F

GCSE (9-1)

Biology A (Gateway Biology)

J247/01: Paper 1 (Foundation 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
BOD	Benefit of doubt given
CON	Contradiction
RE	Rounding error
SF	Error in number of significant figures
ECF	Error carried forward
L1	Level 1
L2	Level 2
L3	Level 3
NBOD	Benefit of doubt not given
SEEN	Noted but no credit given
I	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 A:

	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			B	**1**	1.1	
3			B	**1**	1.1	
4			D	**1**	1.1	
5			B	**1**	1.1	
6			D	**1**	1.1	
7			A	**1**	1.1	
8			A	**1**	1.1	
9			A	**1**	2.1	
10			D	**1**	2.1	
11			C	**1**	1.1	
12			B	**1**	2.1	
13			B	**1**	2.2	
14			C	**1**	2.2	
15			B	**1**	2.1	

Question			Answer	Mark	AO Element	Guidance
16	(a)		**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 0.04 (mm) award 2 marks** 20 ÷ 500 ✓ = 0.04 (mm) ✓	2	2.2	**ALLOW** 0.038 – 0.042 **ALLOW** 19 ÷ 500 OR 21 ÷ 500 **ALLOW** 40 **µm/micrometres** **ALLOW** 0.004 for 1 mark due to incorrect units for measurement
16	(b)		xylem cell ✓	1	1.1	
16	(c)		**Any two from:** dead cells ✓ thick/strengthened cell wall ✓ hollow (lumen) ✓	2	1.1	**ALLOW ECF** from the cell selected in 16(b) **ALLOW** lignin present/lignified **IGNORE** cellulose **ALLOW** waterproof walls **ALLOW** forms continuous walls/column for water/ continuous tube **IGNORE** contain water
16	(d)		(yes) smallest (size of cell) 8 µm/0.8 thousands of a millimetre ✓ (size is) greater than 0.02 thousands of a millimetre / 0.2 µm ✓	2	2.2	If answer is no award zero marks
16	(e)		(sub-cellular) structures were not clearly visible until electron microscopy ✓	1	1.1	**ALLOW** idea that smaller organelles/structures can now be seen by electron microscope

						ALLOW electron microscopes have a higher resolution / magnification **ALLOW (**sub-cellular) structures/organelles shown in more detail/easier to see

Question			Answer	Mark	AO Element	Guidance
17	(a)	(i)	phloem ✓	1	2.1	
17	(a)	(ii)	idea that sugar / food / nutrients removed (by the greenfly) ✓ **Any one from:** So less left for growth ✓ So less for respiration / energy / ATP ✓	2	2.1	**IGNORE** xylem / root hair **IGNORE** water / minerals **ALLOW** so not enough for growth / so unlikely to grow / difficult to grow healthily **ALLOW** less sugar translocated/transported to other parts
17	(b)	(i)	**Any two from:** idea of being more exposed to the wind OR plant in glasshouse is protected from wind/sheltered ✓ moving air increases transpiration/water loss ✓ wind blows the water (vapour) away from the leaf ✓	2	2.1	**ALLOW** greater humidity in glasshouse **ALLOW** leaves moved by wind/air movement **ALLOW** more evaporation/diffusion of water (need comparative statement) **ALLOW** higher level response e.g. the cells losing water and become plasmolysed **if no other marks awarded ALLOW** link between wind and water loss for 1 mark
17	(b)	(ii)	**Any three from:**	3	3.3a	

Question			Answer	Mark	AO Element	Guidance
			control the temperature ✓ control light intensity ✓ cover the pot/prevent water loss from pot ✓ (balance) to measure plant mass before and after ✓ repeats ✓ set up using a potometer ✓			**IGNORE** control the heat **IGNORE** references to time unless linked to potometer **ALLOW** control amount of light **ALLOW** control amount of wind e.g. use of fan **ALLOW** control amount of water given to plants **ALLOW** measure fresh weight of leaves at regular intervals **ALLOW** measure water loss **ALLOW** remove leaves from plant and keep one set of leaves sealed in bag another set in air from fan
17	**(c)**		MRI / X-ray imaging / new technology allows new evidence to be collected ✓ ideas/explanations have changed to fit new observations/technologies ✓	**2**	**3.1b**	**ALLOW** idea MRI etc. shows precise position of water whereas older techniques give approximate position **ALLOW** couldn't see what they can see now with new methods **ALLOW** tissue easily disturbed by injected dyes / AW **ALLOW** modern methods give more accurate results **ALLOW** different techniques give different results so different conclusions drawn

