OCR
Oxford Cambridge and RSA

F

…day June 20XX – Morning/Afternoon

GCSE (9–1) Combined Science B (Twenty First Century Science)
J260/01 Biology (Foundation tier)

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 95

DRAFT

This document consists of 24 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.

Level of response question on this paper is **11(a)**.

11. **Annotations**

Annotation	Meaning
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

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 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.

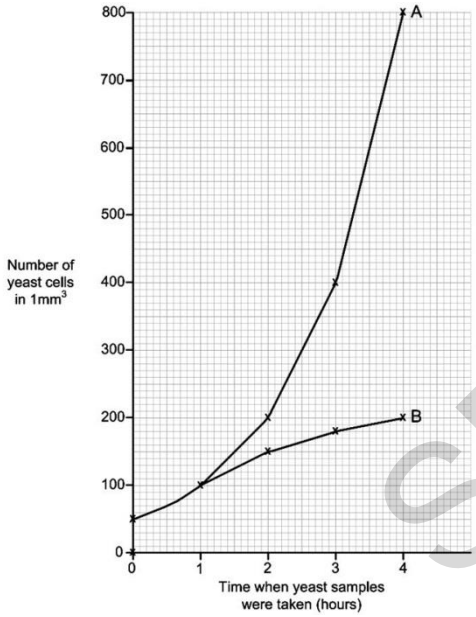
Question			Answer	Marks	AO element	Guidance
1	(a)		Nucleotides ✓ Genes ✓	2	1.1	
	(b)		Jane, Fiona, Phil ✓ Jenny ✓	2	2.1	**ALLOW** Jane, Fiona, and Phil in any order but all must be named for first marking point.
	(c)	(i)	"Parent's embryo" has DNA / chromosomes / genes from mother and father ✓ Mitochondria (contain DNA) from donor embryo ✓	2	3.2b	
		(ii)	**Any two from** *Benefits* Child will not get mitochondrial disease ✓ Child cannot pass on mitochondrial disease ✓ Parents and family could not cope with a child with mitochondrial disease ✓ Cost benefits if don't have to treat affected child ✓	2	3.2a	.

Question			Answer	Marks	AO element	Guidance
2	(a)		**Type of organism** bacteria ☐ insects ☑ protists ☐ fungi ☐	1	1.1	If more than one box is ticked, do not award the mark even if the correct box is also ticked
	(b)		**Defence** / **Description** Bacteria living in intestines → Compete with pathogens Mucus → Traps pathogens Skin → Barriers to pathogens Stomach acid → Breaks down pathogens	2	1.1	Three lines correct = 2 marks Two lines correct = 1 mark One line correct = no marks
	(c)	(i)	**Any three from** Fever / muscle pain / tiredness / headache / sore throat / vomiting / diarrhoea / bleeding ✓	1	2.1	Any order, three needed for one mark
		(ii)	Ebola / virus / pathogen is in vomit / faeces / blood ✓ Contact with vomit / faeces / blood may spread disease / Ebola / virus / pathogen ✓ Idea that physical defences have to be bypassed e.g. cut / break in skin / touch infected bodily fluid then touch own eye ✓	3	2.1	

Question			Answer	Marks	AO element	Guidance
		(iii)	Correct human infection ✓ Correct infection route described ✓	2	1.1	
	(d)		... stops the pathogen getting into the body. ☐ ... stops the pathogen reproducing inside the body. ☐ ... causes the production of antibodies before infection. ✓ ... causes the production of antigens before infection. ☐	1	1.1	If more than one box is ticked, do not award the mark even if the correct box is also ticked

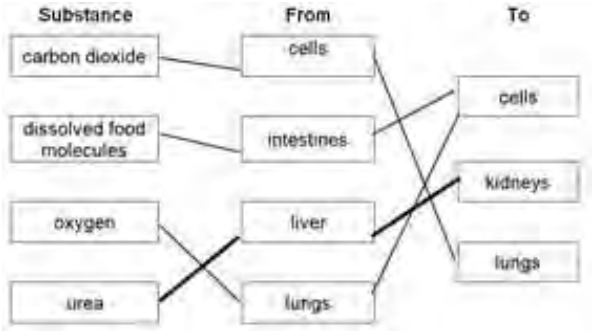
Question			Answer	Marks	AO element	Guidance
3	(a)		All bars correctly plotted = 3 ✓ 3 or 4 bars correctly plotted = 2 ✓ 2 bars plotted correctly = 1 ✓	3	2.2	**ALLOW** error of plus or minus ½ small square on the graphpaper grid
	(b)		**Two correct lifestyle factors and associated descriptions required for 4 marks** Genetic / may have inherited genes ✓ **AND** That makes heart attacks more or less of a risk ✓ **OR** Exercise ✓ **AND** Makes heart attacks less of a risk ✓ **OR** High fat diet / obesity ✓ **AND** Makes heart attacks more of a risk ✓ **OR** Stress ✓ **AND** Makes heart attacks more of a risk ✓ **OR** Drinking too much alcohol ✓ **AND** Makes heart attacks more of a risk ✓ **OR** Smoking ✓ **AND** Makes heart attacks more of a risk ✓	4	1.1	One mark for each correctly identified lifestyle factor without description, up to a maximum of two **ALLOW** increase in blood CO (due to smoking)
	(c)		Acts as a pump ✓	1	1.1	

