Foundation

GCSE

Combined Science B Twenty First Century Science

J260/01: Biology (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2024

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.

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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 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 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 question on this paper is **7c**

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 B:

	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.

Question			Answer	Marks	AO element	Guidance
1	(a)		ear – sound eye – light nose – chemicals in the air ✓✓	2	1.1	Three correct lines = 2 marks One or two lines correct line = 1 mark
	(b)	(i)	rapid/fast / involuntary ✓	1	1.1	**IGNORE** immediate/instant
		(ii)	muscle ✓	1	2.1	
	(c)	(i)	Nerve cell ✓	1	1.1	
		(ii)	decrease ✓	1	2.1	
		(iii)	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>2</td><td>(a)</td><td></td><td>nucleus ✓</td><td>1</td><td>1.1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>instructions ✓

genome ✓</td><td>2</td><td>1.1</td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td><table><tr><th></th><th>True</th><th>False</th></tr><tr><td>DNA is a polymer.</td><td>✓</td><td></td></tr><tr><td>DNA is a triple helix.</td><td></td><td>✓</td></tr><tr><td>DNA is made from a chain of amino acids.</td><td></td><td>✓</td></tr><tr><td>DNA is made of two strands.</td><td>✓</td><td></td></tr></table>✓✓✓</td><td>3</td><td>1.1</td><td>All four correct ticks = 3 marks
Three correct ticks = 2 marks
One or two correct ticks = 1 mark</td></tr>
<tr><td></td><td>(d)</td><td>(i)</td><td>C ✓</td><td>1</td><td>1.2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>B ✓</td><td>1</td><td>1.2</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td>B before C ✓

C before A ✓</td><td>2</td><td>1.1</td><td>BCA = 2 marks</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>3</td><td>(a)</td><td></td><td>a population ✓

an ecosystem ✓</td><td>2</td><td>1.1</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>blackbird population size would increase ✓

because fewer squirrels would be eating grasshoppers / less competition for grasshoppers
OR
because fewer squirrels would be eating wheat so more food for grasshoppers
✓

so more food for blackbirds ✓</td><td>3</td><td>3.2b</td><td>

ALLOW less predators of grasshoppers

ALLOW blackbirds have more grasshoppers to eat / more prey for blackbirds</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>idea that it makes it easier to see effects of changes in population sizes across multiple food chains / makes the interdependence between organisms clear ✓</td><td>1</td><td>2.1</td><td>ALLOW ideas of how one organism affects another / can see competition between organisms
IGNORE to see what eats what / to see the food chains together</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>A – respiration
B – photosynthesis
C – decomposition
D – combustion
✓✓✓</td><td>3</td><td>2.1</td><td>All four correct lines = 3 marks
Two or three correct lines = 2 marks
One correct line = 1 mark</td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table><tr><td></td><td>Abiotic</td><td>Biotic</td></tr><tr><td>Air</td><td>✓</td><td></td></tr><tr><td>animals and plants</td><td></td><td>✓</td></tr><tr><td>fossil fuels</td><td>✓</td><td></td></tr></table>✓✓</td><td>2</td><td>1.1</td><td>All three correct ticks = 2 marks
One or two correct ticks = 1 mark</td></tr>
<tr><td></td><td>(d)</td><td></td><td>lipids ✓

proteins ✓</td><td>2</td><td>1.1</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>4</td><td>(a)</td><td></td><td><table><tr><th></th><th>Aerobic respiration</th><th>Anaerobic respiration</th></tr><tr><td>Conditions under which it happens</td><td>oxygen ✓</td><td></td></tr><tr><td>Amount of ATP produced</td><td></td><td>low / less ✓</td></tr></table>✓✓</td><td>2</td><td>1.1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>Any one from:

it provides ATP/energy ✓

cells need ATP/energy / for life processes ✓</td><td>1</td><td>1.1</td><td>DO NOT ALLOW produces energy

