

# Mark Scheme (Results)

Summer 2012

## International GCSE

Biology (4BI0) Paper 1B

Science Double Award (4SC0) Paper 1B

## Edexcel Level 1/Level 2 Certificate

Biology (KBI0) Paper 1B

Science (Double Award) (KSC0) Paper 1B

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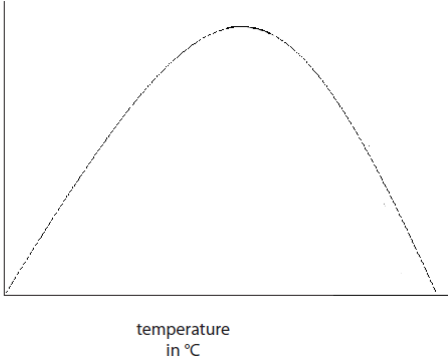
**INTERNATIONAL GCSE BIOLOGY PAPER 1B – SUMMER 2012**

Question number	Answer			Notes	Marks
1 (a)	Feature	Plants	Animals	4 marks all correct 3 marks for 6 or 7 2 marks for 4 or 5 1 marks for 2 or 3 0 marks for 0 or 1  blank squares = wrong  tick cross combined = wrong	4
can move from place to place	(X)	(√)			
can carry out photosynthesis	√	X;			
are multicellular	√	√;			
have cells with cell walls	√	X;			
store carbohydrate as glycogen	X	√;			
(b)	fungi; bacteria / prokaryotes; protocists / protozoa; viruses;			allow singular or plural ignore parasites / microorganisms / specific names eg cholera / amoeba	Max 2

**Total 6 marks**

Question number	Answer	Notes	Marks												
2 (a)	<table border="1"> <thead> <tr> <th>Name of blood vessel</th> <th>Diameter of the lumen in mm</th> <th>Thickness of the wall in mm</th> </tr> </thead> <tbody> <tr> <td><u>vena cava</u>;</td> <td>30.0</td> <td>1.5</td> </tr> <tr> <td><u>capillary</u>;</td> <td>0.006</td> <td>0.001</td> </tr> <tr> <td><u>aorta</u>;</td> <td>25.0</td> <td>2.0</td> </tr> </tbody> </table>	Name of blood vessel	Diameter of the lumen in mm	Thickness of the wall in mm	<u>vena cava</u> ;	30.0	1.5	<u>capillary</u> ;	0.006	0.001	<u>aorta</u> ;	25.0	2.0	2 for all 3 correct 1 for 1 or 2 correct	2
Name of blood vessel	Diameter of the lumen in mm	Thickness of the wall in mm													
<u>vena cava</u> ;	30.0	1.5													
<u>capillary</u> ;	0.006	0.001													
<u>aorta</u> ;	25.0	2.0													
(b) (i)	<u>aorta</u> ;	ignore 0.001mm thick / small / ref to surface area to volume  reject ref to thin <u>cell wall</u>  wrong named blood vessel = 0 for whole item	1												
(ii)	<u>vena cava</u> ;		1												
(iii)	capillary; one cell thick / thin (wall/membrane) / short diffusion distance / low pressure / slow blood flow / eq;		2												

Total 6 marks

Question number	Answer	Notes	Marks
3 (a)	keep out oxygen; <u>anaerobic</u> / prevent <u>aerobic</u> idea / eq;	respiration alone gets no credit	2
(b) (i)	 <p>rate of carbon dioxide production in bubbles per minute</p> <p>temperature in °C</p> <p>starts low and rises; peak / level / rise less steep; down;</p>	inverted = 0	3
(ii)	carbon dioxide / CO <sub>2</sub> (production);		1
(iii)	temperature;		1
(c)	<p>volume of glucose; concentration / mass of glucose;</p> <p>mass / volume / number / of yeast; species / type of yeast; pH of <u>solution</u>;</p>	<p>allow amount / quantity</p> <p>ignore volume of water in bath ignore room temperature ignore ref to oxygen ignore ref to oil</p>	2
(d)	repeat / eq;		1
(e)	volume of gas / measuring cylinder / syringe / eq;		1

Question number	Answer	Notes	Marks
3 (f)	glucose; → ethanol/alcohol; + carbon dioxide;	ignore yeast on left hand side of equation but reject if any other substance used ignore energy / heat allow symbols only if correct eg CO <sub>2</sub> = 0 CO <sub>2</sub> = 1	3

**Total 14 marks**

Question number	Answer	Notes	Marks										
4 (a) (i)	<table border="1"> <thead> <tr> <th>Structure</th> <th>Organ</th> </tr> </thead> <tbody> <tr> <td>Spongy mesophyll</td> <td>leaf</td> </tr> <tr> <td>Alveolus</td> <td>lung(s);</td> </tr> <tr> <td>Nephron</td> <td>kidney(s);</td> </tr> <tr> <td>Villus</td> <td><u>small</u> intestine / duodenum / ileum;</td> </tr> </tbody> </table>	Structure	Organ	Spongy mesophyll	leaf	Alveolus	lung(s);	Nephron	kidney(s);	Villus	<u>small</u> intestine / duodenum / ileum;		3
Structure	Organ												
Spongy mesophyll	leaf												
Alveolus	lung(s);												
Nephron	kidney(s);												
Villus	<u>small</u> intestine / duodenum / ileum;												
(b) (i)	<p>movement of molecules/particles/gases/named molecule;</p> <p>high conc. to low conc. / down concentration gradient / eq;</p> <p>passive / eq;</p>	<p>ignore <u>substances</u></p> <p>allow along concentration gradient</p>	Max 2										
(c)	ultrafiltration / pressure; glomerulus / Bowman's capsule / renal capsule;	ignore filtered alone	2										

