



Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in  
Biology (5BI2F/01)  
Unit 2: The Components of Life

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be **prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.**
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark **scheme to a candidate's response, the team leader must be consulted.**
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- 

## Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Acceptable answers	Mark
<b>1(a)</b>	soluble (1) amino (1)	Must be in the correct order	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(i)</b>	37 (-) 8 (1) 29	Award 2 marks for correct answer	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(ii)</b>	C small intestine		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(c)</b>	moves food (along the digestive tract)	pushes /squeezes/transport  Ignore 'digests food' or 'breaks down food'	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(d)</b>	A description linking two of the following: <ul style="list-style-type: none"> <li>• absorbed/diffuse (1)</li> <li>• into blood/plasma (1)</li> <li>• into capillaries (1)</li> <li>• in veins (to the heart)(1)</li> </ul>	accept through villi	<b>(2)</b>

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
<b>2(a)</b>	<p>A description including two of the following:</p> <ul style="list-style-type: none"> <li>• (produces) genetically identical cells (1)</li> <li>• (produces) diploid cells (1)</li> <li>• one (cell) division (1)</li> <li>• two cells produced (1)</li> </ul>	full/same number of chromosomes (as parent cell)	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)</b>	<p>Indication of doubling e.g. 1, 2, 4, 8, 16 (1)</p> <p>4 (days)</p>	Award 2 marks for correct answer	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(c)</b>	<p>A description including one advantage and one disadvantage:</p> <p>Advantages:</p> <ul style="list-style-type: none"> <li>• conservation of endangered species (1)</li> <li>• to provide food/named desirable feature (1)</li> <li>• providing organs for transplant/medical research (1)</li> </ul> <p>Disadvantages:</p> <ul style="list-style-type: none"> <li>• shorter life-span</li> <li>• health issues e.g. breathing difficulties/arthritis</li> <li>• reduction in gene pool</li> </ul>	<p>prevent extinction</p> <p>Allow expensive if justified</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(d)</b>	gametes (1) four (1)	accept '4'  Must be in the correct order	<b>(2)</b>

Total for Question 2 = 8 marks

Question Number	Answer	Acceptable answers	Mark
<b>3(a)</b>	<p>An explanation linking two of the following</p> <ul style="list-style-type: none"> <li>• more oxygen needed/idea of greater oxygen demand (1)</li> <li>• for aerobic respiration (1)</li> <li>• by muscles (1)</li> <li>• more energy needed/idea of greater energy demand (1)</li> </ul>		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(i)</b>	<ul style="list-style-type: none"> <li>• (overall) increases as walking speed increases (1)</li> <li>• correct reference to data from graph (1)</li> </ul>	you need more oxygen when walking faster	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)(ii)</b>	<p>An explanation linking two of the following points</p> <ul style="list-style-type: none"> <li>• sufficient blood flow (1)</li> <li>• enough oxygen (is reaching muscles) (1)</li> <li>• (so) no / little anaerobic respiration occurs (1)</li> <li>• no / little lactic acid (1)</li> </ul>	<p>energy demand met</p> <p>they are respiring aerobically</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)</b>	carbon dioxide	<p>Accept CO<sub>2</sub></p> <p>Reject CO<sup>2</sup></p>	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(d)</b>	<b>B</b> diffusion		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(e)</b>	<b>B</b> – the heart rate per minute		<b>(1)</b>

Total for question 3 = 10 marks

Question Number	Answer	Acceptable answers	Mark
<b>4(a)</b>	An explanation linking the following points <ul style="list-style-type: none"> <li>plants need light (1)</li> <li>for photosynthesis (1)</li> </ul>		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(i)</b>	A description including the following: <ul style="list-style-type: none"> <li>add the height of each plant together (1)</li> <li>divide by the number of plants/10 (1)</li> </ul>		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(ii)</b>	1.9		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(iii)</b>	<b>A</b> were in a warmer environment		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(i)</b>	root hair (cell)		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)(ii)</b>	A description including three of the following: <ul style="list-style-type: none"> <li>(mineral ions) pumped (1)</li> <li>using energy (1)</li> <li>move up/against their concentration gradient (1)</li> <li>across a (partially permeable) membrane (1)</li> </ul>	low concentration to a high concentration	<b>(3)</b>

Total for question 4 = 10 marks



Question Number	Answer	Acceptable answers	Mark
<b>5(a)</b>	<b>B</b> X-ray crystallography		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b)</b>	<ul style="list-style-type: none"><li>• two strands(1)</li><li>• twisted/coiled/spiral/wound around (each other) (1)</li><li>• held together by (weak) hydrogen bonds (1)</li></ul>		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(c)</b>	A line drawn to the edge or inside the nucleus.		<b>(1)</b>

