OCR
Oxford Cambridge and RSA

Foundation

GCSE

Combined Science B Twenty First Century Science

J260/01: Biology (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2022

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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. **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. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. *(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 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.

The level of response question on this paper is Q6(a)(i).

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**.

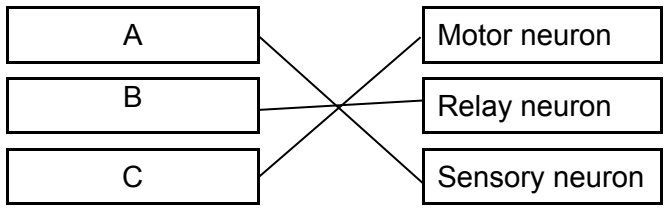
Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

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)		**Any two from:** Cell wall ✓ Chloroplasts ✓ Vacuole ✓	**2**	**1.1**	**ALLOW** regular shape
	(b)		Nucleus ✓	**1**	**1.1**	
	(c)		chromosomes ✓ DNA ✓ helix ✓ nucleotides ✓	**4**	**1.1**	

Question			Answer	Marks	AO element	Guidance
2	(a)		C ✓ **AND** C fits/is the correct shape ✓ Idea it goes into the active site / ref. to lock and key ✓	3	3.2a 2.1 x 2	**ALLOW** AW to fits e.g. slots
	(b)		**Organ system** / **Role** Circulatory system → Transports sugar around the body Digestive system → Absorbs sugar into the body Gaseous exchange → Releases insulin to control blood Endocrine system ✓✓✓	3	1.1	
	(c)		(Aerobic) respiration ✓ Production of ATP/release of energy ✓	2	1.1	**ALLOW** to respire **ALLOW** for energy **ALLOW** examples of processes that use energy/ATP eg for active transport / synthesis of other molecules **DO NOT ALLOW** they produce energy/glucose is an energy store

Question			Answer	Marks	AO element	Guidance
3	(a)		From A to B to C ✓	1	2.1	
	(b)		 ✓✓	2	2.1	All three correct = 2 marks One or two correct = 1 mark
	(c)		**Any one from:** Idea that reduces damage/harm/injury/pain (from touching sharp object) ✓ Idea that you move away from harm/injury/pain/danger ✓	1	2.1	**IGNORE** its quicker unqualified **IGNORE** ideas of learning behaviour
	(d)		Glands ✓ Blood ✓ Receptors ✓	3	1.1	

Question			Answer	Marks	AO element	Guidance
4	(a)		Virus ✓	1	1.1	
	(b)		Idea it can't reproduce/cause disease/cause flu ✓	1	2.1	**ALLOW** can't cause illness/can't make you ill/it could mutate/so you can't infect others
	(c)		EDCAB: E before D ✓ D before C ✓ C before A ✓ A before B ✓	4	2.1	

Question			Answer	Marks	AO element	Guidance
5	(a)	(i)	Peatland = 180 **AND** Woodland = 120 ✓	1	1.2	
		(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 1.5 or 1.43548387… award 2 marks** 180/120 ✓ = 1.5 ✓ **OR** 178/124 ✓ = 1.43548387… ✓	2	2.2	**ALLOW ECF** from rounding in 5(a)(i) for two marks **ALLOW** any correct rounding from 1.43548387… for two marks
	(b)		**Any two from:** Removes/destroys habitat ✓ Removes nutrients/minerals ✓ Removes microorganisms/decomposers/✓ Less fertile soil ✓ Plants destroyed/less plants/less types of plants/stops plants growing✓ Disrupts the food chain/less food for animals ✓	2	2.1	**ALLOW** less places to live/destroys homes **ALLOW** examples eg it removes carbon **ALLOW** examples eg removes/kills worms/insects **IGNORE** less soil

