OCR
Oxford Cambridge and RSA

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GCSE (9–1)

Biology A (Gateway)

J247/02: Paper 2 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for November 2020

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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.

Annotations

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

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

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:

	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.

For answers to Section A, if an answer box is blank ALLOW correct indication of answer e.g. circled or underlined.

Question			Answer	Marks	AO element	Guidance
1			A ✓	1	1.1	
2			D ✓	1	1.1	
3			C ✓	1	1.1	
4			A ✓	1	1.2	
5			A ✓	1	1.1	
6			D ✓	1	2.1	
7			C ✓	1	2.2	
8			D ✓	1	1.1	
9			C ✓	1	2.1	
10			A ✓	1	1.1	
11			A ✓	1	2.1	
12			B ✓	1	2.1	**ALLOW** 19
13			B ✓	1	1.1	
14			B ✓	1	1.1	
15			D ✓	1	1.2	

Question			Answer	Marks	AO element	Guidance
16	(a)	(i)	Three/3 ✓	1	2.2	
		(ii)	(sun)light / the sun ✓	1	1.1	
		(iii)	Award one mark for: (an organism) that lives on/in on a (host) organism ✓ Idea parasite benefits at the expense to its <u>host</u> ✓ Award two marks for: An organism that feeds on a living organism / An organism that causes harm to a living organism ✓✓	2	2 x 1.1	**IGNORE** an organism that feeds on another organism unless qualified
	(b)		**Any three from:** biological control ✓ nematodes will eat cutworms ✓ less cutworms ✓ less stevia eaten ✓ increase the yield ✓	3	3 x 2.1	**ALLOW** predators of the cutworms added **ALLOW** more crop
	(c)	(i)	use Benedicts (reagent) ✓ heat / boil ✓ no change in colour / stays blue / does not go red ✓	3	3 x 1.2	

Question			Answer	Marks	AO element	Guidance
		(ii)	Yes (no mark) blood sugar levels will be controlled/not rise ✓ idea of a sugar replacement ✓	2	 1 x 3.2a 1 x 2.1	If No chosen = 0 marks **IGNORE** blood sugar levels will decrease **ALLOW** less sugar eaten

Question			Answer	Marks	AO element	Guidance
17	(a)		lung ✓	1	2.2	
	(b)		mitosis ✓	1	1.1	
	(c)	(i)	genetic engineering / genetic modification ✓	1	1.1	**ALLOW** GM / Gene Therapy
		(ii)	worried about possible side effects / ethically / morally / religiously wrong ✓	1	3.2a	 **IGNORE** playing God / not natural

Question			Answer	Marks	AO element	Guidance
18	(a)		pooter ✓ **Any two from:** place tube A next to/over moth/insect ✓ student sucks ✓ on tube B ✓	3	3 x 1.2	 **ALLOW** student sucks the moth/insect into tube A = 2 marks **ALLOW** tube with end covered by fine mesh
	(b)	(i)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 250 award 2 marks** 25 x 30 / 3 **OR** 750 / 3 ✓ = 250 ✓	2	2 x 2.2	
		(ii)	Idea of less visible ORA ✓ otherwise they are more likely to be eaten ORA ✓	2	2 x 2.2	 **ALLOW** spot not visible to predators = 2 marks **ALLOW** small spot is less likely to be toxic / poisonous If no other mark scored, credit less likely to be washed off

Question			Answer	Marks	AO element	Guidance
	(c)	(i)	(further from the factory) there is less sulfur dioxide and so thicker cuticle/leaves ORA✓ insects find it harder to feed on the thicker leaves/cuticle ORA✓ the numbers are lower with thicker leaves/cuticle ORA✓	2	2 x 3.1b	**IGNORE** any reference to section A If no other mark scored, credit thicker leaves/cuticle further from the factory ORA
		(ii)	very high concentrations of sulfur dioxide kill the insects✓	1	3.2b	

Question			Answer	Marks	AO element	Guidance
19	(a)		the blood is less likely to clot / wounds bleed for longer/longer to heal ✓	1	1.1	**ALLOW** bruise easily / excessive bleeding **ALLOW** tiredness / fatigue / infections
	(b)	(i)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 10 000(per mm^3) award 2 marks** 1000 ÷ 0.1 **OR** 1000 x 10 ✓ = 10 000 (per mm^3) ✓	2	2 x 2.2	
		(ii)	no (no mark) (because 10 000) is in the normal range / levels / range without Fanconi anaemia✓	1	3.2a	**ALLOW** ECF from (i) **ALLOW** 10 000 is between 6000 and 16000

