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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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Summer 2012
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INTERNATIONAL GCSE BIOLOGY PAPER 1B – SUMMER 2012

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>1 (a)</td><td>
<table>
<tr><th>Feature</th><th>Plants</th><th>Animals</th></tr>
<tr><td>can move from place to place</td><td>(X)</td><td>(√)</td></tr>
<tr><td>can carry out photosynthesis</td><td>√</td><td>X;</td></tr>
<tr><td>are multicellular</td><td>√</td><td>√;</td></tr>
<tr><td>have cells with cell walls</td><td>√</td><td>X;</td></tr>
<tr><td>store carbohydrate as glycogen</td><td>X</td><td>√;</td></tr>
</table>
</td><td>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</td><td>4</td></tr>
<tr><td>(b)</td><td>fungi;
bacteria / prokaryotes;
protoctists / protozoa;
viruses;</td><td>allow singular or plural
ignore parasites / microorganisms / specific names eg cholera / amoeba</td><td>Max 2</td></tr>
</table>

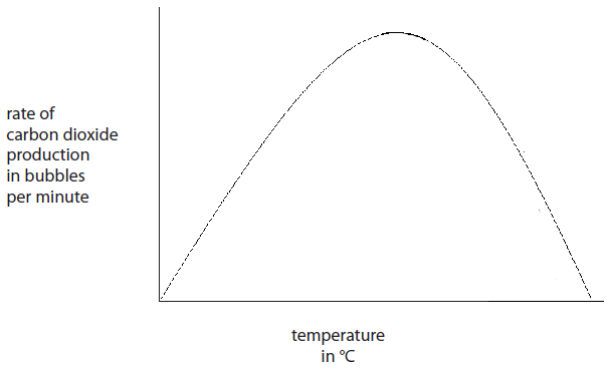
Total 6 marks

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

reject ref to thin cell wall

wrong named blood vessel = 0 for whole item</td><td>2</td></tr>
</table>

Total 6 marks

Question number	Answer	Notes	Marks
3 (a)	keep out oxygen; anaerobic / prevent aerobic idea / eq;	respiration alone gets no credit	2
(b) (i)	 starts low and rises; peak / level / rise less steep; down;	inverted = 0	3
(ii)	carbon dioxide / CO_2 (production);		1
(iii)	temperature;		1
(c)	volume of glucose; concentration / mass of glucose; mass / volume / number / of yeast; species / type of yeast; pH of solution;	allow amount / quantity ignore volume of water in bath ignore room temperature ignore ref to oxygen ignore ref to oil	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 CO2 = 0 CO_2 = 1	3

Total 14 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>4 (a) (i)</td><td>
<table>
<tr><th>Structure</th><th>Organ</th></tr>
<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>
</table>
</td><td></td><td>3</td></tr>
<tr><td>(b) (i)</td><td>movement of molecules/particles/gases/named molecule;

high conc. to low conc. / down concentration gradient / eq;

passive / eq;</td><td>ignore <u>substances</u>

allow along concentration gradient</td><td>Max 2</td></tr>
<tr><td>(c)</td><td>ultrafiltration / pressure;
glomerulus / Bowman’s capsule / renal capsule;</td><td>ignore filtered alone</td><td>2</td></tr>
</table>

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;		1
(ii)	active transport / active uptake; low to high conc. / against conc. gradient / eq;	ignore across concentration gradient	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)	¼ / 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 temperature and midpoint/period/year; U ^{o}C; P 1795 and 1995 plotted correct;	annotate using the letters provided extrapolation loses P mark	6
(b)	1695-1720;		1
(c) (i)	water vapour / 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. cattle farming / rice farming; 5. deforestation; 6. fridges / aerosols (CFCs);	ignore petrol	3

Total 12 marks

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

2. sperm: better chance of fertilisation / swim easier / eq
egg: more cytoplasm / more nutrition / eq;</td><td></td><td>2</td></tr>
</table>

Total 6 marks

Question number	Answer	Notes	Marks
10 (a)	stomata / guard cells; spongy (mesophyll) / spongy (layer) / air spaces / eq; moist; thin; large surface area;	ignore wide and flat	Max 3
(b)	$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$;; $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$ = 1	allow one mark for correct equation and correct formula and a second mark for correct balance formula wrong = 0 eg. CO2 = wrong but CO_2 = 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

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>11 (a) (i)</td><td>(-)10.62 / (-)10.6;;
allow one mark for 9.76 or 1.16 in working however used</td><td>ignore minus sign
ignore additional decimal places</td><td>2</td></tr>
<tr><td>(ii)</td><td>idea of <u>less</u> oxygen /eq;
(less) respiration / energy;
low yield / less growth / smaller fish / eq;</td><td>ignore idea of high oxygen needed for growth
ignore death
ignore number</td><td>Max 2</td></tr>
<tr><td>(b)</td><td><table><tr><th>Method</th><th>How method increases fish production</th></tr><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></table></td><td>ignore competition
ignore ref to energy / nutrients ignore overfeeding
ignore pollution</td><td>3</td></tr>
<tr><td>(c)</td><td>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)</td><td>ignore pepsinogen / trypsinogen

accept name of enzyme if in incorrect part of gut</td><td>Max 5</td></tr>
</table>

Total 12 marks

Question number	Answer	Notes	Marks
12 (a) (i)	hypothalamus / pituitary;		1
(ii)	1. collecting duct; 2. more permeable / eq; 3. (more) water (re)absorbed (into blood) / blood more dilute / eq; 4. osmosis; 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	C indoors / outdoors / eq; O same species / size / age / breed / gender / eq; R repeats / groups / lots / some chickens / eq; M1 mass / length / eq ; M2 time period <u>stated</u>; S1 one variable controlled; S2 another variable controlled;	 eg. 2 inside and 2 outside allow if at start or at end at least one day eg. mass of food / same food / area / water / light / eq ignore temperature ignore environment	Max 6

Total 6 marks

PAPER TOTAL: 120 MARKS

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