



**GCE**

**Biology A**

Unit **H020/01**: Breadth in biology

Advanced Subsidiary GCE

**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

| <b>Annotation</b>   | <b>Meaning</b>   |
|---------------------|--|
| <b>DO NOT ALLOW</b> | Answers which are not worthy of credit                     |
| <b>IGNORE</b>       | Statements which are irrelevant                            |
| <b>ALLOW</b>        | Answers that can be accepted                               |
| ( )                 | Words which are not essential to gain credit               |
| —                   | Underlined words must be present in answer to score a mark |
| <b>ECF</b>          | Error carried forward                                      |
| <b>AW</b>           | Alternative wording  |
| <b>ORA</b>          | 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.

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| Question |   | Answer | Mark | Guidance |
|----------|---|--------|------|----------|
| 1        | C | ✓      | 1    |          |
| 2        | D | ✓      | 1    |          |
| 3        | C | ✓      | 1    |          |
| 4        | A | ✓      | 1    |          |
| 5        | D | ✓      | 1    |          |
| 6        | B | ✓      | 1    |          |
| 7        | B | ✓      | 1    |          |
| 8        | A | ✓      | 1    |          |
| 9        | A | ✓      | 1    |          |
| 10       | B | ✓      | 1    |          |
| 11       | A | ✓      | 1    |          |
| 12       | A | ✓      | 1    |          |
| 13       | D | ✓      | 1    |          |
| 14       | C | ✓      | 1    |          |
| 15       | C | ✓      | 1    |          |
| 16       | B | ✓      | 1    |          |
| 17       | C | ✓      | 1    |          |
| 18       | D | ✓      | 1    |          |
| 19       | C | ✓      | 1    |          |
| 20       | B | ✓      | 1    | ALLOW G1 |

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| Question |     | Answer  | Mark  | Guidance  |
|----------|-----|---|-------|---|
| 21       | (a) | Telmatobius ✓   | 1     | must be written with a capital T<br>note: the spelling must be correct<br><b>DO NOT ALLOW</b> if species name included                                    |
|          | (b) | (good) solvent ✓<br>high specific heat (capacity) / temperature stability<br>OR<br>described ✓<br><br>(high) density (so frog floats / buoyant) ✓<br>ice is less dense than water ✓ | 2 max | <b>ALLOW</b> it has <u>oxygen</u> dissolved in it<br><b>IGNORE</b> 'high heat capacity', 'no temperature change',<br><b>IGNORE</b> 'specific latent heat' |
|          | (c) | (i)   |       |   |
|          |     | large / increase the, surface area / SA:Vol ratio ✓<br><i>idea of:</i> increase (the rate of) oxygen absorption /<br>described ✓<br><br>oxygen levels in the lake are low ✓         | 2 max | <b>ALLOW</b> 'for oxygen absorption' if mp1 given<br>e.g. of description: 'for (more) oxygen to<br>diffuse in (through skin)'                             |

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| Question |      | Answer  | Mark  | Guidance   |
|----------|------|---|-------|--|
|          | (ii) | <p><b>D</b> large surface area ✓</p> <p><b>E</b> for (maximum) <u>diffusion</u> ✓</p> <p><b>D</b> squamous, epithelium / cells<br/>OR<br/>alveolar wall, only 1 cell thick / thin ✓</p> <p><b>E</b> (providing) a short diffusion distance ✓</p> <p><b>D</b> good, blood supply / ventilation ✓</p> <p><b>E</b> maintaining / creating a (steep) concentration<br/>gradient ✓</p> | 2 max | <p>Mark first <b>D</b> response or <b>E</b> response only<br/>For two marks the <b>E</b> mark must be linked to the <b>D</b> mark</p> <p><b>IGNORE</b> increase surface area, ref to SA:Vol ratio</p> <p><b>ALLOW</b> idea of more or faster diffusion</p> |
| (d)      | (i)  | <p>repeat (readings) ✓</p> <p>calculate mean ✓</p> <p>identifying anomalies ✓</p> <p>use statistical test to identify difference ✓</p>  | 2 max | <p>this could be mean distance/size of colourless area, or<br/>mean time if cube allowed to go completely colourless</p> <p><b>ALLOW</b> calculate standard deviation</p>  |

