

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.

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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 | | | 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 | |

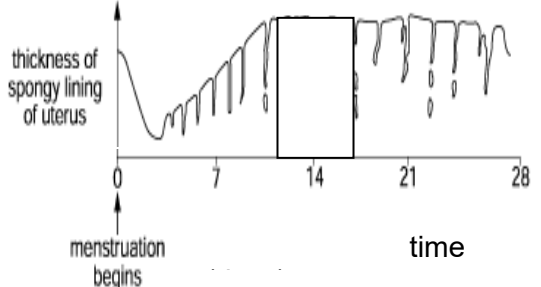
| Question | | | Answer | Marks | AO element | Guidance |
|----------|-----|------|--|-------|------------|---|
| 16 | (a) | (i) | marked correctly on diagram ✓ | 1 | 1.1 | ALLOW centre of X anywhere inside the shaded area  |
| | | (ii) | aorta / arteries ✓ lungs ✓ | 2 | 2 x1.1 | |
| | (b) | (i) | double (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) | <p>left side thicker (than the right side)✓</p> <p>left pumps blood further✓</p> | 2 | 2 x 1.1 | <p>ALLOW it's thicker / it's more muscular</p> <p>ALLOW left ventricle thicker than right</p> <p>IGNORE left is bigger</p> <p>ALLOW left pushes blood all around the (rest of the) body / right only pushes to lungs</p> <p>ALLOW left side must generate more pressure</p> <p>IGNORE left side contains blood at high pressure</p> |
| | (d) | (i) | 2 | 2 x 2.1 | <p>Any two from:</p> <p>artery thicker walled/ ORA ✓</p> <p>artery more muscle tissue/ ORA ✓</p> <p>artery narrower bore/lumen/ ORA ✓</p> <p>ALLOW artery (more) elastic</p> <p>ALLOW artery has smaller area for blood to pass through</p> |
| | | (ii) | 1 | 1.1 | <p>Any one from:</p> <p>veins have valves✓</p> <p>arteries take blood away from the heart / veins take blood to the heart✓</p> <p>blood flows faster / higher pressure in arteries /ORA✓</p> <p>IGNORE valves unqualified</p> <p>ALLOW arteries carry oxygenated / veins carry deoxygenated blood</p> |

| 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 $\frac{10}{0.01}$ ✓ 1000 (x) ✓ | 2 | 1.2 2.2 | |
| | | (ii) | 5(μm)✓ | 1 | 2.2 | ALLOW +/- 1 μm tolerance |
| | (c) | (i) | 6H ₂ O✓ 6O ₂ ✓ | 2 | 2 x1.1 | must be on correct side of equation ALLOW unbalanced/incorrectly balanced H ₂ O O ₂ for one mark |
| | | (ii) | <u>endothermic</u> ✓ | 1 | 1.1 | |
| | (d) | (i) | 30(°C)✓ | 1 | 2.2 | |
| | | (ii) | record at narrower temperature intervals✓ narrower intervals around the 30°C value✓ | 2 | 2 x 3.3b | ALLOW any temperature increment less than 5°C ALLOW narrower intervals around the optimum ALLOW narrower interval range between 25-35°C but must include 30°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 |  <p style="text-align: right;">21400032</p> |
| | (ii) | lining breaks down / is shed✓ | 1 | 1.1 | ALLOW menstruation / a period occurs ALLOW unthickens/thickness reduces/gets thinner/decreases |
| | (d)* | <p>Please refer to the marking instructions on page 5 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks)</p> <p>Applies knowledge of hormonal and one non-hormonal method of contraception.</p> <p>AND</p> <p>Interprets data to explain more than one difference in effectiveness between hormonal and non-hormonal contraceptives.</p> | 6 | 2 x 2.1 2 x 3.1a 2 x 3.2a | <p>AO2.1 Apply knowledge and understanding of methods of contraception.</p> <ul style="list-style-type: none"> • Sterilisation prevents the release of sperm • Hormonal methods prevent ovulation • Diaphragm / condom prevent sperm meeting egg / are barrier methods <p>AO3.1a Analyse information and ideas to interpret the data to explain differences between effectiveness of contraceptives.</p> |

| Question | Answer | Marks | AO element | Guidance |
|----------|--|-------|------------|--|
| | <p>AND Makes at least one judgement to explain why the pill is a popular method of contraception. <i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>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. <i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>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.</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> | | | <ul style="list-style-type: none"> • 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 <p>AO3.2a Analyse information and ideas to make judgements to explain why the pill is a popular method.</p> <ul style="list-style-type: none"> • 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 <i>No response or no response worthy of credit.</i> | | | |
| 21 | (a) | can control temperature (easier)/ can be set to a specific / constant temperature ✓ limited fire risk✓ | 2 | 2 x 2.2 | IGNORE reference to ease of measurement ALLOW less risk of burns ALLOW ORA |
| | (b) | for 60°C / high temperatures: idea that (membranes break down) at 60°C releasing more DNA / DNA is extracted easily ✓ against 60°C / high temperatures: increased risk of DNA breaking down at 60°C / more DNA destroyed at 60°C / DNA not preserved at 60°C ✓ | 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) | <p>First check answer on answer line If answer = 33.1 (mg) award 2 marks</p> <p>$\frac{99.2}{3}$ OR 33.067 / 33.07✓ = 33.1 (mg) ✓</p> | 2 | 1.2 2.2 | |
| | (ii) | <p>(yes because)</p> <p>idea that there is a greater mean / yield / mass produced (of DNA)✓</p> <p>there is less range/variation in results✓</p> | 2 | 2 x 3.1b | <p>ALLOW ECF</p> <p>ALLOW examples of data from table to indicate less range/variability</p> |
| 22 | (a) | <p>pupil has dilated (in diagram B)✓</p> <p>radial muscles contracted✓</p> <p>to allow more light into the eye✓</p> | 3 | 2.1 1.1 1.1 | <p>ALLOW pupil is larger IGNORE eyes / iris dilated</p> <p>ALLOW reflex action has occurred</p> |
| | (b) (i) | <p>person X is short-sighted✓</p> <p>person Y is long-sighted✓</p> | 2 | 2 x 2.1 | <p>ALLOW person X is myopic / has myopia</p> <p>ALLOW person Y is hypermetropic / has hypermetropia (hyperopia)</p> |
| | (ii) | <p>person X concave/divergent lens and person Y convex/convergent lens✓</p> <p>idea that concave lenses diverge light rays / person X needs a lens to diverge light rays (before they enter the eye)✓</p> | 3 | 1.1 2 x 2.1 | <p>ALLOW minus powered lens ALLOW plus powered lens</p> <p>Allow diagram showing lens diverging light</p> |

| 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)✓ | | |  <p data-bbox="1395 491 1984 523">Allow diagram showing lens converging light</p>  <p data-bbox="1395 660 2047 724">Must be stated which diagram refers to which lens or person.</p> |

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