

Foundation

GCSE

Biology A Gateway

J247/01: Paper 1 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2022

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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.

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MARKING INSTRUCTIONS

PREPARATION FOR MARKING

RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM 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 available in RM Assessor.
3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

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 RM Assessor 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 RM Assessor 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 RM Assessor **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 RM Assessor 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 question on this paper is **21**.

11. 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

12. 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

13. 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	B ✓	1	1.1	
2	A ✓	1	1.1	
3	A ✓	1	1.1	
4	D ✓	1	1.1	
5	B ✓	1	1.1	ALLOW 2
6	B ✓	1	1.1	
7	D ✓	1	2.2	ALLOW 19
8	D ✓	1	2.1	
9	A ✓	1	1.2	
10	C ✓	1	2.2	
11	B ✓	1	2.1	
12	A ✓	1	2.1	
13	B ✓	1	2.1	
14	C ✓	1	1.1	
15	B ✓	1	2.2	

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Question			Answer	Marks	AO element	Guidance
16	(a)	(i)	stain ✓ stage ✓ objective ✓ focus ✓	4	4 x 1.2	
	(b)	(i)	Correctly identifies the centre cell on the right-hand side ✓	1	1 x 2.1	
		(ii)	Correctly identifies a nucleus ✓	1	1 x 2.1	DO NOT ALLOW arrow not touching the nucleus
	(c)		Contains meristem cells / cell division/mitosis occurs ✓	1	1 x 2.1	ALLOW stem cells ALLOW multiply IGNORE auxins / growth

Question			Answer	Marks	AO element	Guidance
17	(a)	(i)	Any valve correctly labelled ✓	1	1 x 1.1	
		(ii)	Either atrium correctly labelled ✓	1	1 x 1.1	
		(iii)	Pumps blood to the body ✓ Needs a bigger pressure / blood has to travel further ✓	2	1 x 1.1 1 x 2.1	Assume answer refers to left ventricle if not stated ALLOW right ventricle pumps blood to the lungs ALLOW stronger contraction/force ALLOW ORA about right ventricle throughout
	(b)		First check answer on answer line. If answer = 180 award 2 marks 3 x 60 ✓ = 180 ✓	2	2 x 2.2	
	(c)		Idea as the time spent exercising increases, the resting heart rate gets lower ✓	1	1 x 3.2b	ALLOW ORA for less hours of exercise increases the resting heart rate IGNORE healthier ALLOW higher levels answers with an alternative correct conclusion
	(d)		(Veins do not have) a narrow lumen ✓	1	1 x 1.1	ALLOW veins have a wide/large lumen

Question			Answer	Marks	AO element	Guidance
	(e)		Blood travels through pump/heart twice ✓ On full circuit around body ✓	2	2 x 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/has systemic and pulmonary circuit ALLOW description for 2 marks – blood passes through the heart and goes to the lungs, returns to the heart, and then goes to the rest of the body.

Question			Answer	Marks	AO element	Guidance
18	(a)		sunlight is used to form sugars for the plant photosynthesis xylem and stomata the method of moving sugars around the plant transpiration phloem the loss of water from the aerial parts of a plant translocation chloroplasts	4	4 x 1.1	6 correct lines = 4 5/4 correct lines = 3 3 correct lines = 2 2 correct lines = 1 DO NOT ALLOW more than 1 line from each box
	(b)		Water ✓ Oxygen ✓	2	2 x 1.1	ALLOW alternatives H ₂ O / O ₂ but name takes precedence
	(c)		Similarity – (both have) cell membrane/ cell wall/ ribosomes/ cytoplasm ✓ Difference – bacterial/prokaryotic cells do not have chloroplast/nucleus/mitochondria/ ✓ OR Difference - bacteria/prokaryotic cells have plasmids/flagellum/pili/are smaller ✓	2	2 x 1.1	IGNORE DNA ALLOW ORA for plant differences ALLOW bacterial/prokaryotic cells do not have a permanent vacuole ALLOW reference to composition of the cell walls IGNORE growth rate