Question			Answer	Marks	AO element	Guidance
20	(a)		minerals ✓	1	1.1	more than one answer ringed = no mark
	(b)		to let air / oxygen in ✓ for (aerobic) respiration ✓	2	1 x 2.1 1 x 1.1	**DO NOT ALLOW** carbon dioxide **DO NOT ALLOW** anaerobic respiration
	(c)		to allow a valid comparison of the results✓	1	3.1b	
	(d)	(i)	correct plots ✓✓ smooth curved line between points ✓	3	3 x 2.2	**ALLOW** +/- half a square All correct = 2 marks 3 or 4 plots correct = 1 mark **DO NOT ALLOW** sketchy line / line thicker than half a square
		(ii)	increases up to 10 days/70°C ✓ then decreases ✓	2	3.1a	**ALLOW** increases up to 9-11 days **ALLOW** increases by 44°C
		(iii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 39 (°C) award 2 marks** 70-31 ✓ = 39 (°C)✓	2	 2.2 1.2	

Question			Answer	Marks	AO element	Guidance
		(iv)	normal compost is made by aerobic respiration✓ aerobic respiration releases more energy than anaerobic respiration✓	2	2 x 2.1	2 correct ticks = 2 marks 1 correct ticks = 1 mark 3 ticks two correct = 1 mark 3 ticks one correct = 0 marks 4 or more ticks = 0 marks
	(e)	(i)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 8 (kg) award 3 marks** 1500-1200 **OR** 300 ✓ 300/40 **OR** 7.5 ✓ = 8 (kg) ✓	3	3 x 2.2	**ALLOW** one mark for clear evidence of rounding incorrect answer correctly to the nearest whole number
		ii	less carbon dioxide is produced ✓	1	3.1b	**ALLOW** less contribution to global warming / greenhouse effect / climate change

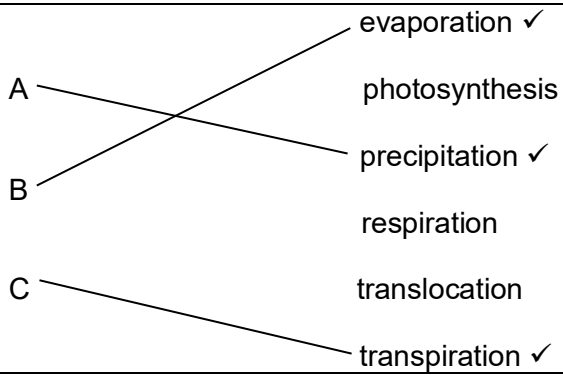
<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>AO element</th><th>Guidance</th></tr>
<tr><td>21</td><td>(a)</td><td></td><td>smallest → nucleotide
allele
largest → chromosome
✓</td><td>1</td><td>1.1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>66000000 ÷ 500 = 132 000✓</td><td>1</td><td>2.2</td><td>ALLOW 0.132 million or 132 thousand or 1.32 x 10^5</td></tr>
<tr><td></td><td>(c)</td><td></td><td>man
woman
<table><tr><th></th><th>D</th><th>d</th></tr><tr><td>d</td><td>Dd</td><td>dd</td></tr><tr><td>d</td><td>Dd</td><td>dd</td></tr></table>✓
50% / 0.5 / ½ ✓</td><td>2</td><td>1 x 2.2

1 x 3.1a</td><td>

ALLOW 1 in 2 or 1:1
ALLOW ecf for probability</td></tr>
</table>

Question	Answer	Marks	AO element	Guidance
(d)*	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)** Provides a detailed explanation linking cholesterol to heart disease. **AND** Provides a detailed analysis to explain if this link is supported by the graph. *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)** Provides a detailed explanation linking cholesterol to heart disease. **OR** Provides a detailed analysis to explain if this link is supported by the graph. **OR** Provides a basic explanation linking cholesterol to heart disease. **AND** Provides a basic analysis of the information to explain if this link is supported by the graph. *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)** Provides a basic explanation linking cholesterol to heart	**6**	**2 x 1.1** **2 x 2.1** **2 x 3.1b**	**AO1.1 Demonstrate knowledge and understanding of the importance of the blood supply to the heart muscle.** • coronary artery carries blood to heart/muscle • blood takes oxygen/glucose to the heart/muscle • heart/muscle carries out aerobic respiration/needs energy • energy is needed for the heart/muscle to contract **AO2.1 Apply knowledge and understanding of the requirements of the heart muscle** • cholesterol build up (partially) blocks the blood flow in the artery • this reduces blood/oxygen/glucose carried to the heart/muscle • heart/muscle carries out less aerobic respiration/less energy released • heart/muscle can't contract as forcefully **AO3.1b Analyse information and ideas to interpret the results on the study** **Support the link:** • men with heart disease had (on average) a higher blood cholesterol level. • Men without heart disease had (on average) a lower blood cholesterol level. • build-up of cholesterol can lead to heart disease **Doesn't support the link:** • considerable overlap between the two groups • men can still have heart disease with low blood

