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# Mark Scheme (Results)

January 2018

Pearson Edexcel International GCSE

In Biology (4BI0) Paper 1B

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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)(i)	four / 4;		1
(ii)	song thrush;		1
(iii)	1. kill aphids / reduce number of aphids / eq;  2. aphids eat crop/wheat / increase/allow crop/wheat growth / less crop/wheat eaten/destroyed / eq;	1. Ignore stop aphids reproducing 1. Allow kill pest	2
(iv)	1. decrease population/number / fewer sparrowhawks;  2. fewer sparrows / fewer robins / less food/prey (for sparrowhawk);  3. bioaccumulation / pesticide build up in food chain / eq;	1. Allow death	2

<p>(b)</p>	<p>1. no need to reapply / eq;</p> <p>2. specific / only kill the pest / no or less effect on other organisms / no or less effect on food chain/web / eq;</p> <p>3. no risk of resistance;</p> <p>4. no bioaccumulation / no build up in food chain;</p> <p>5. lasts longer / eq;</p>	<p>Allow converse for pesticide</p> <p>Ignore eco-friendly / quicker / cost / pollution</p> <p>2. Ignore references to poison humans</p> <p>3. Ignore immunity</p>	<p>max 3</p>
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Total 9 marks

Question number	Answer	Notes	Marks												
2 (a)	<table border="1"> <thead> <tr> <th>Component</th> <th>Function of component</th> </tr> </thead> <tbody> <tr> <td>vitamin A</td> <td>vision / sight / sight in dim light / immune system / disease resistance / skin;</td> </tr> <tr> <td>vitamin C</td> <td>skin / tissue / connective tissue / prevent scurvy / wound healing / immune system / disease resistance;</td> </tr> <tr> <td>vitamin D</td> <td>(bone growth)</td> </tr> <tr> <td>iron</td> <td>haemoglobin / <u>red</u> blood cells;</td> </tr> <tr> <td>dietary fibre</td> <td>peristalsis / food movement / reduce risk of bowel cancer / reduce constipation / eq;</td> </tr> </tbody> </table>	Component	Function of component	vitamin A	vision / sight / sight in dim light / immune system / disease resistance / skin;	vitamin C	skin / tissue / connective tissue / prevent scurvy / wound healing / immune system / disease resistance;	vitamin D	(bone growth)	iron	haemoglobin / <u>red</u> blood cells;	dietary fibre	peristalsis / food movement / reduce risk of bowel cancer / reduce constipation / eq;		4
Component	Function of component														
vitamin A	vision / sight / sight in dim light / immune system / disease resistance / skin;														
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iron	haemoglobin / <u>red</u> blood cells;														
dietary fibre	peristalsis / food movement / reduce risk of bowel cancer / reduce constipation / eq;														
(b)	<ol style="list-style-type: none"> <li>1. Benedict's;</li> <li>2. boil / heat / water bath / eq;</li> <li>3. red / green / yellow / orange / brown (means glucose) / blue means no glucose;</li> </ol>	<ol style="list-style-type: none"> <li>1. Allow clinistix / eq</li> <li>2. for stated time</li> <li>3. green / brown / purple</li> </ol>	3												
(c)(i)	carbon, hydrogen and oxygen / C, H and O;		1												

(ii)			Allow mouth / stomach	2
	<b>Substance</b>	<b>Organ</b>		
	bile	liver;		
	lipase	pancreas;		

Total 10 marks

Question number	Answer	Notes	Marks
3 (a)	1. (no) photosynthesis; 2. starch used up / starch digested / starch converted to maltose/glucose ; 3. respiration / (use) energy;		2
(b) (i)	1. use hot water; 2. boil/heat in ethanol / use water bath to (heat) ethanol; 3. no naked flame / water bath; 4. (soak in) water; 5. add iodine; 6. use goggles;	Put ethanol in water bath = 2	4
(ii)	1. leaf inside labelled no starch / leaf outside labelled starch; 2. leaf inside labelled yellow / white / brown / red / orange / leaf outside labelled blue / black / blue black;	Ignore references to position of bung	2

Total 8 marks



Question number	Answer	Notes	Marks
4(a)	<p>(i) sensory (neurone);</p> <p>(ii) 1. synapse / synaptic cleft / eq; 2. neurotransmitter / chemical / transmitter substance; 3. diffusion; 4. between <u>neurones</u> / from sensory to relay <u>neurone</u>;</p> <p>(iii) 1. cell body; 2. nucleus; 3. axon / cytoplasm; 4. myelin sheath / nodes of Ranvier; 5. dendrites;</p> <p>(iv) 1. impulse / action potential;  2. to effector / muscle; 3. contract;</p>	<p>1. Ignore signals / message</p> <p>2. Ignore arm</p>	<p>1</p> <p>max 2</p> <p>max 3</p> <p>2</p>

