OCR
Oxford Cambridge and RSA

GCSE (9-1)

Biology A (Gateway)

Unit **J247F/01**: Foundation Tier – Paper 1

General Certificate of Secondary Education

Mark Scheme for June 2018

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

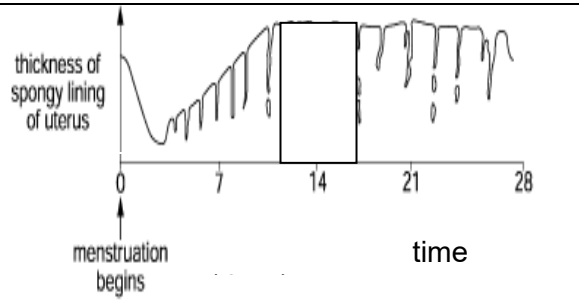
Question			Answer	Marks	AO element	Guidance
16	(a)	(i)	marked correctly on diagram ✓	1	1.1	ALLOW centre of X anywhere inside the shaded area 
		(ii)	aorta / arteries✓ lungs✓	2	2 x1.1	
	(b)	(i)	double (circulation)✓	1	1.1	**ALLOW** double
		(ii)	**Any two from:** increases the pressure of the blood / higher blood pressure✓ increases the flow rate of the blood✓ idea of faster transport of materials✓	2	2 x2.1	**ALLOW** pushes blood more **DO NOT ALLOW** pushes more blood unqualified **ALLOW** to make the blood flow faster **IGNORE** makes blood flow fast **ALLOW** more oxygen / glucose to the tissues **ALLOW** keeps the blood well oxygenated / gets more oxygenated blood **ALLOW** faster removal of carbon dioxide from blood

Question			Answer	Marks	AO element	Guidance
	(c)		left side thicker (than the right side)✓ left pumps blood further✓	2	2 x1.1	**ALLOW** it's thicker / it's more muscular **ALLOW** left ventricle thicker than right **IGNORE** left is bigger **ALLOW** left pushes blood all around the (rest of the) body / right only pushes to lungs **ALLOW** left side must generate more pressure **IGNORE** left side contains blood at high pressure
	(d)	(i)	**Any two from:** artery thicker walled/ **ORA** ✓ artery more muscle tissue/ **ORA** ✓ artery narrower bore/lumen/ **ORA** ✓	2	2 x 2.1	 **ALLOW** artery (more) elastic **ALLOW** artery has smaller area for blood to pass through
		(ii)	**Any one from:** veins have valves✓ arteries take blood away from the heart / veins take blood to the heart✓ blood flows faster / higher pressure in arteries /ORA✓	1	1.1	**IGNORE** valves unqualified **ALLOW** arteries carry oxygenated / veins carry deoxygenated blood

Question			Answer	Marks	AO element	Guidance
17	(a)	(i)	guard cell✓	1	1.1	**IGNORE** stomatal cells
		(ii)	allows gaseous exchange (of CO_2 and O_2)✓ allows water evaporation (to help transpiration)✓	2	2 x1.1	 **ALLOW** to release/let water out of the leaf/plant **IGNORE** to let water enter the leaf/plant
	(b)	(i)	**First check answer on answer line** **If answer = 1000 (x) award 2 marks** 10 0.01 ✓ 1000 (x) ✓	2	 1.2 2.2	
		(ii)	5(μm)✓	1	2.2	**ALLOW** +/- 1 μm tolerance
	(c)	(i)	$6H_2O$✓ $6O_2$✓	2	2 x1.1	must be on correct side of equation **ALLOW** unbalanced/incorrectly balanced H_2O O_2 for one mark
		(ii)	endothermic✓	1	1.1	
	(d)	(i)	30(^{0}C)✓	1	2.2	
		(ii)	record at narrower temperature intervals✓ narrower intervals around the 30^{0}C value✓	2	2 x 3.3b	**ALLOW** any temperature increment less than 5^{0}C **ALLOW** narrower intervals around the optimum **ALLOW** narrower interval range between 25-35^{0}C but must include 30^{0}C

Question			Answer	Marks	AO element	Guidance
18	(a)	(i)	mode = 0.26 (seconds) ✓	1	2.2	
		(ii)	(means are identical so) no difference between reaction time in each hand ✓ (mode shows) non-dominant hand most often faster reaction✓	2	2 x 3.2b	**ALLOW** they are very similar to each other **ALLOW** left side quicker/better to catch ruler
	(b)		include the units✓ record results in rank order✓	2	2 x 3.3b	**ALLOW** put seconds in headings **ALLOW** sort the order
	(c)		use ten left (dominant) hand students / ten right (dominant) hand students✓ opposite non-dominant hand tested for left/right handedness✓ **Any one from:** similar sample sizes / similar aged groups✓ compare means for each group✓	3	3 x 3.3a	**ALLOW** add another table where student is left handed **ALLOW** same reaction room **ALLOW** compare reaction times for each group **ALLOW** set amount of left/right handed people
	(d)		sight✓	1	2.2	**ALLOW** visual **ALLOW** to see when it's coming **ALLOW** light **IGNORE** eyes
	(e)		receptor✓ motor neurone✓	2	2 x 1.1	**correct order needed**

