

**...day June 20XX – Morning/Afternoon**

**GCSE (9–1) Biology B (Twenty First Century Science)**

**J257/04 Depth 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. 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 questions on this paper are **4(a)** and **2(b)**.

## 11. Annotations

<b>Annotation</b>	<b>Meaning</b>
<b>DO NOT ALLOW</b>	Answers which are not worthy of credit
<b>IGNORE</b>	Statements which are irrelevant
<b>ALLOW</b>	Answers that can be accepted
( )	Words which are not essential to gain credit
—	Underlined words must be present in answer to score a mark
<b>ECF</b>	Error carried forward
<b>AW</b>	Alternative wording
<b>ORA</b>	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 Biology B:

	<b>Assessment Objective</b>
<b>AO1</b>	<b>Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.</b>
<b>AO1.1</b>	Demonstrate knowledge and understanding of scientific ideas.
<b>AO1.2</b>	Demonstrate knowledge and understanding of scientific techniques and procedures.
<b>AO2</b>	<b>Apply knowledge and understanding of scientific ideas and scientific enquiry, techniques and procedures.</b>
<b>AO2.1</b>	Apply knowledge and understanding of scientific ideas.
<b>AO2.2</b>	Apply knowledge and understanding of scientific enquiry, techniques and procedures.
<b>AO3</b>	<b>Analyse information and ideas to interpret and evaluate, make judgements and draw conclusions and develop and improve experimental procedures.</b>
<b>AO3.1</b>	Analyse information and ideas to interpret and evaluate.
<b>AO3.1a</b>	Analyse information and ideas to interpret.
<b>AO3.1b</b>	Analyse information and ideas to evaluate.
<b>AO3.2</b>	Analyse information and ideas to make judgements and draw conclusions.
<b>AO3.2a</b>	Analyse information and ideas to make judgements.
<b>AO3.2b</b>	Analyse information and ideas to draw conclusions.
<b>AO3.3</b>	Analyse information and ideas to develop and improve experimental procedures.
<b>AO3.3a</b>	Analyse information and ideas to develop experimental procedures.
<b>AO3.3b</b>	Analyse information and ideas to improve experimental procedures.

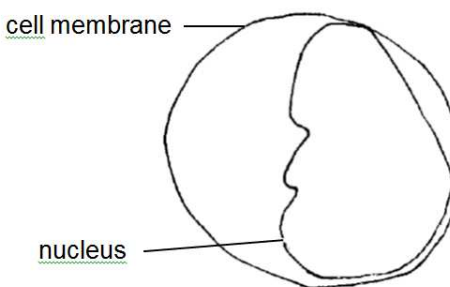
Question			Answer	Marks	AO element	Guidance
1	(a)	(i)	<b>FIRST CHECK THE ANSWER IN TABLE. If answer = +6.1 award 2 marks</b>  (0.3 ÷ 4.9) × 100 ✓ +6.1 ✓	2	2.2	<b>DO NOT ALLOW</b> answer if not given to 1 d.p.
		(ii)	4, 1, 5, 3, 2 ✓	1	3.2a	
		(iii)	Does not take into account width / mass ✓	1	3.3a	
		(iv)	Any two from: Set up experiment as above and re-measure every 10 minutes / other suitable time period ✓ Find out how long it takes until there is no further change in length ✓ Measure mass of potato before and after ✓	2	3.3b	
	(b)	(i)	X = sugar concentration (mol / dm <sup>-3</sup> ) <b>AND</b> Y = change in mean length (mm) ✓	1	2.2	

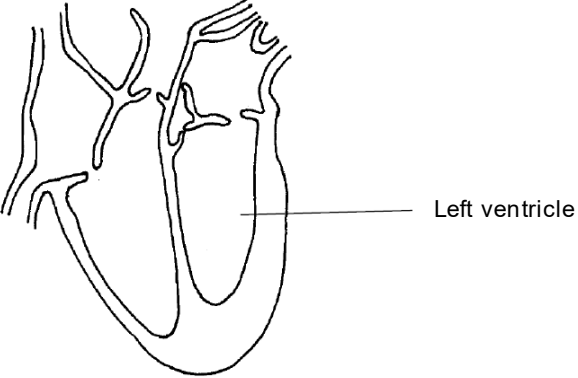
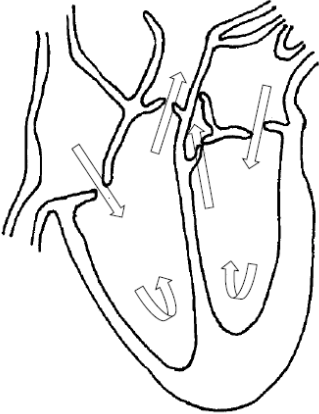