Question			Answer	Marks	AO element	Guidance
19	(a)	(i)	First check answer on answer line. If answer = 35.0 award 2 marks $349.7 / 10 = 34.97 \checkmark$ OR $35 \checkmark$ $35.0 \checkmark$	2	2 x 2.2	ALLOW 34.9 for 1 mark ALLOW one mark for clear evidence of rounding incorrect answer correctly to 1.d.p
		(ii)	First check answer on answer line. If answer = 50% award 2 marks $5 / 10 \checkmark$ OR $0.5 \checkmark$ $\times 100 = 50\% \checkmark$	2	2 x 2.2	ALLOW half / $\frac{1}{2}$ ALLOW one mark for clear evidence of incorrect fraction of rescued people identified with a correctly calculated percentage
		(iii)	Shivering / vasoconstriction $\checkmark$ Maximum two from: (Shivering) increases metabolic rate/respiration $\checkmark$ (Shivering) generates more heat $\checkmark$ (Vasoconstriction) decreases blood flow to the skin surface $\checkmark$ (Vasoconstriction) reduces heat loss $\checkmark$	3	1 x 1.1 2 x 2.1	ALLOW blood vessels narrow ALLOW releases heat / increased thyroxine ALLOW redistribution of blood to organs IGNORE blood vessels move IGNORE go pale/blue/cold extremities If no credit worthy answer given allow goose bumps/hairs stand on end for one mark

Question			Answer	Marks	AO element	Guidance
		(iv)	Any one from: Blood sugar/glucose(level) ✓ Water balance/potential/concentration/levels (in the blood) ✓ pH/carbon dioxide level (of the blood) ✓ Urea level (of the blood) ✓	1	1 x 1.1	IGNORE heart rate/breathing rate/blood pressure
	(b)	(i)	Any two from: Scientists can replicate/reproduce/further develop the work ✓ To check/prove results ✓ To allow recognition for their work ✓	2	2 x 1.1	IGNORE scientists' review ALLOW comment/feedback on work / identify mistakes/misinformation ALLOW can see the value of the research
		(ii)	Idea body temperature is altered ✓ This would affect the mean ✓	2	2 x 3.1a	Assume answer refers to people with illnesses and infections if not stated. ALLOW invalidate results IGNORE inaccurate results
		(iii)	Any one from: Limits impact/identification of anomalies/outlier ✓ Representative of the population ✓	1	1 x 3.1a	

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Question			Answer	Marks	AO element	Guidance
			Gives greater confidence in the conclusion ✓			ALLOW increases validity/reliability/repeatability/ IGNORE accuracy
Question			Answer	Marks	AO element	Guidance
20	(a)	(i)	(Person is) short sighted ✓ And any one from: Eye (ball) is too long / Lens is too powerful / Light/ray refracts too much / Light/rays not focused at the retina / Light/rays focussed in front of the retina ✓	2	2 x 2.1	Incorrect defect identified then no marks ALLOW has myopia ALLOW image not focused at the retina ALLOW image focussed in front of the retina
		(ii)	(glasses/contacts with) concave/diverging lenses / laser eye surgery ✓	1	1 x 2.1	ALLOW ecf for incorrect defect identified in Q20(a)(i)
	(b)		Change the shape of the lens / Accommodation / Focus the light (on retina) ✓	1	1 x 1.1	ALLOW makes clear fluid that fills the space between cornea and iris IGNORE contract/relax DO NOT ALLOW control pupil size
	(c)		Prevent rejection ✓	1	1 x 2.1	ALLOW do not attack the cells/no immune response IGNORE same DNA ALLOW ORA for using donor stem cells

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Question			Answer	Marks	AO element	Guidance
21	(a)		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) Provides a detailed description of a reflex arc with most components in the right order AND Identifies the structures involved in this specific reflex <i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i> Level 2 (3–4 marks) Provides a description of a reflex arc with some components in the correct order AND Identifies a structure involved in this specific reflex OR Provides a detailed description of a reflex arc with most components in the right order <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i> Level 1 (1–2 marks) Provides a basic description of some components of a reflex arc OR Identifies a structure involved in this specific reflex <i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i>	6	3 x 1.1 3 x 2.1	AO1 Demonstrate knowledge and understanding of scientific ideas of a reflex arc • Stimulus detected is by the receptor • Electrical impulses • Pass along sensory neurone • to the relay neurone • to the motor neurone • to the effector/muscle • Bypass the brain • Fast/automatic AO2 Apply knowledge and understanding of scientific ideas to the horse reflex. • Stimulus is the fly • The receptors are in the skin • The horse muscle/effector contracts • Response is skin shivering Maximum Level 1, 2 marks if reflex action goes to the brain

