

GCSE

Biology B

Unit **B731/01**: Modules B1, B2, B3 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for June 2017

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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 used in scoris

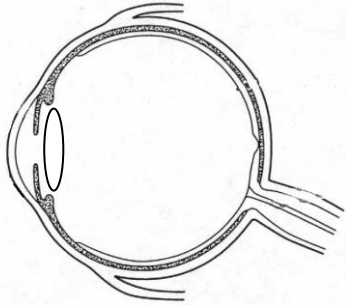
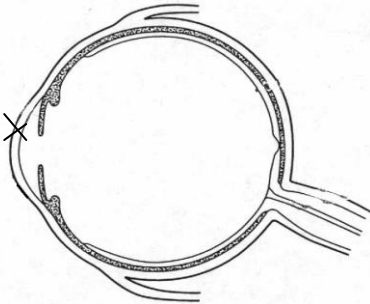
| Annotation | Meaning |
|---|---------------------------------------|
|  | correct response |
|  | incorrect response |
| BOD | benefit of the doubt |
| NBOD | benefit of the doubt not given |
| ECF | error carried forward |
|  | information omitted |
| I | ignore |
| R | reject |
| CON | contradiction |

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

- / = alternative and acceptable answers for the same marking point
- (1) = separates marking points
- allow** = answers that can be accepted
- not** = answers which are not worthy of credit
- reject** = answers which are not worthy of credit
- ignore** = statements which are irrelevant
- () = words which are not essential to gain credit
- = underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
- ecf = error carried forward
- AW = alternative wording
- ora = or reverse argument

| Question | Answer | Marks | Guidance |
|----------|--|----------|--|
| 1 a | fat (1) | 1 | |
| b i | 30 (g) (1) | 1 | |
| ii | 50 (%) (2) But if incorrect or incomplete then $\frac{15}{30} \times 100$ (1) | 2 | allow ECF from (b)(i) |
| c | Comment 1 / about being better for health overall is an opinion (1) Comment 2 / difference in fat content / link between fat and heart disease are scientific facts (1) | 2 | must clearly link each statement to opinion or fact allow comment one is opinion and comment 2 is fact (2) |
| | | 6 | |

| Question | Answer | Marks | Guidance | | | | | | | | |
|---------------------------|--|---------------------------|--|--------------|--|------------------------|---|--------------------|--|---|-------------------------|
| 2 a | pathogen (1) | 1 | allow answer ringed, underlined or ticked more than one answer= 0 | | | | | | | | |
| b | <p>any two from: trapped by mucus (in the airways) (1) (hydrochloric) acid in the stomach (1) blood clotting (1) skin (providing a barrier) (1)</p> <p>and</p> <p>the virus is injected into the body / the virus is injected bloodstream (by a mosquito) / virus enters directly into the blood (1)</p> | 3 | <p>Allow ear wax prevents the entry of pathogens via the ear canal Allow tears prevent the entry of pathogens via the eye ignore reference to cilia / hairs</p> <p>Allow mosquito can break the skin</p> | | | | | | | | |
| c | <table border="1" data-bbox="320 751 831 1018"> <tbody> <tr> <td>peripheral nervous system</td> <td></td> </tr> <tr> <td>sense organs</td> <td></td> </tr> <tr> <td>central nervous system</td> <td>✓</td> </tr> <tr> <td>circulatory system</td> <td></td> </tr> </tbody> </table> | peripheral nervous system | | sense organs | | central nervous system | ✓ | circulatory system | | 1 | more than one answer =0 |
| peripheral nervous system | | | | | | | | | | | |
| sense organs | | | | | | | | | | | |
| central nervous system | ✓ | | | | | | | | | | |
| circulatory system | | | | | | | | | | | |
| d | <p>any two from:</p> <p>to see if they work / are effective (1)</p> <p>to see if there are any side effects / to see if they are harmful (1)</p> <p>to work out the dose (1)</p> | 2 | allow prevent deaths caused by vaccine / allergic reactions | | | | | | | | |
| | | 7 | | | | | | | | | |

