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# Mark Scheme (Results)

January 2019

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) D; (ii) B only; (iii) impulses / signals to <u>brain</u> / <u>CNS</u> ; (b) 1. loss of vision / no vision / blindness / cannot see / reduced field of vision / blurred vision / image not focussed / incomplete image / eq; 2. no connection to optic nerve;	Ignore messages	1 1 1 2

**Total 5 marks**

Question number	Answer	Notes	Marks
2 (a)	1. plant → bacteria → Tubifex/worms → fish; 2. arrows correct;	1. Only allow if four correct organisms named	2
(b) (i)	1. more worms with more dead plants / (positive) correlation / eq; 2. (worms) feed on <u>bacteria</u> / there is more <u>bacteria</u> ;		2
(ii)	1. haemoglobin (help <i>Tubifex</i> /worms) obtain oxygen / haemoglobin carries oxygen; 2. decomposition; 3. less oxygen (for other species); 4. reference to respiration;		4

(c)	<ol style="list-style-type: none"> <li>1. separate/remove organic material/ organisms from mud;</li> <li>2. weigh organic material / weigh organisms;</li> <li>3. more than one sample used / several quadrats; ONCE</li> </ol> <p>OR</p> <ol style="list-style-type: none"> <li>4. dry the mud / remove water from the mud;</li> <li>5. weigh the dried mud;</li> <li>6. oven / burning / eq;</li> <li>7. <u>re</u>weigh after burning;</li> <li>8. more than one sample used / several quadrats; ONCE</li> </ol>	2. Ignore measure mass	max 3 E
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**Total 11 marks**

Question number	Answer	Notes	Marks
3(a)	(i) (line to) nucleus indicated;		1
	(ii) 23 / twenty three;		1
	(iii) 1. fusion / joining / combining of male and female gamete / nuclei;	1. Ignore meets	1
	2. sperm fuses / joins / combines with egg / eq;	2. Ignore meets	
(b)	(i) (more) <u>milk</u> ;		1
	(ii) 1. more light (reflected) by X sperm / chromosome / more light from X sperm / chromosome;	Allow converse in Mps 1 and 2	2
	2. X chromosome has more DNA / X chromosome is bigger / eq;		
(c)	(i) 98 / 97.7 / 97.73 / 97.727 / 97.7273 / 97.72727;;	Correct answer gains full marks Allow one mark for $43 \div 44$ Reject 97.72	2
	(ii) use unsorted sperm/chromosomes / do not use a cell sorter / equal number of X and Y / eq;		1
	(iii) equal number of males and females / 22 males and 22 females / 50% male / 50% female / 50:50 / equal chance / 50%;		1

**Total 10 marks**

Question number	Answer	Notes	Marks
4(a)	1. reduce growth; 2. damage <u>leaves</u> / fewer <u>leaves</u> / less surface area / eq; 3. (less) light absorbed; 4. (less) photosynthesis; 5. (less) starch / glucose / carbohydrate / amino acids / eq; 6. infection / disease / entry of pathogens / bacteria / viruses;	2. Ignore feed / eat 2. Ignore plants 3. Ignore sun  5. Ignore mineral ions / nutrients	max 4
(b)	1. <u>natural selection</u> ; 2. <u>variation</u> / <u>varied</u> / <u>vary</u> in <u>shape</u> / <u>colour</u> ; 3. <u>mutation</u> / <u>mutated</u> ; 4. not seen by predators / not eaten / camouflaged / not attacked / eq; 5. <u>survive</u> / <u>survival</u> / <u>survival</u> (of the fittest); 6. reproduce / produce offspring / eq; 7. pass on allele / gene / DNA;		max 5

**Total 9 marks**



Question number	Answer	Notes	Marks
5(a)	<u>similar</u> / <u>same</u> cells / <u>same</u> type + carry out <u>same</u> / <u>specific</u> / <u>one</u> / <u>certain</u> function / eq;		1
(b)	1. less gas exchange / less diffusion; 2. less surface area; 3. increased distance; 4. (less) oxygen <u>into blood</u> ; 5. (less) (aerobic) respiration; 6. <u>anaerobic</u> respiration / lactic acid / oxygen debt; 7. (less) energy / ATP for muscles;		max 5
(c)	(i) $260\,000 - 95\,000 = 165\,000$ ;;  (ii) 1. silica causes most deaths / coal causes least deaths / asbestos and coal cause less deaths; 2. asbestos and coal cause similar number of deaths; 3. other types of dust cause deaths / these dusts do not cause all the deaths;	Correct answer gains full marks Allow one mark for 95 000 in working  1. Ignore asbestos causes least deaths	2  max 2