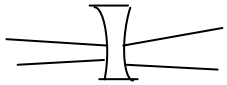
Question			Answer	Marks	AO element	Guidance
19	(a)	(i)	cortex✓	1	1.1	
		(ii)	urine✓	1	1.1	
		(iii)	arrow on diagram points downwards from kidney in same line as ureter✓	1	2.1	**ALLOW** arrow pointing downwards even if not on ureter
	(b)	(i)	Patient A = 2900 & Patient B = 2700 ✓	1	2.2	**Mark answer line first but if nothing on answer line check table for correct answer**
		(ii)	(Patient A) total output of patient A is 2900/exceeds total input / patient B input matches output✓ patient A is losing too much water (from the kidneys)✓	2	 2.1 3.2a	No marks if Patient B identified **ALLOW** input output is imbalanced in patient A **ALLOW** patient A loses more water than normal
	(c)	(i)	Bowman's capsule✓	1	1.1	
		(ii)	glucose present in filtrate but not in urine / more sodium chloride in filtrate than urine / urea/others levels much higher in urine ✓ glucose/sodium chloride must be reabsorbed✓ urea/others excreted in urine✓	3	2.2 2 x 3.2b	 **ALLOW** urea/others removed from body

Question			Answer	Marks	AO element	Guidance
20	(a)		in the blood(stream)✓	1	1.1	
	(b)		brain✓ egg✓ oestrogen✓ progesterone✓	4	4 x 1.1	**ALLOW** estrogen
	(c)	(i)	letter **E** marked on day 14✓	1	2.1	 tolerance area inside white box
		(ii)	lining breaks down / is shed✓	1	1.1	**ALLOW** menstruation / a period occurs **ALLOW** unthickens/thickness reduces/gets thinner/decreases
	(d)*		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)** Applies knowledge of hormonal and one non-hormonal method of contraception. **AND** Interprets data to explain more than one difference in effectiveness between hormonal and non-hormonal contraceptives.	6	2 x 2.1 2 x 3.1a 2 x 3.2a	**AO2.1 Apply knowledge and understanding of methods of contraception.** • Sterilisation prevents the release of sperm • Hormonal methods prevent ovulation • Diaphragm / condom prevent sperm meeting egg / are barrier methods **AO3.1a Analyse information and ideas to interpret the data to explain differences between effectiveness of contraceptives.**

Question			Answer	Marks	AO element	Guidance
			AND Makes at least one judgement to explain why the pill is a popular method of contraception. *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)** Any **two** of: Applies knowledge of hormonal and one non-hormonal method of contraception. **OR** Interprets data to explain one difference in effectiveness between hormonal and non-hormonal contraceptives. **OR** Makes at least one judgement to explain why the pill is a popular method of contraception. *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)** Applies knowledge of at least one hormonal and one non-hormonal method of contraception. **OR** Interprets data to explain at least one difference in effectiveness between hormonal and non-hormonal contraceptives. **OR** Makes at least one judgement to explain why the pill is a popular method of contraception. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.*			• hormonal methods more reliable than non-hormonal barrier methods • due to (named) hormonal methods being easy to use/less awkward in use • (named) non-hormonal barrier methods less reliable as awkward in use • non-hormonal methods show more variation in reliability **AO3.2a Analyse information and ideas to make judgements to explain why the pill is a popular method.** • pill is easier to use than the patch/injectable so preferable to the safer injection • much more reliable than condom/diaphragm but easier to reverse decision than sterilisation

Question			Answer	Marks	AO element	Guidance
			0 marks *No response or no response worthy of credit.*			
21	**(a)**		can control temperature (easier)/ can be set to a specific / constant temperature ✓ limited fire risk✓	**2**	**2 x2.2**	**IGNORE** reference to ease of measurement **ALLOW** less risk of burns **ALLOW** ORA
	(b)		for 60^0C / high temperatures: idea that (membranes break down) at 60^0C releasing more DNA / DNA is extracted easily ✓ against 60^0C / high temperatures: increased risk of DNA breaking down at 60^0C / more DNA destroyed at 60^0C / DNA not preserved at 60^0C ✓	**2**	**2 x 2.2**	 **ALLOW** idea that enzymes destroying DNA are denatured so less DNA destroyed Answers must make it clear which temperature they are referring to. **ALLOW** ORA
	(c)		wear face mask / goggles to prevent protease/ethanol/chemicals being inhaled / entering eyes✓ gloves / use tongs prevent ethanol/protease/chemicals being in contact with skin✓ turn Bunsen off as ethanol is flammable✓	**2**	**2 x 2.2**	 **ALLOW** use tongs as solution/ tube may be hot **IGNORE** reference to lab coats / glass breakages

Question			Answer	Marks	AO element	Guidance
	(d)	(i)	**First check answer on answer line** **If answer = 33.1 (mg) award 2 marks** $\frac{99.2}{3}$ **OR** 33.067 / 33.07✓ = 33.1 (mg) ✓	**2** **1.2** **2.2**		
		(ii)	(yes because) idea that there is a greater mean / yield / mass produced (of DNA)✓ there is less range/variation in results✓	**2**	**2 x 3.1b**	**ALLOW** ECF **ALLOW** examples of data from table to indicate less range/variability
22	**(a)**		pupil has dilated (in diagram B)✓ radial muscles contracted✓ to allow more light into the eye✓	**3** **1.1** **1.1**	**2.1**	**ALLOW** pupil is larger **IGNORE** eyes / iris dilated **ALLOW** reflex action has occurred
	(b)	**(i)**	person **X** is short-sighted✓ person **Y** is long-sighted✓	**2**	**2 x 2.1**	**ALLOW** person X is myopic / has myopia **ALLOW** person Y is hypermetropic / has hypermetropia (hyperopia)
		(ii)	person X concave/divergent lens **and** person Y convex/convergent lens✓ idea that concave lenses diverge light rays / person X needs a lens to diverge light rays (before they enter the eye)✓	**3** **2 x 2.1**	**1.1**	**ALLOW** minus powered lens **ALLOW** plus powered lens **Allow** diagram showing lens diverging light

Question			Answer	Marks	AO element	Guidance
			idea that convex lenses converge light rays / person Y needs a lens to converge light rays (before they enter the eye)✓			 **Allow** diagram showing lens converging light  Must be stated which diagram refers to which lens or person.

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