Question			Answer	Mark	AO Element	Guidance
18	(a)	(i)	**Any one from:** provides a fine/clean cut ✓ for more accurate/precise cutting measurement ✓	1	2.2	**ALLOW** scalpel is sharper **ALLOW** easier to cut with scalpel **IGNORE** more hygienic
18	(a)	(ii)	cut in a direction away from yourself / where possible cut using a cutting board ✓	1	2.2	**ALLOW** place cover over scalpel if not in use **ALLOW** idea of keep fingers away from cutting/sharp edge/blade **IGNORE** safety gloves
18	(a)	(iii)	No roots to take up minerals/water ✓ No shoots so no photosynthesis/sugars ✓	2	2 x 2.2	**ALLOW** (cells absorb) sugars for respiration/energy **ALLOW** to provide water/sugar/minerals/nutrients scores 1 mark if no other mark
18	(b)	(i)	warmth needed for (chemical) reactions / respiration / photosynthesis / growth ✓ light for photosynthesis / chlorophyll produced ✓	2	2 x 2.1	**ALLOW** warmth speeds up metabolism/enzymes/mitosis/reproduction **IGNORE** bacteria **ALLOW** light/sunlight so plant can make sugar **IGNORE** Sun
18	(b)	(ii)	temperature can be controlled / kept at optimum temperature ✓ idea that light can be provided 24 hours / continuous light source ✓	2	3.3a	**ALLOW** keeps constant temperature **IGNORE** keep heat constant **ALLOW** idea that air movement is constant **ALLOW** may go dark at night near window / avoids night-time conditions / avoids sunlight variability AW
18	(b)	(iii)	leaf cells / cells producing stems / chlorophyll being produced ✓	1	3.2a	**ALLOW** explants are making chloroplasts / able to photosynthesise

Question			Answer	Mark	AO Element	Guidance
18	(c)		**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 86.7 (%) award 3 marks** 13 ÷ 15 ✓ = 86.666666... (%) ✓ = 86.7 (%) (1 decimal place) ✓	3	**2 x 2.2** **1.2**	**ALLOW** 86.6· (recurring) **ALLOW** ECF for % calculation if incorrect substitution of values from question **ALLOW** ECF for answer given to 1 decimal place
18	(d)		plant/cauliflower cells can differentiate into any cell/become specialised (and make a new individual) ✓ the type of cell adult stem cells can differentiate into is limited / adult stem cells are difficult to obtain ✓	2	2.1	**If not specified assume answer refers to adult animals** **ALLOW** embryonic cells can differentiate into any cell and make a new individual **ALLOW** adult animals no longer have embryonic (stem) cells **ALLOW** animals cells cannot differentiate into any cell **ALLOW** higher level answers relating to cloning techniques e.g. animal cells with no cell wall so osmotic medium needs balancing precisely to avoid cells bursting

Question			Answer	Mark	AO Element	Guidance
19	(a)	(i)	flower opening ✓ germination ✓ shedding of leaves✓	3	1.1	
19	(b)	(i)	plant B has grown in the direction of/towards the light source ✓ tropic response is positive ✓	2	3.1a	**ALLOW** in plant A it is still showing phototropism to the light source above **IGNORE** movement **ALLOW** positive phototropism is correct
19	(b)	(ii)	auxin ✓	1	1.1	**ALLOW** IAA/indole acetic acid
19	(c)	(i)	FSH ✓ follicle✓ progesterone ✓	3	1.1	
19	(c)	(ii)	Days 3 – 6 ✓	1	2.2	
19	(d)		**Any three from:** mitosis ✓ DNA replicates ✓ chromosomes separate ✓ cells divide into two new cells ✓ cells grow ✓	3	1.1	 **ALLOW** chromosomes are copied **ALLOW** DNA duplicates/doubles **ALLOW** (identical) daughter cells produced each with own copy of chromosomes **ALLOW** cell splits into two

Question			Answer	Mark	AO Element	Guidance
20	(a)	(i)	insulin ✓	1	1.1	
20	(a)	(ii)	**Any two from:** secreted / released from glands/endocrine cells ✓ travel in blood(stream) ✓ affect target organs / cells ✓	2	1.1	**ALLOW** named gland **ALLOW** hormones bind to specific receptors
20	(a)	(iii) *	Please refer to the marking instructions on page 5 of this mark scheme for guidance on how to mark this question. **Level 3 (5–6 marks)**	6	2x 1.1 2x 2.1 2x 3.2a	**AO1.1 Demonstrates knowledge and understanding of scientific ideas to describe how diabetes is controlled**

