

**GCSE (9–1)**

**Combined Science (Biology) A (Gateway Science)**

**J250/01: Paper 1 (Foundation 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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1. 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

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

<b>Annotation</b>	<b>Meaning</b>
/	alternative and acceptable answers for the same marking point
✓	Separates marking points
<b>DO NOT ALLOW</b>	Answers which are not worthy of credit
<b>IGNORE</b>	Statements which are irrelevant
<b>ALLOW</b>	Answers that can be accepted
( )	Words which are not essential to gain credit
<u>—</u>	Underlined words must be present in answer to score a mark
<b>ECF</b>	Error carried forward
<b>AW</b>	Alternative wording
<b>ORA</b>	Or reverse argument

### 3. 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:

	<b>Assessment Objective</b>
<b>AO1</b>	<b>Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.</b>
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
<b>AO2</b>	<b>Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.</b>
AO2.1	Apply knowledge and understanding of scientific ideas.
AO2.2	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
<b>AO3</b>	<b>Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.</b>
<b>AO3.1</b>	Analyse information and ideas to interpret and evaluate.
AO3.1a	Analyse information and ideas to interpret.
AO3.1b	Analyse information and ideas to evaluate.
<b>AO3.2</b>	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.
<b>AO3.3</b>	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			B✓	1	1.1	
2			C✓	1	2.1	
3			D✓	1	1.1	
4			C✓	1	2.1	
5			D✓	1	1.1	
6			D✓	1	2.1	
7			A✓	1	1.1	
8			A✓	1	2.1	
9			A✓	1	2.2	
10			D✓	1	1.1	

BLANK PAGES MUST BE ANNOTATED TO SHOW THEY HAVE BEEN SEEN

Question		Answer	Marks	AO element	Guidance
11	(a)	metabolic ✓ oxygen ✓ insulin ✓	3	3 x 1.1	
	(b)	(i)	3	3 x 1.1	ALLOW inter(neuron) / intermediate
		sensory ✓  relay ✓  motor ✓			
	(b)	(ii)	1	3.1a	DO NOT ALLOW ECF from (b)(i) as muscle should provide the correct direction
		arrow pointing towards spinal cord on or next to sensory neurone <b>AND</b> arrow pointing away from spinal cord on or next to motor neurone ✓			
	(b)	(iii)	2	2 x 1.1	ALLOW 1 mark max. if candidates offer BOTH "automatic" AND "fast" without qualification of either
		idea of automatic so time not wasted processing ✓ idea of being fast to limit contact with heat ✓			
	(c)	(i)	1	3.1a	ALLOW same amount of drink DO NOT ALLOW same (type of) drink
		same volume of drink / 150cm <sup>3</sup> drink (for each group) /  both groups tested at the same time / both groups tested after 10 minutes / both groups tested after 20 minutes ✓			
	(c)	(ii)	2	2 x 3.2b	ALLOW speeds up reactions  e.g. group A mean drops from 0.45s to 0.35s after 10min
		caffeine reduces reaction times ✓  data from table quoted as comparison ✓			



Question		Answer	Marks	AO element	Guidance
12	(a)	oxygen ✓	1	1.1	
	(b)	(i)	2		<b>ALLOW</b> (after discarding anomaly)
		<b>FIRST CHECK ANSWERS IN TABLE</b> <b>If answer = 16 award 2 marks</b>  $\frac{63}{4}$ ✓  = (15.75) = rounded to nearest whole number = 16 ✓		2.2  1.2	$\frac{57}{3}$  19
	(b)	(ii)	2	2 x 3.2b	<b>ALLOW</b> idea that the gas may have been released as 6 larger bubbles than those in other attempts <b>IGNORE</b> references to human error
		(attempt) 3 / 6 (bubbles) ✓  idea that gas may have got stuck in tube / pondweed ✓			