(b)	<p>(i) Parents: Dd and Dd; Gametes: D and d; Offspring: DD and Dd (and Dd) and dd;</p> <p>(ii) <math>1/2 \times 1/4 = 1/8 / 0.125 / 12.5\%</math>;</p> <p>(iii) 7 / 7.33 / 7.3;;</p>	<p>Allow ECF for max 2 Allow other symbols</p> <p>Allow one mark for <math>0.00001 \times 733\ 000</math></p>	<p>3</p> <p>1</p> <p>2</p>
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Total 14 marks

Question number	Answer	Notes	Marks
5(a) (i)	F;		1
(ii)	C;		1
(b)	glucose; $\longrightarrow$ ethanol + carbon dioxide;	Ignore yeast and energy in equation  Allow chemical correct chemical formulae  $C_6H_{12}O_6 / C_2H_5OH + CO_2$	2
(c)(i)	S scale linear and half grid;  L line neatly drawn though points;  A1 axes correct way;  A2 axes labelled with $^{\circ}C$ and bubbles per minute;  P points plotted correctly;	P minus one mark if extrapolation	5
(ii)	1. no oxygen entry;  2. stop/prevent aerobic respiration;	1. Ignore air	2

(iii)	<p>1. repeat;</p> <p>2. reliable / average;</p> <p>or</p> <p>3. use a thermometer;</p> <p>4. check temperature / monitor temperature / eq ;</p> <p>or</p> <p>5. use same concentration of glucose / yeast;</p> <p>6. change only due to temperature / ensures only one independent variable;</p> <p>or</p> <p>7. use measuring cylinder / syringe;</p> <p>8. measure <u>volume</u>;</p> <p>or</p> <p>9. more readings between 40 and 52;</p> <p>10. accurate optimum temperature;</p>	<p>Only give second Mp of each pair if preceded by first MP</p> <p>9. Ignore increase range</p>	2
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(iv)	20 °C 1. low (kinetic) energy / less movement; 2. fewer collisions; 3. below <u>optimum</u> / eq; 52 °C 4. <u>enzymes denatured</u> ; 5. change to active site / substrate no longer binds / eq; 6. yeast killed;		4
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Total 17 marks

Question number	Answer	Notes	Marks
6(a)	<ol style="list-style-type: none"><li>1. osmoreceptors / hypothalamus / pituitary;</li><li>2. less ADH;</li><li>3. transport in blood;</li><li>4. collecting duct;</li><li>5. less permeable;</li><li>6. less water (re)absorbed / less water enters blood;</li><li>7. urine concentration decreases / urine volume increases / urine is dilute / more urine / eq;</li></ol>		max 5
(b)	<ol style="list-style-type: none"><li>1. water enters;</li><li>2. from dilute to concentrated / less water in cells / eq;</li><li>3. osmosis;</li><li>4. burst;</li><li>5. no cell wall;</li></ol>		max 3

Total 8 marks

Question number	Answer	Notes	Marks
7	<p>C range of bleach concentrations;</p> <p>O same species / type / size of explant/plant / age of explant/plant / eq;</p> <p>R repeat / many explants / group / eq;</p> <p>M1 count number of explants that grow / how many survive / free from microbes / measure size / mass / leaf area / count number of microbes / how many microbes / eq;</p> <p>M2 same stated time;</p> <p>S1 same volume of bleach / type of bleach;</p> <p>S2 same species of microbe / same temperature / same light / same carbon dioxide / same agar / same mineral ions / same water / eq;</p>	<p>C bleach and no bleach = 0</p> <p>S1 Ignore amount</p> <p>S2 Ignore same soil / fertiliser</p>	max 6

Total 6 marks

Question number	Answer	Notes	Marks
8(a) (i)	P bronchiole(s); Q trachea / windpipe; R bronchus / bronchi;		3
(ii)	1. diaphragm relaxes; 2. diaphragm moves up / more domed in shape / eq; 3. <u>volume</u> (of chest cavity) decreases; 4. pressure (in chest cavity) increases; 5. pressure higher than atmospheric / eq;		max 3
(b) (i)	1. cm <sup>3</sup> per s / cm <sup>3</sup> per min / dm <sup>3</sup> per min; 2. cm per s / cm per min / m per min;		max 1



