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Mark Scheme (Results)

Summer 2015

Pearson Edexcel International GCSE in Biology (4BI0) 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.

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>1. amylase;

2. digests starch / breaks down starch;

3. maltose;

4. lubricates / moisten / soften food / eq;</td><td>

Mp 3 allow glucose

Mp 4 ignore makes it easier to swallow</td><td>2 max</td></tr>
<tr><td>(b)</td><td><table><tr><th>Sense organ</th><th>Stimulus</th></tr><tr><td>eye</td><td>sight
(of food / sight of lab attendant / eq);</td></tr><tr><td>ear</td><td>sound
(of food arriving / sound of lab attendant / tuning fork / eq);</td></tr><tr><td>nose</td><td>smell
(of food / eq);</td></tr></table></td><td></td><td>2 max</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

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

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>3(a)</td><td>
<table>
<tr><th>Food product</th><th>Genus of organism used</th><th>Group organism belongs to</th><th>Substrate used</th><th>Type of respiration</th><th>Chemical product</th></tr>
<tr><td>beer / wine / bread / eq;</td><td>Saccharomyces</td><td>fungus</td><td>glucose</td><td>anaerobic</td><td>ethanol</td></tr>
<tr><td>yoghurt</td><td>Lactobacillus / Streptococcus;</td><td>bacteria</td><td>lactose;</td><td>aerobic</td><td>lactic acid / lactate;</td></tr>
</table>
</td><td>Ignore alcohol as food product

Ignore milk as substrate used</td><td>5</td></tr>
<tr><td>(b)</td><td>1. pasteurise / boil / sterilise / heat to high temperature / eq;

2. kill / prevent growth of / remove bacteria / microorganisms / pathogens / eq;</td><td>Mp 1 ignore heat milk alone

Mp 2 reject germs</td><td>2 max</td></tr>
</table>

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

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>5(a)</td><td><table><tr><th>area</th><th>Increase in biomass in g per m^2 per year</th></tr><tr><td>A</td><td>125</td></tr><tr><td>B</td><td>110</td></tr><tr><td>C</td><td>?</td></tr></table>
85;;</td><td>Allow one mark for 1700 in working</td><td>2</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

(b)(i)	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;	Ignore carbon dioxide / oxygen / pollution Mp 6 ignore growth nitrate for amino acids = Mp 5 and Mp 6 Mp 5 ignore nutrients / fertiliser	4 max
(ii)	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;	Mp 1 ignore predator	2 max
(c)	0.079 / 0.08 / 0.0791;	Ignore 0.0790625 Allow one mark for 2530 in working	2

Total 10 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>6(a)</td><td>
<table>
<tr><th>pH of amylase solution</th><th>diameter in mm</th></tr>
<tr><td>2</td><td>10 ± 1</td></tr>
<tr><td>4</td><td>(15)</td></tr>
<tr><td>7</td><td>20 ± 1</td></tr>
<tr><td>9</td><td>14 ± 1;</td></tr>
<tr><td>13</td><td>(10)</td></tr>
</table>
</td><td></td><td>1</td></tr>
<tr><td>(b) (i)

(ii)</td><td>1. digestion / break down;
2. no starch;

1. (amylase/enzyme) denatured at pH 2 or 13 / low or high pH;
2. optimum / works best at pH 7;
3. enzymes work less well at pH 9 or pH 4;</td><td>Breaks down all the starch = 2
Breaks down starch = 1</td><td>2 max

2 max</td></tr>
<tr><td>(c)</td><td>pH;</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

(d) (i)	1. <u>volume</u> of amylase; 2. concentration of amylase; 3. same amylase / source of amylase; 4. depth of agar; 5. time;	Mp 1 ignore amount Ignore concentration of starch / agar / iodine	3 max
(ii)	1. 0 for pH 2 and pH 13; 2. wider for pH 7 than at 20 ^{O}C;	Check position of wells	2

Total 11 marks

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