

## **Biology A**

General Certificate of Secondary Education

Unit **A221/02**: Unit 1: Modules B1, B2, B3 (Higher Tier)

## **Mark Scheme for January 2011**

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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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## Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, eg mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

|                     |                                                                 |
|---------------------|-----------------------------------------------------------------|
| /                   | = alternative and acceptable answers for the same marking point |
| (1)                 | = separates marking points                                      |
| <b>not/reject</b>   | = answers which are not worthy of credit                        |
| <b>ignore</b>       | = statements which are irrelevant - applies to neutral answers  |
| <b>allow/accept</b> | = 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            | = alternative wording                                           |
| ORA                 | = or reverse argument                                           |

eg mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

"work done" = 0 marks

"work done lifting" = 1 mark

"change in potential energy" = 0 marks

"gravitational potential energy" = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.
6. 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.

The example below illustrates how to apply this principle to an objective question.

eg for a one mark question, where ticks in boxes 3 and 4 are required for the mark

Put ticks (✓) in the two correct boxes.

|   |  |
|---|--|
|   |  |
|   |  |
| ✓ |  |
| ✗ |  |
|   |  |

*This would be worth zero marks.*

Put ticks (✓) in the two correct boxes.

|   |  |
|---|--|
|   |  |
|   |  |
| ✗ |  |
| ✗ |  |
|   |  |

*This would be worth one mark.*

Put ticks (✓) in the two correct boxes.

|   |   |
|---|---|
| ✗ | ✓ |
| ✗ | ✓ |
| ✓ |   |
| ✓ |   |
|   |   |

*This would be worth one mark.*

## 7. 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, eg 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.

## 8. Marking method for tick boxes:

Always check the additional guidance.

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. If there are no ticks, accept clear, unambiguous indications, eg shading or crosses.

Credit should be given for each box correctly ticked. 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.

*eg if a question requires candidates to identify a city in England, then in the boxes*

|             |  |
|-------------|--|
| Edinburgh   |  |
| Manchester  |  |
| Paris       |  |
| Southampton |  |

*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    | ✓        | ✗        | ✓        | ✓        | ✓        |          |          |          | ✓        |           |
| Paris         |          |          |          | ✓        | ✓        |          | ✓        | ✓        | ✓        |           |
| Southampton   | ✓        | ✗        |          | ✓        |          | ✓        | ✓        |          | ✓        |           |
| <b>Score:</b> | <b>2</b> | <b>2</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>NR</b> |

| Question |   |  | Expected Answers                                         | Marks | Rationale                                                                                                                                                                                                                      |
|----------|---|--|----------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | a |  | 2 (1)<br>either the same or different (1)<br>alleles (1) | [3]   |                                                                                                                                                                                                                                |
|          | b |  | idea of structural (1)<br>enzymes (1)                    | [2]   | <b>accept</b> examples for structural mark eg muscle / skin / hair /<br>new cells / build body<br><b>accept</b> examples for other functions eg hormones, receptor<br>molecules for enzyme mark<br><b>ignore</b> for digestion |
|          |   |  | <b>Total</b>                                             | [5]   |                                                                                                                                                                                                                                |

| Question |   |    | Expected Answers                                                                                                                                                                                                                                                                                                                         | Marks | Rationale                                                                                                                                                                               |
|----------|---|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2        | a | i  | idea that cystic fibrosis has only 1 or 2 genes<br>or alleles (1)<br>idea that eye colour has multiple or more /<br>range of genes or alleles (1)                                                                                                                                                                                        | [2]   | <b>accept</b> continuous (eye colour) and discontinuous (CF)<br>variation<br><b>ignore</b> any reference to dominant and recessive                                                      |
|          |   | ii | <b>any two from:</b><br>thick/sticky mucus or mucus build up;<br>cough / lung infections;<br>breathing problems;<br>sterility;<br>digestive problems / poor growth;                                                                                                                                                                      | [2]   |                                                                                                                                                                                         |
|          | b |    | any 2 from<br>whether or not to have children (1)<br>whether to terminate pregnancy (1)<br>chance of miscarriage / harm fetus or adult /<br>risk of test eg infection (1)<br>test may give false result so still unsure /<br>unreliable (1)<br>may affect (life) insurance / job implications (1)<br>Whether or not to have gene therapy | [2]   | <b>ignore</b> non implications eg a fetus cannot make the decision<br><b>ignore</b> do not want to know / causes stress / can plan your life<br><br><b>ignore</b> can receive treatment |
|          | c | i  | Mandy (1)                                                                                                                                                                                                                                                                                                                                | [1]   |                                                                                                                                                                                         |
|          |   | ii | Dan (1)                                                                                                                                                                                                                                                                                                                                  | [1]   |                                                                                                                                                                                         |
|          |   |    | <b>Total</b>                                                                                                                                                                                                                                                                                                                             | [8]   |                                                                                                                                                                                         |

