Mark Scheme (Results)

Summer 2017

Pearson Edexcel International GCSE
in Biology (4BI0) Paper 1B
Science (Double Award) (4SC0) Paper 1B

Pearson Edexcel Level 1/Level 2 Certificate
Biology (KBI0) Paper 1B
Science (Double Award) (KSC0) 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)	A trachea / windpipe; B bronchus / bronchi; C bronchioles / bronchiole / bronchiol;	 Ignore left / right	 3
(ii)	branches / branching;	Ignore trunks and leaves and roots	1
(b)	1. diaphragm; 2. contracts (ONCE); 3. flattens / moves down / lowers / eq; 4. intercostal muscles; 5. ribs move up / out / ribcage expands / eq; 6. <u>volume</u> increases; 7. <u>pressure</u> decreases;		max 4
(c) (i)	1. passive smoking / others inhale smoke / eq; 2. causes cancer / contains carcinogens; 3. asthma / emphysema / COPD / bronchitis / infection / eq; 4. carbon monoxide reduces transport of oxygen / binding with haemoglobin / eq; 5. causes CVD / heart disease / eq; 6. discourage smoking / eq;	Ignore death	max 3
(ii)	1. slows growth / development / still growing / not fully developed / eq; 2. children smaller / lungs are smaller;		max 1

Total 12 marks

Question number	Answer	Notes	Marks
2 (a) (i)	1. starch column all no; 2. glucose column yes for starch and glucose; 3. glucose column no for starch and maltase, and starch and boiled amylase;		3
(ii)	1. increase / eq; 2. water enters / eq; 3. osmosis; 4. high conc. of <u>water</u> to low conc. of <u>water</u> / <u>water</u> down a concentration gradient / eq;	Allow correct reference to water potential.	max 3
(iii)	1. Benedict's; 2. boil / heat / warm / use waterbath / eq; 3. (brick) red means glucose present / blue means glucose absent;	Allow green / yellow orange Allow Mp2 and Mp3 independent of test	3

(b)	1. use lipid + bile + lipase; 2. use lipid + lipase; 3. use lipid + bile; 4. see if fatty acids/glycerol produced; 5. measure pH / use (universal) indicator / pH meter /eq; 6. leave for same time / stated time eq;	Ignore test for lipid	max 3

Total 12 marks

Question number	Answer	Notes	Marks
3 (a) (i)	8 / eight;		1
(ii)	4 / four;		1
(iii)	Gg / heterozygous / heterozygote;		1
(iv)	0.25 / 25% / ¼ / 1 in 4;		1
(b)(i)	1. rare / random / chance / spontaneous;		
	2. change to DNA / allele / gene / chromosome(s);	Allow genetic information / genome / nucleotides /	2
(ii)	characteristic and benefit described;	eg. black fur for camouflage immunity = 0 disease resistant = 1 resistant = 0	1
(c)	1. frequency decreases / fewer alleles;		
	2. (affected) individuals die / few survive;	individuals do not live long enough to reproduce = 2	
	3. less reproduction / fewer offspring / decide not to have children;		
	4. <u>allele</u> not passed on / eq;	ignore gene not passed on	max 3

Total 10 marks

Question number	Answer	Notes	Marks
4 (a)	1. sperm/ male gametes have X or Y / sperm are X and Y; 2. eggs / female gametes are X / eq; 3. XX is female / mother is XX / X sperm meets X egg produces female; AND XY is male / father is XY / Y sperm meets X egg produces male;	Ignore gene allow MP1 and MP2 from a Punnett square	max 2
(b)	1. more sperm; 2. sperm have one tail / head;	Allow converse Ignore damaged / deformed / healthy	2
(c)(i)	24.75 million / 24 750 000 / 2.475×10^7 / 24.75×10^6;;	Allow one mark for 45% , 45 or 0.45 in working	2
(ii)	1. fewer moving sperm / less/no movement / swimming; 2. fail to reach egg / eq; 3. less <u>fertilisation / fertilises</u> ;	Allow converse ignore lowers fertility as fertility in stem	max 2

Total 8 marks

Question number	Answer	Notes	Marks
5 (a)	S y scale linear and at least half grid; L bars drawn with straight lines; A axes labelled percentage/% and age/years and shows age categories; P all bar heights correct; K good, bad or good and bad;	 Lose mark if line graph Allow half square error	5
(b)	as people get older more think cloning is a good idea / eq;	Allow converse	1
(c)	120;;	Allow one mark for 15 /15% / 0.15 in working	2
(d)	1. named example; 2. <u>nucleus</u> from body/diploid cell put into empty/enucleated egg cell; 3. electricity/ shock ; 4. mitosis / cell division; 5. embryo; 6. uterus / womb; 7. <u>surrogate</u>;	eg. Dolly, Molly / Polly / Snuppy, Copycat, Ralph, Injaz, Cupid, Diana Reject meiosis	max 6

Total 14 marks

Question number	Answer	Notes	Marks
6 (a)	$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$;;	Allow 1 for word equation Allow 1 for correct formula but unbalanced	2
(b) (i)	1. contain more chloroplasts / chlorophyll; 2. absorb / trap / capture / obtain (more) light;		2
(ii)	1. less distance / cells near surface / less of a barrier / eq; 2. (more) light reaches / penetrates / trapped / absorbed / eq; or 3. (shade more) humid; 4. less/no cuticle; or 5. less photosynthesis; 6. less growth;	ignore diffusion distance look to maximise score from within one pair	max 2
(c) (i)	1. less photosynthesis; 2. less light / less sun / eq; 3. low(er) temperature which affects enzymes / kinetic energy / molecular movement / collisions / eq; 4. fewer stomata open / stomata less open / closed;	Ignore carbon dioxide	max 3 max 3

(ii)	1. more photosynthesis; 2. more light / more sun / eq; 3. high(er) temperature which affects enzymes / kinetic energy / molecular movement / collisions / eq; 4. stomata open; 5. low CO_2 (may) slow photosynthesis / CO_2 limits photosynthesis / eq;		
(d)	1. measure oxygen / starch / change in CO_2 / eq; 2. (how measured) count bubbles / volume / gas syringe / iodine / hydrogencarbonate / eq; 3. same time / time stated; 4. control of named biotic variable; 5. control of named abiotic variable;	allow glucose allow Benedict's eg. age / mass / SA eg. light / temperature / CO_2	max 4

Total 16 Marks

Question number	Answer	Notes	Marks
7 (a)	1. more/faster growth in solution with all mineral ions; 2. growth levels off / less growth / decrease in growth / growth stops (45 days / 25 days);	Allow converse for Mp1 and Mp2 Ignore use of numbers alone	2
(b)	1. oxygen; 2. respiration; 3. energy / ATP; 4. active transport / active uptake;		max 3
(c)(i)	1. (kill) algae / bacteria / microorganisms / pathogens / fungi / virus / eq; 2. prevent use of ions (by microbes) / prevent infection / disease ;	Ignore organisms allow nutrients Ignore harm / damage/ kill plants	2 2
(ii)	1. less/no light / exclude light; 2. prevent algae growth / prevent photosynthesis / similar to soil / similar condition for roots / eq;		
(d)(i)	length / height (of stem);	Ignore growth	1
(ii)	age / species / mass of plant / size of plant / surface area / eq;	Allow type	1

Total 11 Marks

Question number	Answer	Notes	Marks
8 (a)	quadrat; quadrant = 0		1
(b) (i)			2

Species	Number of plants	Average (mean) number of plants per m^2
bunchgrass	7	0.19
plantain	8;	0.22 / 0.222 etc 0.2 with recurring dot;

(ii) 2

Species	Frequency	Percentage (%)
bunchgrass	4;	11 / 11.1 / 11.11 etc / 11.1 with recurring dot;
plantain	8	22

(c)	1. (several) quadrats / repeated quadrats / eq; 2. random; 3. use tables / calculator / phone books / generator / eq; 4. count / number / how many / cover / density / frequency / eq; 5. multiply up to calculate total in large field / multiply up from $36m^2$ / eq;		max 4

Total 9 Marks

Question number	Answer	Notes	Marks
9 (a) (i)	nucleus;		1
(ii)	axon / cytoplasm;		1
(iii)	arrow from cell body towards dendrites;		1
(b)	1. impulse;	Allow action potential Ignore signal / message	2
	2. (to) muscle / gland / effector / eq;	reject if other direction described	
		Allow following converses	
(c)	1. electrical;	1. chemical	
	2. uses cells / uses neurones / uses nerves / uses CNS / eq;	2. blood	
	3. faster;	3. slower	
	4. specific target / location / eq;	4. widespread	
	5. all or nothing / no dose effect / eq;	5. dose effect	
	6. short-lasting / eq;	6. long-lasting; hormonal is via blood but nervous is electrical = 2	max 3

Total 8 Marks

Question number	Answer	Notes	Marks
10	1. cellulose; 2. starch; 3. consumers; 4. glycogen; 5. chromosome / nucleiod; 6. plasmids / plasmid; 7. photosynthesis / photosynthesising; 8. yoghurt / cheese; 9. pathogen; 10. pneumonia;	Mp 5 must be singular not chromosomes	10

Total 10 Marks

Question number	Answer	Notes	Marks
11 (a)	1. hyphae / mycelium; 2. enzymes; 3. extracellular / onto wood / outside organism / eq; 4. digest / digestive / breakdown; 5. carbon dioxide / water; 6. saprotroph / saprophyte / saprobiont / eq;	 3. Ignore secrete alone 4. Ignore decay	 max 4
(b)	C different fungicides; O same logs / same wood / same tree / same bench / same species / same age of wood / eq; R more than one log used / several logs / repeat / eq; M1 measure mass/weight (of wood) before and after / change in mass/weight (of wood); M2 reference to a stated time period; S1 and S2 same oxygen / temperature / moisture / volume of fungicide / exposed to same fungi / same mass of fungi / eq;;	 for each fungicide at least a week Allow amount ignore light	 max 6

Total 10 Marks

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