

# OCR

Oxford Cambridge and RSA

## Year 10 Test

GCSE (9–1) Combined Science A (Gateway)

J250/01/07 Biology

**MARK SCHEME**

**Duration:** 1 hour 10 minutes

**MAXIMUM MARK    60**

**This document consists of 16 pages**

## 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. Crossed Out Responses**

Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

**Rubric Error Responses – Optional Questions**

Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

**Multiple Choice Question Responses**

When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).

*When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.*

**Contradictory Responses**

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

**Short Answer Questions** (requiring only a list by way of a response, usually worth only **one mark per response**)

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

**Short Answer Questions** (requiring a more developed response, worth **two or more marks**)

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

**Longer Answer Questions** (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

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 a tick to confirm that the work has been seen.
7. Award No Response (NR) if:
  - there is nothing written in the answer space

Award Zero '0' if:

- anything is written in the answer space and is not worthy of credit (this includes text and symbols).

Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

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 are **11** and **16**.

## 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).

<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

### 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:

	<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.

Question		Answer	Marks	AO element	Guidance
1		B ✓	1	1.1	
2		C ✓	1	1.2	
3		A ✓	1	2.2	
4		C ✓	1	1.2	
5		B ✓	1	1.1	

Question		Answer	Marks	AO element	Guidance
6	(a)	use an (electronic) waterbath ✓	1	1.2	<b>ALLOW</b> description e.g. put the flask in a beaker of water at the right temperature
	(b)	first count 15 <b>AND</b> second count 7 ✓ mean is 11 ✓	2	2 x 2.2	<b>ALLOW</b> correct calculation of mean from incorrect interpretation of tally chart
	(c)	<b>idea that:</b> the third result will help her identify an anomalous result ✓ makes the results more reliable ✓	2	2 x 3.3b	<b>ALLOW</b> outlier <b>DO NOT ALLOW</b> more accurate

Question			Answer	Marks	AO element	Guidance
7	(a)	(i)	artery ✓	1	1.1	
		(ii)	idea that <b>Y</b> pumps blood to the body and head / blood pumped from <b>Y</b> has further to travel ✓	1	1.1	
	(b)		<b>both</b> prevent the blood flowing backwards ✓  Idea that <b>W</b> stops blood going into ventricle <b>and Z</b> stops blood going into the atrium ✓	2	2 x 1.1	
	(c)	(i)	as height above sea level increases so does the number of red blood cells ✓	1	3.1a	<b>ALLOW</b> positive correlation
		(ii)	(if more red blood cells then) <b>more</b> oxygen can be carried around the body ✓  muscles can respire <b>more</b> ✓	2	2 x 2.1	

Question			Answer	Marks	AO element	Guidance
8	(a)	i	surface area of block <b>A</b> = 600 (mm <sup>2</sup> )✓ volume of block <b>A</b> = 1000(mm <sup>2</sup> )✓	2	2.2	Check answers in calculation space if nothing in table.

Question	Answer	Marks	AO element	Guidance
(a)* ii	<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>                      Answer includes idea that SA (to volume ratio) increases from A to C.  <b>AND</b>                      Understands that the acid passes into the jelly by diffusion <b>and</b> Understands that time taken to turn yellow depends on the SA of the block.  <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>                      Answer includes idea that SA (to volume ratio) increases from A to C.  <b>OR</b>                      Understands that the acid passes into the jelly by diffusion <b>and</b> Understands that time taken to turn yellow depends on the SA of the block.  <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>                      Answer includes idea that SA (to volume ratio) increases from A to C.  <b>OR</b>                      Understands that the acid passes into the jelly by diffusion.  <b>OR</b>                      Understands that time taken to turn yellow depends on the SA of the block.  <i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p><b>0 marks</b>  <i>No response or no response worthy of credit.</i></p>	6	2 x 1.2  2 x 2.2  2 x 3.2b	<p><b>AO1.2</b> Demonstrates an understanding of diffusion:</p> <ul style="list-style-type: none"> <li>acid diffuses into the gelatine block</li> <li>acid passes from high concentration outside to low concentration inside the block</li> </ul> <p><b>AO2.2</b> Applies mathematical knowledge to explain how SA to volume ratio changes:</p> <ul style="list-style-type: none"> <li>SA (to volume ratio) of blocks increases from blocks A to C.</li> </ul> <p><b>AO3.2b</b> Makes conclusions about the time taken to turn yellow:</p> <ul style="list-style-type: none"> <li>The time taken to turn yellow depends on the surface area of the block</li> <li>Block <b>C</b> is the fastest as it has the largest surface area compared to the volume.</li> </ul>

Question		Answer	Marks	AO element	Guidance
	(b)	<p>concentration ✓  <b>and</b>  because the higher concentration would increase the rate of diffusion /ora ✓</p> <p><b>OR</b></p> <p>temperature ✓  <b>and</b>  because the higher temperature would increase the rate of diffusion /ora ✓</p> <p><b>OR</b></p> <p>volume ✓  <b>and</b>  because the smaller the volume the less chance of reaction completion/ora ✓</p>	2	2.2	Explanation must match variable.

