

Biology A

General Certificate of Secondary Education

Unit **A163/01**: Module B7 (Foundation Tier)

Mark Scheme for June 2013

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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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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:

| | |
|--|---|
|  | correct response |
|  | incorrect response |
| <input type="text" value="BOD"/> | benefit of doubt |
| <input type="text" value="NBOD"/> | no benefit of doubt |
| <input type="text" value="ECF"/> | error carried forward |
| <input type="text" value="0"/> , <input type="text" value="L1"/> , <input type="text" value="L2"/> , <input type="text" value="L3"/> | indicate level awarded for a question marked by level of response |
| <input type="text" value="A"/> | information omitted |
| <input type="text" value="CON"/> | contradiction |
| <input type="text" value="R"/> | reject |

| | |
|---|---|
|  | indicate uncertainty or ambiguity |
|  | draw attention to particular part of candidate's response |

1. **ADDITIONAL OBJECTS:** You **must** assess and annotate the additional objects for each script you mark. Where credit is awarded, appropriate annotation must be used. If no credit is to be awarded for the additional object, please use annotation as agreed at the SSU.

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:

| | | | | |
|--------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

This would be worth
1 mark.

| | | | | |
|--------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

This would be worth
0 marks.

| | | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

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 | |
| 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 | ✓ | x | ✓ | ✓ | | | | | | ✓ | |
| Paris | | | | ✓ | ✓ | | | ✓ | | ✓ | |
| Southampton | ✓ | x | | ✓ | | ✓ | | ✓ | | ✓ | |
| Score: | 2 | 2 | 1 | 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 |

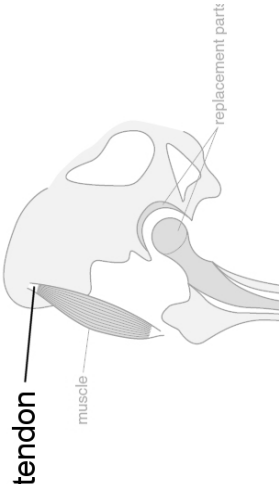
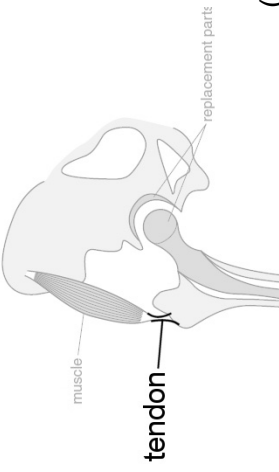
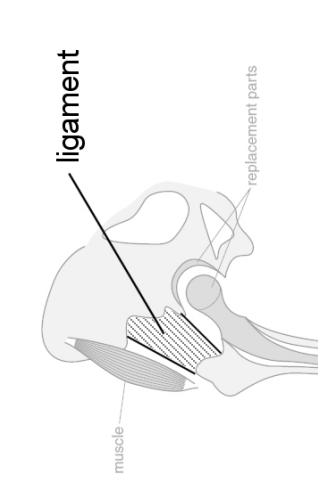
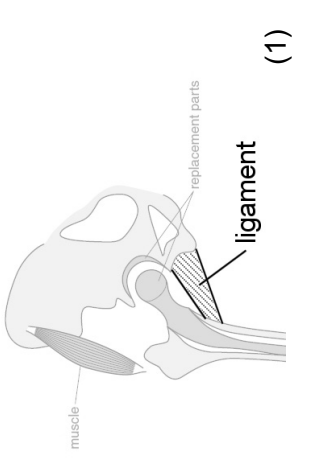
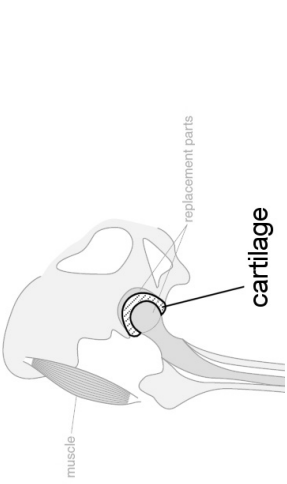
| | |
|-----------------------------------|-----------------------------|
| Just matches the level descriptor | The lower mark in the level |
|-----------------------------------|-----------------------------|