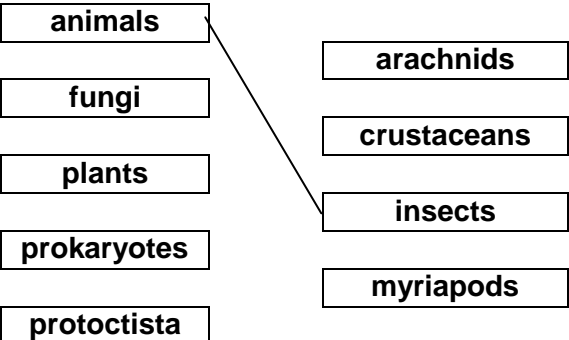
| Question | Answer | Marks | Guidance |
|----------|--|-------|--|
| 3 a |  | 1 | Needs to be in the correct position but not necessarily an ovoid shape |
| b i |  | 1 | The centre of the X must be on the cornea allow label line that touches cornea |
| | ii a person can see / focus on objects that are distant to them (1) but cannot see /focus on close objects (1) | 2 | allow a person can only see / focus on objects that are distant to them = (2) ignore see things in longer distance |
| c | mutation (1) recessive (1) | 2 | |
| | | 6 | |

| Question | Answer | Marks | Guidance |
|----------|--|-------|--|
| 4 | <p>[Level 3] Answer gives a full description of the effect of plant hormone and correctly works out the concentration of the plant hormone solution. (5 – 6 marks)</p> <p>[Level 2] Answer includes a correct statement about the effect of plant hormone and correctly measures the stem. or gives a full description of the effect of plant hormone or correctly works out the concentration of the plant hormone solution. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer includes a correct statement about the effect of plant hormone or correctly measures the stem. (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 up to grade E</p> <p>Indicative scientific points about the effect of plant hormone may include:</p> <ul style="list-style-type: none"> • The plant hormone causes the stem to get longer • Increasing concentration of hormone causes greater elongation • At higher concentrations any increase in concentration has not further effect on growth • Reference to maximum percentage concentration or length <p>Indicative scientific points about the piece include:</p> <ul style="list-style-type: none"> • The length is 20mm • This would be caused by a concentration of 3 parts per million <p>allow concentration in range 2.5 – 3.5 ppm</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |
| | | 6 | |

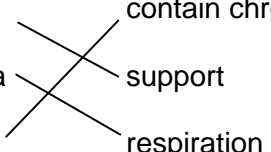
| Question | Answer | Marks | Guidance | | | | | | | | |
|-----------------------------------|--|--------------------------|---|-------------------|--|----------------------------|--|-----------------------------------|--|---|--------------------------|
| 5 a | 78 (%) (1) | 1 | allow answer ringed, underlined or ticked more than one answer= 0 | | | | | | | | |
| b | <table border="1"> <tr> <td data-bbox="315 424 763 483">It is not very reactive.</td> <td data-bbox="763 424 846 483">✓</td> </tr> <tr> <td data-bbox="315 483 763 542">It is colourless.</td> <td data-bbox="763 483 846 542"></td> </tr> <tr> <td data-bbox="315 542 763 601">It cannot get into plants.</td> <td data-bbox="763 542 846 601"></td> </tr> <tr> <td data-bbox="315 601 763 660">It is too high in the atmosphere.</td> <td data-bbox="763 601 846 660"></td> </tr> </table> | It is not very reactive. | ✓ | It is colourless. | | It cannot get into plants. | | It is too high in the atmosphere. | | 1 | more than one answer= 0 |
| It is not very reactive. | ✓ | | | | | | | | | | |
| It is colourless. | | | | | | | | | | | |
| It cannot get into plants. | | | | | | | | | | | |
| It is too high in the atmosphere. | | | | | | | | | | | |
| c | <table border="1"> <tr> <td data-bbox="315 695 651 754">as nitrates</td> <td data-bbox="651 695 748 754">✓</td> </tr> <tr> <td data-bbox="315 754 651 813">as proteins</td> <td data-bbox="651 754 748 813"></td> </tr> <tr> <td data-bbox="315 813 651 873">as carbon dioxide</td> <td data-bbox="651 813 748 873"></td> </tr> <tr> <td data-bbox="315 873 651 932">as nitrogen gas</td> <td data-bbox="651 873 748 932"></td> </tr> </table> | as nitrates | ✓ | as proteins | | as carbon dioxide | | as nitrogen gas | | 1 | more than one answer = 0 |
| as nitrates | ✓ | | | | | | | | | | |
| as proteins | | | | | | | | | | | |
| as carbon dioxide | | | | | | | | | | | |
| as nitrogen gas | | | | | | | | | | | |
| d | <p>Dead plants decompose / decay / rot (1)</p> <p>Action of decomposers / bacteria / fungi (1)</p> <p>Minerals / elements are recycled / more available to plants / more nitrates (1)</p> | 3 | <p>allow break down ignore degrade / corrode</p> <p>ignore nutrients</p> <p>allow any named mineral</p> | | | | | | | | |
| | | 6 | | | | | | | | | |

