

# Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in  
Biology (5BI1H) Paper 01  
Unit B1: Influences on Life

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Summer 2015

Publications Code UG042587

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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.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Mark
<b>1a(i)</b>	9 -10 (%)	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1a(ii)</b>	<p>A suggestion to include two of the following</p> <p>more health awareness (1)</p> <p>more (NHS) support programmes (1)</p> <p>Increased use of nicotine replacement products as an alternative to smoking (1)</p> <p>increases in cost / taxation (1)</p> <p>new laws / smoking outdoors (1)</p> <p>more negative opinions against smokers (1)</p>	<p>accept advertising on cigarette packets for this mp / people know more about the risks / awareness of passive smoking / health campaigns</p> <p>accept reference to other stop smoking aids such as patches, gum, e cigarettes etc</p> <p>accept restrictions in advertising</p> <p>Ignore references to age limits as this has not changed</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1b(i)</b>	<b>D</b> <input checked="" type="checkbox"/> nicotine		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(ii)</b>	<p>A explanation linking two of the following:</p> <p>cigarettes / tobacco / smoke contains tar (1)</p> <p>(tar) is <b>carcinogenic</b> / a <b>carcinogen</b> (1)</p> <p>leads to mutations in DNA (1)</p>	<p>Ignore references to causes cancer / tumours</p> <p>accept: mutations in cells /rapid cell division</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(iii)</b>	<p>A explanation linking two of the following points:</p> <p>cigarette smoke contains carbon monoxide / carbon monoxide attaches to {red blood cells / haemoglobin}(1)</p> <p>which reduces the oxygen carrying capacity of {red blood cells/haemoglobin} (1)</p> <p>less oxygen to the muscles /reduced respiration in muscles / reduced muscle contraction (1)</p> <p><b>OR</b></p> <p>tar reduces the surface area of the lungs (1)</p> <p>so decreased gas exchange / less oxygen absorbed into the bloodstream (1)</p> <p>less oxygen to the muscles /reduced respiration in muscles / reduced muscle contraction (1)</p>	<p>Accept {red blood cells / haemoglobin} carry less oxygen / forms carboxyhaemoglobin</p> <p>Accept: smoke particles for tar</p> <p>accept causing emphysema (1)</p>	<b>(2)</b>

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
<b>2(a)(i)</b>	<p>A description including <b>two</b> of the following:</p> <p>as pH decreases so do the number of species in the lake (1)</p> <p>all the organisms /species in the lake are found at 6.0/6.5 (1)</p> <p>comment on specific reading from the graph e.g. (only) {frogs / 1 organism} remain at lowest pH. eq. (1)</p>	<p>accept: the more acidic the lake is the lower the number of species {more species / types of organisms} live in more neutral conditions /less organisms live where {low pH /more acidic}</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(a)(ii)</b>	<b>D</b> <input checked="" type="checkbox"/> sulfur dioxide		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)</b>	<p>An explanation linking <b>three</b> of the following:</p> <p>eutrophication (1)</p> <p>causes an algal bloom (1)</p> <p>plants {at the bottom of the lake / underneath the algae} cannot get light to photosynthesise (1)</p> <p>plants at the bottom of the lake die and microorganisms break them down (1)</p> <p>microorganisms respire removing oxygen from the water (1)</p> <p>reduction in biodiversity (1)</p>	<p>accept: <b>increased</b> growth of algae</p> <p>accept: decomposers for microorganisms</p> <p>Ignore references to fish suffocating / dying this is insufficient for this marking point</p>	<b>(3)</b>