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) | <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>What the muscles do to move a joint.</p> <p>A pair of muscles working in opposite directions.</p> <p>What the skeleton does to keep the body upright.</p> </div> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>antagonistic</p> <p>support</p> <p>contract</p> <p>relax</p> <p>protect</p> </div> </div> | 3 | |

| Question | Answer | Marks | Guidance |
|----------|--|-------|--|
| 1 (b) | <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>tendon</p> <p>muscle</p> <p>replacement parts</p> </div> <div style="width: 45%; text-align: center;"> <p>OR</p>  <p>tendon</p> <p>muscle</p> <p>replacement parts</p> </div> </div> <hr style="border-top: 1px dashed black;"/> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>ligament</p> <p>muscle</p> <p>replacement parts</p> </div> <div style="width: 45%; text-align: center;"> <p>OR</p>  <p>ligament</p> <p>muscle</p> <p>replacement parts</p> </div> </div> <div style="text-align: right; margin-top: 20px;">  <p>cartilage</p> <p>muscle</p> <p>replacement parts</p> </div> | 3 | <p>1 mark for each correct label & drawing in correct position</p> <p>max 1 for 3 correct labels with incomplete drawings</p> |

| Question | Answer | Marks | Guidance |
|-----------------|---|-----------|--|
| 1 (c) (i) | 1 / 0.05 (1) 20 years (1) | 2 | Correct answer scores 2 marks |
| (ii) | any two from: idea it will last his lifetime / longer / won't need replacing as often ; idea that it's reliable / new ceramics don't break / crack ; no safety issue as with metallic ; smooth / less friction | 2 | |
| (iii) | any two from: exercise / how active / named active sport ; body mass / weight ; another relevant problem with the skeleton e.g. osteoporosis | 2 | |
| (iv) | any one from: cause allergic reaction ; damage the bone / socket could crack ; risk of surgery / infection ; come loose | 1 | Question is about the ceramic type reject answers about metal ions entering blood ignore 'it could crack' as it refers to the ceramic ignore ideas about rejection |
| | Total | 13 | |

| Question | Answer | Marks | Guidance |
|----------|--|----------|--|
| 2 (a) | 306 (1) (306 x 2) 612 (1) 49 (1) | 3 | 49 alone scores 3 marks ignore decimal places |
| (b) | poor | 1 | ecf from (a) if value in (a) is between 0 and 200 |
| (c) | any two from: measuring results will vary / inaccurate ; idea that fitness score is in ranges and not a continuous score ; other factors such as BMI / mass / weight / age / (short term) injury | 2 | |
| | Total | 6 | |

| Question | Answer | Marks | Guidance |
|----------|---|----------|---|
| 3 | <p>Level 3 (5–6 marks) Includes some basic and some higher components with an explanation of what they do. Quality of written communication does not impede communication of science at this level.</p> <p>Level 2 (3–4 marks) Include some structural components with an explanation of what they do. Quality of written communication partly impedes communication of science at this level.</p> <p>Level 1 (1–2 marks) Include some basic structural component(s) OR one component explained Quality of written communication impedes communication of science at this level.</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit.</p> | 6 | <p>This question is targeted at grades up to G</p> <p>Indicative scientific points may include:</p> <p>Specific</p> <p>Higher</p> <ul style="list-style-type: none"> • hormones – chemical messengers • glucose – for respiration • carbon dioxide – from respiration • urea – waste • plasma (explained) carries substances <p>Basic</p> <ul style="list-style-type: none"> • red blood cells – haemoglobin – transport oxygen • white blood cells – destroy micro-organisms • platelets – clot blood • plasma (identified) – liquid part of blood <p>General</p> <ul style="list-style-type: none"> • Level 2 and 3 should include an explanation of what the components do. <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p> |
| | Total | 6 | |

| Question | Answer | Marks | Guidance |
|----------|--|----------|--|
| 4 (a) | vena cava ventricle aorta auricle / atrium | 2 | 4 correct = 2 marks 2 or 3 correct = 1 mark |
| (b) | <div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 2px 10px;">lungs</div> <div style="margin: 0 5px;">→</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px 10px;">rest of body</div> <div style="margin: 0 5px;">←</div> </div> </div> | 1 | both boxes correct for mark |
| (c) | valve (1) stops back flow of blood / blood flows in one direction (1) | 2 | accept (stops blood) backtracking / wrong direction |
| | Total | 5 | |

