H

GCSE (9–1)

Biology A (Gateway)

J247/04: Paper 4 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2019

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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 available in RM Assessor

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:

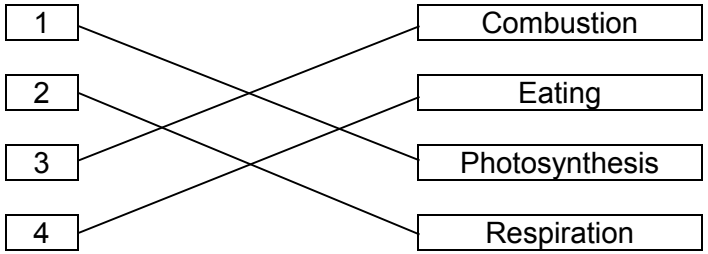
	Assessment Objective
AO1	**Demonstrate knowledge and understanding of scientific ideas and scientific techniques and procedures.**
AO1.1	Demonstrate knowledge and understanding of scientific ideas.
AO1.2	Demonstrate knowledge and understanding of scientific techniques and procedures.
AO2	**Apply knowledge 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			B	1	2.2	
2			B	1	1.2	
3			D	1	1.1	
4			A	1	1.1	
5			C	1	1.2	
6			B	1	1.1	
7			C	1	1.1	
8			B	1	1.1	
9			B	1	1.1	
10			B	1	1.2	
11			D	1	2.1	
12			B	1	1.1	
13			B	1	1.2	
14			C	1	1.1	
15			D	1	1.1	

Question			Answer	Marks	AO element	Guidance
16	(a)	(i)	feeds on seeds it is a primary (consumer) ✓ feeds on insects, then it is a secondary (consumer) ✓	2	2.1	**ALLOW** eats seeds which are the producer/first trophic level **ALLOW** eats insects which are the primary consumer **ALLOW** it feeds on seeds and insects if no other marks scored. **IGNORE** references to herbivores/carnivores/predators
		(ii)	predator because it eats/kills pine martens ✓ competitor (with pine martens) because they eat flycatchers/same prey ✓	2	2.1	**ALLOW** pine martens are foxes prey **ALLOW** foxes hunt pine martens **ALLOW** competitor because pine martens also eat flycatchers
		(iii)	insect(s) / Great tits	1	1.1	
	(b)	(i)	correctly chosen axes, labelled with units ✓ suitable scale for the number of bird boxes ✓ bars correctly drawn ✓ suitable key ✓	4	2.2	height (m) must be on x-axis **DO NOT ALLOW** scale that use less than half the grid **ALLOW** +/- half a square **IGNORE** –touching adjacent bars

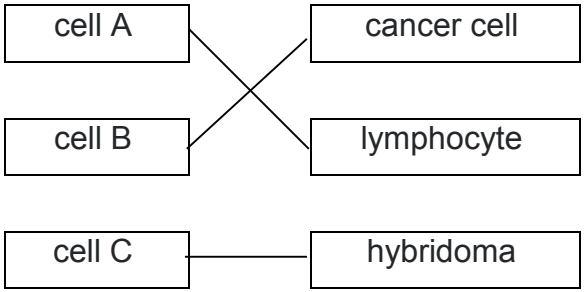
Question			Answer	Marks	AO element	Guidance
		(ii)	**Any three from:** great tits (nest) higher (in the trees) / ORA ✓ this protects them from weasels who live mainly on the ground / ORA ✓ idea flycatchers (nest) at all heights ✓ as pine martens can move up and down/climb the tree ✓	**3**	**3.2b**	**ALLOW** weasels can't reach them/great tits **ALLOW** fewer great tits lower down as weasels eat them = 2 **ALLOW** flycatchers can get killed anywhere in tree by pine marten **IGNORE** pine martens eat flycatchers and live in the trees

Question			Answer	Marks	AO element	Guidance
17	(a)		 ✓✓	2	1.1	**ALLOW** numbers matched to correct boxes All 4 lines correct = 2 marks 2 or 3 lines correct = 1 mark 1 or 0 lines correct = 0 mark
	(b)	(i)	(no) microorganisms (in the soil) ✓ no decay (takes place) ✓	2	1.1 2.1	**AW** microbes, decomposers, saprophytes, detritivores, bacteria, fungi **AW** decomposition, rotting, break down **ALLOW** not enough nitrifying bacteria to replace nitrates / no nitrates released by nitrifying bacteria = 2 **IGNORE** no organisms to recycle the minerals
		(ii)	plants release oxygen by photosynthesis ✓ organisms in the soil / microbes / animals release carbon dioxide by respiration ✓	2	2.2	**ALLOW** correct word (or symbol) equations for photosynthesis linked to plants and respiration linked to organisms in the soil / microbes / animals **AW** microbes, decomposers, saprophytes **IGNORE** breathe out carbon dioxide **IGNORE** plants will respire and give out carbon dioxide **ALLOW** 1 mark for plants release oxygen/photosynthesise and microbes give out carbon dioxide/respire if no other marks are awarded.