	(c)		The threat to biodiversity in the peatlands was lowest in 2010 ✓	1	3.2b	

Question			Answer	Marks	AO element	Guidance
6	(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)** Explains in detail the different roles played by plants and animals in the water cycle **AND** explains in detail the different reasons why water is needed by plants and animals *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)** Explains in some detail the different roles played by plants and animals in the water cycle **OR** explains in some detail the different reasons why water is needed by plants and animals *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)** Explains the role played by plants/animals in the water cycle **OR** explains why water is needed by plants/animals *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	1.1	**AO1.1 Demonstrating knowledge by explaining roles of plants and animals in the water cycle** For example: • Plants take up water from soil • Plant roots slow the runoff of water • Plants lose water to the air (by transpiration /evaporation) • Animals drink water • Much of most animals' food is water by mass • Water (in food) is passed along food chains • Plants and animals make water during respiration • Animals lose water during exhalation /breathing/excretion/urine/faeces/sweating **AO1.1 Demonstrating knowledge by explaining why plants and animals need water** For example: • Plants need water for photosynthesis • Cell cytoplasm is mostly water • Animals and plants use water in their transport systems (blood/translocation) • Water loss by plants and animals has a cooling effect (sweat/transpiration) • Water plays a structural role in plants and some animals/water prevents plants wilting • Water is a habitat/to live in • Water is a solvent/required for chemical reactions

Question			Answer	Marks	AO element	Guidance
	(b)		Appropriate scale using more than half of the paper with equidistant numbers on y-axis ✓ Correctly labelled y-axis/percentage of rain that evaporates per year ✓ All bars plotted correctly ✓✓	4	1.2	Four points correct = 2 marks Two or three correct = 1 mark One correct = 0 marks **ALLOW** correct plots for 1 mark if a line graph drawn
	(c)		**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 1:2 award 2 marks** 150 : 300 ✓ = 1 : 2 ✓	2	1.2	**ALLOW** non fully simplified ratios for 1 mark eg 5:10/15:30 **ALLOW ECF** for fully simplifying an incorrect ratio from marking point 1
	(d)		Cycled through both parts ✓ Cycled through both parts ✓	2	2.1	

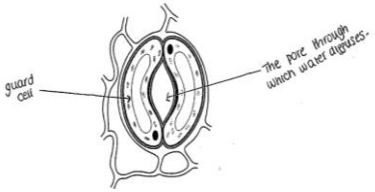
Question			Answer	Marks	AO element	Guidance
7	(a)		**Any two from:** Temperature ✓ Light intensity/level/brightness ✓ Carbon dioxide concentration/level ✓ Size/volume of beaker ✓ Volume/amount of water ✓ Nutrient/mineral levels in water ✓ Species of duckweed ✓ Age/condition/size of duckweed ✓ Time that beakers are left ✓	**2**	**2.2**	**DO NOT ALLOW** number of plants/amount of duckweed/pH **ALLOW** amount of light **IGNORE** light unqualified
	(b)		pH7 ✓ pH9 ✓	**2**	**3.3a**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>8</td><td>(a)</td><td></td><td>
<table>
<tr><th></th><th>Interphase</th><th>Mitosis</th></tr>
<tr><td>The cell grows larger</td><td>✓</td><td></td></tr>
<tr><td>Chromosomes are copied</td><td>✓</td><td></td></tr>
<tr><td>Chromosomes divide</td><td></td><td>✓</td></tr>
<tr><td>More organelles form</td><td>✓</td><td></td></tr>
<tr><td>The nucleus divides</td><td></td><td>✓</td></tr>
</table>
✓ ✓ ✓ ✓
</td><td>4</td><td>1.1</td><td>All five rows correct = 4 marks
Four rows correct = 3 marks
Three rows correct = 2 marks
Two rows correct = 1 mark
One row correct = 0 marks</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Idea that otherwise the number of chromosomes will double/increase every generation ✓</td><td>1</td><td>2.1</td><td>IGNORE references to haploid cells/half numbers that join to produce full set/diploid embryo</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>63 ✓</td><td>1</td><td>2.1</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td>63 ✓</td><td>1</td><td>2.1</td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td>Genes are turned off and on ✓</td><td>1</td><td>2.1</td><td></td></tr>
<tr><td></td><td>(d)</td><td></td><td>Any one from:
Root hair cells/specialised cells are better/more effective at their job ✓

