



Mark Scheme (Results)

Summer 2016

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

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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.
- 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. breakdown / broken down; 2. (large molecules) to small; 3. (insoluble) to soluble;	Complex to simple substances = 0  Ignore examples	Max 2
(b)	1. (no) insulin;  2. high <u>blood</u> glucose level / excess <u>blood</u> glucose / glucose <u>not</u> converted to glycogen / less glucose absorbed by cells;  3. not (re)absorbed (in kidney) / eq;	2. Ignore blood sugar 2. No control of blood glucose = 0	3
(c)	1. amylase / carbohydrase; 2. lipase; 3. protease / trypsin / peptidase;	Ignore maltase Reject list on same line containing incorrect enzyme	Max 2
(d)	insulin/hormone travels in <u>blood</u> / insulin/hormone travels in <u>blood</u> vessels / (pancreas is an) endocrine gland;		1
(e)	1. no injection / inject with water;  2. to show changes are due to insulin / (valid) comparison;	Ignore injecting into dogs with intact pancreas  Eg. Compare with dogs that had insulin extract injected	2

(f)	<u>hepatic artery</u> ;		1
(g)	insoluble / does not dissolve / no osmotic effect / eq;	Allow converse for glucose	Max 1
(h)	(i) <u>change</u> in glucose (level) / <u>high</u> glucose / <u>low</u> glucose;	Ignore amount of glucose Ignore amount of glucose eaten	1
	(ii) <u>pancreas</u> / <u>Islets of Langerhans</u> ;		1
	(iii) <u>pancreas</u> / <u>Islets of Langerhans</u> / <u>liver</u> / <u>muscle</u> ;	Ignore negative feedback alone	1
	(iv) insulin release / glucagon release / change in glucose (level) / increase/decrease in glucose (level) / glucose to glycogen / glycogen to glucose / uptake of glucose / glucose levels return to normal / glucose absorbed / eq;		1

Question number	Answer	Notes	Marks
2 (a)	1 / stage 1 / pasteurise; 2 / stage 2 / sterilise;	Ignore order	2
(b)	1. prevent killing / prevent enzyme <u>denaturation</u> ; 2. bacteria / <i>Lactobacillus</i> / <i>Streptococcus</i> ;	Avoid denaturing bacteria = 1 Kill enzyme = 0 Ignore reference to suitable temperature for enzymes	2
(c)	1. less production / product contaminated / spoil taste / eq; 2. (other) bacteria present / bacteria not killed / bacteria would compete / bacteria use lactose / eq;	Contaminated with other bacteria = 2  Allow microorganisms / microbes / fungi	2
(d)	1. less production / take longer / less lactic acid / affect the taste / eq; 2. because bacteria stop growing / bacteria stop reproducing; 3. less enzyme activity / below <u>optimum</u> / less (kinetic) energy / eq;	3. Ignore denature	Max 2
(e)	1. contains vitamin C; 2. prevent scurvy;	Allow vitamin C if in list with other vitamins  Allow vitamin A	Max 1

Question number	Answer	Notes	Marks
3 (a) (i)	107:1 / 107 to 1;	Ignore 107 alone	1
(ii)	1. no/less oxygen; 2. respiration / energy / ATP; 3. active transport / active uptake;		3
(b)	chlorophyll; amino acid / protein / peptide / polypeptide / DNA / RNA / nucleic acid;	Ignore chloroplast	2

Question number	Answer	Notes	Marks															
4 (a)	<table border="1" data-bbox="444 352 1008 751"> <thead> <tr> <th data-bbox="444 352 542 422">Test tube</th> <th data-bbox="542 352 797 422">Factor being tested</th> <th data-bbox="797 352 1008 422">Seeds germinated</th> </tr> </thead> <tbody> <tr> <td data-bbox="444 422 542 495">A</td> <td data-bbox="542 422 797 495">(no) water / moisture</td> <td data-bbox="797 422 1008 495">no;</td> </tr> <tr> <td data-bbox="444 495 542 569">B</td> <td data-bbox="542 495 797 569">control (all factors present)</td> <td data-bbox="797 495 1008 569">(yes)</td> </tr> <tr> <td data-bbox="444 569 542 642">C</td> <td data-bbox="542 569 797 642">(oxygen)</td> <td data-bbox="797 569 1008 642">no;</td> </tr> <tr> <td data-bbox="444 642 542 751">D</td> <td data-bbox="542 642 797 751">temperature / warmth / heat / cold</td> <td data-bbox="797 642 1008 751">no;</td> </tr> </tbody> </table>	Test tube	Factor being tested	Seeds germinated	A	(no) water / moisture	no;	B	control (all factors present)	(yes)	C	(oxygen)	no;	D	temperature / warmth / heat / cold	no;	<p data-bbox="1068 422 1260 516">One mark for each correct row</p> <p data-bbox="1068 554 1273 617">Ignore humidity for A</p>	3
Test tube	Factor being tested	Seeds germinated																
A	(no) water / moisture	no;																
B	control (all factors present)	(yes)																
C	(oxygen)	no;																
D	temperature / warmth / heat / cold	no;																
(b)(i)	radicle / plumule / shoot / root / sprout / seed split / testa split / coat split / eq;	Ignore grow alone	1															
(b)(ii)	<ol data-bbox="391 1058 997 1289" style="list-style-type: none"> <li>1. species / type / age / genotype of seed / size of a seed / mass of a seed;</li> <li>2. amount of seeds / mass of seeds / number of seeds;</li> <li>3. light;</li> </ol>		Max 2															
(c)(i)	starch / lipid / oil / protein;	Ignore carbohydrate Allow fat	1															
(ii)	<ol data-bbox="391 1604 1013 1801" style="list-style-type: none"> <li>1. energy / respiration;</li> <li>2. lack leaves / no light / under the ground / eq;</li> <li>3. cannot carry out photosynthesis;</li> </ol>		Max 2															



(d)	<ol style="list-style-type: none"><li>1. ignite seed / eq;</li><li>2. transfer under tube of water / use of calorimeter;</li><li>3. quick transfer / complete combustion / relight;</li><li>4. mass of water / volume of water / eq;</li><li>5. measure increase in temperature / measure temperature at start and at end;</li><li>6. repeat / eq;</li></ol>	Allow Mp4 and Mp5 from formula	Max 4
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Question number	Answer	Notes	Marks
6	<p>(a)(i) 1. gain entry / break through egg membrane / break into egg / penetrate egg / eq; 2. chromosomes / DNA / genes / alleles / genetic material;</p> <p>(ii) 1. respiration; 2. ATP / energy;</p> <p>(iii) swim / move / eq;</p>	<p>1. Ignore digest / fertilise 2. Ignore nucleus</p>	<p>2</p> <p>2</p> <p>1</p>
	<p>(b) 1. dendrites connect with other neurones / eq; 2. axon carries/allows impulse / eq; 3. myelin sheath for protection / insulation / faster impulse / eq; 4. connected to muscle fibres / allows impulse to reach muscle fibres / enables muscle fibres to contract / synapses with muscle fibres;</p>		<p>Max 2</p>