Question			Answer	Marks	AO element	Guidance
			0 marks <i>No response or no response worthy of credit.</i>			

Question			Answer	Marks	AO element	Guidance
22	(a)		1.75 (million)	1	1 x 2.2	ALLOW in range of 1.65 – 1.8 million
	(b)		First check answer on answer line. If answer = 9.75 million award 2 marks 11.5 million ✓ 11.5 million – 1.75 million = 9.75 million ✓	2	2 x 2.2	ALLOW ecf from Q22(a) for UK diabetes patient numbers ALLOW 1 st mark for correct figure for USA in range of 11-12 million ALLOW second mark for correctly calculated difference between stated USA and UK figures
	(c)		Any two from: Idea in both countries the number of individuals has increased over time ✓ The rate has increased over time/ ref to gradient in both countries ✓ USA fluctuates more than UK ✓ Quotes correct data increases for both UK and USA ✓	2	2 x 3.2b	Assume answer refers to both countries if not stated. DO NOT ALLOW only one countries rate has increased
	(d)		Not all diabetics may be diagnosed/recorded/identified/aware ✓	1	1 x 3.2a	IGNORE estimates/averages
	(e)		Type 1 diabetes treated with insulin ✓ Type 2 diabetes controlled through diet/exercise ✓	2	2 x 1.1	ALLOW medication to lower blood glucose/sugar ALLOW reduce sugar/glucose intake ALLOW lose weight IGNORE causes of diabetes throughout

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Question			Answer	Marks	AO element	Guidance
23	(a)	(i)	Lipase ✓ Fatty acids ✓ Glycerol ✓	3	3 x 2.1	ALLOW enzyme
		(ii)	Curve that goes up (and down) ✓ Curve that shows peak/maximum in alkaline pH ✓	2	2 x 2.1	ALLOW any pH peak/maximum greater than 7
	(b)		Independent variable (max 2) - Change the temperature ✓ - Method of maintaining/changing the temperature e.g. water bath/Bunsen burner ✓ Observations to be made (max 2) - Record the time it takes (for the indicator) to change colour ✓ - To colourless ✓ - Reference to use of a stop clock ✓ Variables to be controlled (max 2) - Volume/mass of milk ✓ - Concentration of enzyme ✓ - Volume/mass of enzyme ✓ - Type of milk ✓	5	5 x 3.3a	Marks can be credited if scored in the incorrect section as long as the explanation is clear IGNORE heater ALLOW see which flask turns colourless first = 2 IGNORE amount/quantity throughout ALLOW use the same milk DO NOT ALLOW temperature

Question			Answer	Marks	AO element	Guidance
24	(a)	(i)	All 3 bars correctly drawn ✓ Both scales correctly completed ✓	2	2 x 2.2	ALLOW +/- ½ small square ALLOW correct heights even without scale on Y axis IGNORE absence of 'tick' marks on axis if scale is clear IGNORE width of bar
		(ii)	3 of the (six) readings are over 30 / half/50% of the readings are over 30 ✓	1	1 x 3.2a	ALLOW the named three months IGNORE only two months stated ALLOW the mean reading is over 30
		(iii)	Any two from: Idea that needs to take readings over a longer time ✓ Readings need to be more consistent/less fluctuations ✓ Readings could be more precise (not rounded) ✓ Measure progesterone/LH/oestrogen levels ✓ Some measure of the frequency/change of periods ✓	2	2 x 3.3a	IGNORE just more readings IGNORE reference to hot flushes / mood swings / bone strength
	(b)		Any three from: It depends how bad her symptoms are / if she has hot flushes/mood swings/weak bones / idea that it reduces the symptoms of menopause ✓ She needs to balance up the benefits versus risks ✓ HRT would reduce the risk of her bones breaking / it would maintain the strength of her bones ✓	3	3 x 3.1a	 IGNORE references to weak bones unqualified

Question			Answer	Marks	AO element	Guidance
			She is under 60, so no increased risk from heart disease ✓ She is overweight, so has increased risk of blood clots ✓ She should try to lose weight ✓ Increased risk of breast cancer if she takes it long term/for longer than a year ✓			ALLOW she is close to 60 so she will soon be at greater risk from heart disease ALLOW use HRT but try not to take it for more than 1 year ALLOW if there is a family history of breast cancer

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