



Oxford Cambridge and RSA

**...day June 20XX – Morning/Afternoon**

**GCSE (9–1) Biology A (Gateway Science)**

**J247/04 Paper 4 Higher Tier**

**SAMPLE MARK SCHEME**

**Duration:** 1 hour 45 minutes

**MAXIMUM MARK      90**

**This document consists of 16 pages**

**MARKING INSTRUCTIONS****PREPARATION FOR MARKING****SCORIS**

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *scoris 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 posted on the RM Cambridge Assessment Support Portal <http://www.rm.com/support/ca>
3. Log-in to scoris and mark the **required number** of practice responses (“scripts”) and the **required number** of standardisation responses.

YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

**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 scoris 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 scoris 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 a tick to confirm that the work has been seen.
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 scoris **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 scoris 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.**

## 11. Annotations

<b>Annotation</b>	<b>Meaning</b>
<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
—	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

## 12. 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 Biology A:

	<b>Assessment Objective</b>
<b>AO1</b>	<b>Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.</b>
<b>AO1.1</b>	Demonstrate knowledge and understanding of scientific ideas.
<b>AO1.2</b>	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>
<b>AO2.1</b>	Apply knowledge and understanding of scientific ideas.
<b>AO2.2</b>	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.
<b>AO3.1a</b>	Analyse information and ideas to interpret.
<b>AO3.1b</b>	Analyse information and ideas to evaluate.
<b>AO3.2</b>	Analyse information and ideas to make judgements and draw conclusions.
<b>AO3.2a</b>	Analyse information and ideas to make judgements.
<b>AO3.2b</b>	Analyse information and ideas to draw conclusions.
<b>AO3.3</b>	Analyse information and ideas to develop and improve experimental procedures.
<b>AO3.3a</b>	Analyse information and ideas to develop experimental procedures.
<b>AO3.3b</b>	Analyse information and ideas to improve experimental procedures.

## SECTION A

Question	Answer	Marks	AO element	Guidance
1	A	1	1.1	
2	C	1	1.1	
3	B	1	1.2	
4	C	1	1.1	
5	C	1	2.2	
6	C	1	2.2	
7	C	1	2.1	
8	A	1	1.2	
9	D	1	1.1	
10	C	1	2.1	
11	B	1	2.2	
12	A	1	2.1	
13	A	1	2.1	
14	D	1	1.2	
15	A	1	2.1	



## SECTION B

Question		Answer	Marks	AO element	Guidance
16	(a)	mutualism (1)	1	1.1	
	(b)	algae gain protection (1) fungi gain sugars (1)	1 1	2.1 2.1	<b>allow</b> idea about prevention of drying out / absorbing water / minerals
	(c)	larger surface area (to take up pollutants) (1)	1	2.1	<b>allow</b> sticks out more from bark
	(d) (i)	use of random numbers (1)	1	1.2	
	(ii)	40.4 (2)	2	2.2	<b>allow</b> correct mean i.e. 9.0
	(iii)	moderate diversity (1) only just above low / closer to low than high (1)	1 1	3.1a 3.2a	<b>allow</b> ECF from (d) (ii)
	(iv)	identify the species of lichens present in their sample (1)  find out how sensitive to pollution these lichens are (1)  if the lichens are mostly pollution sensitive species = low pollution levels (1)	1  1 1	3.3b  3.3b 3.3b	<b>allow</b> reference to bushy / crusty   <b>allow</b> ora

Question			Answer	Marks	AO element	Guidance
17	(a)	(i)	the temperature of the heap was the same as the external temperature (1)	1	2.2	
		(ii)	Change in temperature ÷ time  <b>OR</b>  Tangent drawn from line and used to calculate rate	1	2.2	
	(b)		above 60°C the enzymes in the decomposers had denatured (1)	1	1.2	
			below 30°C the enzymes in the decomposers were working too slowly (1)	1	1.2	
	(c)		initially / for the first three times forking reduces the temperature / stops it getting too hot (1)	1	3.1a	
			towards the end forking helps to increase the temperature (1)	1	3.1a	

Question		Answer	Marks	AO element	Guidance	
18	(a)	<b>two from:</b>				
		a chemical (usually) made by fungi / microbes (1)	1	1.1		
		that kills (other) microbes / kills bacteria (1)	1	1.1		
	(b)	(i)	any higher and the bacteria might be killed / bacterial enzymes denatured (1)	1	2.2	<b>allow</b> optimum temperature for the bacteria / bacterial enzymes
			any lower and the erythromycin would diffuse slower / bacteria would reproduce more slowly so takes longer to get the results (1)	1	2.2	<b>allow</b> spread out slower
		(ii)	prevent contamination by other microbes (1)	1	1.2	<b>not</b> germs / bugs
	(c)	(i)	correct area = 452(mm <sup>2</sup> ) (2)	2	2 x 2.2	<b>allow</b> 452.2
			not resistant (1)	1	3.2b	<b>allow</b> one mark for correct calculation and interpretation using incorrect radius
		(ii)	only one plate used / no replicates (1)	1	3.3b	
			only gives limited information ie one of three choices (1)	1	3.3b	
	(d)	(i)	coat is digested (1)	1	2.1	
			by enzymes present in small intestine (1)	1	1.1	

