

Mark Scheme (Results)

Summer 2015

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

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2015

Publications Code UG042587

All the material in this publication is copyright

© Pearson Education Ltd 2015

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
1a(i)	9 -10 (%)	(1)

Question Number	Answer	Acceptable answers	Mark
1a(ii)	<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>	(2)

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

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	<p>A explanation linking two of the following:</p> <p>cigarettes / tobacco / smoke contains tar (1)</p> <p>(tar) is carcinogenic / a carcinogen (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>	(2)

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	<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>OR</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>	(2)

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	<p>A description including two 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>	(2)

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

Question Number	Answer	Acceptable answers	Mark
2(b)	<p>An explanation linking three 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: increased 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>	(3)

Question Number	Answer	Mark						
Q02c	<table border="1"> <thead> <tr> <th data-bbox="300 331 708 371">condition</th> <th data-bbox="708 331 1117 371">indicator species</th> </tr> </thead> <tbody> <tr> <td data-bbox="300 371 708 763">clean water</td> <td data-bbox="708 371 1117 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 1117 1155">bloodworm / sludgeworm / algae / rat tailed maggot / water louse/ leeches/ planarian worms / aquatic worms /</td> </tr> </tbody> </table>	condition	indicator species	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)
	condition	indicator species						
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 /							
<p data-bbox="300 1196 1225 1267">Ignore general references to organisms such as frogs / snails/ squid the answers need to be specific indicator species.</p> <p data-bbox="300 1339 1082 1375">If unsure of an organism then please put into review</p>	(1)							

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	(2)

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

Question Number	Answer	Acceptable answers	Mark
3(a)(iii)	A description to include: insulates the (electrical) impulse / insulates 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	(2)

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

Question Number	Answer	Acceptable answers	Mark
3(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>	(4)

Total for question 3 = 10 marks

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

Question Number	Answer	Acceptable answers	Mark									
4a(ii)	<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>	(2)
	H	h										
H	HH	Hh										
h	Hh	hh										

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

Question Number	Answer	Acceptable answers	Mark
4b(i)	<p>An explanation linking two 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>	(2)

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

Question Number	Answer	Acceptable answers	Mark
4b(iii)	An explanation linking two 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)	Reject: mucus in lungs/intestine accept sperm duct / vas deferens	(2)

Total for question 4 = 10 marks

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

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

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

Question Number	Indicative Content	Mark
QWC	<p>*5(b) An explanation to include some of the following points</p> <ul style="list-style-type: none"> • mutualism involves organisms living closely with each other • both organisms benefit <p>oxpeckers</p> <ul style="list-style-type: none"> • relationship with large herbivores in Africa • oxpecker feeds off of the parasitic insects that live on the herbivore • disease reduced in herbivores from parasitic insect removal <p>cleaner fish</p> <ul style="list-style-type: none"> • relationship with ocean species such as sharks and large fish • cleaner fish eats the dead skin and parasites on the large fish or sharks • large fish / sharks have disease reduced by removal of parasites <p>nitrogen fixing bacteria</p> <ul style="list-style-type: none"> • relationship with leguminous plants such as beans • bacteria live inside root nodules • bacteria fix nitrogen for the plant to use • bacteria obtain nutrition from the plant and are protected from the environment <p>chemosynthetic bacteria</p> <ul style="list-style-type: none"> • relationship tubeworms in deep sea vents • lack of light so no photosynthesis • tubeworm gathers chemical substances needed by the bacteria for chemosynthesis / provide protection from heat • bacteria produce chemicals for the tubeworm 	(6)
Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited explanation of at least one example of mutualism or definition of mutualism • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> • a simple explanation of at least two examples of mutualism or a detailed explanation of one • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> • a detailed explanation of at least three examples of mutualism including nitrogen fixing bacteria or chemosynthetic bacteria • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Total for question 5 = 12 marks

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

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	<p>An explanation linking four 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>	(4)

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

Question Number	Indicative Content	Mark
QWC	*6(c)	(6)
	<p>An explanation to include some of the following points:</p> <p>lowering blood glucose concentrations</p> <ul style="list-style-type: none"> • insulin is released • from the pancreas • into the bloodstream • causing glucose to be converted to glycogen • stored in the liver / muscle tissue • blood glucose concentrations are lowered <p>raising blood glucose concentrations</p> <ul style="list-style-type: none"> • glucagon is released • from the pancreas • into the bloodstream • causing glycogen to be converted to glucose • glucose released into the bloodstream • blood glucose concentrations are raised 	
Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited explanation of either lowering or raising glucose concentrations in the blood • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> • a simple explanation of both lowering and raising glucose concentrations in the blood or a detailed explanation of one of them • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> • a detailed explanation of both raising and lowering blood glucose concentrations including the role of the hormones and the role of glycogen. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Total for question 6 – 12 marks