Question			Answer	Marks	AO element	Guidance
18	(a)		spread by wind ✓ spores ✓ enters leaves through the stomata ✓	3	1.1	**ALLOW** spread by water/ air / contact **ALLOW** enters leaf pores **IGNORE** holes in leaf / wounds / roots / stem
	(b)	(i)	kills the spores / fungus ✓	1	2.1	**ALLOW** kills/burns/eradicates the (barley) powdery mildew
		(ii)	the spores left by the fungus growing on the barley cannot infect wheat / the fungus does not grow on wheat / wheat is not a host for the fungus✓ (after two years) there will be less spores/fungus population / the spores/fungus will die✓	2	2.1	AW barley powdery mildew for fungus AW pathogen for fungus **ALLOW** wheat resistant to barley powdery mildew
	(c)		(control using) the same field and divide it into two ✓ because different fields may have different types of soil / different minerals / different levels of light ✓	2	3.3b	**ALLOW** any suitable improvement e.g. control light / pH / temperature / same location / use optimum concentration of each fungicide / a control explanation must link to suitable improvement e.g. light because photosynthesis would affect growth/yields

Question			Answer	Marks	AO element	Guidance
19	(a)		all organisms show variation / mutation causes variation ✓ **Any three from:** the blue tits with the longer beaks get more food / ORA ✓ they are more likely to survive / ORA ✓ they reproduce and pass on the alleles for longer beaks / ORA ✓ over many generations beak length increases in the blue tit population / ORA ✓	**4**	**1.1** **2.1 x3**	**ALLOW** description of variation in beak length in the original population **ALLOW** the blue tits with the longer beaks get access bird feeders **IGNORE** pass on genes **ALLOW** idea of many repeats of cycle
	(b)		shows that over the years the birds are laying eggs earlier (in May) ✓ this could be because temperatures are increasing (year on year) ✓ however, the data shows a lot of variation ✓ there could be other factors involved ✓	**4**	**3.1a** **3.2b** **3.1a** **3.2b**	**ALLOW** shows downward trend **ALLOW** because Earth is getting warmer **ALLOW** examples of variation in data from the graph **ALLOW** data shows lots of fluctuations / erratic data / spikes in the data **ALLOW** examples of factors such as predator/prey relationship may be different

Question			Answer	Marks	AO element	Guidance
20	(a)		(made by) white blood cells / lymphocytes ✓ when stimulated by antigens / antigens detected ✓	2	1.1	**DO NOT ALLOW** phagocytes **IGNORE** fight off/combat antigens
	(b)	(i)	control ✓ can act as a comparison / to check the drug works ✓ idea of identifying / eliminates any psychological effect ✓	3	1.1	**ALLOW** placebo contains no active drug / dummy injection **ALLOW** see the effects of the drug **ALLOW** to test if receiving something from a doctor or the drug itself is having the effect / some people believe they are feeling better when they are not **ALLOW** to eliminate placebo effect **ALLOW** tricks body into thinking it is taking a medicine
		(ii)	**FIRST CHECK ANSWER ON THE ANSWER LINE** **If answer = 51.6 (%) award 3 marks** 9.1-4.4 = 4.7 ✓ (4.7÷9.1) x 100 ✓ = 51.6 (%) ✓	3	**2 x 2.2** **1 x 1.2**	51.648 / 51.65 /51.7 = two marks **ALLOW** ECF on the rounding **IGNORE** sign

Question			Answer	Marks	AO element	Guidance
	(c)			2	1.1	all correct = 2 marks one or two correct = 1 mark