| Question | Answer | Marks | Guidance |
|----------|---|----------|---|
| 5 | <p>Level 3 (5–6 marks) Includes detailed explanation of both heating and cooling, OR homeostasis and correct difference(s) from aquatic mammal. Quality of written communication does not impede communication of science at this level.</p> <p>Level 2 (3–4 marks) Includes explanation of either heating or cooling and correct difference(s) from aquatic mammal OR explanation of heating AND cooling OR Homeostasis but no correct differences with aquatic mammal Quality of written communication partly impedes communication of science at this level.</p> <p>Level 1 (1–2 marks) Includes limited explanation of either heating OR cooling Quality of written communication impedes communication of science at this level.</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit.</p> | 6 | <p>This question is targeted at grades up to C</p> <p>Relevant points include:</p> <p>General</p> <ul style="list-style-type: none"> should include too hot, too cold and how aquatic mammals may differ <p>Specific</p> <p>Homeostasis</p> <ul style="list-style-type: none"> hypothalamus / receptors / effectors <p>Too hot</p> <ul style="list-style-type: none"> vasodilation / blood flow near surface of skin increases more heat radiated away sweating heat lost by evaporation / latent heat <p>Too cold</p> <ul style="list-style-type: none"> vasoconstriction / blood flow near surface of skin decreases heat stored in body core / less heat radiated away shivering / increased respiration rate generates heat <p>Differences</p> <ul style="list-style-type: none"> e.g. aquatic mammal lives in water so sweat will not work / has (thick) fur / hair / waterproof <p>do not look for layer of fat / blubber as this is not on the specification.</p> <p>Use the L 1, L2, L3 annotations in Scoris; do not use ticks.</p> |
| 6 | (a) (i) | 6 | |
| | Total | 6 | |
| | | 2 | read whole answer, as factor and outcome may |

| Question | Answer | Marks | Guidance | | | | | | | | | | |
|--|---|--|--|---|--|--|---|---|--|---|---|---|---|
| | factor = carbon (dioxide) level (increases) (1) outcome = rate of photosynthesis increases (1) | | be on same line but must be clear which is the factor and which is the outcome | | | | | | | | | | |
| (ii) | (carbon dioxide levels are increasing) because combustion / burning fuels / waste from human system (so not closed loop) | 1 | | | | | | | | | | | |
| (iii) | <table border="1" data-bbox="502 981 794 1872"> <tr> <td>plants release oxygen and animals release carbon dioxide.</td> <td></td> </tr> <tr> <td>deforestation reduces the amount of photosynthesis.</td> <td></td> </tr> <tr> <td>photosynthesis stops during winter months.</td> <td>✓</td> </tr> <tr> <td>animals cannot photosynthesise.</td> <td></td> </tr> <tr> <td>the amount of carbon dioxide in the air is much larger than the amount used in photosynthesis.</td> <td>✓</td> </tr> </table> | plants release oxygen and animals release carbon dioxide. | | deforestation reduces the amount of photosynthesis. | | photosynthesis stops during winter months. | ✓ | animals cannot photosynthesise. | | the amount of carbon dioxide in the air is much larger than the amount used in photosynthesis. | ✓ | 2 | three ticks = 1 mark max. four or more ticks = 0 marks |
| plants release oxygen and animals release carbon dioxide. | | | | | | | | | | | | | |
| deforestation reduces the amount of photosynthesis. | | | | | | | | | | | | | |
| photosynthesis stops during winter months. | ✓ | | | | | | | | | | | | |
| animals cannot photosynthesise. | | | | | | | | | | | | | |
| the amount of carbon dioxide in the air is much larger than the amount used in photosynthesis. | ✓ | | | | | | | | | | | | |
| (b) (i) | A | 1 | | | | | | | | | | | |
| (ii) | <table border="1" data-bbox="943 981 1299 1872"> <tr> <td>there is no waste because the output from one part of the system becomes the input for another part of the system.</td> <td>✓</td> </tr> <tr> <td>the waste output is always greater than the input.</td> <td></td> </tr> <tr> <td>there is no waste because the output from one part of the system is less than the input to another part of the system.</td> <td></td> </tr> <tr> <td>the waste output is always less than the input.</td> <td></td> </tr> <tr> <td>there is no waste because output from one part of the system is greater than the input to another part of the system.</td> <td></td> </tr> </table> | there is no waste because the output from one part of the system becomes the input for another part of the system. | ✓ | the waste output is always greater than the input. | | there is no waste because the output from one part of the system is less than the input to another part of the system. | | the waste output is always less than the input. | | there is no waste because output from one part of the system is greater than the input to another part of the system. | | 1 | two or more ticks = 0 marks |
| there is no waste because the output from one part of the system becomes the input for another part of the system. | ✓ | | | | | | | | | | | | |
| the waste output is always greater than the input. | | | | | | | | | | | | | |
| there is no waste because the output from one part of the system is less than the input to another part of the system. | | | | | | | | | | | | | |
| the waste output is always less than the input. | | | | | | | | | | | | | |
| there is no waste because output from one part of the system is greater than the input to another part of the system. | | | | | | | | | | | | | |

