

GCSE

Biology A

Unit **A161/01**: Modules B1, B2, B3 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2016

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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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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1. Annotations

Used in the detailed Mark Scheme:

| Annotation | Meaning |
|---------------------|---|
| / | alternative and acceptable answers for the same marking point |
| (1) | separates marking points |
| not/reject | answers which are not worthy of credit |
| ignore | statements which are irrelevant - applies to neutral answers |
| allow/accept | answers that can be accepted |
| (words) | words which are not essential to gain credit |
| <u>words</u> | underlined words must be present in answer to score a mark |
| ecf | error carried forward |
| AW/owtte | credit alternative wording / or words to that effect |
| ORA | or reverse argument |

Available in scoris to annotate scripts:

| | |
|---|---|
|  | indicate uncertainty or ambiguity |
|  | benefit of doubt |
|  | contradiction |
|  | incorrect response |
|  | error carried forward |
|  | draw attention to particular part of candidate's response |
|  | no benefit of doubt |
|  | reject |

| | |
|---|---|
|  | correct response |
| L1 , L2 , L3 | indicate level awarded for a question marked by level of response |
| ^ | information omitted |

2. Subject-specific Marking Instructions

- a. Accept any clear, unambiguous response (including mis-spellings of scientific terms if they are *phonetically* correct, but always check the guidance column for exclusions).
- b. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

e.g. for a one-mark question where ticks in the third and fourth boxes are required for the mark:

| |
|---|
| |
| |
|  |
|  |
| |

*This would be worth
1 mark.*

| |
|--|
| |
| |
| ✓ |
|  |
| |

*This would be worth
0 marks.*

| |
|---|
|  |
|  |
| ✓ |
| ✓ |
| |

*This would be worth
1 mark.*

- c. The list principle:
If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

d. Marking method for tick-box questions:

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes. If there is at least one tick, ignore crosses and other markings. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses. Credit should be given according to the instructions given in the guidance column for the question. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

e.g. if a question requires candidates to identify cities in England:

| | |
|-------------|--------------------------|
| Edinburgh | <input type="checkbox"/> |
| Manchester | <input type="checkbox"/> |
| Paris | <input type="checkbox"/> |
| Southampton | <input type="checkbox"/> |

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

| | | | | | | | | | | |
|---------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Edinburgh | | | ✓ | | | ✓ | ✓ | ✓ | ✓ | |
| Manchester | ✓ | x | ✓ | ✓ | ✓ | | | | ✓ | |
| Paris | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| Southampton | ✓ | x | | ✓ | | ✓ | ✓ | | ✓ | |
| Score: | 2 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | NR |

e. For answers marked by levels of response:

- i. **Read through the whole answer from start to finish**
- ii. **Decide the level that best fits** the answer – match the quality of the answer to the closest level descriptor
- iii. **To determine the mark within the level**, consider the following:

| Descriptor | Award mark |
|--------------------------------------|------------------------------|
| A good match to the level descriptor | The higher mark in the level |
| Just matches the level descriptor | The lower mark in the level |

iv. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

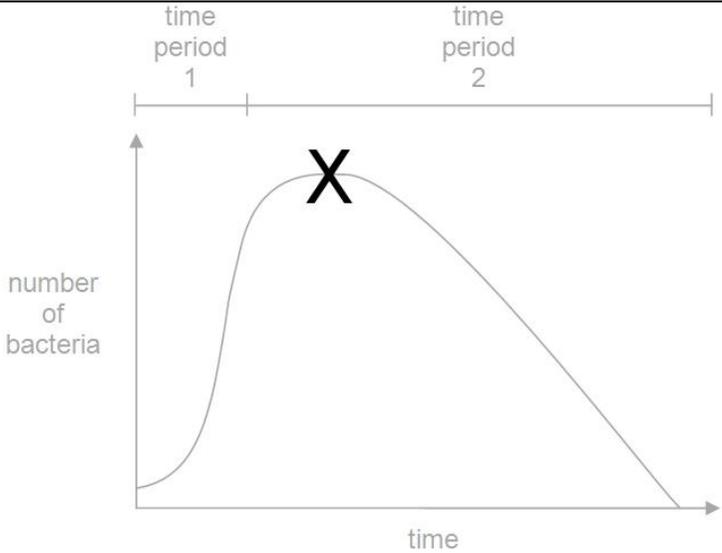
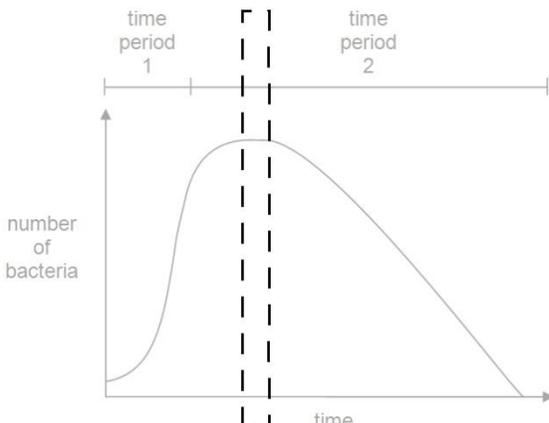
| Question | | Answer | Marks | Guidance |
|--------------|-----|---|----------|--|
| 1 | (a) | instructions ; chromosomes ; alleles | 2 | ignore any line in which more than one word is circled three correct lines = 2 marks two correct lines = 1 mark one correct line = 0 marks |
| | (b) | human body cells <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 1 | two or more ticks = 0 marks |
| Total | | | 3 | |

