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Mark Scheme (Results)

January 2016

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

Pearson Edexcel Certificate in
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)	1. (food web) order correct; 2. all arrows correct;	plant, hare, fox, cats and eagles need to be in correct order allow order only if in pyramid	2
(ii)	herbivore / primary consumer;		1
(b) (i)	young heather;		1
(ii)	1. more food / eq; 2. more nutritious food / eq; 3. easier to digest / softer / less spikes / eq; 4. fewer other animals / competition from other herbivores; 5. camouflage / fewer predators / protection from predators / shelter from predators / hide in long grass;	2. ignore better quality / taste 4. ignore competition alone / intraspecific	3
(c)(i)	32;;	allow one for 224 ÷ 700	2
(ii)	bilberry;		1

(d)	1. placed at random; 2. same sized quadrat	ignore repeat	1

Total 11 marks

Question number	Answer	Notes	Marks
2 (a) (i)	A; (C) B; A;	Only one letter in each box	3
(ii)	1. (bile) <u>emulsification</u> / <u>emulsifies</u>; 2. small(er) drops / increased surface area / more drops; 3. optimum pH / correct pH / best pH; 4. (lipase) is an enzyme; 5. digestion / breakdown; 6. into <u>fatty acids</u> / into <u>glycerol</u>;		4
(b)(i)	villus / villi;	allow phonetic spelling	1

(ii)	1. large surface area; 2. microvilli ; 3. capillaries; 4. movement of blood / concentration gradient / eq; 5. one cell thick / thin wall / thin / short distance; 6. diffusion; 7. active transport;	1. ignore many villi idea 4. ignore cell wall	5

Total 13 marks

Question number	Answer	Notes	Marks
3 (a)	1. cell membrane; 2. cytoplasm; 3. chromosome / nucleiod; 4. plasmid(s); 5. flagellum; 6. pilli; 7. ribosome; 8. capsule;	 3. ignore DNA 4. ignore circle of DNA ignore incorrect structure label ignore correct structure labelled incorrectly or doesn't look like correct structure eg plasmid going to a straight line in cytoplasm	3
(b)(i)	S vertical scale linear and at least half grid; L neat lines drawn for bars; A axes labelled number of people and type of food / names of foods; P bars at correct height for ill and dead; K key to show ill and dead;	If scale not linear lose S and P Line graph loses L	5

(ii)	1. cheese; 2. indication of working 22% / 21.9% / 21.97% risk of death / 78% chance of living / ratio of 4.55;		2
(c)	1. kill/destroy bacteria / eq; 2. white blood cells; 3. <u>phagocytes / macrophage</u>; 4. engulf / surround / ingest / digest / eat / eq; 5. <u>lymphocytes</u>; 6. antibodies / antitoxins; 7. (bind to) antigens; 8. memory cells;	phagocytosis = 2 lymphocytes engulf = allow lymphocyte mark only phagocytes produce antibodies all phagocyte mark only white blood cells engulf = 2 white blood cells produce antibodies = 2	5

Total 15 marks

Question number	Answer	Notes	Marks
4 (a)	1. parents are BB and bb; 2. first generation is Bb;	no TE	2
(b)	1. gametes B and b; 2. second generation BB, Bb, Bb and bb;	allow TE for 1 mark for correct offspring from incorrect gametes	2
(c)	1. sperm; 2. fertilisation / fusion; 3. zygote; 4. diploid; 5. mitosis; 6. 40 / forty / 20 pairs;		6

Total 10 marks

Question number	Answer	Notes	Marks
5	C ± GM / GM field and normal field / eq; O same species / size / mass / length / eq; R many plants / several fields / eq; M1 mass / length / surface area of leaves / count fruit / count flowers / eq; M2 <u>stated</u> time period; S1 and S2 same temp. / light intensity / carbon dioxide / water / mineral ions / soil / exposure to pests / eq;;	M1 ignore yield M2 one day plus	6

Total 6 marks

Question number	Answer	Notes	Marks
6 (a)	$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$;;	unbalanced but correct =1 eg $CO_2 + H_2O \longrightarrow C_6H_{12}O_6 + O_2$; words alone = 0	2
(b) (i)	1. turn off Bunsen / use water bath / eq; 2. ethanol is flammable / eq; OR 3. wear goggles; 4. protect eye; OR 5. use forceps / tongs; 6. protect fingers / skin;	ignore gloves / protective clothing	2
(ii)	kill leaf / stop digestion / stop chemical reactions; denature enzymes;	ignore wax removal / soften leaf	1
(iii)	1. remove chlorophyll / remove green (pigment) / remove colour / to see colour of iodine; 2. allow remove waxy cuticle;	ignore remove chloroplasts / destroy chlorophyll	1

(c)(i)	1. place one leaf in light / no cover of leaf; 2. place one leaf in dark / cover part of leaf;	2. eg use of stencil / tape	2
(ii)	1. use variegated leaf / eq; 2. draw pattern of chlorophyll and compare results / test white and green parts / eq;		2
(iii)	1. NaOH / soda lime / KOH; 2. absorb / remove carbon dioxide / eq;		2