**Total 7 marks**

Question number	Answer	Notes	Marks
5 (a) (i)	enzymes;  kinetic energy / more collisions / molecules move faster / eq;  (more) photosynthesis; (more) carbohydrate / glucose / eq; energy / respiration;	ignore reactions alone ignore ref to transpiration / diffusion  ignore food	Max 3
(ii)	minerals / ions / salts / nutrients / eq; named mineral 1; function of named mineral 1; named mineral 2; function of named mineral 2;	eg. nitrate (ignore nitrogen) / ammonium for; amino acids / protein; if nitrogen ignored still allow function mark  magnesium; for chlorophyll/chloroplast;  phosphate for; ATP / DNA / eq;  ignore NPK	Max 3
(b) (i)	ladybird / eq; aphid / eq;	accept any predator prey eg birds eating caterpillars ignore 'predator' eats a 'pest'	2
(ii)	1. lasts longer / no need to reapply / eq; 2. specific / no harm to other species; 3. no bioaccumulation / no biomagnification / eq; 4. no resistance; ignore immunity 5. no harm/affect to food chain(s) / eq;	accept converse answers that refer to chemical pesticide ignore ref to eutrophication ignore pollution / harm to habitat / eq ignore cost ignore ref to not harming crops/safer for humans	3

**Total 11 marks**



Question number	Answer	Notes	Marks
6 (a) (i)	respiration / energy;	ignore across concentration gradient	1
(ii)	active transport / active uptake; low to high conc. / against conc. gradient / eq;		2
(iii)	chlorophyll / chloroplasts; photosynthesis / absorb light / eq;		2
(b)	1. variation ( in Ash borers) / eq; 2. <u>mutation</u> / <u>mutate(s)</u> / <u>mutated</u> ; 3. not eaten / not attacked / avoided / eq; 4. <u>survive(s)</u> / <u>survival</u> / <u>survived</u> ; 5. reproduce / breed / mated / multiply / eq; 6. pass on gene(s) / allele(s) / eq; 7. process continues over time / eq;		Max 4

**Total 9 marks**

Question number	Answer	Notes	Marks
7 (a) (i)	parents: Aa Aa; gametes: A a A a; offspring: AA Aa Aa aa; phenotypes: short short short average;	allow parent, gamete and offspring marks in Punnett square if parent genotypes wrong allow ecf to max of 3 for gametes, offspring and phenotypes allow if other symbols used allow other terms for short and average eg achondroplasia and tall only give phenotype mark if it is clear that candidate knows there are three short and one average a statement that the phenotypes are short and average = 0	4
(b)	$\frac{1}{4}$ / 25% / 0.25 / 1 in 4 / eq;	ecf	1

Question number	Answer	Notes	Marks
7 (c) (i)	always / in heterozygote / in both heterozygote and homozygote / eq;  expressed / seen / shown / determines characteristic / develops the trait / (in phenotype) / eq;	ignore stronger / overpowers / masks	Max 2
(ii)	1. those with achondroplasia less likely to have children / reproduce / eq; 2. allele is rare / eq; 3. selective advantage for aa / eq;	allow converse for all points  allow health implications for achondroplasia	Max 2

**Total 9 marks**

Question number	Answer	Notes	Marks
8 (a)	S scale linear and at least half grid; L lines neat and through points; A1 axes correct way round; A2 axes labelled <u>temperature</u> and <u>midpoint/period/year</u> ; U <u>°C</u> ; P 1795 and 1995 plotted correct;	annotate using the letters provided  extrapolation loses P mark	6
(b)	1695-1720;		1
(c) (i)	water <u>vapour</u> / carbon dioxide / nitrous oxide / methane / CFCs / ozone;	allow any oxide of nitrogen	1
(ii)	traps heat / reflects infra red / reflects long wave radiation / contributes to global warming / eq;	ignore contributes to greenhouse effect	1
(iii)	1. burning / combustion / eq; 2. fossil fuels / coal / oil / gas; 3. cars / planes / factories / trains / power stations / eq; 4. <u>cattle</u> farming / <u>rice</u> farming; 5. deforestation; 6. fridges / aerosols (CFCs);	ignore petrol	3