Root hair cells have a bigger surface area/faster uptake of water/minerals/nutrients/named nutrient ✓</td><td>1</td><td>2.1</td><td></td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
9	(a)		Cannot be passed on (from organism-to-organism) ✓	1	1.1	**ALLOW** cannot be spread/transmitted/caught/ is not contagious
	(b)		Genes ✓ Lifestyle/environment ✓	2	1.1	**ALLOW** Inherited from parents **ALLOW** gene/chromosome mutations **ALLOW** any correct example of lifestyle for example, poor diet/high fat diet/alcohol consumption/lack of exercise/stress/lack of sleep/smoking or another drug abuse etc.
	(c)	(i)	Idea that if someone already has CVD you can't measure the risk of developing it. ✓	1	3.2a	**ALLOW** the medicine would not work on people who already had CVD **IGNORE** references to side effects
		(ii)	Idea of a large number of participants/12000 people ✓ Idea of a long/six-year study ✓	2	3.2a	
		(iii)	**Any one from:** sex/gender ✓ lifestyle ✓ family history ✓ ethnicity ✓ medical history/health conditions ✓ actual age of people ✓	1	3.3b	**ALLOW** examples of relevant lifestyles e.g., smoking/diet/exercise **IGNORE** if they are healthy
		(iv)	Only people over the age of 55/similar ages were studied ✓	1	3.1b	
	(d)	(i)	'Dummy' treatment/no active ingredient ✓	1	1.1	**ALLOW** fake/false drug/pill **IGNORE** treatment with no effect **DO NOT ALLOW** fake vaccine/fake paracetamol/fake antibiotic
		(ii)	Idea that used for comparison/to see the effects of the real drug ✓	1	2.2	
		(iii)	No one in the study was ill with CVD ✓	1	2.1	

		(iv)	**Any two from:** The placebo doesn't lower the risk as much as the medicines/the placebo has the highest number of people that develop CVD ✓ Medicine 1 lowers the risk of CVD ✓ Medicine 2 lowers the risk of CVD ✓ Medicine 1 lowers the risk more than medicine 2/medicine 2 was the least effective medicine✓ Both medicines lower the risk the most/both medicines were the most effective ✓ None of the medicines completely prevent CVD ✓	**2**	**3.2b**	**ALLOW** the placebo is the least effective **ALLOW** using a medicine lowers the risk
		(v)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 30 award 2 marks** 4.6 – 3.6 = 1 ✓ (1/100) x 3000 = 30 ✓ **OR** 3000/100 x4.6 – 3000/100 x 3.6 ✓ **OR** 138-108 ✓ =30 ✓	**2**	**2.2**	

Question			Answer	Marks	AO element	Guidance
10	(a)		lost ✓ water ✓ xylem ✓	3	1.1	
	(b)		Pore labelled/label 1 **AND** any part of either guard cell labelled/label 2 ✓  	1	2.1	Both required for mark. **IGNORE** other labels
	(c)		x4 lowest stage ✓✓	2	2.1	All three correct = 2 marks One or two correct = 1 mark
	(d)	(i)	Distance (moved between the markers) ✓ Time taken (for bubble to move between markers) ✓	2	2.2	**IGNORE** number of bubbles
		(ii)	**Any two from:** When the tap is open ✓ Water from reservoir pushes bubble back to first marker/reset the bubble ✓ Allows repeat readings ✓	2	2.2	**ALLOW** idea that water can be added from the reservoir
	(e)	(i)	0.75 is/could be an outlier ✓ Idea to discard outliers only if there is a reason to reject it ✓	2	3.1b 3.2a	**ALLOW** description of an outlier **ALLOW** the reading should be repeated

Question			Answer	Marks	AO element	Guidance
		(ii)	**FIRST CHECK THE ANSWER IN TABLE / ON ANSWER LINE** **If answer = 3.16 award 3 marks** (4.55 + 4.17 + 0.75) / 3 **OR** 9.47/3 ✓ = 3.15666666666 ✓ = 3.16 ✓	**3** **2.2 x 2** **1.2**	 **ALLOW ECF** from marking point one **ALLOW ECF** from marking point two for correct rounding
	(f)		wind speed and temperature are the same in A and B/only light is different in A and B ✓	**1**	**3.2b**	**DO NOT ALLOW** "it's not a fair test" without further explanation **ALLOW** C and D have different temperatures and wind speed/ idea that in experiments C and D other factors/variables (in addition to light level) changed / were not controlled ✓

Question			Answer	Marks	AO element	Guidance
11			active transport ✓ ATP ✓ aerobic ✓	3	2.1 1.1 x 2	

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