ALLOW examples of processes, e.g. active transport, chemical reactions, cell division, cell multiplication, muscle contraction
IGNORE reproduce</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>increase / get warmer ✓</td><td>1</td><td>2.1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>carbon dioxide ✓</td><td>1</td><td>2.1</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td>glucose is needed for respiration ✓</td><td>1</td><td>2.1</td><td>DO NOT ALLOW glucose produces energy for respiration</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>5</td><td>(a)</td><td>(i)</td><td>
<table>
<tr><td></td><td>Part of…</td><td>Not part of…</td></tr>
<tr><td>abiotic factors</td><td></td><td>✓</td></tr>
<tr><td>genes that living organisms have</td><td>✓</td><td></td></tr>
<tr><td>living organisms</td><td>✓</td><td></td></tr>
<tr><td>Rocks</td><td></td><td>✓</td></tr>
<tr><td>water supply</td><td></td><td>✓</td></tr>
</table>
✓✓✓</td><td>3</td><td>1.1</td><td>Five correct ticks = 3 marks
Three or four correct ticks = 2 marks
One or two correct ticks= 1 mark</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>The tortoises became too hot ✓
There were fewer plants for the tortoises to eat ✓</td><td>2</td><td>3.2b</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>People rely on the goats for food / meat / milk ✓</td><td>1</td><td>3.1b</td><td>ALLOW other valid reasons eg for skins / dairy products / is the culture/tradition
ALLOW livelihood if qualified</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>biodiversity provides materials / medicines / food / habitat / pleasure / fertile soil / cycling of materials ✓</td><td>1</td><td>1.1</td><td>ALLOW ideas of maintaining genetic diversity</td></tr>
<tr><td></td><td>(c)</td><td></td><td>A before D ✓
D before E ✓
E before C ✓</td><td>3</td><td>3.3a</td><td>AD(B)EC</td></tr>
<tr><td></td><td>(d)</td><td></td><td>impossible to find all the goats / impossible to count the whole population / would take too long ✓</td><td>1</td><td>2.2</td><td></td></tr>
<tr><td></td><td>(e)</td><td></td><td>First check the answer on answer line
If answer = 20 award 2 marks

$\frac{10 \times 14}{7}$ ✓
= 20 ✓</td><td>2</td><td>2.2</td><td></td></tr>
<tr><td></td><td>(f)</td><td></td><td>take a larger sample

OR

more samples and find a mean ✓</td><td>1</td><td>3.3b</td><td>ALLOW take more samples and a description of how to calculate a mean/average</td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
6	(a)		<table><tr><td></td><td>Genetics</td><td>Lifestyle</td><td>Pathogens</td></tr><tr><td>Communicable</td><td></td><td></td><td>✓</td></tr><tr><td>Non-communicable</td><td>✓</td><td>✓</td><td></td></tr></table> ✓✓	2	1.1	One mark for each correct row
	(b)	(i)	2 ✓	1	1.1	
		(ii)	1 ✓	1	1.1	
	(c)	(i)	2012 plotted at 254 ✓ 2013 plotted at 245 ✓	2	2.2	**ALLOW** half a square tolerance
		(ii)	the number of people who caught malaria decreased ✓	1	3.1a	**ALLOW** negative correlation
		(iii)	**First check the answer on answer line** **If answer = 13.4 award 3 marks** ((254 - 220) ÷ 254) x 100 ✓ = 13.38583 (%) ✓ = 13.4 (%) to 1 d.p. ✓	3	**2.2 x 2** **1.2**	**ALLOW** –13.4 **ALLOW ECF** for rounding an answer to 1 d.p
	(d)	(i)	mosquitoes/insects spread malaria ✓	1	2.1	
		(ii)	D before B ✓ B before C ✓	2	1.2	(A)DBC = 2 marks
		(iii)	180 ✓	1	3.2a	

Question			Answer	Marks	AO element	Guidance
7	(a)	(i)	colour / pattern / stripes / texture ✓	1	2.1	
		(ii)	idea that it is genetic (variation) ✓	1	2.1	**ALLOW** genes/DNA/alleles/genetic mutation
	(b)	(i)	**Any two from:** reference to selective breeding / artificial selection ✓ the seeds will contain alleles / mutations / genetic variants for large size ✓ offspring (likely to) inherit alleles / mutations / genetic variants for large size ✓	2	2.1	**IGNORE** genes/genetic material **IGNORE** genetic engineering
		(ii)	**Any two from:** environment / growing conditions could cause pumpkins to be smaller / **ORA** for larger pumpkins this year ✓ seeds will not necessarily contain alleles / mutations / genetic variants for large size ✓ offspring will not necessarily inherit alleles / mutations / genetic variants for large size ✓	2	2.1	**IGNORE** genes/genetic material **ALLOW** examples of the environment e.g. weather, disease, sunlight, water availability