Question			Answer	Marks	AO element	Guidance
	(d)		✓ Cells are joined end to end with no connecting walls	1	1.1	If more than one box is ticked, do not award the mark even if the correct box is also ticked
	(e)		They can specialise into other cells ✓ Could be used to treat disease ✓	2	1.1 2.1	

Question			Answer	Marks	AO element	Guidance
4	(a)		Add (equal volume) of Benedict's solution ✓ Heat in a hot water bath ✓ Brick red precipitate is a positive test for glucose ✓	3	1.2	**DO NOT ALLOW** heat over a Bunsen burner
	(b)	(i)	Plots correct +/- half a square ✓ Appropriate scale ✓ Axes correct and labelled ✓ Lines joined in curves and labelled ✓  	4	2.2	

Question			Answer	Marks	AO element	Guidance
		(ii)	**Any two from** **A** / oxygen increases faster than **B** / no oxygen ✓ In **A**, numbers double every hour ✓ In **B**, numbers double every hour and then slow ✓ Both increase at the same rate in the first hour ✓ **A** increases to 800 ✓ **B** increases to 200 ✓	**2**	**3.1a**	
	(c)		**Any two from** Aerobic uses oxygen and anaerobic does not use oxygen ✓ Anaerobic releases less energy / ATP than aerobic ✓ Anaerobic can release lactic acid / carbon dioxide ✓ Glucose breakdown is complete in aerobic but incomplete in anaerobic ✓	**2**	**1.1**	**ALLOW** the reverse answer in each case

Question			Answer	Marks	AO element	Guidance
5	(a)	(i)	800 ✓	1	2.2	
		(ii)	*A has:* Greater resolution / more detail ✓ Greater magnification ✓	2	2.2	**ALLOW** organelles such as mitochondria are visible
	(b)	(i)	Y = cell membrane ✓	1	2.1	
		(ii)	Releases energy / ATP ✓	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>6</td><td>(a)</td><td></td><td> 
</td><td>3</td><td>1.1</td><td>Cells to carbon dioxide to lungs

Intestines to dissolved to cells

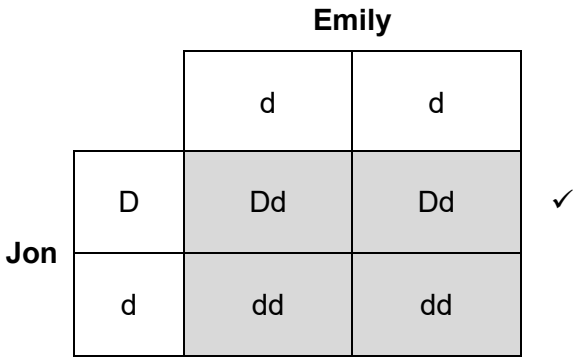
Lungs to oxygen to cells

i.e. mark each substance separately</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table>
<tr><th>Model</th><th>Surface area (cm^2)</th><th>Volume (cm^3)</th><th>Surface area : volume ratio</th></tr>
<tr><td>A</td><td>24</td><td>8</td><td>3:1 ✓</td></tr>
<tr><td>B</td><td>48</td><td>8</td><td>6:1 ✓</td></tr>
</table></td><td>2</td><td>2.2</td><td></td></tr>
<tr><td></td><td>(c)</td><td></td><td>Any two from
As they get bigger, the surface area : volume ratio gets smaller ✓
So gases diffuse more slowly in / out ✓
Diffusion across outer body surface too slow ✓</td><td>2</td><td>2.1 x 1

1.1 x 1</td><td></td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
7	(a)	(i)	C ✓	1	1.1	
		(ii)	**B:** 92.86 ✓ **C:** 39.36 ✓	2	2.2	**DO NOT ALLOW** answers not given to 2d.p.
		(iii)	Prevents impulse leaking out / insulates neuron ✓	1	1.1	
	(b)	(i)	Fast ✓	1	1.1	
		(ii)	Prevent damage / safety ✓	1	1.1	

Question			Answer	Marks	AO element	Guidance
8	(a)		**D C B E A** all three marks **D** first and **A** last ✓ **C** before **B** ✓ **B** before **E** ✓	3	1.1	
	(b)		**Any four from** Choose a bull from a high milk yield herd / mother with high milk yield ✓ Choose a cow from a high milk yield herd / mother with high milk yield ✓ Breed together ✓ From the next generation choose high yield cow ✓ Repeat over many generations ✓	4	2.1	**ALLOW** genes for high milk yield increase / genes for low milk yield lost from population.