**Total 10 marks**

Question number	Answer	Notes	Marks
6(a)	(i) cell wall / wall;	Do not award if in list	1
	(ii) glycogen;	Do not award if in list	1
(b)	(i) water bath / use hot water / use cold water / use Bunsen burner / use ice cubes / eq;	Ignore heat water	1
	(ii) use oil / boil and cool glucose solution / eq;	Ignore exclude oxygen	1
	(iii) temperature (of water) / °C;	Ignore room temperature	1
	(iv) 1. repeat / calculate mean / calculate average; 2. use more temperatures between 40 and 52 °C; 3. measure volume (of gas) / collect gas in measuring cylinder / syringe / eq; 4. use water bath / use thermometer; 5. use same concentration / volume / mass of glucose / yeast; 6. use control tube <u>with no yeast</u> / <u>no glucose</u> ; 7. bubble into limewater / hydrogen-carbonate;	2. Ignore regular intervals	3

**Total 7 marks**

Question number	Answer	Notes	Marks												
7 (a)	<table border="1"> <thead> <tr> <th>Description of event</th> <th>Name of organ</th> </tr> </thead> <tbody> <tr> <td>pumps blood</td> <td>(heart)</td> </tr> <tr> <td>forms oxyhaemoglobin</td> <td>lung(s);</td> </tr> <tr> <td>stores urine</td> <td>bladder;</td> </tr> <tr> <td>secretes oestrogen</td> <td>ovary / ovaries;</td> </tr> <tr> <td>forms sperm</td> <td>testis / testes / testicles;</td> </tr> </tbody> </table> <p>           1. Bowman's capsule / renal capsule / renal corpuscle;            2. renal artery / renal vein;            3. <u>glomerulus</u>;            4. cortex;            5. proximal/first/distal/second/convoluted tubules / pct / dct;            6. loop of Henle;            7. medulla;            8. collecting duct;            9. ureter;         </p>	Description of event	Name of organ	pumps blood	(heart)	forms oxyhaemoglobin	lung(s);	stores urine	bladder;	secretes oestrogen	ovary / ovaries;	forms sperm	testis / testes / testicles;	<p>Do not allow if not in list</p> <p>Reject gall bladder</p> <p>3. Ignore knot of capillaries / glomerular filtrate</p>	<p>4</p> <p>max 5</p>
Description of event	Name of organ														
pumps blood	(heart)														
forms oxyhaemoglobin	lung(s);														
stores urine	bladder;														
secretes oestrogen	ovary / ovaries;														
forms sperm	testis / testes / testicles;														

**Total 9 marks**

Question number	Answer	Notes	Marks
8(a)	$6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ ;;	Allow one mark for correct formula LHS and RHS but unbalanced  Word equation = 0	2
(b) (i)	S linear and half of each axis;  L straight and passing through all points;  A1 x axis is year;  A2 axes labelled mass of CO <sub>2</sub> in millions of tonnes and year;  P points correctly plotted within one square;	Allow truncated y axis so long as scale is correct  Bar chart / extrapolation loses L  If scale non-linear with just points plotted on y axis loses S, L and P	5
(ii)	9900 - 6000 = 3900; 3900 ÷ 6000 × 100 = 65%;	Correct answer gains full marks One mark for 3900 in working	2

(c)	<ol style="list-style-type: none"> <li>1. <u>global warming</u> / <u>greenhouse effect</u>;</li> <li>2. melting ice caps / rising sea levels / flooding / eq;</li> <li>3. drought / climate change / extreme weather / hurricanes / desertification / eq;</li> <li>4. <u>habitat</u> destruction / acidification / bleaching of coral / damage to coral reefs</li> <li>5. extinction / affect food chains / eq;</li> <li>6. migration / change in distribution / spread of disease / spread of pests / eq;</li> </ol>	<ol style="list-style-type: none"> <li>2. Affect the weather = 0</li> <li>3. Ignore acid rain</li> </ol>	max 3
(d)	<ol style="list-style-type: none"> <li>1. absorb / take up / use / carbon dioxide / eq;</li> <li>2. photosynthesis;</li> </ol>		2

