



Oxford Cambridge and RSA

# Foundation

**GCSE**

**Biology A Gateway**

**J247/01: Paper 1 (Foundation Tier)**

General Certificate of Secondary Education

**Mark Scheme for June 2023**

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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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**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 **20**.

## 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
—	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 Biology:

	<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	A	1	2.1	
2	B	1	2.1	
3	C	1	1.1	
4	D	1	1.1	
5	D	1	1.1	
6	B	1	2.1	
7	D	1	1.1	
8	D	1	2.1	
9	C	1	2.1	
10	A	1	2.1	
11	D	1	2.1	
12	A	1	2.1	
13	B	1	2.2	ALLOW -8.8%
14	A	1	1.1	
15	A	1	2.1	

Question		Answer			Marks	AO element	Guidance																		
16	(a)	<table border="1"> <thead> <tr> <th>Statement about DNA</th> <th>True (T)</th> <th>False (F)</th> </tr> </thead> <tbody> <tr> <td>DNA is a polymer.</td> <td>✓</td> <td></td> </tr> <tr> <td>DNA is made of 4 strands.</td> <td></td> <td>✓</td> </tr> <tr> <td>The strands in DNA form a double helix.</td> <td>✓</td> <td></td> </tr> <tr> <td>A DNA nucleotide is made of a sugar, a phosphate group and a base.</td> <td>✓</td> <td></td> </tr> <tr> <td>The 4 bases found in DNA are A, C, G and U.</td> <td></td> <td>✓</td> </tr> </tbody> </table>	Statement about DNA	True (T)	False (F)	DNA is a polymer.	✓		DNA is made of 4 strands.		✓	The strands in DNA form a double helix.	✓		A DNA nucleotide is made of a sugar, a phosphate group and a base.	✓		The 4 bases found in DNA are A, C, G and U.		✓			3	3 x 1.1	5 correct ticks = 3 marks 4 correct ticks = 2 marks 2/3 correct ticks = 1 mark <b>DO NOT ALLOW</b> more than 1 tick for each statement
Statement about DNA	True (T)	False (F)																							
DNA is a polymer.	✓																								
DNA is made of 4 strands.		✓																							
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A DNA nucleotide is made of a sugar, a phosphate group and a base.	✓																								
The 4 bases found in DNA are A, C, G and U.		✓																							
	(b)					2	2 x 1.1	4 correct lines = 2 marks 3/2 correct lines = 1 mark <b>DO NOT ALLOW</b> more than 1 line from each box																	
	(c)	(i)	Stage ✓		1	1.2																			
		(ii)	Objective ✓		1	1.2																			
		(iii)	Focusing knob ✓		1	1.2																			

Question		Answer				Marks	AO element	Guidance
17	(a)	<b>Structure</b>	<b>Part of the nervous system</b>	<b>Part of the endocrine system</b>	<b>Not part of either system</b>	5	5 x 1.1	One mark for each correct row
		Insulin producing cells in the pancreas		✓				
		Kidney tubules			✓			
		Pituitary gland		✓				
		Spinal cord	✓					
		Temperature receptors in the skin	✓					
								✓✓✓✓✓
	(b) (i)	<b>Any two from:</b> Idea that stem cells are undifferentiated / unspecialised ✓ Idea can divide into any type of cell in the body ✓ Which form tissues and organs ✓				2	2 x 1.1	<b>ALLOW</b> stem cells can specialise / can differentiate
	(ii)	<b>First check the answer on answer line</b> <b>If answer = 16 award 3 marks</b> Conversion: (2 days) = 48 (hours) ✓ (48 ÷ 12) = 4 (divisions) ✓ (4 divisions) = 16 (cells) ✓				3	3 x 2.2	<b>ALLOW</b> 12 x 4 = 48 = 2 days for two marks <b>ALLOW</b> diagram showing 4 divisions