| Question | Answer | Marks | Guidance | | | | | | | | | | |
|---------------------------------------|---|------------------------------|---|-------------------------|----------|---------------------------|----------|---------------------------------------|----------|-------------------------------|----------|---|--|
| 6 a | <p>Any two from:</p> <p>on the sides for the hare so it can see all around / wide field of view (1)</p> <p>at the front for the lynx so that it can judge distance (1)</p> <p>hare has monocular vision and lynx binocular (1)</p> | 2 | <p>ignore more accurate image / narrower field of view</p> <p>allow one mark for on the sides for the hare and at the front for the lynx if no other mark scored</p> <p>allow one mark for so hare can see all around / wide field of view and lynx can judge distance if no other mark scored</p> | | | | | | | | | | |
| b | <table border="1"> <thead> <tr> <th data-bbox="315 935 714 1038">Charles Darwin's observation</th> <th data-bbox="714 935 943 1038">Scientists' observation</th> </tr> </thead> <tbody> <tr> <td data-bbox="315 1038 714 1102">survival of the fittest</td> <td data-bbox="714 1038 943 1102">C</td> </tr> <tr> <td data-bbox="315 1102 714 1166">competition for resources</td> <td data-bbox="714 1102 943 1166">B</td> </tr> <tr> <td data-bbox="315 1166 714 1270">inheritance of successful adaptations</td> <td data-bbox="714 1166 943 1270">D</td> </tr> <tr> <td data-bbox="315 1270 714 1366">presence of natural variation</td> <td data-bbox="714 1270 943 1366">A</td> </tr> </tbody> </table> | Charles Darwin's observation | Scientists' observation | survival of the fittest | C | competition for resources | B | inheritance of successful adaptations | D | presence of natural variation | A | 2 | <p>all four correct = 2 marks</p> <p>three or two correct = 1 mark</p> <p>one or none correct = 0 marks</p> |
| Charles Darwin's observation | Scientists' observation | | | | | | | | | | | | |
| survival of the fittest | C | | | | | | | | | | | | |
| competition for resources | B | | | | | | | | | | | | |
| inheritance of successful adaptations | D | | | | | | | | | | | | |
| presence of natural variation | A | | | | | | | | | | | | |

| | | | |
|-----------------|---|------------------|---|
| <p>c</p> | <p>[Level 3] Answer includes a correct description of the greenhouse effect and is able to link this to the decrease in population of hares.</p> <p>Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer includes a correct description of the greenhouse effect or explains why warmer weather results in less hares surviving.</p> <p>Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer includes reference to the greenhouse effect or global warming or identifies that the predictions are for less hares to survive (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | <p>6</p> | <p>This question is targeted up to grade C</p> <p>Indicative scientific points about the warmer weather may include:</p> <ul style="list-style-type: none"> • The greenhouse effect • Carbon dioxide being a greenhouse gas • Trapping more heat in the Earth’s atmosphere • Less radiated out to space <p>Indicative scientific points about the prediction of the hares include:</p> <ul style="list-style-type: none"> • Warmer weather means less snow • Hares will be less well camouflaged • More eaten by lynx • Increased risk of disease due to warmer conditions • Flooding of habitats due to sea level rising • Lack of food due to inability to grow in the new climate <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |
| | | <p>10</p> | |

| Question | Answer | Marks | Guidance |
|----------|--|----------|--|
| 7 a |  | 2 | <p>line from animal (1) line to insects (1)</p> <p>multiple lines all from animals or all to insects (1)</p> |
| b i | sun(light) / light (1) | 1 | not green plants |
| ii | <p>any two from: can be a herbivore and a carnivore / is an omnivore / feeds on both plants and animals / feeds on both green plant and caterpillar (1)</p> <p>when it feeds on green plants it is a primary consumer (1) when it feeds on caterpillar it is a secondary consumer (1)</p> | 2 | |
| iii | <p>numbers increase (1)</p> <p>less are eaten (1)</p> | 2 | allow its predator has gone |
| c | <p>Sam (1) (mean is 16 but this means that) there could be some ladybirds with 7 spots (and some with 15 or more) (1)</p> | 2 | answer must include figure |
| | | 9 | |