**Total 12 marks**

Question number	Answer			Notes	Marks
9 (a)	runners / corms / bulbs / tubers / rhizomes;			ignore cuttings / cloning / vegetative propagation / micropropagation / tissue culture	1
(b)	Feature	Sexual reproduction in plants	Sexual reproduction in animals		3
male gametes	(pollen nucleus)	sperm;			
site of fertilisation	<u>ovule</u> ;	oviduct / fallopian tube / eq;			
(c)	<p>1. indication of number and size difference; eg .more sperm + smaller / less eggs + larger / more sperm + larger egg / less eggs + smaller sperm</p> <p>2. sperm: better chance of fertilisation / swim easier / eq egg: more cytoplasm / more nutrition / eq;</p>				2

**Total 6 marks**

Question number	Answer	Notes	Marks
10 (a)	stomata / guard cells; <u>spongy</u> (mesophyll) / <u>spongy</u> (layer) / air spaces / eq; moist; thin; large surface area;	ignore wide and flat	Max 3
(b)	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ ;;  $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 = 1$	allow one mark for correct equation and correct formula and a second mark for correct balance formula wrong = 0 eg. $\text{CO}_2 = \text{wrong}$ but $\text{CO}_2 = \text{correct}$ reject word equation  ignore light/chlorophyll/energy	2
(c) (i)	dark for 12 hours plus;		1
(ii)	keep in dark / no light / cover leaf surface / eq;		1
(iii)	boil/heat/warm in ethanol/alcohol; safety: water bath / no flame / eq; iodine; blue black / eq;	tube of ethanol in water bath = 2  ignore tongs / gloves etc  allow black / dark black / dark blue / blue	3

Total 10 marks

Question number	Answer	Notes	Marks								
11 (a) (i)	(-)10.62 / (-)10.6;; allow one mark for 9.76 or 1.16 in working however used	ignore minus sign ignore additional decimal places	2								
	(ii)										
(b)	<table border="1"> <thead> <tr> <th>Method</th> <th>How method increases fish production</th> </tr> </thead> <tbody> <tr> <td>adding antibiotics to the water</td> <td>control disease / kill bacteria / parasites / pathogens / eq;</td> </tr> <tr> <td>using nets to cover tanks</td> <td>protect fish being eaten by predators / named predator / prevent escape;</td> </tr> <tr> <td>feeding small quantities of food frequently</td> <td>all eaten / no waste / no decay / less eutrophication / less bacterial growth / eq;</td> </tr> </tbody> </table>	Method	How method increases fish production	adding antibiotics to the water	control disease / kill bacteria / parasites / pathogens / eq;	using nets to cover tanks	protect fish being eaten by predators / named predator / prevent escape;	feeding small quantities of food frequently	all eaten / no waste / no decay / less eutrophication / less bacterial growth / eq;	ignore competition ignore ref to energy / nutrients ignore overfeeding ignore pollution	3
Method	How method increases fish production										
adding antibiotics to the water	control disease / kill bacteria / parasites / pathogens / eq;										
using nets to cover tanks	protect fish being eaten by predators / named predator / prevent escape;										
feeding small quantities of food frequently	all eaten / no waste / no decay / less eutrophication / less bacterial growth / eq;										
(c)	digested / broken down; amino acids / (poly)peptides; stomach; protease / named protease enzyme (ONCE); HCl / acid / low pH / eq; small intestine / duodenum / ileum; bile / neutralise /alkaline / eq; <u>optimum</u> pH (ONCE)	ignore pepsinogen / trypsinogen  accept name of enzyme if in incorrect part of gut	Max 5								

Total 12 marks

Question number	Answer	Notes	Marks
12 (a) (i)	hypothalamus / pituitary;		1
(ii)	1. <u>collecting</u> duct; 2. more permeable / eq; 3. (more) water (re)absorbed (into blood) / blood more dilute / eq; 4. <u>osmosis</u> ; 5. urine concentrated / less water in urine / less urine;	1. ignore nephron 2. ignore changes permeability 3. allow water potential concept if used correctly	3
(b)	1. fast(er) (versus slow(er)); 2. electrical/impulse (versus chemical); 3. neurones (versus blood); 4. short(er) lasting (versus long(er) lasting); 5. target cells (versus all around body);	nervous / hormone point alone = accept  'it' is faster – assume nerves discussed  allow two ways if in same numbered section	Max 2
(c)	light all around: straight and taller than start; light from side: grows towards light; darkness: straight and taller than light all around after two days;		3
(d)	down / positively geotropic / toward gravity / eq; anchor / hold plant / stability / eq; (obtain) water / mineral ions / nutrients / eq;		3

**Total 12 marks**



Question number	Answer	Notes	Marks
13	<p>C indoors / outdoors / eq;</p> <p>O same species / size / age / breed / gender / eq;</p> <p>R repeats / groups / lots / some chickens / eq;</p> <p>M1 mass / length / eq ;</p> <p>M2 time period <u>stated</u>;</p> <p>S1 one variable controlled;</p> <p>S2 another variable controlled;</p>	<p>eg. 2 inside and 2 outside</p> <p>allow if at start or at end</p> <p>at least one day</p> <p>eg. mass of food / same food / area / water / light / eq</p> <p>ignore temperature ignore environment</p>	Max 6

**Total 6 marks**

**PAPER TOTAL: 120 MARKS**

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