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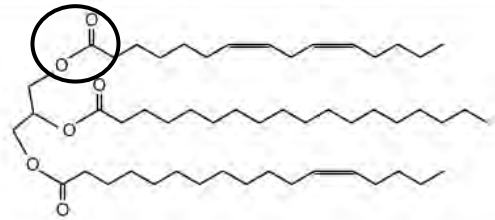
| Question |       | Answer  | Mark  | Guidance   |
|----------|-------|---|-------|--|
|          | (ii)  | cube A = 0.6 (: 1) ✓<br>cube B = 1.5 (: 1) ✓  | 2     | <b>ALLOW</b> 1 mark for 600 : 1000 <b>and</b> 96 : 64<br>6 : 10 <b>and</b> 3 : 2<br>3 : 5 <b>and</b> 3 : 2<br>(as correct ratios but not expressed correctly)<br>Allow these ratios if written anywhere in the answer space.<br><br><b>DO NOT ALLOW</b> if units given |
|          | (iii) | large(r) organism has small(er) SA : Vol ratio ✓<br><br>(rate of) diffusion (too) slow /<br>diffusion distance (too) long ✓<br><br>for (sufficient), delivery / uptake of, oxygen / nutrients<br>OR<br>for (sufficient) removal of (named) waste products ✓<br><br>for, (aerobic) respiration / metabolic demands ✓ | 3 max | <b>ALLOW ORA</b> for first three mark points   |



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| Question |     | Answer  | Mark  | Guidance  |
|----------|-----|---|-------|---|
| 22       | (a) | any appropriate bond circled ✓  | 1     |  <p>Accept more than one correct circle<br/>Circle should include both O atoms and the C between them</p>  |
|          | (b) | glycerol ✓  | 1     |   |
|          | (c) | (i)   | 3 max | <p><b>DO NOT ALLOW</b> energy for respiration</p> <p><b>IGNORE</b> for warmth unless linked to insulation</p> <p>e.g protection around kidneys</p>  |
|          |     | (ii)  | 2 max | <p><b>One mark</b> for description (1<sup>st</sup> mark point)<br/><b>One mark</b> for explanation.</p> <p>Note mp1 only awarded for clear statement of trend not for full description of data<br/><b>DO NOT ALLOW</b> hydrogen, ions / bonds / molecules</p> |
|          |     |   |       |   |
|          |     | (d)   | 2 max | <b>ALLOW</b> marks in suitably annotated diagram  |
|          |     | they / fatty acids, hydrophobic / described ✓<br>phospholipid bilayer (formed) ✓<br>fatty acids / tails, on the inside / pointing inwards ✓ |       |   |

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| Question |     | Answer              | Mark   | Guidance  |  |
|----------|-----|---------------------|--|---|--|
| 23       | (a) | 350, (x / times) ✓✓ | 2  | <b>ALLOW</b> range 333(.33) - 350 x<br><br>scale bar = 21mm<br>max.1 working mark for:<br>21mm / 0.06mm or 21 000µm / 60µm<br><br>Note: candidate may measure size of photo (image size) and calculate size of object using the scale bar. If calculated correctly this gives an answer very close to 350. Allow 2 marks. |  |
|          | (b) | (i)                 | (similar) cells working together with, common / same / similar, (named) function ✓ | 1   | Need to see both 'working together' <b>and</b> 'same function'<br>The named function must be storage of starch or photosynthesis |
|          |     | (ii)                | Q is phloem ✓<br>S is xylem ✓  | 2   |  |
|          | (c) |                     | cambium / meristem(atic)   | 1   |  |

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| Question |     |      | Answer  | Mark  | Guidance  |
|----------|-----|------|---|-------|---|
| 24       | (a) | (i)  | deoxyribose ✓   | 1     |   |
|          |     | (ii) | phosphodiester ✓  | 1     |   |
|          | (b) |      | <p><i>both have:</i><br/>           a pentose (sugar) ✓<br/>           adenine (base) ✓<br/>           phosphodiester bond (between sugar and phosphate) ✓<br/>           an OH group on carbon 3 of the sugar ✓<br/>           phosphate (group) ✓</p> <p><i>ATP has:</i><br/>           two additional phosphates ✓</p> <p>deoxyribose replaced by ribose ✓</p> <p>an OH group on carbon 2 of the, sugar / ribose</p> | 4 max | <p>Mark first two similarities and first two differences</p> <p><b>IGNORE</b> both have N, C, H, O, NO<sub>3</sub><sup>-</sup></p> <p><b>DO NOT ALLOW</b> phosphate ion / molecule (but penalise only once)</p> <p><b>ALLOW ORA</b> for DNA nucleotide</p> <p><b>DO NOT ALLOW</b> 'ATP has ribose' without comparison</p> |