Question	Answer	Marks	AO element	Guidance
* (c)	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p><b>Level 3 (5–6 marks)</b> Detailed description of how to control factors and change light intensity. <b>AND</b> Correctly predicts the expected results.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p><b>Level 2 (3–4 marks)</b> Simple description of how to change light intensity. <b>AND</b> Correctly predicts the expected results.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p><b>Level 1 (1–2 marks)</b> Simple description of how to change light intensity. <b>OR</b> Correctly predicts the expected results.</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p><b>0 marks</b> <i>No response or no response worthy of credit.</i></p>	6	3 x 2.2 2 x 3.2b 1 x 3.3a	<p><b>AO2.2 Apply knowledge and understanding of scientific enquiry, techniques and procedures to describe the method and how they will control the investigation.</b></p> <ul style="list-style-type: none"> <li>• repeat using same (type/age/size) plant</li> <li>• idea of same concentration of sodium hydrogen carbonate / same amount of carbon dioxide</li> <li>• count the number of bubbles released in a set time</li> <li>• idea of controlling temperature in some way</li> </ul> <p><b>AO3.2b Analyse information and ideas to draw conclusions about the expected results.</b></p> <ul style="list-style-type: none"> <li>• closer the lamp/brighter the lamp/greater the light intensity the more bubbles or faster rate/OR</li> </ul> <p><b>AO3.3a Analyse information and ideas to develop investigation to show the effect of light intensity.</b></p> <ul style="list-style-type: none"> <li>• move the lamp / alter bulb brightness to change the light intensity (and record the number of bubbles)</li> </ul>

Question		Answer	Marks	AO element	Guidance
13	(a)	valve(s) ✓	1	1.1	
	(b) (i)	mouse ✓	1	2.1	
	(b) (ii)	longer the life expectancy the lower the heart rate / ORA ✓	1	2.1	
	(b) (iii)	<p>their heart rate is higher than expected for their life expectancy / ORA ✓</p> <p>they have the highest life expectancy but <b>not</b> the lowest heart rate ✓</p> <p>heart rate should be lower than tiger, but it is the same ✓</p> <p>heart rate should be lower than ass/horse/lion/elephant/whale but it is higher ✓</p>	1	2.1	<b>ALLOW</b> idea of point being far away from line of best fit

Question			Answer	Marks	AO element	Guidance												
14	(a)	(i)	potometer ✓	1	1.2													
	(a)	(ii)	record the distance the bubble moves ✓ in a set time ✓	2	2 x 2.2													
	(a)	(iii)	higher temperature ✓ higher light intensity ✓ increased air movement ✓	2	2 x 1.1													
	(b)		stop air bubbles inside the plant ✓	1	2.2	<b>ALLOW</b> lower humidity <b>ALLOW</b> maintains continuous column of water in plant												
	(c)	(i)	<table border="1"> <thead> <tr> <th></th> <th>Transpiration</th> <th>Translocation</th> </tr> </thead> <tbody> <tr> <td><b>substances transported</b></td> <td>(water and) mineral (ions) ✓</td> <td>water and sugar</td> </tr> <tr> <td><b>vessels used for transport</b></td> <td>xylem</td> <td>phloem ✓</td> </tr> <tr> <td><b>direction water moves in vessels</b></td> <td>root to leaf / up the stem ✓</td> <td>up <b>AND</b> down the stem / both directions / source to sink ✓</td> </tr> </tbody> </table>		Transpiration	Translocation	<b>substances transported</b>	(water and) mineral (ions) ✓	water and sugar	<b>vessels used for transport</b>	xylem	phloem ✓	<b>direction water moves in vessels</b>	root to leaf / up the stem ✓	up <b>AND</b> down the stem / both directions / source to sink ✓	4	4 x 1.1	
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<b>direction water moves in vessels</b>	root to leaf / up the stem ✓	up <b>AND</b> down the stem / both directions / source to sink ✓																
	(c)	(ii)	hollow / contains lignin ✓	1	1.1													



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

**OCR (Oxford Cambridge and RSA Examinations)**  
**The Triangle Building**  
**Shaftesbury Road**  
**Cambridge**  
**CB2 8EA**

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

[www.ocr.org.uk](http://www.ocr.org.uk)

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