Question			Answer	Marks	AO element	Guidance
9	(a)		 ✓ Probability ½ / 50% / 1 in 2 ✓	2	2.2	
	(b)		**FIRST CHECK THE ANSWER ON THE ANSWER LINE IF** answer = 12 820 award 2 marks 64 100 000 / 5 000 ✓ 12 820 ✓	2	2.2	
	(c)		Linked to smoking ✓ Linked to work related exposure to pollutants ✓	2	1.1	

Question			Answer	Marks	AO element	Guidance
10	(a)		Chloroplast ✓	1	1.1	
	(b)		The closer the light the faster photosynthesis / more bubbles produced ✓ No further increase on photosynthesis / number of bubbles from 25 to 12.5 cm ✓	2	3.1a	**ALLOW** more oxygen produced
	(c)	(i)	Repeat the reading for 12.5 cm ✓ If the number of bubbles is close to 105 then she can be more certain it is the true value ✓	2	3.3b	**ALLOW** repeat for all distanced and calculate a mean
		(ii)	**Any two from** Use a heat source to vary the temperature e.g. a water bath ✓ Use a thermometer to measure the temperature ✓ Count the number of bubbles (of oxygen) given off (at each temperature) ✓	2	3.3a	
	(d)	(i)	Transpiration ✓	1	1.1	
		(ii)	**C:** mean 9.46 ✓ **C:** rate of water uptake 0.32 ✓	2	1.2	
		(iii)	Stomata let in gas / carbon dioxide needed for photosynthesis ✓ Stomata open when it is light / during the day ✓	2	1.1	**ALLOW** idea that more stomata are open for one mark

Question			Answer	Marks	AO element	Guidance
		(iv)	**Any two from** **1.** Water may be lost from parts of the apparatus that are not sealed ✓ **2.** Some water is used for photosynthesis ✓ **3.** If the plant is wilting, the plant will use water to restore turgidity ✓	**2**	**1.2** **1.1**	MP2 **DO NOT ALLOW** incorrect use of water e.g. respiration
	(e)		Will be unable to exchange gases / take in carbon dioxide ✓ So rate of photosynthesis will decrease / go down ✓	**2**	**2.1**	

Question			Answer	Marks	AO element	Guidance
11	(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)** Correctly explains in detail how to use all four pieces of apparatus to carry out a transect from the tree to the middle of the field. **AND** Provides a complete description as to how results will be processed. *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)** Correctly explains in detail how to use two or three pieces of apparatus to carry out a transect from the tree to the middle of the field. **AND** Provides a partial description as to how results will be processed. *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)** Correctly explains how to use one piece of apparatus to carry out a transect from the tree to the middle of the field. **AND** Provides a simple description as to how results will be processed.	**6**	**2.1 ×4** **3.1a ×2**	**AO2.1 Application of knowledge of apparatus to carry out sampling to this example** Tape measure: • Spread tape measure out from tree to middle of field • Mark regular intervals to place quadrat e.g. every other metre • Take regular readings along the transect Quadrat • A quadrat is a square frame • Place quadrat on the ground • At the intervals indicated by the tape measure being used to mark out the transect • Estimate percentage cover of plants. Identification key: • Compare plants observed to images / descriptions • Use to find names / species of plants • In each quadrat • Dichotomous choices within the key. Light meter: • Measure light levels / light intensities • Hold equipment at ground level • Equipment should be held at the same angle each time

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td></td><td></td><td></td><td>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.

0 marks
No response or no response worthy of credit.</td><td></td><td></td><td>• Take a reading for each quadrat along the transect
AO3.1a Description of the processing of results
• Consider the types of plants in relation to the light readings
• Compare the light levels along the transect
• Compare plant types / species / percentage cover along the transect
• Draw a table to show percentage cover in each quadrat along the quadrat
• Possible graphical representation of results e.g. bar chart / kite diagram.</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table><tr><td>Number of species</td><td>2</td><td>3</td></tr><tr><td>Total number of plants</td><td>20</td><td>20</td></tr><tr><td>Biodiversity index</td><td>0.1</td><td>0.15</td></tr></table></td><td>1</td><td>2.2</td><td>All values need to be correct to award the mark</td></tr>
</table>

Question	Answer	Marks	AO element	Guidance
(c)		1	1.1	

Using wood rather than oil for fuel. ☐

Storing seeds in seed banks. ✓

Increasing the population of a common species. ☐

Decreasing the genetic variation within species. ☐