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| Question             |                             | Answer  | Mark  | Guidance  |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
|----------------------|-----------------------------|---|-------|---|----------------------|-----------------------------|------------------------------|---|---|---|---|---|---|---|---|---|----|---|---|---|---|----|---|---|---|---|---|---|---|---|---|---|------|----|---|---|---|
| 25                   | (a)                         | continuous ✓  | 1     |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
|                      | (b)                         | use a microscope ✓<br>use a graticule / calibrate ✓<br>count number hairs per (unit) area ✓<br>repeat (measurements on same leaf) ✓<br>calculate mean (leaf hair density) ✓<br>divide by area used (to calculate density) ✓ | 3 max | e.g. calculate the area of view<br><br><b>ALLOW</b> calculate mean average  |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
|                      | (c) (i)                     | differences completed correctly ✓<br><br>squares of differences completed correctly ✓   | 2     | <b>IGNORE</b> all negative signs in Difference of ranks column<br><br><b>DO NOT ALLOW</b> negatives in Difference squared column<br><br><b>ALLOW</b> ECF for mp 2<br><br><table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Rank of hair density</th> <th>Difference in ranks (<math>d</math>)</th> <th>Difference squared (<math>d^2</math>)</th> </tr> </thead> <tbody> <tr><td>2</td><td>2</td><td>4</td></tr> <tr><td>1</td><td>0</td><td>0</td></tr> <tr><td>7</td><td>0</td><td>0</td></tr> <tr><td>10</td><td>0</td><td>0</td></tr> <tr><td>4</td><td>4</td><td>16</td></tr> <tr><td>3</td><td>0</td><td>0</td></tr> <tr><td>8</td><td>1</td><td>1</td></tr> <tr><td>6</td><td>0</td><td>0</td></tr> <tr><td>9</td><td>(-)7</td><td>49</td></tr> <tr><td>5</td><td>0</td><td>0</td></tr> </tbody> </table> | Rank of hair density | Difference in ranks ( $d$ ) | Difference squared ( $d^2$ ) | 2 | 2 | 4 | 1 | 0 | 0 | 7 | 0 | 0 | 10 | 0 | 0 | 4 | 4 | 16 | 3 | 0 | 0 | 8 | 1 | 1 | 6 | 0 | 0 | 9 | (-)7 | 49 | 5 | 0 | 0 |
| Rank of hair density | Difference in ranks ( $d$ ) | Difference squared ( $d^2$ )  |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 2                    | 2                           | 4   |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 1                    | 0                           | 0   |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 7                    | 0                           | 0   |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 10                   | 0                           | 0   |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 4                    | 4                           | 16  |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 3                    | 0                           | 0   |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 8                    | 1                           | 1   |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 6                    | 0                           | 0   |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 9                    | (-)7                        | 49  |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |
| 5                    | 0                           | 0   |       |   |                      |                             |                              |   |   |   |   |   |   |   |   |   |    |   |   |   |   |    |   |   |   |   |   |   |   |   |   |   |      |    |   |   |   |

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| Question |      | Answer   | Mark  | Guidance  |
|----------|------|--|-------|---|
|          | (ii) | $r_s = 0.576 / 0.58$ ✓✓  | 2     | <b>ALLOW</b> ECF from table<br><b>ALLOW</b> one mark for working<br>e.g. $n(n^2-1) = 990$ ✓<br>$6 \times 70 / 10(99)$ ✓<br>0.57 = one mark (incorrect rounding)<br>0.580 = one mark (for incorrect rounding)<br>0.6 = one mark (rounding too far) |
| (d)      | (i)  | further away from the river less water (available) / ORA ✓<br><br>transpiration causes water loss ✓<br><br>hairs, trap water vapour / reduce transpiration / reduce loss of water (vapour) ✓<br><br>reduced water (vapour) potential gradient from inside to outside leaf ✓  | 2 max | <b>DO NOT ALLOW</b> 'further from source' 'no source'<br><br><br><b>DO NOT ALLOW</b> hairs prevent water (vapour) loss  |
|          | (ii) | same / similar, size / age, trees ✓<br>same / similar, size / age, leaves ✓<br>repeated leaves from each tree <b>and</b> calculate mean ✓<br>record results at same, time of year / day ✓<br>ensure leaves selected are from, same side / same height / evenly distributed around tree ✓<br>systematic sampling / sample at set distances (from river) / described ✓ | 3 max |   |
| (e)      |      | their conclusion is incorrect ✓<br><br>reject (the student's), hypothesis / $H_1$ ✓<br><br>there is no, relationship / correlation, (between leaf hair density and distance from river) / the pattern seen is due to chance ✓  | 2 max | <b>ORA</b> accept the null hypothesis / $H_0$   |

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