**Total 14 marks**

Question number	Answer	Notes	Marks												
9 (a)	<table border="1"> <thead> <tr> <th>Name of blood vessel</th> <th>Letter</th> </tr> </thead> <tbody> <tr> <td>aorta</td> <td>(C)</td> </tr> <tr> <td>hepatic vein</td> <td>K;</td> </tr> <tr> <td>pulmonary artery</td> <td>M;</td> </tr> <tr> <td>renal artery</td> <td>F;</td> </tr> <tr> <td>vena cava</td> <td>L / N / L and N;</td> </tr> </tbody> </table>	Name of blood vessel	Letter	aorta	(C)	hepatic vein	K;	pulmonary artery	M;	renal artery	F;	vena cava	L / N / L and N;		4
Name of blood vessel	Letter														
aorta	(C)														
hepatic vein	K;														
pulmonary artery	M;														
renal artery	F;														
vena cava	L / N / L and N;														
(b)	<p>(i) B;</p> <p>(ii) C;</p> <p>(iii) M;</p>		1 1 1												
(c)	<p>1. elastic / can stretch / can expand / eq;</p> <p>2. strong / can withstand high pressure / eq;</p> <p>3. does not perish / break down / decompose / eq;</p> <p>4. does not cause immune response / will not be rejected / eq;</p> <p>5. does not cause clotting / smooth / eq;</p>	1. Ignore flexible / bend	max 2												

**Total 9 marks**

Question number	Answer	Notes	Marks
10 (a)	(i) <u>homeostasis</u> ; (ii) <u>osmoregulation</u> ;	Allow homeostatis	1 1 1
(b)	1. increased (blood) concentration / less water (in blood) / more negative / lower water potential / eq; 2. osmoreceptors / hypothalamus; 3. pituitary produces ADH; 4. collecting duct (more)_permeable; 5. water absorbed into blood / water reabsorbed; 6. less urine / more concentrated urine / less water in urine;		max 4
(c)	1. electrical / impulses (VERSUS chemical); 2. fast / quick / rapid (VERSUS slow) / eq; 3. neurones / (VERSUS blood / plasma) / eq; 4. last short time (VERSUS long time) / eq; 5. one target / localised / specific (VERSUS many targets / widespread / general) / eq;	1. Ignore signals / messages  3. Ignore nerves / brain / nervous system	max 3

**Total 9 marks**

Question number	Answer	Notes	Marks
11 (a)	<p>(i)</p> <ol style="list-style-type: none"> <li>1. form / version / type of a gene;</li> <li>2. present in phenotype / always expressed / homozygote and heterozygote are similar / eq;</li> </ol> <p>(ii)</p> <ol style="list-style-type: none"> <li>1. had children / already reproduced;</li> <li>2. before symptoms appear / before knowing (have disease) / do not know (have the disease) / hard to diagnose before symptoms / eq;</li> <li>3. pass on allele;</li> </ol>	<p>2. Allow with one allele it has the disease / one present it has the disease</p>	<p>2</p> <p>max 2</p>



(b)	<p>parents     Dd   dd;</p> <p>gametes     D or d     d;</p> <p>offspring     Dd             dd;</p> <p>phenotypes     disease / affected + no disease / unaffected / eq;</p>	<p>Allow ecf from incorrect parents to max 3</p> <p>Allow Mps 1, 2 and 3 from Punnett square</p> <p>Allow other symbols</p> <p>Must see separation of gametes</p> <p>Phenotypes do not need to be matched but no credit if matched incorrectly</p>	4
(c)	<p>1. rare / random;</p> <p>2. change in gene / allele / genome / DNA / genetic code / eq;</p>	<p>Rare genetic change = 2</p> <p>2. Allow fault in DNA</p>	2

**Total 10 marks**

	Answer	Notes	Marks
12	<ol style="list-style-type: none"><li>1. oxygen / O<sub>2</sub>;</li><li>2. cellulose;</li><li>3. insoluble / does not dissolve;</li><li>4. iodine / I<sub>2</sub> / KI / iodide;</li><li>5. brown / reddish brown / yellow / orange;</li><li>6. blue / black / blue black;</li><li>7. glycogen;</li><li>8. liver;</li><li>9. insulin;</li><li>10. pancreas;</li></ol>	<ol style="list-style-type: none"><li>5. Ignore red alone / brick red</li></ol>	10

**Total 10 marks**

	<b>Answer</b>		<b>Notes</b>	<b>Marks</b>
13	C	± amino acids / range of amino acid concentration / different amino acids / number of amino acids / eq;		max 6
	O	same age / mass / size / same plant / species / type / clone / eq;	Ignore same health	
	R	repeat / eq;		
	M1	height / width / mass / number of leaves / eq;	Ignore use ruler alone	
	M2	after stated time / 1 day+ / eq;		
	S1	same temperature / light / CO <sub>2</sub> / humidity / oxygen / water;		
	S2	sterile / cotton bung / foil cover / agar / minerals / glucose / hormones / auxin / eq;	S2 Ignore nutrients	

**Total 6 marks**