Question	Answer	Marks	AO element	Guidance
(c)*	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)** Detailed explanation of the causes/advantages of having a longer neck **AND** increased probability of breeding **AND** pass on genes/alleles/mutation. **AND** Correctly uses technical terms, e.g. competition / variation / adaptation / adapted / advantage / mutation/allele/variant/gene. *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)** Explanation of the causes/advantages of having a longer neck **AND** increases probability of breeding / passing on genes/alleles/mutation/characteristics. *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)** Basic explanation of the causes/advantages of having a longer neck **OR** increases probability of breeding **OR** passing on genes/alleles/mutation/characteristics. *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.*	**6**	**2.1**	**AO2.1 Applying understanding of natural selection to explain why giraffes with a long neck became more common** For example: • competition/competing between giraffes for (limited) food/leaves • (genetic/random) variation between giraffes meant some had a long neck • giraffes with a long neck were better able/adapted to reach leaves/food • giraffes with a long neck had an advantage • giraffes with a long neck were more likely to get (enough) food/leaves to survive / survival of the fittest • therefore, they were more likely to reproduce • so they were more likely to pass their characteristics/alleles/variants/mutations/ gene • this repeats (for many generations and giraffes with a long neck became more common)

Question			Answer	Marks	AO element	Guidance
8	(a)		regulate menstrual cycle / ovulation ✓	1	1.1	**ALLOW** any correct reference to a part of human reproduction eg mature follicle/egg / thicken uterus lining / produce gametes / sperm production Any named hormone must have the correct role **IGNORE** ideas of puberty/secondary sexual characteristics
	(b)	(i)	3 ✓	1	2.1	**ALLOW** ovulation
		(ii)	**Any one from:** less risk of catching a sexually transmitted disease ✓ risk of becoming pregnant is higher/1% higher ✓ idea larger decrease of risk of catching an STD than increase from getting pregnant ✓	2	3.1b	Answer must be comparative **ORA** for contraceptive implant contraceptive implant has more risk of catching a sexually transmitted disease contraceptive implant, risk of becoming pregnant is lower idea of contraceptive implant has a larger increase of risk of catching an STD than a decrease from getting pregnant
		(iii)	acts as a barrier (to sperm and to pathogens) ✓	1	2.1	**ALLOW** descriptions of a barrier eg stops sperm entering **IGNORE** condom breaking

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>9</td><td>(a)</td><td>(i)</td><td>sugar ✓</td><td>1</td><td>2.1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table><tr><th>Small molecule</th><th>Needed for aerobic respiration</th><th>Produced by aerobic respiration</th><th>Not needed or produced by aerobic respiration</th></tr><tr><td>oxygen</td><td>✓</td><td></td><td></td></tr><tr><td>urea</td><td></td><td></td><td>✓</td></tr><tr><td>water</td><td></td><td>✓</td><td></td></tr></table>✓✓</td><td>2</td><td>1.1</td><td>All three correct ticks = 2 marks
One or two correct ticks = 1 mark

DO NOT ALLOW more than 1 tick for each correct statement</td></tr>
<tr><td></td><td>(b)</td><td></td><td>diffusion ✓
osmosis ✓
active transport ✓</td><td>3</td><td>1.1</td><td>DO NOT ALLOW more than 1 ring for each correct statement</td></tr>
<tr><td></td><td>(c)</td><td></td><td><table><tr><th></th><th>True</th><th>False</th></tr><tr><td>Carbon dioxide and urea move out of cells into the blood.</td><td>✓</td><td></td></tr><tr><td>Oxygen and carbon dioxide move between blood in capillaries and air in alveoli.</td><td>✓</td><td></td></tr><tr><td>Urea is filtered into the blood by the kidneys.</td><td></td><td>✓</td></tr><tr><td>Water and food molecules are absorbed from the digestive system into blood in capillaries.</td><td>✓</td><td></td></tr></table>✓✓✓</td><td>3</td><td>1.1</td><td>All four correct ticks = 3 marks
Three correct ticks = 2 marks
One or two correct ticks = 1 mark

DO NOT ALLOW more than 1 tick for each row</td></tr>
<tr><td></td><td>(d)</td><td>(i)</td><td>First check the answer on answer line
If answer = 3:1 award 4 marks

SA = 6 x (2x2) ✓
= 24(cm^2) ✓
V = 2 x 2 x 2 = 8(cm^3) ✓
(SA:V = 24:8) = 3:1 ✓</td><td>4</td><td>2.2</td><td>ALLOW ECF for correct answer to incorrect SA substitution using numbers from the diagram

ALLOW ECF for simplification of an incorrect calculation/ratio</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>idea that C is made up of lots of A ✓</td><td>1</td><td>2.2</td><td>ALLOW AW eg each square in C is equivalent to A</td></tr>
</table>

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