Question		Answer	Marks	AO element	Guidance
9	(a)	(combined) pill ✓	1	1.2	
	(b)	(male) condom ✓	1	1.2	
	(c)	(combined) pill ✓	1	2.2	

Question	Answer	Marks	AO element	Guidance
10	A✓	1	1.1	
11	B✓	1	1.1	
12	B✓	1	2.1	
13	A✓	1	2.1	
14	C✓	1	2.2	

Question	Answer	Marks	AO element	Guidance
15 (a)	1000 (x) ✓	1	2.2	
(b) (i)	<p><b>Any one from:</b>                      light microscope because electron microscope slide preparation kills tissue / AW ✓                       dead sample materials only for electron microscope / AW ✓                       need tissue to be alive to view contraction / AW ✓</p>	1	2.2	Mark is for explanation.
(b) (ii)	electron microscope because has a greater magnification / resolution ✓	1	2.2	Mark is for explanation.
(c)	<p>mitochondrion releases energy for cell / mitochondrion is where respiration happens ✓                       idea that muscle cells require <b>more</b> energy (than most cells) to contract ✓</p>	2	2 x 1.1	<b>ALLOW</b> site of energy release / produces ATP

Question		Answer	Marks	AO element	Guidance
16	(a)	<p>maintaining a constant internal environment ✓</p> <p><b>OR</b></p> <p>balancing bodily inputs and outputs ✓</p>	1	1.1	<p><b>ALLOW</b> to regulate a named condition in body e.g. body temperature / blood sugar levels</p> <p><b>DO NOT ALLOW</b> references to negative feedback</p>
	(b)	(i)	1	3.2a	<b>ALLOW</b> 85-95 (mg/ml)
		(ii)	4	<p>1 x 2.1</p> <p>1 x 1.1</p> <p>1 x 2.1</p> <p>1 x 1.1</p>	<p><b>ALLOW</b> insulin increases cell permeability to glucose</p> <p><b>ALLOW</b> glycogen broken down to release glucose</p>
	(c)	(i)	2	2.2	If no other mark <b>ALLOW</b> Chris <b>and</b> Bob do not have diabetes
		(ii)	1	1.1	<p><b>ALLOW</b> undifferentiated so can become any cell type</p> <p><b>ALLOW</b> so can become an insulin producing cell</p>

Question			Answer	Marks	AO element	Guidance
17	(a)	(i)	(results for) 0.3 (m) ✓	1	2.2	<b>ALLOW</b> 187
		(ii)	ignore it when calculating the mean ✓	1	1.2	<b>ALLOW</b> calculate the mean of the other two values (only)
		(iii)	<p><b>Any one from</b></p> <p>place a heat screen/sink between the lamp and the potometer ✓</p> <p>repeat trial 2 for 0.3 m ✓</p> <p>increase the range of distances ✓</p>	1	3.3b	
	(b)	(i)	<p><b>FIRST CHECK THE ANSWER ON ANSWER LINE</b></p> <p><b>If answer = 6.25 award 2 marks</b></p> <p>relative light intensity = <math>\frac{1}{\text{distance from light source}^2}</math> ✓</p> <p><b>= 6.25 ✓</b></p>	2	1.2  2.2	<p><b>ALLOW</b> 6.3 or 6 for one mark if no other marking point</p> <p><b>DO NOT ALLOW</b> 6.2</p> <p>Check table for answer</p>

	<p>(b) (ii)</p>	<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></p> <p>Identifies patterns in the results <b>AND</b> identifies other factors that can affect the rate of photosynthesis <b>AND</b> comments on the differences of the effect of light intensity at higher <b>and</b> lower relative light intensities  <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></p> <p>Identifies one pattern in the results <b>AND</b> identifies one other factor that can affect the rate of photosynthesis <b>AND</b> comments on the differences of the effect of light intensity at higher <b>and</b> lower relative light intensities  <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></p> <p>Identifies one pattern in the results <b>OR</b> identifies one other factor that can affect the rate of photosynthesis <b>OR</b> comments on the differences of the effect of light intensity at higher <b>and</b> lower relative light intensities  <i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p><b>0 marks</b>  <i>No response or no response worthy of credit.</i></p>	<p>6</p>	<p>2 x 1.1</p> <p>2 x 3.1a</p> <p>2 x 3.2a</p>	<p><b>AO1.1: knowledge of limiting factors that can affect the rate of photosynthesis</b></p> <ul style="list-style-type: none"> <li>limiting factors other than light intensity could be temperature / carbon dioxide / pH / water levels / wavelength of light</li> </ul> <p><b>AO3.1a: Analysis of the information and interpret the data on relative light intensity and rate of photosynthesis - patterns in results</b></p> <ul style="list-style-type: none"> <li>rate of photosynthesis follows a similar pattern to relative light intensity</li> <li>rate of photosynthesis is less than expected at high light intensity / 0.1m / relative light intensity 100</li> <li>rate does not increase much at higher light intensities</li> <li>rate follows expected pattern at lower relative light intensity</li> </ul> <p><b>AO3.2a: Analysis of the information and draw conclusions from the data on relative light intensity and rate of photosynthesis</b></p> <ul style="list-style-type: none"> <li>rate of photosynthesis is affected / limited by factors other than light at higher light intensities</li> <li>rate of photosynthesis is affected / limited by light at relatively lower light intensities</li> </ul> <p><b>ALLOW</b> greater distances for relatively lower light intensity</p> <p><b>ALLOW</b> shorter distances for relatively greater light intensity</p>
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