OCR
Oxford Cambridge and RSA

Higher

GCSE

Combined Science Biology A Gateway Science

J250/01: Paper 1 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2023

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.

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 50% 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. Work crossed out:

   a. where a candidate crosses out an answer and provides an alternative response, the crossed out response is not marked and gains no marks

   b. if a candidate crosses out an answer to a whole question and makes no second attempt, and if the inclusion of the answer does not cause a rubric infringement, the assessor should attempt to mark the crossed out answer and award marks appropriately.

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 read.

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 isn't 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.**

   If you have any questions or comments for your Team Leader, use the phone, the RM Assessor messaging system, or email.

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.

Level of response questions on this paper is **14(a)(ii)**.

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.

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

Question			Answer	Marks	AO element	Guidance
11	(a)	(i)	Mineral ions ✓ Osmosis ✓ Surface area ✓	3	3 x 1.1	
		(ii)	**Any two from:** By transpiration ✓ Through xylem ✓ Evaporation from leaf/mesophyll cells ✓	2	2 x 1.1	**ALLOW** evaporation into air spaces **ALLOW** higher level answers e.g., loss of water reduces pressure (in xylem) / references to adhesion/cohesion-tension – **1 mark for each valid point**.
	(b)	(i)	Increases (water uptake) ✓	1	3.1a	
		(ii)	**First check the answer on answer line** **If answer = 0.2 (cm^3/min) award 3 marks** (22-16) / 25 ✓ 0.24 ✓ 0.2 ✓	3	3 x 2.2	**ALLOW ECF** following incorrect substitution **ALLOW** one mark for evidence of incorrect answer rounded correctly to one significant figure
		(iii)	Idea of using light source at different distances / changing brightness/intensity/wattage/power of bulb ✓	1	3.3a	**ALLOW** turn lamp on and off / place plant in dark and light

Question			Answer	Marks	AO element	Guidance
12	(a)	(i)	The arrows showing impulse direction should point downwards ✓	1	3.1b	
		(ii)	Brain ✓	1	1.1	**IGNORE** relay neurone / inter-neurone
	(b)		Chemical ✓ Blood/plasma ✓	2	2 x 1.1	 **ALLOW** blood vessels
	(c)		<u>Oestrogen</u> **Any one from:** Increases thickness of uterus lining ✓ Inhibits release of FSH ✓ <u>Testosterone</u> Produces sperm ✓	2	2 x 1.1	 **ALLOW** uterus wall **IGNORE** maintains (thickness of) uterus lining **ALLOW** (at high concentration) causes release of LH **ALLOW** example of female secondary characteristic **IGNORE** causes release of FSH **IGNORE** (stimulates) release of sperm **ALLOW** example of male secondary characteristic **DO NOT ALLOW incorrect** reference to male/female
	(d)		(10.4) is too high / > 7 ✓ Idea that insulin will reduce levels ✓	2	2.2 1.1	

Question			Answer	Marks	AO element	Guidance
13	(a)	(i)	Leave both plants for same length of time / leave plants in same conditions ✓ Test for starch ✓	2	2 x 2.2	 **ALLOW** correct description of test for starch e.g., (only) B will turn iodine solution blue-black / A will not turn iodine solution blue-black / iodine remains brown for plant A
		(ii)	Result for Plant A = will not contain starch **AND** Result for Plant B = will contain starch ✓	1	2.2	**ALLOW** for Plant A (iodine solution) no change in colour **ALLOW** for Plant B (iodine solution) changes to blue-black
	(b)	(i)	Idea that (rate of photosynthesis) increases then levels off (as carbon dioxide concentration increases) ✓	1	2.2	
		(ii)	Rate of photosynthesis ✓	1	2.1	
	(c)		Monomer = glucose ✓ Polymer = starch ✓	2	2 x 1.1	

Question			Answer	Marks	AO element	Guidance
14	(a)	(i)	Vena cava ✓	1	1.1	
		(ii)	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)** Demonstrates detailed knowledge of the structure of the heart **AND** Detailed explanation of effect of the hole on the mixing of the blood **AND** Detailed explanation of the effect of the hole on oxygen transportation *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)** Demonstrates two of the following: Detailed knowledge of the structure of the heart **AND/OR** Detailed explanation of effect of the hole on the mixing of the blood **AND/OR** Detailed explanation of the effect of the whole on oxygen transportation *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.*	6	2 x 2.1 4 x 3.2a	**AO2.1 Applies knowledge and understanding of scientific ideas to describe defect** • hole in wall/septum between chambers • identifies the chambers as ventricles **AO3.2a Analyse information and ideas to make judgements – effect of hole on blood** • blood (on two sides of heart) will mix • idea of oxygenated and deoxygenated blood mixing / blood from body mixing with blood from lungs • blood going to body will transport less oxygen • less oxygen transported to cells/tissues/organs • heart may need to work harder (to transport sufficient oxygen) • idea that individual maybe short of breath / need to breathe harder to take in sufficient oxygen • oxygenated blood returned to lungs

