.1	ALLOW each enzyme can only bind to specific substrates ALLOW the idea that each enzyme has only one substrate that will fit into enzyme's active site✓✓ DO NOT ALLOW substrate having an active site ALLOW substrate is complementary in shape to the active site of the enzyme DO NOT ALLOW substrate having an active site IGNORE references to denaturing

Question			Answer	Marks	AO element	Guidance
16	(a)		Any two from: high levels of thyroxine (in blood) inhibit release of TSH ✓ low levels of TSH (in blood) inhibits the release of thyroxine ✓ any change (in energy levels) is detected ✓ changes in thyroxine levels bring energy levels back to normal ✓ high levels of thyroxine inhibit release of (more) thyroxine ✓	2	1.1	ALLOW higher levels of thyroxine increase energy levels / ora ALLOW idea that body responds to change to bring it back to normal IGNORE when a system counteracts a change in order for internal body conditions to remain constant
	(b)		eating lunch/intake of food increases levels of glucose in the blood ✓ insulin converts glucose to glycogen (so levels rise) ✓ levels of glycogen then fall as glucose in the blood is used up ✓ (because) glucagon causes glycogen to be converted to glucose ✓	4	2.1 1.1 2.1 1.1	ALLOW eating lunch/intake of food increases levels of blood sugar ALLOW eating lunch/intake of food results in high levels of glucose in the blood DO NOT ALLOW insulin breaks glucose down into glycogen ALLOW levels of glycogen fall as glucose levels fall ALLOW levels of glycogen then fall because it needs to be converted to glucose IGNORE references to time of day

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