| Question |   |    | Expected Answers                                                                                                                                                                                                                                                                                                                                                  |  | Marks | Rationale                                                                                                                                                                                                                                                                                    |
|----------|---|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3        | a | i  | 3 and 5 (1)                                                                                                                                                                                                                                                                                                                                                       |  | [1]   | <b>both</b> required for the mark<br><b>accept</b> either way round                                                                                                                                                                                                                          |
|          |   | ii | 3 - it encourages the body to make <u>antibodies</u> / <u>antitoxin</u> to destroy the virus (1)<br>5 – the new vaccine would enable the body to destroy the flu (virus) entering the body (1)                                                                                                                                                                    |  | [2]   | Mark whole of this response independently of 3ai<br><br>QWTTE accept either way round<br><br>OWTTE accept either way round<br><br>For sentence 5 look for idea that the vaccine would not work on any other virus.<br><br><b>reject</b> idea that vaccine stops flu virus entering the body. |
|          | b |    | Vaccination can never be ... <input checked="" type="checkbox"/> (1)<br><br><input type="checkbox"/><br><br><input type="checkbox"/><br><br><input type="checkbox"/><br><br>Once the body has made the ... <input checked="" type="checkbox"/> (1)<br><br><input type="checkbox"/><br><br>Symptoms of the disease are ... <input checked="" type="checkbox"/> (1) |  | [3]   |                                                                                                                                                                                                                                                                                              |
|          | c |    | idea of less chance of infectious person meeting non vaccinated person (1)<br>idea of more infectious the disease the more people need to be vaccinated (1)                                                                                                                                                                                                       |  | [2]   | <b>ignore</b> it will stop it spreading / pass it on                                                                                                                                                                                                                                         |
|          |   |    | <b>Total</b>                                                                                                                                                                                                                                                                                                                                                      |  | [8]   |                                                                                                                                                                                                                                                                                              |

| Question |   | Expected Answers                                                                                                                                                                                                                                                                                                           | Marks | Rationale                                                             |
|----------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------|
| 4        | a | Antibiotic resistance begins ... <input checked="" type="checkbox"/><br>The process is helped ... <input checked="" type="checkbox"/><br><input type="checkbox"/><br>Natural selection ensures ... <input checked="" type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/> | [1]   | 3 correct = 1 mark                                                    |
|          | b | <input type="checkbox"/><br><input type="checkbox"/><br>a cream that restores ... <input checked="" type="checkbox"/><br><input type="checkbox"/><br>a drug that increases ... <input checked="" type="checkbox"/><br>a new contraceptive pill ... <input checked="" type="checkbox"/><br><input type="checkbox"/>         | [2]   | 3 correct = 2 marks<br>2 correct = 1 mark<br>1 or 0 correct = 0 marks |