Question			Answer	Marks	AO element	Guidance
			Level 1 (1–2 marks) Demonstrates one of the following: Detailed knowledge of the structure of the heart **OR** Detailed explanation of effect of the hole on the mixing of the blood **OR** Detailed explanation on the effect of the hole on oxygen transportation *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.*			
	(b)		**First check the answer on answer line** **If answer = 7.5 / 8.0 / 8 award 2 marks** 15/2 ✓ 7.5 / 8.0 / 8 ✓	**2**	 **2.2** **1.2**	**ALLOW** 1 mark for 15 seen anywhere in answer **ALLOW ECF** from incorrect measurement

Question			Answer	Marks	AO element	Guidance
15	(a)		Plasmid ✓	1	1.1	
	(b)		Higher magnification ✓ Higher resolution ✓	2	2 x 1.1	
	(c)		Chloroplasts ✓	1	1.1	

Question			Answer	Marks	AO element	Guidance
16	(a)	(i)	Idea that sugar is used up ✓	1	2.2	**ALLOW** sugar concentration decreases over time / sugar is broken down (into ethanol) / sugar is a reactant / sugar is needed for respiration / so there is still some sugar to react / concentration will change **ALLOW** to make the sugar (solution)/it the same each time **ALLOW** glucose for sugar **IGNORE** sugar could have evaporated / sugar could have dissolved / to remove the ethanol being made / so the yeast reacts the same each time / all the yeast has been used up **IGNORE** (just) fair test / it is a control variable / no contamination from previous test
		(ii)	Number of alginate beads ✓	1	2.2	More than one box ticked = 0 marks **ALLOW** any indication of correct mark e.g., circling or crossing but ticking takes precedence
		(iii)	Carbon dioxide ✓	1	1.2	**ALLOW** CO_2 **IGNORE** incorrect formula e.g., CO^2 / CO2 /Co_2 **DO NOT ALLOW** other gasses / ethanol
	(b)	(i)	Anomaly / outlier ✓	1	3.1b	**ALLOW** phonetic spellings of anomaly/anomalous **ALLOW** idea that it does not fit the pattern e.g., too high / not 1 or 2 / higher than (result for) 45°C **IGNORE** just 'it was 6' / not accurate / bung was not on correctly / unreliable compared to trials 2

Question			Answer	Marks	AO element	Guidance
						and 3 / it was wrong / it was a mistake / temperature was higher than rest of trials
		(ii)	Suitable scale on Y axis ✓ Y axis labelled with units (mean) volume of gas (collected) cm^3 ✓ Plotting is accurate ✓	**3**	**3 x 2.2**	**place ticks and crosses on right hand side of grid** minimum 1 small square = 1 cm^3 **ALLOW** + or - half square plots are: 15, 6 25,15 35, 24 45, 2 55, 1 **IGNORE** plot (0, 0)
		(iii)	Suitable curve of best fit through most points ✓	**1**	**2.2**	**ALLOW** curve of best fit for their plotting / reasonable curve through most points **IGNORE** any extrapolation of line

		(iv)	Increase in (kinetic) energy (as temperature increases) / **ORA** ✓ More (frequent) collisions (as temperature increases) / **ORA** ✓	2	2 x 3.2b	**answers must be comparative** **ALLOW** increased movement / faster movement (of particles) / (particles) gain (kinetic) energy **ALLOW** at 35 (°C) there is more (kinetic) energy / at 15 (°C) there is less (kinetic) energy **IGNORE** working faster / work best / just 'high energy' / optimum temperature / reacts faster **ALLOW** at 35 (°C) there are more collisions / at 15 (°C) there are less collisions **ALLOW** more enzyme substrate complexes form **IGNORE** speeding up collisions **IGNORE** references to denature above 35 (°C) **DO NOT ALLOW** enzyme denatures at lower temperatures
		(v)	Idea of increasing range / more temperatures ✓ **BUT** Idea of using a range between 35 – 45 (°C) ✓✓	2	2 x 3.3b	**ALLOW** go up in smaller intervals e.g., go up in 5 (°C) (intervals) / use smaller increments / start at 10 (°C) and go up in 10s **IGNORE** use all the values in the range / use accurate temperatures **ALLOW for 2 marks** use (range) temperatures between 35 – 45 (°C) / use smaller increment e.g. 35,36,37 etc (°C) / more temperatures closer to 40 (°C)

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