| Question | Answer | Marks | Guidance | | | | | | | | | | | | | | |
|--|---|-----------------------|----------|----------------------|--|--------------------------|---|----------------------------------|--|----------------------|--|--|--|----------------------------------|---|---|---|
| (c) | <table border="1" data-bbox="229 1223 612 1868"> <tbody> <tr> <td data-bbox="229 1301 284 1868">prevents soil erosion</td> <td data-bbox="229 1223 284 1301">✓</td> </tr> <tr> <td data-bbox="284 1301 338 1868">reduces productivity</td> <td data-bbox="284 1223 338 1301"></td> </tr> <tr> <td data-bbox="338 1301 392 1868">promotes cloud formation</td> <td data-bbox="338 1223 392 1301">✓</td> </tr> <tr> <td data-bbox="392 1301 446 1868">produces large numbers of fruits</td> <td data-bbox="392 1223 446 1301"></td> </tr> <tr> <td data-bbox="446 1301 501 1868">produces new species</td> <td data-bbox="446 1223 501 1301"></td> </tr> <tr> <td data-bbox="501 1301 555 1868">only photosynthesises during the daytime</td> <td data-bbox="501 1223 555 1301"></td> </tr> <tr> <td data-bbox="555 1301 612 1868">prevents extremes of temperature</td> <td data-bbox="555 1223 612 1301">✓</td> </tr> </tbody> </table> | prevents soil erosion | ✓ | reduces productivity | | promotes cloud formation | ✓ | produces large numbers of fruits | | produces new species | | only photosynthesises during the daytime | | prevents extremes of temperature | ✓ | 2 | 3 correct = 2 marks 2 correct = 1 mark four ticks = 1 mark max. five or more ticks = 0 marks |
| prevents soil erosion | ✓ | | | | | | | | | | | | | | | | |
| reduces productivity | | | | | | | | | | | | | | | | | |
| promotes cloud formation | ✓ | | | | | | | | | | | | | | | | |
| produces large numbers of fruits | | | | | | | | | | | | | | | | | |
| produces new species | | | | | | | | | | | | | | | | | |
| only photosynthesises during the daytime | | | | | | | | | | | | | | | | | |
| prevents extremes of temperature | ✓ | | | | | | | | | | | | | | | | |
| | Total | 9 | | | | | | | | | | | | | | | |

| Question | Answer | Marks | Guidance |
|----------|--|----------|---|
| 7 | <p>[Level 3] Includes reference to getting the gene AND transferring the gene AND expressing the gene. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Includes reference to getting the gene AND transferring the gene OR getting the gene AND expressing the gene. OR transferring the gene AND expressing the gene. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Includes reference to getting the gene OR transferring the gene OR expressing the gene. 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 D to C</p> <p>Indicative scientific points may include:</p> <p>Getting the gene</p> <ul style="list-style-type: none"> • identify gene • isolate gene • replicate gene <p>Transferring the gene</p> <ul style="list-style-type: none"> • put gene into vector • example of vector eg virus / aerosol / plasmid / phage • explanation of how insertion occurs <p>Expressing the gene</p> <ul style="list-style-type: none"> • idea that DNA is common in all organisms <p><i>in humans</i></p> <ul style="list-style-type: none"> • transferred gene makes Factor 8 <p><i>in bacteria</i></p> <ul style="list-style-type: none"> • transferred gene makes Factor 8 • bacteria reproduce • isolate / purify Factor 8 / give people Factor 8 <p>If they inject bacteria into human, then max L2</p> <p>Use the L1, L2, L3 annotations in Scorisc; do not use ticks.</p> |
| | Total | 6 | |

| Question | Answer | Marks | Guidance |
|----------|--|-----------|--|
| 8 (a) | 2 before 3; 3 before 1; 1 before 6; 6 before 5 | 2 | 2 or 3 steps correct for 1 mark 4 steps correct for 2 marks (Correct order 23165) |
| (b) | 0.001 0.000 001 (0.000 000 001) 0.000 000 000 001 0.000 000 000 000 001 | 1 | |
| (c) | virus is 1000 nm (in diameter) (1) therefore need <u>electron microscope</u> (1) | 2 | accept less than 2000nm ignore "need to use a more powerful microscope" |
| (d) | (i) not enough is known about nanoparticles (1) (10% are) released when socks are washed / into washing water (1) | 2 | ignore "may not be completely safe" |
| | (ii) make them so none / less are released when washed | 1 | |
| (e) | idea that 101nm may be just as dangerous as 99nm | 1 | ignore use less nanoparticles |
| | Total | 9 | |
| | Paper Total | 60 | |

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

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