| Question |   | Expected Answers                    | Marks | Rationale                                                             |
|----------|---|-------------------------------------|-------|-----------------------------------------------------------------------|
| 4        | c |                                     | [2]   | 3 correct = 2 marks<br>2 correct = 1 mark<br>1 or 0 correct = 0 marks |
|          |   | <input type="checkbox"/>            |       |                                                                       |
|          |   | <input checked="" type="checkbox"/> |       |                                                                       |
|          |   | <input type="checkbox"/>            |       |                                                                       |
|          |   | <input checked="" type="checkbox"/> |       |                                                                       |
|          |   | <input type="checkbox"/>            |       |                                                                       |
|          |   | <input checked="" type="checkbox"/> |       |                                                                       |
|          |   | <input type="checkbox"/>            |       |                                                                       |
| Total    |   | [5]                                 |       |                                                                       |

| Question |   | Expected Answers                                                                                                                                                                                           | Marks | Rationale                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5        | a | <p><input type="checkbox"/></p> <p>The blood supply <input checked="" type="checkbox"/> (1) <input type="checkbox"/></p> <p>The heart <input checked="" type="checkbox"/> (1) <input type="checkbox"/></p> | [2]   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|          | b | <p><b>any two from:</b><br/>correct named example but must include heart disease;</p> <p>idea of cause <b>explained</b> and linked to the stated correlation;</p>                                          | [2]   | <p><b>ignore</b> any repeat of stem of question.<br/>Answers must relate to the heart.</p> <p><b>ignore</b> any reference to ice cream and hot weather.</p> <p>correlation must be clear eg the <b>more</b> you smoke the <b>more</b> likely you are to have heart disease</p> <p><b>reject</b> smoking causes heart disease</p> <p>correlation could be negative eg the <b>more</b> exercise you do the <b>less</b> likely you are to have heart disease</p> <p><b>reject</b> exercise stops heart disease</p> <p>eg cigarette smoke contains chemicals that damage the heart<br/>eg exercise improves efficiency of heart muscle</p> |
|          |   | <b>Total</b>                                                                                                                                                                                               | [4]   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Question |   | Expected Answers                                                                                                                                                                         | Marks      | Rationale |
|----------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|
| 6        | a | Both Bs in correct place (1)<br><b>C</b> before <b>A</b> on left (1)<br><b>D</b> before <b>E</b> on right (1)                                                                            | [3]        |           |
|          | b | <p>communication <input type="checkbox"/> (1)</p> <p><input type="checkbox"/> (1)</p> <p>homeostasis (1) <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/> (1)</p> | [2]        |           |
|          |   | <b>Total</b>                                                                                                                                                                             | <b>[5]</b> |           |

| Question |   | Expected Answers    |                   |                    |      | Marks | Rationale                                                                       |
|----------|---|---------------------|-------------------|--------------------|------|-------|---------------------------------------------------------------------------------|
| 7        | a | description         | natural selection | selective breeding | both |       |                                                                                 |
|          |   | humans              |                   | ✓                  |      | [3]   | 7 correct rows = 3 marks<br>6 correct rows = 2 marks<br>5 correct rows = 1 mark |
|          |   | not species         |                   | ✓                  |      |       |                                                                                 |
|          |   | evolution           | ✓                 |                    |      |       |                                                                                 |
|          |   | generations         |                   |                    | ✓    |       |                                                                                 |
|          |   | fittest             | ✓                 |                    |      |       |                                                                                 |
|          |   | alleles             |                   |                    | ✓    |       |                                                                                 |
|          |   | reproduction        |                   |                    | ✓    |       |                                                                                 |
|          |   | The introduction of | ✓                 |                    |      |       |                                                                                 |
|          |   |                     |                   |                    |      | [2]   | 3 correct = 2 marks<br>2 correct = 1 mark                                       |
|          |   |                     |                   |                    |      |       |                                                                                 |
|          |   |                     |                   |                    |      |       |                                                                                 |
|          |   | Climate change      | ✓                 |                    |      |       |                                                                                 |
|          |   | Another species     | ✓                 |                    |      |       |                                                                                 |
|          |   |                     |                   |                    |      |       |                                                                                 |
|          | c | i                   | Val (1)           |                    |      | [1]   |                                                                                 |
|          |   | ii                  | Ali (1)           |                    |      | [1]   |                                                                                 |
|          |   |                     | Total             |                    |      | [7]   |                                                                                 |

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