F

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

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.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

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).

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

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:

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

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

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 description of how to control factors and change light intensity. **AND** Correctly predicts the expected results. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 2 (3–4 marks)** Simple description of how to change light intensity. **AND** Correctly predicts the expected results. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Simple description of how to change light intensity. **OR** Correctly predicts the expected results. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant***.** **0 marks** *No response or no response worthy of credit.*	**6**	**3 x 2.2** **2 x 3.2b** **1 x 3.3a**	**AO2.2 Apply knowledge and understanding of scientific enquiry, techniques and procedures to describe the method and how they will control the investigation.** • repeat using same (type/age/size) plant • idea of same concentration of sodium hydrogen carbonate / same amount of carbon dioxide • count the number of bubbles released in a set time • idea of controlling temperature in some way **AO3.2b Analyse information and ideas to draw conclusions about the expected results.** • closer the lamp/brighter the lamp/greater the light intensity the more bubbles or faster rate/ORA **AO3.3a Analyse information and ideas to develop investigation to show the effect of light intensity.** • move the lamp / alter bulb brightness to change the light intensity (and record the number of bubbles)

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)	their heart rate is higher than expected for their life expectancy / ORA ✓ they have the highest life expectancy but **not** the lowest heart rate ✓ heart rate should be lower than tiger, but it is the same✓ heart rate should be lower than ass/horse/lion/elephant/whale but it is higher ✓	1	2.1	**ALLOW** idea of point being far away from line of best fit

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>14</td><td>(a)</td><td>(i)</td><td>potometer ✓</td><td>1</td><td>1.2</td><td></td></tr>
<tr><td></td><td>(a)</td><td>(ii)</td><td>record the distance the bubble moves✓

in a set time✓</td><td>2</td><td>2 x 2.2</td><td></td></tr>
<tr><td></td><td>(a)</td><td>(iii)</td><td>higher temperature✓

higher light intensity✓

increased air movement✓</td><td>2</td><td>2 x 1.1</td><td>ALLOW lower humidity</td></tr>
<tr><td></td><td>(b)</td><td></td><td>stop air bubbles inside the plant ✓</td><td>1</td><td>2.2</td><td>ALLOW maintains continuous column of water in plant</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>
<table>
<tr><th></th><th>Transpiration</th><th>Translocation</th></tr>
<tr><td>substances transported</td><td>(water and) mineral (ions)✓</td><td>water and sugar</td></tr>
<tr><td>vessels used for transport</td><td>xylem</td><td>phloem✓</td></tr>
<tr><td>direction water moves in vessels</td><td>root to leaf / up the stem✓</td><td>up AND down the stem / both directions / source to sink✓</td></tr>
</table>
</td><td>4</td><td>4 x 1.1</td><td></td></tr>
<tr><td></td><td>(c)</td><td>(ii)</td><td>hollow / contains lignin ✓</td><td>1</td><td>1.1</td><td></td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
15	(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)	(i)	 suitable scale on correctly chosen axes ✓ both axes 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 the grid** minimum 50% of grid used scale must be in ascending order 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 (cm^3/min) award 3 marks** $\frac{3.8}{15}$ ✓ 0.253333 ✓ = 0.25 (cm^3/min)✓	**3**	**3 x 2.2**	**ALLOW** incorrect rounding/number of significant figures for 2 marks **ALLOW** evidence of rounding numbers to 2SF for one mark
	(c)		use a water bath ✓	**1**	**3.3b**	**IGNORE** use a thermometer / heat regulator

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