| Question | | Answer | Marks | Guidance |
|----------|-----|--|-------|--|
| 2 | (a) | Clone A and clone B have identical genes. <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/> The clones were made using asexual... <input checked="" type="checkbox"/> (1) | 2 | three ticks = 1 mark four ticks = 0 marks |
| | (b) | idea of producing bulb(s) | 1 | accept corm(s) accept rhizomes accept tubers accept creepers accept stolon(s) do not credit runner(s) (given in part a) do not credit seed(s) do not credit cuttings ignore ref. to named plant |

| Question | | Answer | Marks | Guidance |
|----------|-----|--|----------|---|
| 2 | (c) | <p>[Level 3] Answer explains why the twins look very similar AND explains why they look different. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer gives an explanation for difference OR similarity with an example. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer gives examples of possible differences OR gives examples of possible similarities. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | 6 | <p>This question is targeted at grades up to E</p> <p>Indicative scientific points may include:</p> <p><i>Why they look very similar:</i> <i>examples of similarities in appearance</i> eye colour, nose shape, ear lobes etc</p> <p><i>explanation</i></p> <ul style="list-style-type: none"> • they have identical alleles / genotype / genetic information / DNA / chromosomes / genes • they are clones • they came from the same embryo / zygote / <u>fertilised</u> egg / sperm and egg • the embryo split <p>ignore they are identical twins (given in stem) ignore same genes/chromosomes accept same DNA/alleles</p> <p><i>Why they will not always look exactly the same:</i> <i>examples of possible differences in appearance that could arise</i> physical damage, weight, hairstyle, clothes, tattoos</p> <p><i>explanation</i></p> <ul style="list-style-type: none"> • idea that differences are only due to environment/lifestyle • high level idea that any genetic differences must be due to changes/mutations in body cells (not in original gametes) <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |
| | | Total | 9 | |

| Question | | | Answer | Marks | Guidance |
|----------|-----|------|--|-------|--|
| 3 | (a) | (i) | 0.87 | 1 | |
| | | (ii) | idea that she would definitely develop breast cancer / it would be certain | 1 | accept it is 100% (certain/she will get cancer / she is going to get it) ignore any answer that suggests she already has it, including "she will have it" unless it is qualified |
| | (b) | | <p>any 3 from:</p> <p>her risk of developing breast cancer is high ;</p> <p>(but) she may not develop breast cancer / it is not certain ;</p> <p>reference to risk/pain/side-effects/scars/death/infection ;</p> <p>consider how much the surgery would reduce the risk of cancer ;</p> <p>cancer is life-threatening / a very serious disease ;</p> <p>may not eliminate the risk of breast cancer/she might still get breast cancer ;</p> <p>idea that benefits (of surgery) outweigh risk/pain (of surgery) /ORA</p> | 3 | <p>do not credit unqualified idea that it is major surgery, as this is given in the question</p> <p>ignore 'it may go wrong'</p> <p>ignore 'it may not be safe'</p> <p>ignore ref. to cost</p> <p>accept example of consequence of surgery e.g. she might not be able to breastfeed/body image issues</p> <p>ignore false positive/negative/discrimination/insurance comments/pregnancy</p> <p>accept 'it may not work'</p> |

| Question | | Answer | Marks | Guidance |
|----------|-----|--|----------|---|
| | (c) | <p>any 1 from:</p> <p>could get cancer in other parts of the body/could get other types of cancer ;</p> <p>other factors can cause cancer (e.g. lifestyle/environmental) ;</p> <p>other genes could cause cancer</p> | 1 | <p>do not accept could still be some cancer cells left/ may not have removed/ got rid of all the cancer</p> |
| | (d) | <p>any 2 from:</p> <p>idea that it is unlikely/rare/low chance/0.1% chance that the normal allele will become faulty ;</p> <p>idea that Jane inherited the faulty allele/it from her mother ;</p> <p>idea that Jane's mother inherited the faulty allele/it from Jane's grandmother ;</p> | 2 | <p>do not credit ref. to "1 in 1000" unqualified, as this is given in the question</p> <p>accept the idea that it was passed on ignore unqualified reference to being a carrier</p> <p>ignore "Jane inherited it from her grandmother" / "it skipped a generation" as this does not support the doctor's conclusion</p> |
| | | Total | 8 | |