Question			Answer	Mark	AO Element	Guidance
			Correctly compares differences in insulin and glucose levels and identifies each person with evidence from the graphs. **AND** Describes the treatment for Type 1 **and** Type 2 diabetes. *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)** Correctly identifies at least one of the people who are diabetic/healthy **AND** Describes the treatment for Type 1 **or** Type 2 diabetes. **OR** Correctly compares differences in insulin and glucose levels in at least one person. **AND** Describes the treatment for Type 1 **or** Type 2 diabetes. *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)** Correctly identifies at least one of the people who are diabetic/healthy. **OR** Correctly compares differences in insulin and glucose levels in at least one person. **OR** Describes the treatment for Type 1 **or** Type 2 diabetes. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant***.** **0 marks**			• Type 1 diabetes needs insulin injections • Type 2 diabetes needs a carefully managed diet/avoid high sugar intake/regular exercise/take diabetic medication/pills **AO2.1 Applies knowledge and understanding of scientific ideas in describing the differences in the glucose and insulin levels** • In person A the insulin levels increase and return the glucose levels to normal • In person B insulin levels remain low and glucose levels are very high and not reduced • In person C insulin is produced (but slowly) and glucose levels are slow to be reduced/do not return to normal • Persons B and C have higher resting glucose levels **AO3.2a Analyse information and ideas to make judgements and draw conclusions about the type of diabetes each person has** • Person A is healthy • Person B and C have diabetes • Person B has Type 1 diabetes • Person C has Type 2 diabetes

Question			Answer	Mark	AO Element	Guidance
			No response or no response worthy of credit.			
20	**(b)**		kidney ✓	**1**	**1.1**	
20	**(c)**		**Any two from:** drugs shape is same as substrate ✓ blocks the active site ✓ denature the enzyme ✓ change (shape of) active site ✓	**2**	**2.1**	**ALLOW** drug is competitive/non-competitive inhibitor **ALLOW** competes with enzyme for active site **NOT** kill the enzyme **ALLOW** drug deforms enzyme/active site **ALLOW** substrate doesn't fit the active site/not complimentary **ALLOW** key doesn't fit the lock

Question			Answer	Mark	AO Element	Guidance
21	(a)		blood travels through pump/heart twice ✓ on full circuit around body ✓	2	1.1	**ALLOW** idea that there are two pumps / idea that blood is pumped twice **ALLOW** idea that blood passes **separately** to lungs and body
21	(b)		bird ✓ bird has 4 chambered heart ✓ bird has double circulation✓	3	2.1	If bird is not ticked or bird not selected in answer, then zero for question **ALLOW** bird has heart with 4 sections/compartments/named four chambers **ALLOW** description of double circulation
21	(c)	(i)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 4 award 2 marks** 25 000÷5800 = 4.3 ✓ = 4 (nearest whole number) ✓	2	 2.2 1.2	 **ALLOW** ECF mark for correct rounding if calculation is incorrect
21	(c)	(ii)	**Any two from:** muscles need more energy / more ATP / more respiration ✓ muscles need more oxygen / more carbon dioxide to be removed / more glucose / to avoid anaerobic respiration / to avoid lactic acid production ✓ other organs not needed (in exercise) ✓	2	3.2a	need to include only one comparative word e.g. more, to be able to score the first two marking points, e.g. muscles need **more** oxygen for energy = 2 marks **ALLOW** to remove more heat **ALLOW** other organs not prioritised / blood diverted from other organs

Question			Answer	Mark	AO Element	Guidance
22	(a)	(i)	alcohol / ethanol **and** carbon dioxide ✓	1	1.1	**ALLOW** either order **ALLOW** correct formulae
22	(b)		**Any two from:** alcohol produced in yeast (not humans) / ORA✓ lactic acid produced by humans (not yeast) / ORA✓ carbon dioxide produced by yeast (not humans) / ORA✓	2	1.1	If any incorrect product is stated, then max 1 mark. If yeast or humans are not stated assume answer refers to yeast **IGNORE** reference to oxygen debt / ATP production
22	(c)	(i)	sucrose ✓	1	3.2a	
22	(c)	(ii)	**FIRST CHECK THE ANSWER ON ANSWER LINE** **If answer = 12 award 2 marks** 6.0 ÷ 0.5 ✓ = 12 ✓	2	2.2	
22	(c)	(iii)	glucose ✓	1	3.2a	
22	(c)	(iv)	(Yeast B) doesn't ferment fructose ✓ (Yeast B) produces some fermented products ✓	2	3.1a	**ALLOW** (Yeast B) does not use up fructose / fructose levels decrease slightly / fructose levels remain high / higher yield of fructose / fructose levels remain constant **ALLOW** reverse arguments for Yeast A **DO NOT ALLOW** fructose is produced **ALLOW** fermented products increased **DO NOT ALLOW** fermented products produced from fructose **DO NOT ALLOW** produces high levels of fermented products **IGNORE** fermented product level stays the same / less fermented product than A

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