OCR
Oxford Cambridge and RSA

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…day June 20XX – Morning/Afternoon

GCSE (9–1) Combined Science B (Twenty First Century Science)
J260/04 Combined Science (Foundation Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 75

This document consists of 20 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 **4(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.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>✓ lipsticks are mixtures of substances</td><td>1</td><td>1.2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Any one from
So that he has other samples for other analyses ✓
Has another sample if analysis goes wrong ✓
Sample available for others, e.g. defence lawyer, to check results ✓</td><td>1</td><td>2.2</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>FIRST CHECK THE ANSWER ON THE ANSWER LINE IF answer = 50 cm^3 award 3 marks

25 + 18 + 15 + 2 = 60 ✓
120 / 60 x 25 ✓
50 cm^3 ✓</td><td>3</td><td>2.2</td><td>ALLOW ECF for addition</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Would dissolve spot into solvent / would remove spot ✓</td><td>1</td><td>2.2</td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>Lipstick Brand B was on the tissue ✓</td><td>1</td><td>3.2b</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table>
<tr><th>Sample</th><th>Distance moved by spot in cm</th><th>Distance moved by solvent in cm</th><th>Rf value</th></tr>
<tr><td>Spot 1</td><td>1.6</td><td rowspan="3">7.2</td><td>0.22</td></tr>
<tr><td>Spot 2</td><td>4.2</td><td>0.58</td></tr>
<tr><td>Spot 3</td><td>5.4</td><td>0.75</td></tr>
<tr><td></td><td>Both correct ✓</td><td></td><td>Both correct ✓</td></tr>
</table></td><td>2</td><td>2.2</td><td>Measurements correct to +/- 0.1 cm
Rf values to 2 d.p. for mark</td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
		(iii)	Compare Rf value ✓ With literature value or AW ✓	2	1.2 2.2	
	(d)		**Any one from** Solvent (system) may not separate other dyes ✓ They may have dyes with similar Rf value so won't separate ✓	1	3.3a	
	(e)		✓ spray the chromatogram with a locating agent ✓	1	3.3b	

Question			Answer	Marks	AO element	Guidance
2	(a)	(i)	✓ the variable is controlled, so that results from different sunscreens can be compared	1	2.2	
		(ii)	**Any one from** Same UV / same wavelength source ✓ Distance of UV source ✓ Same type of plastic film ✓	1	2.2	
		(iii)	Risk ✓ Safety precaution ✓	2	1.1 2.2	Sensible risks and safety precautions, e.g. risk – damaging to eyes, safety precaution – do not look directly at light source
	(b)	(i)	Symbols (Zn, O_2) ✓ Balancing (2Zn and 2ZnO) ✓	2	1.1 2.2	
		(ii)	✓ the zinc is oxidised during the reaction	1	2.1	
	(c)		Ethanol produces particles with the narrowest range of size ✓	1	3.1a	

Question			Answer	Marks	AO element	Guidance
	(d)	(i)	*Interpreting data* 1 - 3 cups some reduction of melanoma ✓ 4 cups bigger / more marked reduction ✓ **OR** Percentage stays very similar for all coffee intakes ✓ Reduction in percentage for 4 cups not big enough to support the claim ✓ **Any two from** *Limitations* Accuracy of recording coffee intake ✓ Prior exposure to Sun ✓ Coffee intake may be correlated with other behavioural ✓ Characteristics that may affect melanoma ✓ Other factors that may affect melanoma ✓ Exposure to Sun variable ✓ Variation in different protective measures between different people ✓	**4**	**3.1a x2** **3.2b x2**	Maximum 2 marks for interpreting data
		(ii)	(suggest / establish a) plausible mechanism ✓	**1**	**1.2**	

Question			Answer	Marks	AO element	Guidance
3	(a)	(i)	We cannot tell ✓ False ✓ False ✓	3	1.2	
		(ii)	**FIRST CHECK THE ANSWER ON THE ANSWER LINE IF** answer = 96 600 (J) award 4 marks Recall of formula – Energy transferred (J) = power (W) x time (s) ✓ Calculation of mean = 32.2 ✓ 32.2 x 3000 ✓ Correct calculation = 96 600 (J) ✓	4	 1.1 2.2 2.2 1.2	
		(iii)	**FIRST CHECK THE ANSWER ON THE ANSWER LINE IF** answer = 68 040 J award 3 marks Calculation of temperature rise ✓ Substitute values into formula ✓ Correct answer = 68 040 J ✓	3	 2.2 1.1 2.2	
		(iv)	**Any two from** The data does support the prediction ✓ Efficiency does increase with volume ✓ Relationship is almost linear (as volume increases) ✓ Data quote in support of the prediction ✓	2	 3.1a 3.2a	**ALLOW** answers relating to prediction being proven / true / correct e.g. 74% with 0.4 kg rising to 87% with 1.6 kg so a 13% increase when increasing the mass x4

Question			Answer	Marks	AO element	Guidance
	(b)		Poly(propene) ✓ **Any three from:** Poly(propene) has the lowest thermal conductivity / has a value of 0.15 W/m/K Copper and stainless steel have a higher thermal conductivity / have thermal conductivity values of 390.00 and 17.00 In metals, heat transferred by free electrons ✓ Bonds between particles transfer heat in polymers ✓ Transfer of heat is quick in metals ✓ Transfer of heat is slow in polymers ✓	**4**	**3.2a** **3.1b x3**	**ALLOW** specific examples of metals **ALLOW** specific examples of polymers **ALLOW** metals in place of named metals from the table of data

Question			Answer	Marks	AO element	Guidance
4	(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)** Gives a detailed method of how to carry out investigation. **AND** Describes how to preserve environment. **AND** Gives an indication of the processing of results. *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)** Builds on basic method and gives more details as to how to determine distribution. **AND** Either describes how to preserve the environment **OR** how the 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)** Gives a basic method how to determine distribution of plants in area.	**6**	**1.2 x2** **2.2x4**	**AO1.2** **Recall of basic method** For example: • use of quadrat / counting numbers • idea of sampling **AO2.2** **Additional detail of method applied to the grassland** For example: • use of quadrat of appropriate area, e.g. 1 m^2 • appropriate number of quadrats, e.g. 50 • idea of random sampling • idea of preservation of habitat, e.g. identify / survey without damaging / uprooting plants / removing plants from the area / limits trampling • idea of random sampling using grid and (computer generated) random number table • details of processing: count numbers of each plant in each quadrat / calculate mean / species density

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. **Level 0 (0 marks)** *No response or no response worthy of credit.*			
	(b)		✓ Increasing nitrogen falling on the grassland reduces the biodiversity	**1**	**3.1a**	
	(c)		✓ The experiment could be improved by testing different sources of nitrogen pollution	**1**	**3.3b**	

Question			Answer	Marks	AO element	Guidance
5	(a)		✓ Bacteria in France show the highest percentage of resistance	1	3.1a	
	(b)		**Any three from** Patients may not understand the effects of overuse of antibiotics / taking a course of antibiotics correctly ✓ (Not taking the full course) may lead to antibiotic resistance ✓ (Taking antibiotics prescribed for someone else) may lead to side effects ✓ (Antibiotics prescribed for someone else) may not be suitable for treating person's (communicable) disease ✓ (If the full course isn't taken), all in the population of bacteria (causing the disease) may not be killed ✓ Mutation with natural selection leads to whole population of bacteria becoming resistant ✓	3	3.2a	
	(c)	(i)	Cancer Diabetes Diarrhoeal disease Road traffic accidents AMR Measles Cholera Tetanus ✓	1	3.1a	All answers required in correct order for 1 mark

Question			Answer	Marks	AO element	Guidance
		(ii)	**Any three from** New antibiotics / ways of controlling bacteria may be developed/discovered ✓ Way of making (current) antibiotics more effective could be developed / discovered ✓ Figure based on mathematical model / only one projection of current data ✓ Current estimate may not be reliable / must be reliable (to produce model) ✓ Suggestion of other cause of deaths / catastrophic event that may affect world population ✓	**3**	**3.1b**	
		(iii)	**Any two from** Cost of treatment of disease / more medical staff required ✓ Research and development of new antibiotics / alternative treatments ✓ Effects on workforce ✓	**2**	**3.2a**	

Question			Answer	Marks	AO element	Guidance
6	(a)	(i)	Different panels may have different characteristics / produce different voltages ✓	1	2.2	
		(ii)	**Any one from** Type / intensity of light source ✓ Distance of light source from panel ✓ Temperature ✓	1	2.2	
	(b)	(i)	Points plotted correctly ✓✓	2	2.2	All four points plotted correctly – 2 marks 2-3 plotted correctly – 1 mark
		(ii)	Points joined appropriately ✓	1	2.2	
		(iii)	Increase in voltage with increasing area ✓ Non-linear / graph levelling off ✓	2	3.1a	
	(c)		Circuit has ammeter in series ✓ Voltmeter in parallel ✓ Suitable load, e.g. light bulb, resistor ✓ Use of equation to calculate the power output of the solar cell: power in watts = voltage / potential difference in volts x current in amps ✓	4	2.2 x3 2.1	One mark for circuit diagram without elaboration / description

Question			Answer	Marks	AO element	Guidance
	(d)		**Any four from** Other types currently more efficient ✓ Only developed since 2013 ✓ Rate of improvement in efficiency suggests that these will be most efficient type of cell by 2016 / exceed efficiency of monocrystalline silicon by 2016 / data on efficiency data to support ✓ Other non-performance factors to consider, e.g. cost, environmental impact, toxicity ✓ But we don't know how they will perform in non-laboratory situations ✓	**4**	**3.2b**	

Summary of updates

Date	Version	Change
May 2018	2	We've reviewed the look and feel of our papers through text, tone, language, images and formatting. For more information please see our assessment principles in our "Exploring our question papers" brochures on our website