OCR
Oxford Cambridge and RSA

H

…day June 20XX – Morning/Afternoon

GCSE (9–1) Biology B (Twenty First Century Science)
J257/03 Breadth in biology (Higher Tier)

SAMPLE MARK SCHEME

Duration: 1 hour 45 minutes

MAXIMUM MARK 90

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. **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

11. **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.

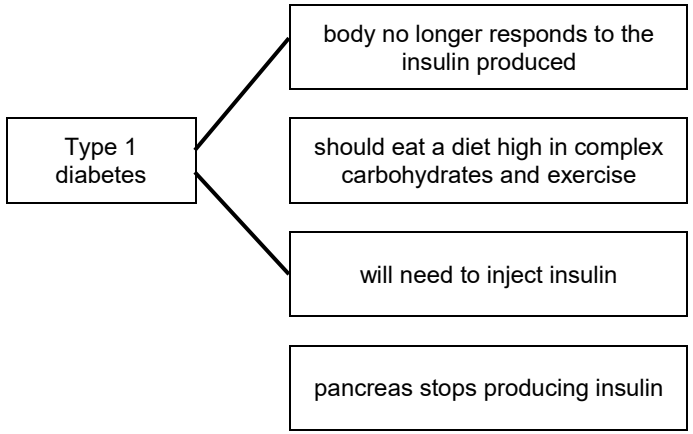
You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New 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 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)	(i)	Transports oxygen ✓	1	1.1	**ALLOW** carries oxygen / carries carbon dioxide / transports carbon dioxide
		(ii)	**Any three from** **1.** Sarah has fewer red blood cells than normal ✓ **2.** Less oxygen transported ✓ **3.** So less ATP produced ✓ **4.** As less respiration ✓	3	2.1	MP3 **DO NOT ALLOW** less energy produced
		(iii)	136 / 90 = 1.5 : 1 ✓	1	2.2	
		(iv)	Increases rate of diffusion of oxygen into cell ✓	1	1.1	
		(v)	A (chemical) messenger ✓	1	1.1	
	(b)	(i)	**Any one from** *Descriptions* **1.** Person B sugar level falls faster / person A sugar level falls more slowly ✓ **2.** Person B sugar level falls back to starting level after just over 2 hours / Person A sugar level remains high ✓ **Any one from** *Reasons why* **3.** Person A does not respond to the hormone / insulin produced to convert sugar to glycogen ✓ **4.** Person B produces a hormone / insulin in response to the rise in blood sugar and this causes cells to convert the sugar to glycogen so the level falls ✓	2	3.1a 2.1	Max 1 for description and max 1 for the reason why MPs 3 and 4 **DO NOT ALLOW** a reference to hormone response or lack of response without reference to the role of insulin.

Question			Answer	Marks	AO element	Guidance
		(ii)		2	1.1	If more than 2 lines are drawn, delete one mark for each incorrect line

Question			Answer	Marks	AO element	Guidance
2	(a)		**Any three from** Use a line transect **AND** quadrat ✓ Running from the sea up the shore ✓ To take many samples ✓ Repeat at different parts of the shore ✓	3	2.2	
	(b)	(i)	8 ✓	1	3.1a	
		(ii)	**FIRST CHECK THE ANSWER ON THE ANSWER LINE IF** answer = 47 award 2 marks (45 + 47 + 49) / 3 ✓ 47 ✓	2	2.2	
	(c)		limpets will decrease in numbers ✓ as more are eaten ✓ **OR** crabs will increase ✓ as more food ✓	2	3.1a 2.1 3.1a 2.1	**ALLOW** any correct species with correct explanation
	(d)		**Any two from** idea of interdependence ✓ example of interdependence e.g. food / shelter / reproduction ✓ maintaining genetic diversity ✓ may be required in the future for medicines ✓ maintains the stability of the food web ✓	2	1.1	
	(e)		Advantage: (can be) fast / no need to find a mate ✓ Disadvantage: lack of genetic diversity / are all genetically identical ✓	2	1.1	MP2 **ALLOW** are clones **DO NOT ALLOW** are all identical
	(f)	(i)	✓ Enzymes will become denatured	1	2.1	If more than one box is ticked, do not award the mark even if the correct box is also ticked
		(ii)	✓ Some cells may burst	1	2.1	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)		✓ DNA is made from four different nucleotides ✓ DNA is a polymer	2	1.1	If more than two boxes are ticked, do not award the mark even if the correct box is also ticked
	(b)		Correct sequence of amino acids – leu, glu, tyr, thr ✓	1	2.1	**ALLOW** leucine, glutamine, tyrosine, threonine
	(c)		**Any four from** Mutation is a substitution ✓ Result could be no change / new triplet might still code for same amino acid ✓ Result might be that the new triplet code for a different amino acid ✓ This might cause the protein not to function correctly / not to form ✓ Might affect a characteristic / the phenotype ✓	4	2.1	