Question			Answer	Marks	AO element	Guidance
18	(a)	(i)	Medulla ✓	1	2.1	
		(ii)	Cortex ✓	1	2.1	
		(iii)	Artery ✓	1	2.2	<b>DO NOT ALLOW</b> more than one answer circled
	(b)	(i)	<p><b>First check the answer in table / on answer line</b>  <b>If answer = 1.5 (litres) award 2 marks</b></p> <p>(Water gain = <math>2.2 + 0.3</math>) = 2.5 (litres)  <b>PLUS</b>  (Water loss = <math>0.9 + 0.1</math>) = 1.0 (litres) ✓</p> <p><math>2.5 - 1.0 = 1.5</math> ✓</p>	2	2 x 2.2	<b>ALLOW</b> one mark for clear evidence of incorrect water loss gain or loss with a correctly calculated difference
		(ii)	<p><b>Any three from:</b></p> <p>(Water lost) in sweat (when running/exercising) ✓</p> <p>The water concentration in blood falls ✓</p> <p>The kidney (tubules) will reabsorb more water (into the blood) ✓</p> <p>Making the urine more concentrated ✓</p> <p>Lower volume of urine ✓</p>	3	3 x 2.1	<p><b>ALLOW</b> water potential in blood falls</p> <p><b>ALLOW</b> the kidney (tubules) becomes more permeable</p> <p>Additional marking point ADH secreted from pituitary gland for 1 mark</p>

Question			Answer	Marks	AO element	Guidance
19	(a)	(i)	5 correct data plots ✓✓	2	2 x 2.2	3 or 4 correct data plots = 1 mark <b>ALLOW</b> +/- half a square
		(ii)	Line of best fit through most points increasing and decreasing ✓	1	2.2	<b>DO NOT ALLOW</b> dot to dot line <b>ALLOW</b> line of best fit for their plotting <b>IGNORE</b> any extrapolation of line
	(b)		<p><b>Any two from:</b></p> <p>As pH increases amount, oxygen collected increases, then decreases ✓</p> <p>The optimum pH is between 6-8/pH 8 ✓</p> <p>Above and/or below pH 6-8/pH 8, enzyme starts to denature ✓</p>	2	2 x 3.2b	<b>IGNORE</b> temperature

Question	Answer	Marks	AO element	Guidance
(c)	<div style="display: flex; flex-wrap: wrap;"> <div style="border: 1px solid black; padding: 5px; width: 50%;">The experiment is completed three times for each pH.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">makes the data more accurate</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">Use a measuring cylinder, not a beaker to measure the volume of enzyme.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">allows the identification of any anomalous results</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">Place the mixture of catalase and hydrogen peroxide in a water bath. This will keep the temperature the same for each pH.</div> <div style="border: 1px solid black; padding: 5px; width: 50%;">makes the data more valid</div> </div> <p style="text-align: right;">✓✓</p>	2	2 x 3.3b	Three lines correct = 2 marks One/two line correct = 1 mark  <b>DO NOT ALLOW</b> more than 1 line from each box
(d)	Repeat the experiment using pH 6.5, 7, 7.5, 8 and 8.5. ✓	1	3.3b	<b>DO NOT ALLOW</b> more than 1 box ticked





Question	Answer	Marks	AO element	Guidance
	<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>			

Question		Answer	Marks	AO element	Guidance
21	(a)	Amino acids ✓ Enzymes ✓ Fatty acids and glycerol ✓ Sugar ✓ Respiration ✓	5	1.1 1.1 1.1 2.1 1.1	Either order
	(b)	Person C ✓ Risk identified as dangers of following the diet ✓  Benefit identified that the diet helps overweight people reduce health issues ✓	3	3 x 3.1a	If answer is not person C then award 0 marks.
	(c)	<b>Any two from:</b>  Starch and sugar are both carbohydrates ✓  To test for starch, you need to use iodine test ✓  To test for sugar you need to use Benedict's test ✓	2	3.1b  2.2	<b>AW</b> potassium iodide   If no other marks awarded allow sugar and starch test / iodine and benedict's test for one mark