| Question | | | Answer | Marks | Guidance |
|----------|-----|-------|--|-------|--|
| 4 | (a) | (i) | 3200 | 1 | |
| | | (ii) | It will only take hours/ it will only take 1 more hour/3 hours in total (1) the population size/number of bacteria only needs to double three more/a few more times (1) | 2 | credit correct numerical calculation that shows 3 more divisions equals more than 20000 credit 25600 bacteria |
| | | (iii) | damage cells (1) produce toxins/poisons (1) | 2 | ignore destroys/kills/attacks cells |
| | (b) | (i) |  <p>number of bacteria</p> <p>time</p> | 1 | X should be on the horizontal portion of the curve, or anywhere directly above or below it (see dashed box for guidance) |
| | | |  <p>number of bacteria</p> <p>time</p> | | |

| Question | | | Answer | Marks | Guidance |
|----------|-----|------|---|----------|--|
| 4 | (b) | (ii) | <p>any 2 from:</p> <p>immune system/white blood cells ;</p> <p>(by) producing antibodies ;</p> <p>clumping of bacteria ;</p> <p>releases/produces antitoxins ;</p> <p>(by white blood cells) engulfing/digesting the bacteria (destroying bacteria)</p> | 2 | <p>accept agglutination</p> <p>ignore eating/fighting/killing/attacking bacteria</p> <p>credit bacteria have run out of food/oxygen/nutrients credit waste products are killing the bacteria</p> |
| | | | Total | 8 | |

| Question | | | Answer | Marks | Guidance |
|----------|-----|-------|--|-------|--|
| 5 | (a) | (i) | 50.0 (2) | 2 | correct working $\frac{4000}{8000} \times 100$ (1) award 1 mark for 50% |
| | | (ii) | any 2 from: this figure is only true for Mali/one country/ states an example of another country with a lower fatality rate; number of cases in Mali/8 people is a small sample; population size is not considered ; should have calculated the mean value for all countries/ mean value is 55%; only gives the maximum case fatality rate / does not represent the range of the data ; | 2 | do not credit “wrong / not true / not accurate / not correct” without explanation accept because 3 countries were below this figure accept (Mali) uses the figure from smallest number of cases |
| | | (iii) | any 1 from: uses the mean to rewrite headline 55%/55.4%; use the range to rewrite headline / 30% - 75% / up to 75% | 1 | accept true mean 42.9%/43% |
| | (b) | (i) | Animals <input checked="" type="checkbox"/> <input type="checkbox"/> human cells grown in the laboratory <input checked="" type="checkbox"/> <input type="checkbox"/> | 1 | two correct ticks = 1 mark three or more ticks = 0 marks |

| Question | | | Answer | Marks | Guidance |
|----------|-----|------|---|-----------|---|
| 5 | (b) | (ii) | <p>[Level 3] Answer gives correct reason for three groups AND discusses ethical issues. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer gives correct reason for two groups OR one group and discusses ethical issues. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer gives general statements for drug testing. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | 6 | <p>This question is targeted at grades up to C Indicative scientific points may include:</p> <p><i>Reasons for group A / healthy volunteers + drug:</i></p> <ul style="list-style-type: none"> • to test for safety • side effects/examples of side effects <p><i>Reasons for group B / people with Ebola + drug:</i></p> <ul style="list-style-type: none"> • to test for safety • side effects/examples of side effects • effectiveness/if drug works <p><i>Reasons for group C / people with Ebola + placebo:</i></p> <ul style="list-style-type: none"> • a placebo (is a similar substance that) has no drug in it • to show results without drug • control group • to compare with group • placebo (only) used if there is no existing treatment for Ebola <p><i>Ethical issues with group C / placebo:</i></p> <ul style="list-style-type: none"> • should not knowingly withhold a drug that could help them • people in this group likely to die/suffer • people in this group will not benefit from the new drug • because case fatality rate/death rate for Ebola is high <p><i>General statements</i></p> <ul style="list-style-type: none"> • drug trials test for safety/side effects • drug trials test for effectiveness • placebos can be used and do not contain active ingredients • use a placebo to see if there is a placebo/psychological effect • use of blind/double blind trials <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |
| | | | Total | 12 | |