Question Number	Indicative Content	Mark																
<b>QWC</b>	<p><b>*5(d)</b></p> <p>A description to include some of the following points</p> <table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left; width: 50%;"><u>Structure</u></th> <th style="text-align: left; width: 50%;"><u>Role</u></th> </tr> </thead> <tbody> <tr> <td>cell wall</td> <td> <ul style="list-style-type: none"> <li>• provides strength</li> <li>• gives the cell shape/structure</li> <li>• support for plant</li> <li>• acts as a barrier (to pathogens)</li> </ul> </td> </tr> <tr> <td>cell membrane</td> <td> <ul style="list-style-type: none"> <li>• is partially permeable</li> <li>• allows substances/named substances to pass in and out of the cell</li> </ul> </td> </tr> <tr> <td>cytoplasm</td> <td> <ul style="list-style-type: none"> <li>• where chemical reactions take place</li> </ul> </td> </tr> <tr> <td>chloroplasts</td> <td> <ul style="list-style-type: none"> <li>• site for photosynthesis</li> <li>• absorb light</li> <li>• produce sugar/glucose</li> </ul> </td> </tr> <tr> <td>vacuole</td> <td> <ul style="list-style-type: none"> <li>• stores mineral ions/nutrients</li> <li>• contains/absorbs water for cell support</li> </ul> </td> </tr> <tr> <td>nucleus</td> <td> <ul style="list-style-type: none"> <li>• contains genetic information / chromosomes / DNA</li> <li>• gives instructions to cell/controls cell activities</li> </ul> </td> </tr> <tr> <td>mitochondria</td> <td> <ul style="list-style-type: none"> <li>• (cellular/aerobic) respiration</li> <li>• releases energy</li> </ul> </td> </tr> </tbody> </table>	<u>Structure</u>	<u>Role</u>	cell wall	<ul style="list-style-type: none"> <li>• provides strength</li> <li>• gives the cell shape/structure</li> <li>• support for plant</li> <li>• acts as a barrier (to pathogens)</li> </ul>	cell membrane	<ul style="list-style-type: none"> <li>• is partially permeable</li> <li>• allows substances/named substances to pass in and out of the cell</li> </ul>	cytoplasm	<ul style="list-style-type: none"> <li>• where chemical reactions take place</li> </ul>	chloroplasts	<ul style="list-style-type: none"> <li>• site for photosynthesis</li> <li>• absorb light</li> <li>• produce sugar/glucose</li> </ul>	vacuole	<ul style="list-style-type: none"> <li>• stores mineral ions/nutrients</li> <li>• contains/absorbs water for cell support</li> </ul>	nucleus	<ul style="list-style-type: none"> <li>• contains genetic information / chromosomes / DNA</li> <li>• gives instructions to cell/controls cell activities</li> </ul>	mitochondria	<ul style="list-style-type: none"> <li>• (cellular/aerobic) respiration</li> <li>• releases energy</li> </ul>	<b>(6)</b>
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<b>Level I</b>	<b>0</b>	No rewardable content																
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>• a limited description that includes at least one structure or role</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>																
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>• a simple description that includes details of at least two structures linked to their role</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>																
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>• a detailed description that includes details of at least four structures linked to their role</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>																

Question Number	Answer	Acceptable answers	Mark
<b>5(e)</b>	An explanation linking two of the following <ul style="list-style-type: none"><li>• it contains beta carotene (1)</li><li>• (increased) vitamin A (1)</li><li>• reduces (night) blindness (1)</li></ul>	reduces sight problems	<b>(2)</b>

Total for question 5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
<b>6(a)(i)</b>	any number from 230 to 250 (cm <sup>3</sup> )		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(a)(ii)</b>	300 (÷) 500 (x100) (1) 60 (%)	two marks for correct answer	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(a)(iii)</b>	A suggestion including two of the following: <ul style="list-style-type: none"> <li>• change temperature (to optimum) (1)</li> <li>• change pH (to optimum) (1)</li> <li>• increase the surface area (1)</li> <li>• allow more time (for the reaction) (1)</li> </ul>	crush/press/squeeze /blend  stir (the mixture) (1)	<b>(2)</b>

Question Number	Indicative Content	Mark
<b>QWC</b>	<p><b>*6(b)</b></p> <p>An explanation to include some of the following:</p> <p>Enzymes:</p> <ul style="list-style-type: none"> <li>• are involved in the digestion of food and other reactions</li> <li>• are biological catalysts</li> <li>• catalyse a specific reaction</li> <li>• are proteins</li> <li>• have specific shape*</li> <li>• have an active site*</li> <li>• active site has a complementary shape to substrate*</li> <li>• reference to denaturing</li> </ul> <p>Action of enzymes:</p> <ul style="list-style-type: none"> <li>• enzymes bind to their substrate*</li> <li>• enzyme substrate complex formed*</li> <li>• enzyme and product released*</li> <li>• enzyme reused*</li> </ul> <p>Hypothesis</p> <ul style="list-style-type: none"> <li>• enzyme acts as the lock*</li> <li>• substrate acts as the key*</li> </ul> <p>*annotated diagrams may show indicative content</p>	<b>(6)</b>
<b>Level</b>	<b>0</b>	No rewardable content
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>• a limited explanation that includes at least one piece of information from at least one area</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>• a simple explanation that gives at least one piece of information from two areas or a detailed explanation from one area</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>• a detailed explanation that gives at least two pieces of information from each of the three areas or detailed explanations from two areas</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>

Question Number	Answer	Acceptable answers	Mark
<b>6(c)</b>	<b>C</b> phloem		<b>(1)</b>

Total for question 6 = 12 marks