Question			Answer	Marks	AO element	Guidance
4	(a)	(i)	**FIRST CHECK THE ANSWER ON THE ANSWER LINE** **IF** answer = 177.63 award 2 marks π (7.5 x 7.5) ✓ 177.63 mm^2 ✓	**2**	**1.2**	
		(ii)	✓ Antibiotic B has the least effect. Jack should not be given antibiotic B	**1**	**3.2b**	
		(iii)	**Any one from** Used as a comparison ✓ To show that it is the antibiotic that has the effect ✓	**1**	**3.3a**	
	(b)		*Technique* Working under flame ✓ Use of alcohol / flame ✓ *For explanation* Prevents other bacteria colonising agar plate ✓ Kills other microorganisms ✓	**2**	**1.2**	**ALLOW** any correct technique Technique and explanation required for 2 marks **DO NOT ALLOW** two techniques for 2 marks

Question			Answer	Marks	AO element	Guidance
5	(a)		C ✓	1	2.1	
	(b)		✓ FSH	1	1.1	
	(c)	(i)	Antigen is injected into the animal ✓ The antibody producing cells are taken from the animal ✓ The cells producing the correct antibody are then Selected and cultured ✓	3	1.1	All three stages needed for three marks
		(ii)	D B A C	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>(i)</td><td>✓ C</td><td>1</td><td>1.1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Blood vessel X – vein ✓
Blood vessel Y – artery ✓
Blood vessel Z – capillary ✓</td><td>3</td><td>1.1</td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>As the percentage of fat in the diet increases, the greater the risk of dying from heart disease ✓</td><td>1</td><td>3.2b</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Any two from
Reduce amount of fat in diet ✓
Reduce stress✓
Stop smoking ✓
Take (regular) exercise ✓</td><td>2</td><td>3.1b</td><td>ALLOW reduce cholesterol/salt</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>Correct Punnet square ✓
<table><tr><td></td><td>X^H</td><td>X^h</td></tr><tr><td>X^H</td><td>X^HX^H</td><td>X^HX^h</td></tr><tr><td>Y</td><td>X^HY</td><td>X^hY</td></tr></table>Probability 25% / ¼ / 1 in 4 ✓</td><td>2</td><td>1.2

3.1a</td><td>

ECF correct probability if Punnet square incorrect</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>X^hX^h ✓</td><td>1</td><td>2.1</td><td></td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
7	(a)	(i)	Cornea – responsible for bending the light ✓ Light rays will no longer meet on the retina so sight will be poor ✓	2	1.1 2.1	**ALLOW** reference to blindness
		(ii)	An unspecialised cell which can become any cell type ✓	1	1.1	
		(iii)	**Any one from** Embryos killed in the process ✓ Embryos could be a life ✓	1	2.1	
	(b)		**FIRST CHECK THE ANSWER ON THE ANSWER LINE IF** Answer = 27.42 award 2 marks (141 ÷ 360) × 70 ✓ 27.42 (minutes) ✓	2	2.2	