Question Number	Answer	Mark						
Q02c	<table border="1"> <thead> <tr> <th data-bbox="300 331 708 371"><b>condition</b></th> <th data-bbox="708 331 1118 371"><b>indicator species</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="300 371 708 763">clean water</td> <td data-bbox="708 371 1118 763">stonefly (larvae / nymph)/ (freshwater) shrimp / mayfly larvae/nymph/ caddis fly larvae / dragonfly nymph / damselfly nymph / riffle beetle / water penny larvae /</td> </tr> <tr> <td data-bbox="300 763 708 1155">polluted water</td> <td data-bbox="708 763 1118 1155">bloodworm / sludgeworm / algae / rat tailed maggot / water louse/ leeches/ planarian worms / aquatic worms /</td> </tr> </tbody> </table>	<b>condition</b>	<b>indicator species</b>	clean water	stonefly (larvae / nymph)/ (freshwater) shrimp / mayfly larvae/nymph/ caddis fly larvae / dragonfly nymph / damselfly nymph / riffle beetle / water penny larvae /	polluted water	bloodworm / sludgeworm / algae / rat tailed maggot / water louse/ leeches/ planarian worms / aquatic worms /	(1)
	<b>condition</b>	<b>indicator species</b>						
	clean water	stonefly (larvae / nymph)/ (freshwater) shrimp / mayfly larvae/nymph/ caddis fly larvae / dragonfly nymph / damselfly nymph / riffle beetle / water penny larvae /						
polluted water	bloodworm / sludgeworm / algae / rat tailed maggot / water louse/ leeches/ planarian worms / aquatic worms /							
(1)								
<p>Ignore general references to organisms such as frogs / snails/ squid the answers need to be specific indicator species.</p> <p>If unsure of an organism then please put into review</p>								

Total for Question 2 = 8 marks



Question Number	Answer	Mark
Q03ai	structure A – dendron / dendrite  structure B – nucleus  answers must be in the correct order	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(ii)</b>	<b>B</b> <input checked="" type="checkbox"/> electrical impulses		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(iii)</b>	A description to include:  <b>insulates</b> the (electrical) impulse / <b>insulates</b> the {axon / neurone} (from surrounding tissue) (1)  allows quicker (electrical) conductance (1)	  accept: speeds up transmission / sends {impulses / signals} faster  ignore references to protection of the axon  ignore reference to messages	<b>(2)</b>

Question Number	Answer	Mark
Q03aiv	synapse(s) / synaptic cleft / synaptic gap	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)</b>	<p>A description linking four of the following</p> <p>{receptor} detects a stimulus (1)</p> <p>sensory neurone passes (impulse) to {relay neurone / spinal cord / CNS} (1)</p> <p>relay neurone in spinal cord /CNS (1)</p> <p>relay neurone passes (impulse) onto motor neurone (1)</p> <p>motor neurone passes (impulse) to {effector / muscle /gland} (1)</p> <p>{effector / muscle /gland} initiates response (1)</p>	<p>accept sensory neurone to motor neurone for 1 mark</p>	<b>(4)</b>

Total for question 3 = 10 marks

Question Number	Answer	Acceptable answers	Mark
<b>4a(i)</b>	answers must be in this order.  dominant  HH		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark									
<b>4a(ii)</b>	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>H</td> <td>h</td> </tr> <tr> <td>H</td> <td>HH</td> <td>Hh</td> </tr> <tr> <td>h</td> <td>Hh</td> <td>hh</td> </tr> </table>		H	h	H	HH	Hh	h	Hh	hh	<p>1 mark for correct gametes 1 mark for correct offspring</p> <p>If incorrect gametes allow 1 mark for correct Punnett square based on selected gametes</p>	<b>(2)</b>
	H	h										
H	HH	Hh										
h	Hh	hh										

Question Number	Answer	Acceptable answers	Mark
<b>4a(iii)</b>	75% / $\frac{3}{4}$ / 0.75	<p>accept error carried forward from their Punnett square</p> <p><b>accept:</b> 3 : 1</p>	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4b(i)</b>	<p>An explanation linking <b>two</b> of the following:</p> <p>Huntington's disease is caused by a dominant <u>allele</u> / CF is caused by a recessive <u>allele</u> (1)</p> <p>only one allele for Huntington's disease needs to be inherited to have the disease / would have the disease if heterozygous (or homozygous dominant)(1)</p> <p>two alleles (recessive) need to be inherited to have CF / be homozygous recessive for CF (1)</p>	<p>Ignore refs to gene for allele against this marking point</p> <p>Ignore refs to gene for allele against this marking point</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4b(ii)</b>	<b>A</b> ☒ mucus		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4b(iii)</b>	An explanation linking <b>two</b> of the following:  (thick / sticky / more) mucus (1)  builds up in the tubes (of the reproductive system) (1)  (the mucus) blocks the flow of sperm (1)	<b>Reject: mucus in lungs/intestine</b>  accept sperm duct / vas deferens	<b>(2)</b>