| Question | | Answer | Marks | Guidance | | | | | | | | | | | | | | | | |
|----------|--------|---|---------|----------------------------|------|---------|---|--|--|-----|--|--|---|-----|--|---|--|-----|---|--|
| 6 | (a) | <table border="1"> <thead> <tr> <th>Rowe</th> <th>Wilson</th> <th>Both</th> <th>Neither</th> </tr> </thead> <tbody> <tr> <td>✓</td> <td></td> <td></td> <td>(1)</td> </tr> <tr> <td></td> <td></td> <td>✓</td> <td>(1)</td> </tr> <tr> <td></td> <td>✓</td> <td></td> <td>(1)</td> </tr> </tbody> </table> | Rowe | Wilson | Both | Neither | ✓ | | | (1) | | | ✓ | (1) | | ✓ | | (1) | 3 | |
| Rowe | Wilson | Both | Neither | | | | | | | | | | | | | | | | | |
| ✓ | | | (1) | | | | | | | | | | | | | | | | | |
| | | ✓ | (1) | | | | | | | | | | | | | | | | | |
| | ✓ | | (1) | | | | | | | | | | | | | | | | | |
| | (b) | <p>C before E (1) E before B (1) B before D (1)</p> | 3 | correct order: C (A) E B D | | | | | | | | | | | | | | | | |
| | (c) | adapted | 1 | accept fit/suited | | | | | | | | | | | | | | | | |
| | (d) | <p>any 3 from:</p> <p>(more deer) so more herbs/vegetables eaten ;</p> <p>less herbs/vegetables, less bison/less food for bison ;</p> <p>more Neanderthals because more deer available to eat/for food ;</p> <p>less Neanderthals because fewer bison available to eat/for food ;</p> <p>less Neanderthals because fewer veg/herbs available to eat/for food ;</p> | 3 | | | | | | | | | | | | | | | | | |

| Question | | Answer | Marks | Guidance |
|--------------|-----|---|-----------|--|
| 6 | (e) | <p>[Level 3] Answer includes causes AND explanations including a level 3 adaptation explanation. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer includes several causes and a level 2 explanation. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer includes only causes OR explanations. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | 6 | <p>This question is targeted at grades up to C</p> <p>Indicative scientific points may include:</p> <p>Causes <i>environmental conditions:</i></p> <ul style="list-style-type: none"> • environmental conditions changed / natural disaster • example of environmental change (e.g. change in temperature) • example of consequences of environmental change (e.g. different vegetation, affecting diet) • idea that the change was long-term (i.e. not just seasonal/temporary) <p><i>introduction of:</i></p> <ul style="list-style-type: none"> • a new competitor of the Neanderthals/example • a new predator of the Neanderthals/example • a new pathogen/disease/example <p>accept increase in number of competitors/predators/pathogens</p> <p><i>disappearance of another species:</i></p> <ul style="list-style-type: none"> • another species disappeared/died out/declined • idea that the Neanderthals ate/depended upon this species <p>Explanations: Level 1/2</p> <ul style="list-style-type: none"> • the Neanderthals could not reproduce (successfully) • not enough food • conditions too cold / too hot for them <p>Level 3</p> <ul style="list-style-type: none"> • the Neanderthals were not well adapted to the new conditions • the Neanderthals (species) did not adapt quickly enough <p>ignore 'suited' for adapted</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |
| Total | | | 16 | |

| Question | | Answer | Marks | Guidance | | | | | | | | | | | | | | | |
|----------------------------------|-------------------------------------|---|----------|----------|---|----------------------------------|-------------------------------------|--------------------------|-------------------------------|--------------------------|-------------------------------------|-------------------------------|--------------------------|-------------------------------------|------------------------------|--------------------------|-------------------------------------|---|--|
| 7 | (a) | a group of organisms that can breed (1) to produce fertile offspring (1) | 2 | | | | | | | | | | | | | | | | |
| | (b) | <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 10%; text-align: center;">T</th> <th style="width: 10%; text-align: center;">F</th> </tr> </thead> <tbody> <tr> <td>All jellyfish are invertebrates.</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Jellyfish are a type of fish.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>The animal could be a mammal.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td>All animals are vertebrates.</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </tbody> </table> | | T | F | All jellyfish are invertebrates. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Jellyfish are a type of fish. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | The animal could be a mammal. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | All animals are vertebrates. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 2 | Ignore any row in which there is more than one tick Four correct = 2 marks Two or three correct = 1 mark One correct = 0 marks |
| | T | F | | | | | | | | | | | | | | | | | |
| All jellyfish are invertebrates. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | | | | | | | | | | | | | | | | | |
| Jellyfish are a type of fish. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | |
| The animal could be a mammal. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | |
| All animals are vertebrates. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | | | | | | | | | | | | | | | | | |
| Total | | | 4 | | | | | | | | | | | | | | | | |

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