Question			Answer	Marks	AO element	Guidance
			disease. **OR** Provides a basic analysis of the information to explain if this link is supported by the graph. **OR** Demonstrates knowledge of the importance of the blood supply to the heart muscle. *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*			cholesterol levels • Men without heart disease can still have high blood cholesterol levels

Question			Answer	Marks	AO element	Guidance
22	(a)			3	3 x 1.1	**Each correct line = 1 mark** **DO NOT ALLOW** more than 1 line from each letter
	(b)		prevents lake drying out / replenishes lake water / washes minerals into the lake ✓	1	1.1	**ALLOW** idea of lack of water in lake causing harm to organisms that live in the water / will provide organisms with sufficient/enough water to live in **ALLOW** idea of providing organisms with dissolved oxygen **IGNORE** will provide organisms with more water **IGNORE** nutrients
	(c)		idea that water is added from (each) lake to a (separate) Petri dish using (sterile) pipette ✓ filter paper/antibiotic disc is placed in (the centre of) each dish with the (sterile) forceps ✓ Petri dishes are incubated ✓ idea that the inhibition zone/clear area/area with no bacteria growth around the discs is measured ✓	4	4 x 1.2	**ALLOW** idea of repeats **ALLOW** idea of setting up a control

Question			Answer	Marks	AO element	Guidance
	(d)		Lake Bellandur– no mark **Any two from:** more (antibiotic) resistant bacteria / more species of bacteria are resistant to antibiotics / ORA ✓ Lower number of bacteria killed by antibiotics / less species of bacteria killed by antibiotics / ORA ✓ this lake contains a higher ratio of resistant bacteria compared to bacteria killed by antibiotics✓ (antibiotic) resistant bacteria more likely to survive/reproduce with more (antibiotic) pollution ORA✓	**2**	**2 x 3.2a**	Incorrect or no lake given then no marks **ALLOW** bacteria are more resistant (antibiotic) **DO NOT ALLOW** more resistant to bacteria **IGNORE** immune **ALLOW** only 28 species are killed **ALLOW** idea of natural selection causing increased resistant bacteria with more (antibiotic) pollution

Question			Answer	Marks	AO element	Guidance
23	(a)	(i)	Yes (no marks) cooler than black/grey skin **OR** Yes (no marks) lighter skin is cooler **OR** No (no marks) zebra skin was similar temperature to the other barrels **OR** No (no marks) idea it is warmer than the barrel covered by the white skin / ORA ✓	**1**	**3.2a**	argument must support decision
		(ii)	paint the barrels different colours rather than using the skins / use the same type of skin painted different colours **OR** idea to make sure that thicknesses/SA/V /volume/temperature of water in barrel need to be controlled ✓	**1**	**3.3a**	**ALLOW** use painted towels to cover barrels **ALLOW** for same type of skin e.g. hair-free skin
	(b)	**(i)**	**Any two from:** zebras with stripes attracts less/fewer insects / ORA✓ narrower stripes attract less insects / ORA ✓ stripe width for least number of insects/optimum protection is about 8cm / stripe width for most number of insects is about 25cm ✓	**2**	**2 x 3.1a**	**ALLOW** insect bites for insects **IGNORE** length of stripe **ALLOW** width range between 5-10cm for least number of insects / most number of insects is 22-27cm

Question			Answer	Marks	AO element	Guidance
		(ii)	stripe width of 8cm because it is the lowest point on the graph/fewest number of insects ✓	1	3.2a	**ALLOW** width tolerance between 7-9cm and least number of insects (on tape)
		(iii)	**Any three from:** stripes developed as a mutation / variation for skin stripes ✓ (animals with stripes) less likely to be bitten by insects / more healthy / spread less pathogens / ORA ✓ (striped animals) more likely to survive ✓ (striped animals) more likely to reproduce ✓ pass on allele/gene for stripes / ORA ✓ process occurs over many generations ✓	3	3 x 2.1	**ALLOW** some more striped than others **ALLOW** offspring produced / breed together **IGNORE** selective breeding **ALLOW** pass on advantageous gene **IGNORE** trait is passed on / genes are passed on **IGNORE** over time

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