Question		Answer	Marks	AO element	Guidance
	(ii)		2	2.2	5 plots correct = 2 3 or 4 plots correct = 1
	(iii)	Straight line through points ✓	1	2.2	
	(iv)	0.35 to 0.4 ✓	1	3.1a	
	(v)	Idea that it is the same concentration / isotonic ✓ Water movement is the same in both directions / no net flow ✓	1	3.2b	

Question		Answer	Marks	AO element	Guidance
2	(a)	Substrate – hydrogen peroxide <b>AND</b> enzyme – catalase ✓	1	2.1	
	(b)*	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p><b>Level 3 (5–6 marks)</b>  <i>Describes in detail the pattern of the graph</i>  <b>AND</b>  <i>Links this to an explanation of the effect of all temperatures on enzyme function</i>  <b>AND</b>  <i>Identifies the optimum temperature for the enzyme</i></p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p><b>Level 2 (3–4 marks)</b>  <i>Describes the pattern of the graph</i>  <b>AND</b>  <i>Links this to an explanation of the effect of temperature on enzyme function</i>  <b>OR</b>  <i>Identifies the optimum temperature for the enzyme</i></p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p>	6	3 x 2.1 2 x 3.1a 1 x 3.2a	<p><b>AO3.1a Identification of patterns in graph</b>  For example:</p> <ul style="list-style-type: none"> <li>• Rate of reaction increases between 0°C and 30°C</li> <li>• Rate of reaction decreases between 30°C and 60°C</li> </ul> <p><b>AO2.1 Details of effect of temperature on enzyme function</b>  For example:</p> <ul style="list-style-type: none"> <li>• Increase between 0 and 30°C is because there is more kinetic energy</li> <li>• So more collisions</li> <li>• So more Enzyme-substrate complex form</li> <li>• Decrease between 30°C and 60°C is because enzyme is denatured</li> <li>• Loss of 3D structure</li> <li>• ESC can no longer form as substrate does not fit into the enzyme</li> </ul> <p><b>AO3.2a Identification of the optimum temperature of the enzyme</b>  For example:</p> <ul style="list-style-type: none"> <li>• Optimum temperature is 30°C</li> </ul>

Question	Answer	Marks	AO element	Guidance
	<p><b>Level 1 (1–2 marks)</b>  <i>Describes the pattern of the graph</i>  <b>AND</b>  <i>Makes reference to the effect of temperature on enzyme function between 0 and 30 °C</i>  <b>OR</b>  <i>Makes reference to the effect of temperature on enzyme function between 30 °C and 60 °C</i></p> <p><i>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.</i></p> <p><b>0 marks</b>  <i>No response or no response worthy of credit.</i></p>			

Question		Answer	Marks	AO element	Guidance	
3	(a)	Correct cell drawn ✓ Continuous, unfeathery lines, no shading ✓ Label lines drawn with a ruler ✓ Nucleus <b>AND</b> cell membrane correctly labelled ✓	4	1.2 ×3  1.1	Drawing should take up approximately 50% of space e.g. 	
	(b)	<b>Any two from</b> Supply sugar / oxygen ✓ Thick walls of heart do not otherwise get enough sugar / oxygen ✓ By diffusion ✓	2	2.1		
	(c)	(i)	Greater pressure generated (by thicker muscle) ✓ To push blood further (round the body) ✓	2	2.2	

Question	Answer	Marks	AO element	Guidance
(ii)	Label pointing to left ventricle on diagram ✓ 	1	1.1	
(iii)	Arrows as shown below ✓ ✓ 	2	1.2	1 mark for correct on each side

Question	Answer	Marks	AO element	Guidance
4 (a)*	<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p><b>Level 3 (5–6 marks)</b>  <i>Explains fully the physical changes that occur during the menstrual cycle</i>  <b>AND</b>  <i>Links them correctly to evidence from the diagram and graphs</i></p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p><b>Level 2 (3–4 marks)</b>  <i>Explains two physical changes that occur during the menstrual cycle</i>  <b>AND</b>  <i>Links them correctly to evidence from the diagram and graphs</i></p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p><b>Level 1 (1–2 marks)</b>  <i>Explains one physical change that occurs during the menstrual cycle</i>  <b>AND</b>  <i>links it correctly to evidence from the diagram and graphs</i></p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p>	6	1.1 x3  3.1a x3	<p><b>AO1.1 Physical and hormonal menstrual cycle changes</b>          For example:</p> <ul style="list-style-type: none"> <li>• Uterus becomes thicker because it becomes more vascular</li> <li>• Ovulation is when an egg is released from an ovary</li> <li>• Ovulation occurs when a follicle ruptures / bursts</li> <li>• Has to be an egg present in the oviduct / Fallopian tube for fertilisation could occur</li> <li>• High progesterone and thick uterus lining required for successful implantation.</li> </ul> <p><b>AO3.1a Interpretation of graphs and diagram</b>          For example:</p> <ul style="list-style-type: none"> <li>• Days 7-14 uterus lining thickens / develops</li> <li>• Thickening of uterus occurs under the influence of a rise in oestrogen</li> <li>• Day 14 is when ovulation occurs / an egg is released</li> <li>• Follicle bursts due to a peak of LH</li> <li>• Days 15-28, fertilisation could occur</li> <li>• Uterus lining stays thick from days 21-28.</li> </ul>