| Question | Answer | Marks | Guidance |
|----------|--|-------|--|
| 8 a | red blood cells – carry oxygen (1) platelets – clotting (of blood) (1) | 2 | allow stops bleeding ignore heals / forms scabs / blocks wounds |
| b i | more (1) smaller (1) | 2 | allow answer ringed, underlined or ticked more than one answer= 0 |
| ii | 28% (2) But if incorrect or incomplete $\frac{7 \times 40}{10}$ (1) | 2 | |
| iii | Camels (blood has lower percentage of red blood cells because) often have to go for long periods of time without water ORA (1) | 1 | |
| | | 7 | |

| Question | Answer | Marks | Guidance |
|----------|---|-------|--|
| 9 a | vacuole mitochondria nucleus  contain chromosomes support respiration | 2 | all three correct = 2 marks one or two correct = 1 mark |

| | | |
|---|----------|--|
| <p>b</p> <p>[Level 3] Answer includes a correct description of how protein synthesis is controlled and is able to link this to the change in shape of the cap Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Answer includes a correct description of how protein synthesis is controlled or links change in shape of the cap to the movement of the nucleus Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Answer includes a correct statement about how protein synthesis is controlled. or Links change in shape of the cap to production of different proteins / presence of different genes. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p> | <p>6</p> | <p>This question is targeted up to grade C</p> <p>Indicative scientific points about protein synthesis may include:</p> <ul style="list-style-type: none"> • Proteins are coded for by genes / DNA • Genes / DNA are kept in the nucleus (on chromosomes) • The genes contain a sequence of bases that code for the protein <p>Indicative scientific points about the experiment include:</p> <ul style="list-style-type: none"> • The cap changes shape because the cell starts to make different proteins • The different proteins are made because the nucleus has come from the cell with the crinkled cap • Therefore the cell's DNA / genes are now coding for proteins that make the cap crinkle <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |
| | <p>8</p> | |

| Question | Answer | Marks | Guidance | | | | | | |
|---|--|--|---|---|--|---|---|---|-------------------------|
| 10 a | <table border="1"> <tr> <td data-bbox="315 296 958 344">It takes a long time for mutations to occur.</td> <td data-bbox="958 296 1016 344"></td> </tr> <tr> <td data-bbox="315 344 958 392">Moving genes between plants is difficult.</td> <td data-bbox="958 344 1016 392"></td> </tr> <tr> <td data-bbox="315 392 958 472">The plants have to be selected over many generations.</td> <td data-bbox="958 392 1016 472">✓</td> </tr> </table> | It takes a long time for mutations to occur. | | Moving genes between plants is difficult. | | The plants have to be selected over many generations. | ✓ | 1 | More than one answer =0 |
| It takes a long time for mutations to occur. | | | | | | | | | |
| Moving genes between plants is difficult. | | | | | | | | | |
| The plants have to be selected over many generations. | ✓ | | | | | | | | |
| b | <p>all clones (1)</p> <p>so are genetically identical / have the same genes (1)</p> | 2 | | | | | | | |
| c | <p>some people may not want to buy / eat GM plants (1)</p> <p>there are concerns about their safety / some people do not think that GM is ethically right (1)</p> | 2 | <p>allow some people are against GM</p> <p>allow some people prefer to buy non-GM</p> <p>allow environmental concerns</p> <p>allow may cause allergies / side effects / be harmful</p> <p>ignore 'playing God'</p> | | | | | | |
| | | 5 | | | | | | | |

| Question | Answer | Marks | Guidance |
|----------|--|-------|---|
| 11 a | DNA is not a protein (1) | 1 | ignore just DNA |
| b | <p>any two from: egg cells do not supply all the chromosomes / genes (1)</p> <p>BUT (sperm and) eggs (each) supply half of the genetic material / genes / chromosomes (2)</p> | 2 | egg cells are larger because they do not need to swim / contain food reserves (1) |
| c | <p>the substrate is like a key (not the enzyme) (1)</p> <p>the substrate fits into the enzyme's active site (not the other way round) (1)</p> | 2 | <p>allow: the enzyme is like a lock (not a key) (1)</p> <p>allow: the enzyme has an active site not the substrate (1)</p> <p>allow: 'enzyme and the substrate are the wrong way round' (2)</p> |
| | | 5 | |

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