Total 12 marks

Question number	Answer	Notes	Marks
7 (a) (i)	fungi / fungus;	allow phonetic spelling eg funghi	1
(ii)	no <u>oxygen</u>;	ignore no air	1
(iii)	glucose; $\longrightarrow$ ethanol/alcohol + carbon dioxide;	allow 1 for chemical symbols	2
(b) (i)	steam / radiation / high temperature / disinfectant / ethanol / washed in hot water / eq;		1
(ii)	remove pathogens / bacteria / microorganisms / eq;	ignore prevent competition / prevent contamination	1
(c) (i)	<u>amylase</u> / <u>maltase</u>;	ignore amyl<u>o</u>se / malt<u>o</u>se	1
(ii)	<u>maltose</u> / <u>glucose</u>;		1
(d)	1. less food / less glucose / less maltose; 2. (increase in) ethanol / alcohol;	ignore less barley ignore beer	2

Total 10 marks

Question number	Answer	Notes	Marks
8 (a) (i)	artery / arteries / aorta;		1
(ii)	atrium / left or right atrium / left or right atria / left or right auricle;		1
(iii)	1. fewer chambers / two chambers / one atrium / one ventricle / eq; 2. fewer valves / eq; 3. no separation of left and right sides / no septum / no left and right atria / no left and right ventricles; 4. chamber walls have similar size / eq; 5. fewer blood vessels / only two blood vessels / eq;	allow converse for <u>human</u> heart 3. ignore ref to circulation / blood flow	3

(b)	1. less oxygen/deoxygenated in fish heart; 2. more carbon dioxide in fish heart; 3. oxygen used in respiration; 4. carbon dioxide produced by respiration;; 5. blood oxygenated in human lungs; 6. carbon dioxide removed in human lungs;	allow converse for blood in human heart	4
(c)	1. single circulation / no separate lung circulation / blood passes through heart once / blood in fish has to pass through two sets of capillaries / eq; 2. fish are smaller / fish have smaller heart / fish heart has thinner walls;	allow converse for human	2

Total 11 marks

Question number	Answer	Notes	Marks
9 (a)	1. larger (petals); 2. colour; 3. enclosed anther / enclosed stamens / shorter stamen / shorter filament; 4. enclosed stigma / enclosed carpels / shorter style / stigma not feathery; 5. nectary;	ignore amount of pollen or nectar allow converse for wind-pollinated for all Mps ignore attractive / smell / sticky as not structures	3
(b)	A petal / petals / corolla;		1
	B anther;		1
	C filament;		1

(c)	1. stigma; 2. pollen tube grows (down style); 3. into ovule / ovary; 4. enters via micropyle; 5. (male) nucleus / (pollen grain) nucleus / male gamete; 6. fertilisation / fuse / join / eq; 7. ovum / egg / (female) nucleus / female gamete; 8. ovule becomes seed; 9. ovule wall becomes seed coat / testa; 10. ovary becomes fruit;	allow if shown on clearly labelled diagram	5

Total 11 marks

Question number	Answer	Notes	Marks
10 (a)	1. housing / building / construction / eq; 2. agriculture / farming / farming cattle / palm oil plantations / eq; 3. transport / roads / railways / eq; 4. making furniture / making paper; 5. for fuel / cooking / charcoal / to burn / eq;	ignore for logs / wood / employment	2
(b) (i)	1. less oxygen / more carbon dioxide / eq; 2. (less) photosynthesis; 3. more burning;		2
(ii)	1. soil erosion / less roots to hold soil in place / loose soil; 2. leaching / loss of minerals / loss of nutrients / loss of fertility / eq;		2

(c)	1. laws to protect / prevent / limit deforestation / make deforestation illegal / eq; 2. replant / replace each tree felled / plant more trees / use sustainable wood sources / eq;		2

Total 8 marks

Question number	Answer	Notes	Marks
11 (a) (i)	1. cannot reproduce without host; 2. do not move; 3. do not respire; 4. do not respond to stimuli; 5. do not grow / develop; 6. do not excrete; 7. do not feed; 8. do not control internal conditions;		2
(ii)	1. HIV / AIDS; 2. TM(V) / tobacco mosaic disease; 3. influenza / flu / cold / Ebola / eq;	allow any named virus or disease caused by virus	1

(b)	1. no genetic material / DNA / RNA; 2. not recognised by immune system / eq; 3. smaller; 4. always fatal; 5.viruses have protein coat; 6. viruses can be used as vectors;	allow converse	2

Total 5 marks

Question number	Answer	Notes	Marks
12 (a)	1. before and after exercise; 2. breaths per minute;	allow interchangeable rows /columns ignore breathing rate no credit for graph	2
(b)	1. muscle(s); 2. respiration; 3. oxygen required; 4. remove lactic acid; 5. oxygen debt; 6. remove carbon dioxide;		4
(c)	1. repeat / use more people / eq; 2. measure breathing rate during exercise; 3. somebody else / machine / data logger / spirometer count breaths / eq; 4. run at same speed / for same time same distance / run on treadmill / eq;		2

Total 8 marks

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