Question	Answer	Marks	AO element	Guidance
(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> <b>Explains the shapes of the two graphs in the effectiveness/safety of the drugs delivery system</b> <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> <b>Explains the shapes of the two graphs the total dosage of the drugs</b> <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> <b>Simply describes the patterns in the graph</b> <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 2.1 2 x 2.2 2 x 3.2a	<p><b>AO3.2a: Analyse the information and judge the relative effectiveness of the two delivery systems</b></p> <ul style="list-style-type: none"> <li>• links this to the advantages / disadvantages of keeping a steady, intermediate level in the blood.</li> <li>• with tablet high levels may be toxic</li> <li>• if reduce the dose, then when levels low it may not kill all bacteria</li> <li>• reference to allowing resistant strains to develop</li> </ul> <p><b>AO2.2: Apply knowledge to demonstrate an understanding of how the capsules and tablets work in delivering the drug</b></p> <ul style="list-style-type: none"> <li>• Any statement regarding the total dosage for the two delivery methods</li> <li>• Dosage rises rapidly because of rapid absorption into the blood stream</li> <li>• Dosage falls fast because it is rapidly broken down</li> <li>• capsules allow staggered release of drug dosage</li> <li>• this is because walls are different thicknesses of the capsule</li> <li>• therefore different digestion time</li> <li>• conventional tablet releases drug all at once</li> <li>• tablet may not have a coating</li> </ul> <p><b>AO2.1: Apply knowledge and understanding in reading the graphical information</b></p>

Question		Answer	Marks	AO element	Guidance
					<ul style="list-style-type: none"> <li>Simple description of the patterns of the two lines on the graph.</li> </ul>
Question		Answer	Marks	AO element	Guidance
19	(a)	change in base sequence of DNA (1)	1	1.1	
		change in order of amino acids (1)	1	1.1	
		protein shape changes (1)	1	1.1	
		reference to shape not being suited to function e.g. change in enzymes active site shape (1)	1	1.1	
	(b)	heterozygous (1)	1	2.1	
		does not have Wolfram's syndrome (1)	1	2.1	
	(c)	(i) Tim's and Lucy's genotypes Nn (1)	1	2.2	<b>allow</b> correctly completed punnet square
		correct genotypes of offspring (NN, Nn, Nn, nn) (1)	1	2.2	
	(ii)	baby may be nn (1)	1	2.1	
		one in four chance of baby being affected (1)	1	3.1b	
		pancreas produces insulin (1)	1	2.1	
		insulin controls blood glucose level (1)	1	1.1	

Question			Answer	Marks	AO element	Guidance
20	(a)	(i)	kills the fungus (that is killing the bananas) so protects/increases the crop/yield (1)	1	1.1	
		(ii)	choose the most resistant individual / banana (1) allow it to reproduce (1) repeat this process over many generations (1)	1 1 1	1.2 1.2 1.2	
	(b)		some growth (1) grows well (1)	1 1	3.2a 3.2a	
	(c)	(i)	A (1)	1	2.2	
		(ii)	Show that it will be able to grow in less area (all calculations greater than 86.4) (1)	1	3.2b	
	(d)		protesters in Europe think that genetic engineering is ethically wrong / not safe (1)	1	3.2a	
			people in Africa need the food as less is available (1)	1	3.2a	

Question			Answer	Marks	AO element	Guidance
21	(a)	(i)	blood in arteries is under higher pressure (1)	1	1.1	
		(ii)	arteries have thicker walls / elastic walls (1)	1	1.1	
	(b)	(i)	number of people having strokes is the same after pollution compared to when there is no pollution (1)	1	2.2	
			pollution is not a risk factor in strokes (1)	1	3.1a	

Question			Answer	Marks	AO element	Guidance
		(ii)	ozone (1)	1	3.2b	
		(iii)	data from 28 countries / 6 million people / large sample (1)	1	1.2	
			even a small risk factor number means a lot of people (were affected) (1)	1	1.2	

Question			Answer	Marks	AO element	Guidance
22	(a)	(i)	three (1)	1	1.1	
		(ii)	correct tapering pyramid shape (1)	1	1.2	
			grass/grass seeds at bottom, mice next and owls and rattlesnakes at the top (1)	1	1.2	
	(b)	(i)	black colour produced by mutation (1)	1	1.1	Maximum three marks without reference to rattlesnake / owl predation or camouflage
			black mice better camouflaged (1)	1	1.1	
			black mice less likely to be eaten from rattlesnakes/owls (1)	1	2.1	
			survive to reproduce (1)	1	1.1	
			past on the gene for black colour (1)	1	1.1	
		(ii)	humans reproduce more slowly (1)	1	2.1	ORA
			go through less generations in a certain time (1)	1	2.1	ORA