Question		Answer	Marks	AO element	Guidance
22	(a)	<p>Correct comparison identified of the effectiveness/preventing pregnancies of a contraceptive method when used incorrectly ✓</p> <p>Correct comparison identified of the effectiveness/preventing pregnancies of a contraceptive method when used correctly ✓</p> <p>Correct comparison of the difference in effectiveness/preventing pregnancies of a contraceptive method when used incorrectly compared to correctly ✓</p> <p>Correct use of data to describe one comparison ✓</p>	4	<p>2 x 3.1a</p> <p>2 x 3.2a</p>	<p><b>ALLOW</b> hormonal methods more effective than barrier methods when used incorrectly ORA</p> <p><b>ALLOW</b> hormonal methods more effective than barrier methods when used correctly ORA</p> <p>If no marks awarded allow a correct comparison on the effectiveness (in preventing pregnancies) of the different contraceptive methods</p>
	(b)	<p>Day 13 ✓</p> <p>Ovulation has occurred/egg is released so fertilisation can happen ✓</p>	2	<p>3.1a</p> <p>3.2a</p>	<p><b>ALLOW</b> between day 12-15</p> <p><b>ALLOW</b> description of fertilisation</p>
	(c)	<p>Uterus lining will not be maintained/will be shed/will not stay thick ✓</p>	1	3.2a	<p><b>ALLOW</b> will not be able to support a pregnancy/embryo will not be able to implant/will lose the baby/will miscarry/period happens</p>

Question		Answer	Marks	AO element	Guidance
23	(a)	<p><b>Sub-cellular structure</b></p> <p><b>Contents</b></p> <p><b>Function</b></p> <p>✓✓✓✓</p>	4	4 x 1.1	<p>6 correct lines = 4 marks                      5/4 correct lines = 3 marks                      3 correct lines = 2 marks                      2 correct lines = 1 mark</p> <p><b>DO NOT ALLOW</b> more than 1 line from each box</p>
	(b) (i)	<p>Correct outline shape of this mitochondrion drawn with continuous lines and no shading ✓</p> <p>Double outer membrane and internal membranes accurately drawn ✓</p>	2	2 x 2.2	<b>IGNORE</b> labels
	(ii)	<p>Electron microscope ✓</p> <p>The image is highly magnified /                      The image is in a lot of detail /                      Can see organelles /                      The resolution is high ✓</p>	2	2 x 2.1	<p><b>ALLOW</b> TEM or SEM</p> <p>Second marking point is dependent on the first  <b>IGNORE</b> image is black and white  <b>ALLOW</b> ORA for light microscopes for each reason</p>
	(c)	Ribosome / cell membrane / cytoplasm ✓	1	1.1	

Question		Answer				Marks	AO element	Guidance
24	(a)	Feature	Arteries	Capillaries	Veins	3	3 x 1.1	One mark for each correct row
		Have valves along their length			✓			
		Have a very thick wall	✓					
		Have a wide lumen			✓			
		✓✓✓						
	(b)	Effect: backflow of blood will not be prevented / blood could collect/pool in the veins ✓  Symptom: legs may swell/be painful / have itchy skin ✓				2	2 x 2.1	<b>ALLOW</b> reduced blood flow back to heart/from legs  <b>ALLOW</b> blood clots / (muscle) cramps / varicose veins / numbness
	(c)	<b>First check the answer on answer line</b> <b>If answer = 319 200 award 2 marks</b>  5320 / 4560 / 76 x 70 x 60 ✓  319 200 ✓				2	2 x 1.2	

Question		Answer	Marks	AO element	Guidance
	(d)	<p>Biconcave shape / large surface area ✓            For faster/rapid/maximum uptake/diffusion (of oxygen) ✓</p> <p><b>OR</b></p> <p>No nucleus ✓            So more space for haemoglobin/oxygen ✓</p> <p><b>OR</b></p> <p>Are small/flexible ✓            So can squeeze/pass/move/fit through capillaries/small blood vessels ✓</p>	2	2 x 1.1	<b>IGNORE</b> to contain/transport more oxygen

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