OCR
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

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.

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).

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 Biology:

	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.

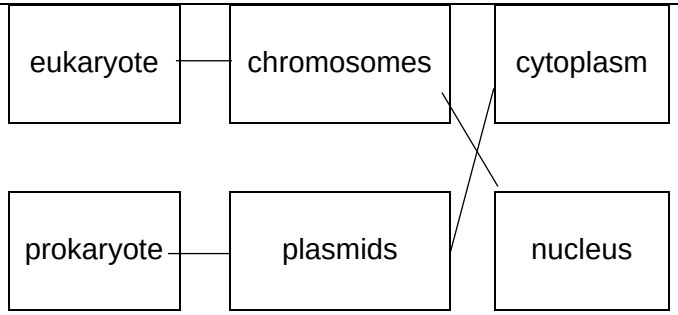
For answers to Section A if an answer box is blank ALLOW correct indication of answer e.g. circled or underlined.

Question	Answer	Marks	AO element	Guidance
1	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	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>16</td><td>(a)</td><td></td><td>
<table>
<tr><th>Statement about DNA</th><th>True (T)</th><th>False (F)</th></tr>
<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>
</table>
✓✓✓</td><td>3</td><td>3 x 1.1</td><td>5 correct ticks = 3 marks

4 correct ticks = 2 marks

2/3 correct ticks = 1 mark

DO NOT ALLOW more than 1 tick for each statement</td></tr>
<tr><td></td><td>(b)</td><td></td><td>


✓✓</td><td>2</td><td>2 x 1.1</td><td>4 correct lines = 2 marks

3/2 correct lines = 1 mark

DO NOT ALLOW more than 1 line from each box</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>Stage ✓</td><td>1</td><td>1.2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Objective ✓</td><td>1</td><td>1.2</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Focusing knob ✓</td><td>1</td><td>1.2</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>17</td><td>(a)</td><td></td><td>
<table>
<tr><th>Structure</th><th>Part of the nervous system</th><th>Part of the endocrine system</th><th>Not part of either system</th></tr>
<tr><td>Insulin producing cells in the pancreas</td><td></td><td>✓</td><td></td></tr>
<tr><td>Kidney tubules</td><td></td><td></td><td>✓</td></tr>
<tr><td>Pituitary gland</td><td></td><td>✓</td><td></td></tr>
<tr><td>Spinal cord</td><td>✓</td><td></td><td></td></tr>
<tr><td>Temperature receptors in the skin</td><td>✓</td><td></td><td></td></tr>
</table>
✓✓✓✓✓</td><td>5</td><td>5 x 1.1</td><td>One mark for each correct row</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Any two from:

Idea that stem cells are undifferentiated / unspecialised ✓

Idea can divide into any type of cell in the body ✓

Which form tissues and organs ✓</td><td>2</td><td>2 x 1.1</td><td>

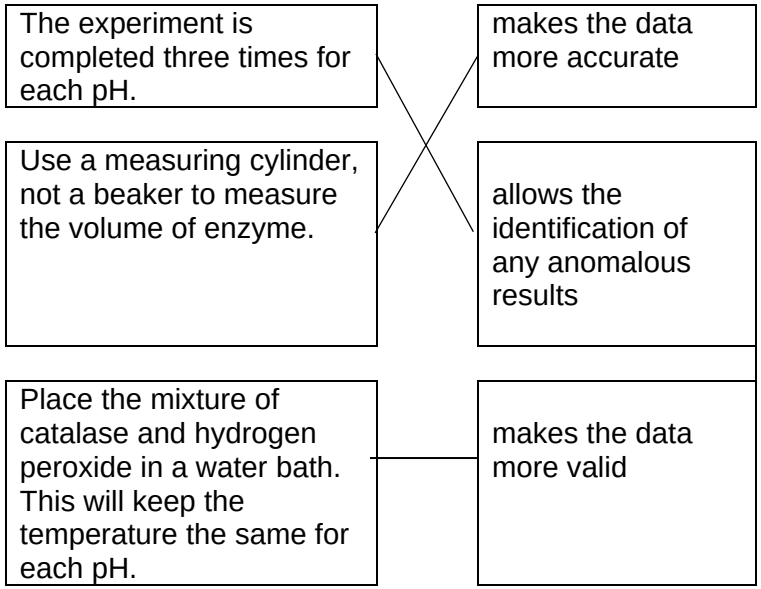
ALLOW stem cells can specialise / can differentiate</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>First check the answer on answer line
If answer = 16 award 3 marks

Conversion: (2 days) = 48 (hours) ✓
(48 ÷ 12) = 4 (divisions) ✓
(4 divisions) = 16 (cells) ✓</td><td>3</td><td>3 x 2.2</td><td>

ALLOW 12 x 4 = 48 = 2 days for two marks
ALLOW diagram showing 4 divisions</td></tr>
</table>