Question			Answer	Marks	AO element	Guidance
21	(a)		an allele is a form/version of a gene ✓ dominant means that it always expresses itself when present ✓	2	1.1	 **ALLOW** only needs one allele present to be expressed/shown in the phenotype **ALLOW** allele which is expressed instead of another
	(b)	*	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)** What the results of the test tell the patient. **AND** Correctly interprets the information in the graph. **AND** Includes an analysis of usefulness of having the test. *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)**	6	3 x 2.2 3 x 3.2a	**AO2.2 Applies knowledge and understanding to interpret the results of the test and the information in the graph** • the test can tell them if they have the allele and are therefore likely to get the disease • the test will tell them the number of repeats they have • the graph will tell them the mean age that symptoms first develop in somebody who has a certain number of repeats • symptoms develop earlier with an increased number of CAG repeats / ORA

Question			Answer	Marks	AO element	Guidance
			What the results of the test tell the patient. **OR** Correctly interprets the information in the graph. **AND** Includes an analysis of usefulness of having the test. *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)** What the results of the test tell the patient. **OR** The answer correctly interprets the information in the graph. **OR** Includes an analysis of usefulness of having the test. *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.*			• lower number of CAG repeats means a much larger age range in which symptoms first develop / ORA **AO3.2a Analyses information and ideas to make judgements and draw conclusions.** • the person may decide not to have children and therefore will not pass on the allele • there is a wide range of ages that a person of a certain age can first show symptoms • it does not show how bad the symptoms are or how long the person will live for • some people would rather not know when, or if, they are likely to become ill • it's useful to be aware and prepare for when the first symptoms will show • less useful/reliable/predictable test of when the first symptoms will show with a lower number of CAG repeats. • less useful as there is no cure only limited treatment for symptoms
	(c)		mRNA prevented from carrying the code (for the protein to the ribosomes) ✓ this stops protein synthesis ✓	**2**	**2.1 x2**	**ALLOW** translation cannot take place / ribosomes don't receive the code from mRNA **IGNORE** references to transcription **ALLOW** protein (that causes symptoms) is not made/less is made

Question			Answer	Marks	AO element	Guidance
22	(a)		(the salt) will draw water out of the plant cells by <u>osmosis</u> ✓	1	2.1	**ALLOW** plant cells will lose water and become plasmolysed **IGNORE** flaccid / dries the plant out
	(b)	(i)	**FIRST CHECK ANSWER ON THE ANSWER LINE** **If answer = 0.1 (%) award 3 marks** = 2.5 ✓ $\frac{2.5}{2500}$ x 100 ✓ = 0.1 (%)✓	3	 1.2 2.2 1.2	 **ALLOW** ECF on area of quadrats **ALLOW** ECF
		(ii)	**Any three from:** the second student samples less area / ORA ✓ the second student did not sample at random / only sampled in the centre of the marsh / ORA ✓ the centre may contain different plants compared to the edges ✓ so, idea that the second student's results may be less representative / less accurate / ORA ✓	3	3.1b	**ASSUME SECOND SAMPLE IF NOT STATED** **ALLOW** only 5 quadrats taken / less repeats / less sample size / less data collected **ALLOW** the second student will not have results from all over the marsh / ORA
		(iii)	make sure the tide is not coming in / make sure that the marsh is stable enough / wash hands after the experiment ✓	1	3.3b	**ALLOW** be aware of tide timetables/high tides **ALLOW** be safe as the tide is unpredictable **ALLOW** avoid falling into deeper marsh/slipping in mud **IGNORE** references to clothing
	(c)		salt marshes are rare habitats ✓ they contain plants that do not live anywhere else ✓	2	3.2b	**ALLOW** salt marsh plants are rare **ALLOW** plants can be lost / extinct **ALLOW** loss of habitat for the animals that live there

Question			Answer	Marks	AO element	Guidance
23	(a)		platelets are needed for blood clotting ✓ the rat would keep bleeding/bleed to death ✓	2	2.1	
	(b)		parents are Rr and Rr ✓ offspring are RR, Rr, Rr, rr ✓ rr identified as being non-resistant ✓	3	2.2	**ALLOW** all marks from a Punnett square **ALLOW** ECF on offspring
	(c)		Rr/heterozygous rats more likely to survive than RR/homozygous rats as they need less vit K / ORA ✓ therefore, when two Rr rats mate rr rats will be born ✓	2	2.2	**ALLOW** rats that need less vit K are more likely to survive
	(d)	(i)	(DNA) ligase ✓	1	1.1	
		(ii)	males are XY ✓ so only male rats will be born / ORA ✓ the population will contain an imbalance of sexes / (too many males and) not enough females/no females to mate/reproduce with ✓	3	1.1 2.1 x2	**ALLOW** female is XX **DO NOT ALLOW** males are YY **ALLOW** genetic diagram for 2 marks male ~~X~~ Y female X -- XY X -- XY Male only

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