Total for question 4 = 10 marks

Question Number	Answer	Acceptable answers	Mark
<b>5a(i)</b>	<b>A</b> <input checked="" type="checkbox"/> autotrophically		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5a(ii)</b>	$7\,760 / 97\,000 = 0.08$ (1) $0.08 \times 100 = 8.00$ (1) $100 - 8.00 = 92.00$ (%) OR $97000 - 7760 = 89240$ (1) $89240/97000 = 0.92$ (1) $\times 100 = 92$ (%)	<b>Award 3 marks for correct bald answer</b>  <b>Accept alternate method of calculation</b>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5a(iii)</b>	Any two of the following: not all of the organisms are consumed (1) indigestible / <b>egestion</b> (1) <b>excretion</b> (1) movement (1) heat / respiration (1) reproduction (1)	hunting / flying	<b>(2)</b>

Question Number	Indicative Content	Mark
<b>QWC</b>	<p><b>*5(b)</b> An explanation to include some of the following points</p> <ul style="list-style-type: none"> <li>• mutualism involves organisms living closely with each other</li> <li>• both organisms benefit</li> </ul> <p>oxpeckers</p> <ul style="list-style-type: none"> <li>• relationship with large herbivores in Africa</li> <li>• oxpecker feeds off of the parasitic insects that live on the herbivore</li> <li>• disease reduced in herbivores from parasitic insect removal</li> </ul> <p>cleaner fish</p> <ul style="list-style-type: none"> <li>• relationship with ocean species such as sharks and large fish</li> <li>• cleaner fish eats the dead skin and parasites on the large fish or sharks</li> <li>• large fish / sharks have disease reduced by removal of parasites</li> </ul> <p>nitrogen fixing bacteria</p> <ul style="list-style-type: none"> <li>• relationship with leguminous plants such as beans</li> <li>• bacteria live inside root nodules</li> <li>• bacteria fix nitrogen for the plant to use</li> <li>• bacteria obtain nutrition from the plant and are protected from the environment</li> </ul> <p>chemosynthetic bacteria</p> <ul style="list-style-type: none"> <li>• relationship tubeworms in deep sea vents</li> <li>• lack of light so no photosynthesis</li> <li>• tubeworm gathers chemical substances needed by the bacteria for chemosynthesis / provide protection from heat</li> <li>• bacteria produce chemicals for the tubeworm</li> </ul>	<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 of at least one example of mutualism or definition of mutualism</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 of at least two examples of mutualism or a detailed explanation of one</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 of at least three examples of mutualism including nitrogen fixing bacteria or chemosynthetic bacteria</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>

Total for question 5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
<b>6a(i)</b>	<b>C</b> <input checked="" type="checkbox"/> hypothalamus		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(a)(ii)</b>	<p>An explanation linking <b>four</b> of the following:</p> <p>vasodilation occurs when the body is hot (1)</p> <p>blood vessels near the surface of the skin widen / the blood vessels increase the amount of blood flow near the surface of the skin (1)</p> <p>vasoconstriction occurs when the body is cold (1)</p> <p>blood vessels near the surface narrow /the blood vessels reduce the blood flow near the surface of the skin (1)</p>	<p>accept: description of shunt valve (1)</p>	<b>(4)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(b)</b>	osmoregulation		<b>(1)</b>

Question Number	Indicative Content	Mark
<b>QWC</b>	<b>*6(c)</b>	<b>(6)</b>
	<p>An explanation to include some of the following points:</p> <p>lowering blood glucose concentrations</p> <ul style="list-style-type: none"> <li>• insulin is released</li> <li>• from the pancreas</li> <li>• into the bloodstream</li> <li>• causing glucose to be converted to glycogen</li> <li>• stored in the liver / muscle tissue</li> <li>• blood glucose concentrations are lowered</li> </ul> <p>raising blood glucose concentrations</p> <ul style="list-style-type: none"> <li>• glucagon is released</li> <li>• from the pancreas</li> <li>• into the bloodstream</li> <li>• causing glycogen to be converted to glucose</li> <li>• glucose released into the bloodstream</li> <li>• blood glucose concentrations are raised</li> </ul>	
<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 of either lowering or raising glucose concentrations in the blood</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 of both lowering and raising glucose concentrations in the blood or a detailed explanation of one of them</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 of both raising and lowering blood glucose concentrations including the role of the hormones and the role of glycogen.</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>

Total for question 6 – 12 marks