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

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 **ALLOW** +/- half a square
		(ii)	Line of best fit through most points increasing and decreasing ✓	1	2.2	**DO NOT ALLOW** dot to dot line **ALLOW** line of best fit for their plotting **IGNORE** any extrapolation of line
	(b)		**Any two from:** As pH increases amount, oxygen collected increases, then decreases ✓ The optimum pH is between 6-8/pH 8 ✓ Above and/or below pH 6-8/pH 8, enzyme starts to denature ✓	2	2 x 3.2b	 **IGNORE** temperature

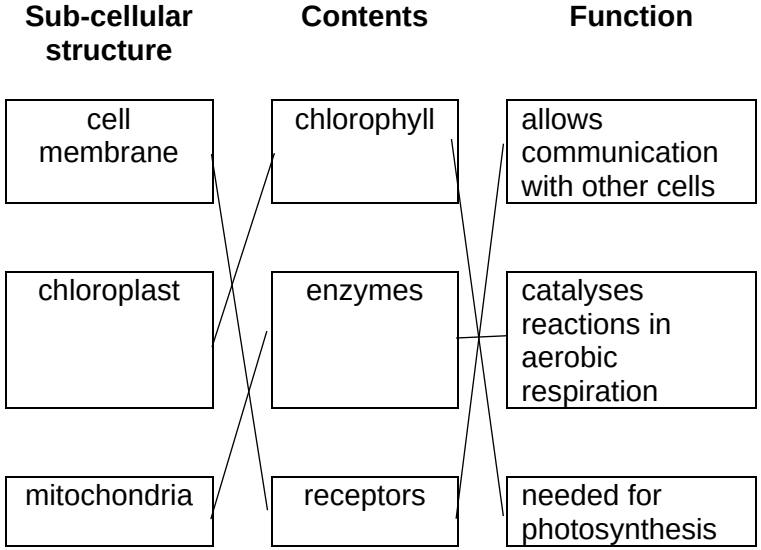
Question			Answer	Marks	AO element	Guidance
	(c)		 ✓✓	2	2 x 3.3b	Three lines correct = 2 marks One/two line correct = 1 mark **DO NOT ALLOW** more than 1 line from each box
	(d)		Repeat the experiment using pH 6.5, 7, 7.5, 8 and 8.5.✓	1	3.3b	**DO NOT ALLOW** more than 1 box ticked

Question			Answer	Marks	AO element	Guidance
20	(a)		*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)** Provides a detailed description of how to change the light intensity **AND** describes variables that need to be controlled **AND** Describes in detail the measurements that should be taken. *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)** Describes how to change the light intensity, states a variable that needs to be controlled and describes a measurement that should be taken. **OR** Provides a detailed description of how to change the light intensity and describes variables that need to be controlled. **OR** Provides a detailed description of how to change the light intensity and describes in detail the measurements that should be taken. **OR** Describes variables that need to be controlled and describes in detail the measurements that should be taken *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)** Describes how to change the light intensity **OR** describe variables that need to be controlled **OR** describes a measurement that should be taken.	**6**	**4 x 2.2** **2x 3.3a**	**AO2.2 Describes how to change the light intensity** • suitable method used to describe how to change the light intensity. e.g. place the lamp at different distances from the pondweed/change light intensity • suggest how many light intensities / range of distances **AO3.3a Describes the variables that need to be kept constant to collect valid data** • same species of plant • same piece/mass/amount of pondweed in each experiment • same volume/concentration of sodium hydrogen carbonate • same volume of water • eliminate all other light sources/only light source is the lamp • keep the temperature constant /use a thermostatically controlled water bath • same wavelength of light • pH **AO2.2 Describes the measurements that should be taken** • count the number of bubbles of oxygen given off in a set time • repeat the readings and/or calculate a mean

Question			Answer	Marks	AO element	Guidance
			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.*			

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

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

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>24</td><td>(a)</td><td></td><td>
<table>
<tr><th>Feature</th><th>Arteries</th><th>Capillaries</th><th>Veins</th></tr>
<tr><td>Have valves along their length</td><td></td><td></td><td>✓</td></tr>
<tr><td>Have a very thick wall</td><td>✓</td><td></td><td></td></tr>
<tr><td>Have a wide lumen</td><td></td><td></td><td>✓</td></tr>
</table>
✓✓✓</td><td>3</td><td>3 x 1.1</td><td>One mark for each correct row</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Effect: backflow of blood will not be prevented / blood could collect/pool in the veins ✓

Symptom: legs may swell/be painful / have itchy skin ✓</td><td>2</td><td>2 x 2.1</td><td>ALLOW reduced blood flow back to heart/from legs

ALLOW blood clots / (muscle) cramps / varicose veins / numbness</td></tr>
<tr><td></td><td>(c)</td><td></td><td>First check the answer on answer line
If answer = 319 200 award 2 marks

5320 / 4560 / 76 x 70 x 60 ✓

319 200 ✓</td><td>2</td><td>2 x 1.2</td><td></td></tr>
</table>

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

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