

Mark Scheme (Results)

Summer 2015

Pearson Edexcel International GCSE
in Biology (4BI0) Paper 2BR

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 UG040909

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.
- 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.

Question number	Answer	Notes	Marks								
1(a)	1. amylase; 2. digests starch / breaks down starch; 3. maltose; 4. lubricates / moisten / soften food / eq;	Mp 3 allow glucose Mp 4 ignore makes it easier to swallow	2 max								
(b)	<table border="1" data-bbox="407 694 1393 1054"> <thead> <tr> <th data-bbox="407 694 900 762">Sense organ</th> <th data-bbox="900 694 1393 762">Stimulus</th> </tr> </thead> <tbody> <tr> <td data-bbox="407 762 900 873">eye</td> <td data-bbox="900 762 1393 873">sight (of food / sight of lab attendant / eq);</td> </tr> <tr> <td data-bbox="407 873 900 983">ear</td> <td data-bbox="900 873 1393 983">sound (of food arriving / sound of lab attendant / tuning fork / eq);</td> </tr> <tr> <td data-bbox="407 983 900 1054">nose</td> <td data-bbox="900 983 1393 1054">smell (of food / eq);</td> </tr> </tbody> </table>	Sense organ	Stimulus	eye	sight (of food / sight of lab attendant / eq);	ear	sound (of food arriving / sound of lab attendant / tuning fork / eq);	nose	smell (of food / eq);		2 max
Sense organ	Stimulus										
eye	sight (of food / sight of lab attendant / eq);										
ear	sound (of food arriving / sound of lab attendant / tuning fork / eq);										
nose	smell (of food / eq);										

(c)	<p>1. fast(er) / quick / rapid / immediate / eq;</p> <p>2. involuntary / unconscious / without thinking / automatic / does not involve brain/ eq;</p> <p>3. instinctive / inherited / inborn / innate / not learnt;</p> <p>4. protects the body from damage / eq;</p>		2 max
(d) (i)	<p>closer to B / similar to B / closer to original stimulus / eq;</p>	Ignore cannot hear E and F	1
(d) (ii)	<p>1. measure <u>volume</u> / <u>mass</u> / <u>weight</u> of saliva;</p> <p>2. measuring cylinder / suitable scaled container / scales / syringe / eq;</p>	<p>Ignore reference to time</p> <p>Allow idea of cotton wool being weighed by scales</p>	2 max
(e)	<p>1. different behaviours / different responses / respond to different stimuli / eq;</p> <p>2. different nervous systems / brains / eq;</p>	<p>Mp 1 Allow different hearing ability / different sensitivity</p> <p>Mp 2 Ignore different intelligence</p>	2 max

(f)	1. receptors; 2. impulse / signal; 3. sensory neurone; 4. to spinal cord / grey matter / CNS; 5. synapse; 6. relay neurone / intermediate neurone / interneurone ; 7. motor neurone; 8. muscle / effector;	Mp 2 ignore message	5 max
-----	---	---------------------	-------

Total 16 marks

Question number	Answer	Notes	Marks
2(a)	1. protects fetus; 2. cushions / shock absorber / supports / eq;		2
(b)(i)	1. oxygen; 2. glucose; 3. amino acids; 4. vitamins / named vitamins; 5. minerals / named mineral / ions / salts; 6. antibodies; 7 water;	Mineral ions and proteins on same line = 0 Minerals and proteins on different lines = 1 Mp 5 ignore nutrients / food	2 max
(ii)	1. carbon dioxide; 2. urea;	Mp 2 ignore urine	2
(c)	1. <u>villi</u> ; 2. large surface area; 3. blood supply / capillaries; 4. concentration gradient; 5. short distance / thin walled / eq;	blood vessels close to each other get Mp 3 and Mp 5	3 max

Total 9 marks

Question number	Answer						Notes	Marks																		
3(a)	<table border="1"> <thead> <tr> <th data-bbox="322 387 481 539">Food product</th> <th data-bbox="481 387 757 539">Genus of organism used</th> <th data-bbox="757 387 947 539">Group organism belongs to</th> <th data-bbox="947 387 1128 539">Substrate used</th> <th data-bbox="1128 387 1321 539">Type of respiration</th> <th data-bbox="1321 387 1494 539">Chemical product</th> </tr> </thead> <tbody> <tr> <td data-bbox="322 539 481 730">beer / wine / bread / eq;</td> <td data-bbox="481 539 757 730"><i>Saccharomyces</i></td> <td data-bbox="757 539 947 730">fungus</td> <td data-bbox="947 539 1128 730">glucose</td> <td data-bbox="1128 539 1321 730">anaerobic</td> <td data-bbox="1321 539 1494 730">ethanol</td> </tr> <tr> <td data-bbox="322 730 481 882">yoghurt</td> <td data-bbox="481 730 757 882"><i>Lactobacillus</i> / <i>Streptococcus</i>;</td> <td data-bbox="757 730 947 882">bacteria</td> <td data-bbox="947 730 1128 882">lactose;</td> <td data-bbox="1128 730 1321 882">aerobic</td> <td data-bbox="1321 730 1494 882">lactic acid / lactate;</td> </tr> </tbody> </table>						Food product	Genus of organism used	Group organism belongs to	Substrate used	Type of respiration	Chemical product	beer / wine / bread / eq;	<i>Saccharomyces</i>	fungus	glucose	anaerobic	ethanol	yoghurt	<i>Lactobacillus</i> / <i>Streptococcus</i>;	bacteria	lactose;	aerobic	lactic acid / lactate;	<p>Ignore alcohol as food product</p> <p>Ignore milk as substrate used</p>	5
Food product	Genus of organism used	Group organism belongs to	Substrate used	Type of respiration	Chemical product																					
beer / wine / bread / eq;	<i>Saccharomyces</i>	fungus	glucose	anaerobic	ethanol																					
yoghurt	<i>Lactobacillus</i> / <i>Streptococcus</i>;	bacteria	lactose;	aerobic	lactic acid / lactate;																					
(b)	<ol style="list-style-type: none"> <li data-bbox="322 1029 1494 1070">1. pasteurise / boil / sterilise / heat to high temperature / eq; <li data-bbox="322 1161 1494 1235">2. kill / prevent growth of / remove bacteria / microorganisms / pathogens / eq; 						<p>Mp 1 ignore heat milk alone</p> <p>Mp 2 reject germs</p>	2 max																		