Question			Answer	Marks	AO element	Guidance
8	(a)	(i)	**FIRST CHECK THE ANSWER ON THE ANSWER LINE IF** answer = 0.23 award 2 marks 7 / 30 ✓ 0.23 ✓	**2**	**1.2**	**ALLOW** 1 mark for 7 / 30
		(ii)	Measure the rate of water uptake with a fan running on the shoot ✓	**1**	**3.3a**	**DO NOT ALLOW** 'place plant/apparatus outside'
		(iii)	**Any two from** **1.** Water may be lost from parts of the equipment 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**	**DO NOT ALLOW** incorrect use of water e.g. respiration
	(b)		**Any two from** Potassium ions (reduce the water potential) increase the concentration in the guard cells ✓ So water moves into the cell ✓ By osmosis ✓ Guard cells become turgid ✓	**2**	**1.1**	

Question			Answer	Marks	AO element	Guidance
9	(a)		Able to grow in colder conditions / less likely to be damaged by cold conditions ✓	1	2.1	**DO NOT ALLOW** reference to freezing tomatoes
	(b)	(i)	**Any three from:** Isolate the gene for human growth hormone ✓ Put the gene into a vector / plasmid ✓ Use the vector to put the (human growth hormone) gene into *E.coli* bacteria ✓ Grow bacteria / separate the hormone ✓	3	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>10</td><td>(a)</td><td>(i)</td><td>Antigen ✓</td><td>1</td><td>1.1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Antibody ✓</td><td>1</td><td>1.1</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Whole cell could cause disease ✓</td><td>1</td><td>2.1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>
<table>
<tr><th>Preclinical tests</th><th>Safety</th><th>Effectiveness</th><th>Both</th></tr>
<tr><td>Cultured human cells</td><td></td><td></td><td>✓</td></tr>
<tr><td>Whole animals</td><td></td><td></td><td>✓</td></tr>
</table>
<table>
<tr><th>Clinical tests</th><th>Safety</th><th>Effectiveness</th><th>Both</th></tr>
<tr><td>Healthy volunteers</td><td>✓</td><td></td><td></td></tr>
<tr><td>Humans with the disease</td><td></td><td></td><td>✓</td></tr>
</table>
</td><td>2</td><td>1.1</td><td>Tick in correct box for mark
If more than one box is ticked in each empty row, do not award the mark even if the correct box is also ticked</td></tr>
</table>

Question			Answer	Marks	AO element	Guidance
11	(a)		A pairs with T or A pairs with C ✓ G pairs with T or G pairs with C ✓	2	3.2b	**DO NOT ALLOW** A pairs with T or G pairs with C alone
	(b)		Triplet ✓ Order / sequence ✓ Classification ✓	3	1.1	
	(c)		Whales ✓ As they are closer to them on the tree ✓	2	2.1	

Question			Answer	Marks	AO element	Guidance
12	(a)		Would have biggest bar at bottom, then next biggest with smallest at top ✓	1	2.1	**DO NOT ALLOW** if bars are not labelled
	(b)	(i)	(4 / 600) x 100 = 0.67% ✓	1	2.2	
		(ii)	**Any one from** Not all of the biomass is eaten e.g. roots ✓ Biomass is used in respiration (by other organisms) ✓ Biomass is egested (by slugs/ thrush) ✓	1	2.1	**DO NOT ALLOW** biomass egested by grass
	(c)	(i)	**Any two from** Activity starts to rise in spring ✓ Activity is at its peak in the summer months ✓ Activity falls in autumn ✓ Activity is low in the winter ✓	2	3.1a	
		(ii)	**Any two from** (Rise in spring) as more water is available ✓ (peak in summer) as this is when it is warmer / when the temperature is higher ✓ (Fall / low in autumn / winter) as this is when it is colder / when the temperature is lower ✓ *Idea of* a link between more enzyme activity and more decomposer activity ✓	2	1.1	