(ii)	<p>1. meter on zero - accurate/correct/true reading / (ONCE) / reading will not be too high / eq;</p> <p>2. fingers not touching - accurate/correct/true reading / reading will not be too low / no obstruction / slider can move / eq;</p> <p>3. horizontal – accurate/correct/true reading / no effect of gravity / slider does not go too far / not far enough / stop slider moving down / slider cannot move up / eq;</p>	<p>Allow accurate/correct/true ONCE</p> <p>Allow converse for all Mps</p> <p>Unqualified reference to accuracy = 1 only</p>	max 2
(iii)	<p>1. <u>reliable</u> results;</p> <p>2. detect <u>anomalous</u> results;</p> <p>3. calculate average;</p>	accurate and reliable = 0	max 2
(c)	<p>1. widen /dilate / open up;</p> <p>2. airways / bronchioles / bronchi;</p>		2

Total 13 marks

Question number	Answer	Notes	Marks								
9(a)	<table border="1"> <thead> <tr> <th>Type of cell</th> <th>Number of chromosomes</th> </tr> </thead> <tbody> <tr> <td>egg cell</td> <td>23;</td> </tr> <tr> <td>red blood cell</td> <td>0 / none / zero;</td> </tr> <tr> <td>white blood cell</td> <td>46;</td> </tr> </tbody> </table>	Type of cell	Number of chromosomes	egg cell	23;	red blood cell	0 / none / zero;	white blood cell	46;		3
Type of cell	Number of chromosomes										
egg cell	23;										
red blood cell	0 / none / zero;										
white blood cell	46;										
(b) (i)	<p>1. <u>repair</u>;</p> <p>2. asexual reproduction / cloning / producing identical offspring / vegetative reproduction / micropropagation;</p>	Allow converse for mitosis	2								
(ii)	<p>1. haploid / half the number;</p> <p>2. 23 chromosomes / one of each pair;</p>		2								
(iii)	anther(s) / stamen(s);		1								

Total 8 marks

Question number	Answer	Notes	Marks
10	glands / organs / system; blood / plasma / circulation; testosterone; ovaries; oestrogen; insulin; glycogen; liver / muscles; adrenaline;		9

Total 9 marks

Question number	Answer	Notes	Marks
11(a) (i)	15.2;;	$19 \div 1.25$ $3.8 \times 4$ $3.8 \div 0.25$ Allow one mark for 19 or 3.8	2
(ii)	1. place at random / eq;  2. use of coordinates / use of number generator / eq;	Use a random number generator = 2  2. Ignore thrown	2
(iii)	1. more plants/clover/plantain in B / fewer plants/clover/plantain in A / eq;  2. more plantain in B than clover / more clover in A than plantain / eq;  3. more even population of each species in B / less even population of each species in A / eq;	Allow converse	3

<p>(b)</p>	<p>1. (more) (sun)light;                  2. (more) photosynthesis;                  or                  3. (more) rain / water / humidity / drought / eq;                  4. (more) growth / photosynthesis;                  or                  5. (high) temperature;                  6. (more) photosynthesis / enzyme;                  or                  7. (more) mineral ions / minerals / named mineral ion;                  8. role of named mineral ion;                  or                  9. (more) carbon dioxide;                  10. (more) photosynthesis;                  or                  11. pH;                  12. enzymes;</p>	<p>Max two factors                  Allow converse                  Ignore weather / wind / humidity /                    7. Ignore fertiliser / nutrients</p>	<p>max 4</p>
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Question number	Answer	Notes	Marks								
12(a)	<table border="1"> <thead> <tr> <th>Example</th> <th>Process</th> </tr> </thead> <tbody> <tr> <td>carbon dioxide moving through stomata into a leaf</td> <td>diffusion / gas exchange;</td> </tr> <tr> <td>nitrate ions moving into a plant root hair cell against a concentration gradient</td> <td>active transport / active uptake;</td> </tr> <tr> <td>water moving from a collecting duct of the kidney into blood plasma</td> <td>osmosis / reabsorption;</td> </tr> </tbody> </table>	Example	Process	carbon dioxide moving through stomata into a leaf	diffusion / gas exchange;	nitrate ions moving into a plant root hair cell against a concentration gradient	active transport / active uptake;	water moving from a collecting duct of the kidney into blood plasma	osmosis / reabsorption;		3
Example	Process										
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nitrate ions moving into a plant root hair cell against a concentration gradient	active transport / active uptake;										
water moving from a collecting duct of the kidney into blood plasma	osmosis / reabsorption;										
(b)	<ol style="list-style-type: none"> <li>1. villi / microvilli increase surface area;</li> <li>2. thin walls / one cell thick provide short diffusion distance / faster diffusion / more diffusion / eq;</li> </ol>		max 4								

	<p>3. capillaries to absorb glucose / amino acids / blood supply to absorb glucose / amino acids;</p> <p>4. capillaries maintain diffusion gradient / maintain concentration gradient / blood supply maintain diffusion gradient / maintain concentration gradient / eq;</p> <p>5. lacteals absorb fatty acids and glycerol;</p> <p>6. long so more diffusion / absorption / increases surface area;</p>		
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Total 7 marks