Question		Answer	Marks	AO element	Guidance
		<p><b>0 marks</b>  <i>No response or no response worthy of credit.</i></p>			
	(b)	<p><b>Any two from</b>            Condom is least effective / has highest percentage of pregnancies ✓            Hormone implants are most effective / have lowest percentage of pregnancies ✓            Birth control pill still has quite a high percentage of pregnancies ✓  <b>AND</b>  <b>Any one from</b>            Condom may burst / fall off ✓            Implant is a long-term method ✓            People may forget to take the (birth control) pill ✓  <b>AND</b>            Choice for couple e.g. implant as most effective and will suit them as married and in no hurry to have children ✓</p>	<b>4</b>	<p><b>3.1b ×2</b></p> <p><b>1.1×1</b></p> <p><b>3.2a × 1</b></p>	<p>Candidates must provide a suggestion of a contraceptive method with a reason to get four marks.</p> <p>One mark is awarded for the choice, two further marks come from the evaluation and one for the reason(s).</p> <p><b>ALLOW</b> any other justified choice</p>

Question		Answer	Marks	AO element	Guidance
5	(a)	Width answers i.e. 4 x larger ✓ Area answers i.e. 12 – 20 x larger ✓✓ Volume answers i.e. 60 – 70 x larger ✓✓✓	3	2.2	If estimates are incorrect allow max 2 marks for appreciation of area (1 mark) and volume (2 marks).  Explanation is for using width or area or volume.
	(b)	(i)			
		(ii)			
		(iii)			
		Only need one egg cell / makes it easier for sperm to find egg cell ✓ RBC needs to move through small spaces / need lots of RBCs ✓	2	2.1 1.1	<b>ALLOW</b> idea of food storage in egg cell
	(c)	Cell division <b>X</b> : meiosis Cell division <b>Y</b> : mitosis	2	2.1	<b>DO NOT ALLOW</b> ambiguous spelling e.g. meiotis
	(d)	Some genes are switched off ✓ Some genes are switched on ✓ These makes proteins ✓ For specific cell types ✓	4	1.1	



Question		Answer	Marks	AO element	Guidance
6	(a)	<p><i>Similarity:</i> made from DNA / nucleic acid ✓</p> <p><i>Difference:</i> in the nucleus in the animal cell and in a loop in the bacteria ✓</p>	2	1.1	
	(b)	<p><b>Any five from</b></p> <p>Bacteria with resistance gene have an advantage ✓</p> <p>Resistance occurs due to a mutation ✓</p> <p>They will not be killed by antibiotics / are more likely to survive ✓</p> <p>They will reproduce ✓</p> <p>And pass on this gene to future generations ✓</p> <p>So the population becomes more antibiotic resistant ✓</p>	5	2.1	
	(c)	<p><b>Any two from</b></p> <p>Separate circular DNA to main loop of DNA ✓</p> <p>Naturally pass from one bacterial cell to another ✓</p> <p>Can carry required genes (for resistance) into bacteria ✓</p>	2	2.1	

Question		Answer	Marks	AO element	Guidance
7	(a)	Rays converge ✓ But do not meet ✓	2	1.1	
	(b)	(i)			
		(i)	2	2.1	
		(ii)	4	3.2b 2.1 ×3	
	(c)	<b>Any four from</b> Damaged tissue difficult to get to ✓ Treatment might damage other areas ✓ Nervous tissue highly specialised / differentiated ✓ Nervous tissue / neurons cannot regrow ✓ Therefore treatment must not cause further damage ✓	4	1.1	

Question		Answer	Marks	AO element	Guidance
8	(a)	<b>Any four from</b> Place same amount of hot water in each test tube ✓ Take temperature of water with thermometer ✓ Take temperature of water in each tube each minute / set time period ✓ For 10 minutes / specified time period ✓ Record in a table ✓	4	2.2	
	(b)	Water next to the skin will evaporate ✓ Taking heat away from the skin, cooling the person ✓	2	2.1	
	(c)	(i)	2	1.1	
		(ii)	1	2.1	

Question		Answer	Marks	AO element	Guidance
9	(a)	<b>Any three from</b> B most similar to humans ✓ D most different to humans ✓ Idea of showing how closely related different organisms are ✓ Reference to different proteins ✓	3	3.1a 3.2b	
	(b)	Longer sequence ✓ Repeat ✓	2	3.3b	
	(c)	✓ Can identify species from small parts of the organism ✓ Can distinguish between species that look very similar	2	1.2	

## Summary of updates

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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

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