Total 7 marks

Question number	Answer	Notes	Marks
4(a) (i)	mass;		1
(ii)	1. water in; 2. high conc. (of water) to low conc. (of water) / from dilute solution to concentrated solution / eq;	Mp 2 allow correct reference to water potential Ignore osmosis	2
(b) (i)	minus 10;;	One mark for 10 alone	2
(ii)	bar drawn to minus 10 / answer in (i);		1
(c)	1. water (only); 2. membrane;	Ignore reference concentration gradient	1 max

Total 7 marks

Question number	Answer	Notes	Marks								
5(a)	<table border="1" data-bbox="423 296 1408 643"> <thead> <tr> <th data-bbox="423 296 580 435">area</th> <th data-bbox="580 296 1408 435">Increase in biomass in g per m² per year</th> </tr> </thead> <tbody> <tr> <td data-bbox="423 435 580 504">A</td> <td data-bbox="580 435 1408 504">125</td> </tr> <tr> <td data-bbox="423 504 580 572">B</td> <td data-bbox="580 504 1408 572">110</td> </tr> <tr> <td data-bbox="423 572 580 643">C</td> <td data-bbox="580 572 1408 643">?</td> </tr> </tbody> </table> <p data-bbox="423 715 488 746">85;;</p>	area	Increase in biomass in g per m ² per year	A	125	B	110	C	?	<p data-bbox="1435 687 1805 759">Allow one mark for 1700 in working</p>	2
area	Increase in biomass in g per m ² per year										
A	125										
B	110										
C	?										

<p>(b)(i)</p>	<ol style="list-style-type: none"> 1. (more) (sun)light; 2. water / rainfall; 3. photosynthesis; ONCE 4. warmer/ higher temperature; 5. enzymes; 6. (more) mineral ions / named mineral ion / eq; 7. <u>use of named</u> mineral ion; 	<p>Ignore carbon dioxide / oxygen / pollution</p> <p>Mp 6 ignore growth</p> <p>nitrate for amino acids = Mp 5 and Mp 6</p> <p>Mp 5 ignore nutrients / fertiliser</p>	<p>4 max</p>
<p>(ii)</p>	<ol style="list-style-type: none"> 1. fewer herbivores / less grazing / fewer plants eaten / fewer consumers / fewer pests / eq; 2. fewer weeds / fewer different plants / less competition from other plants; 3. less disease / less infection; 4. more nitrogen fixing / nitrifying bacteria; 	<p>Mp 1 ignore predator</p>	<p>2 max</p>
<p>(c)</p>	<p>0.079 / 0.08 / 0.0791;</p>	<p>Ignore 0.0790625</p> <p>Allow one mark for 2530 in working</p>	<p>2</p>

Total 10 marks

Question number	Answer	Notes	Marks												
6(a)	<table border="1"> <thead> <tr> <th data-bbox="405 312 898 379">pH of amylase solution</th> <th data-bbox="898 312 1395 379">diameter in mm</th> </tr> </thead> <tbody> <tr> <td data-bbox="405 379 898 448">2</td> <td data-bbox="898 379 1395 448">10 ± 1</td> </tr> <tr> <td data-bbox="405 448 898 517">4</td> <td data-bbox="898 448 1395 517">(15)</td> </tr> <tr> <td data-bbox="405 517 898 585">7</td> <td data-bbox="898 517 1395 585">20 ± 1</td> </tr> <tr> <td data-bbox="405 585 898 654">9</td> <td data-bbox="898 585 1395 654">14 ± 1;</td> </tr> <tr> <td data-bbox="405 654 898 722">13</td> <td data-bbox="898 654 1395 722">(10)</td> </tr> </tbody> </table>	pH of amylase solution	diameter in mm	2	10 ± 1	4	(15)	7	20 ± 1	9	14 ± 1;	13	(10)		1
pH of amylase solution	diameter in mm														
2	10 ± 1														
4	(15)														
7	20 ± 1														
9	14 ± 1;														
13	(10)														
(b) (i)	<p>1. digestion / break down;</p> <p>2. no starch;</p>	<p>Breaks down all the starch = 2</p> <p>Breaks down starch = 1</p>	2 max												
(b) (ii)	<p>1. (amylase/enzyme) denatured at pH 2 or 13 / low or high pH;</p> <p>2. optimum / works best at pH 7;</p> <p>3. enzymes work less well at pH 9 or pH 4;</p>		2 max												
(c)	pH;		1												

(d) (i)	<ol style="list-style-type: none"> 1. <u>volume</u> of amylase; 2. concentration of amylase; 3. same amylase / source of amylase; 4. depth of agar; 5. time; 	<p>Mp 1 ignore amount</p> <p>Ignore concentration of starch / agar / iodine</p>	3 max
(ii)	<ol style="list-style-type: none"> 1. 0 for pH 2 and pH 13; 2. wider for pH 7 than at 20 °C; 	Check position of wells	2

Total 11 marks

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom