edexcel

Mark Scheme (Results)

Summer 2016

Pearson Edexcel International GCSE in Biology (4BI0) Paper 1BR

Pearson Edexcel International in Science Double Award (4SC0) Paper 1BR

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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)	E; C;		2
(b)	1. can be used in the production of beer; 2. cell wall is made of chitin;	3 ticks max 1 4 ticks or more = 0	2

Question number	Answer	Notes	Marks
2 (a)	leaf;		1
(b)	made from tissue(s) + perform a specific function / eq;		1
(c)	The following named and labelled correctly: cell wall; cell membrane; 5 to 6 correct = 3 nucleus; chloroplast; 3 to 4 correct = 2 cytoplasm; vacuole; 1 to 2 correct = 1	ignore mitochondria and ribosomes	3

Question number	Answer	Notes	Marks
3 (a)	grass;		1
(b) (i)	1600;;	allow one mark for 96 000 or 1.6 or ÷ 60 in working	2
(ii)	1. anaerobic (respiration);		
	2. less oxygen;	ignore oxygen debt	
	3. lactic acid / low pH;		
	4. affects enzymes / denatures enzymes;	ignore muscle fatigue / cramp / pain	
	5. less energy / less ATP;		Max 3
(c)	1. <u>variation</u> / <u>variety</u>;	allow converse	
	2. <u>mutation</u> / <u>mutates</u>;		
	3. <u>survive</u> / <u>survival</u> / <u>survival</u> of the fittest;		
	4. reproduction / breed / mate / produce offspring;	3. ignore several generations / increase in number	
	5. pass on gene / DNA / allele;	4. ignore pass on mutation unless defined / characteristic	Max 4

(d)(i)	light passes through retina twice / retina again / more light through retina / more detection by retina / more stimulation of retina / more retina cells stimulated / reflects back through retina / eq;		1
(ii)	large(r) pupil / dilated pupil / expanded pupil / <u>more</u> rods / larger hole in iris / radial muscles contract more / eq;	ignore more cones ignore smaller iris ignore circular muscles relax	1
(e)(i)	1. lion eats <u>protein</u> / meat is <u>protein</u>; 2. amylase cannot digest <u>protein</u>;	1. allow lion does not eat <u>starch</u> / meat has no <u>starch</u> 2. allow amylase digests <u>starch</u>	2
(ii)	1. increase surface area / increase surface area to volume ratio; 2. <u>protease</u> / <u>pepsin</u>;	ignore enzyme	2

Question number	Answer	Notes	Marks
4 (a) (i)	November and December;		1
(ii)	(grass / yew)		
	1. most months / 7 months / longest/longer duration / eq;	allow Mp1 for yew ignore many months	
	2. largest/highest count / highest/higher peak / most pollen / eq;		2
(b)	1. rain / precipitation / humidity;	1. ignore weather / water / time of day / slide size / amount of jelly	
	2. temperature;		
	3. wind;	3. ignore fans / eq	Max 2
(c)	1. pollen tube;		
	2. style;		
	3. ovary;		
	4. (pollen tube / male gamete into) ovule;		
	5. male nucleus / male gamete / male sex cell;	5. ignore pollen	
	6. fertilisation / fertilised / fertilize / fuses / joins / eq;	pollen fertilises the ovum = 2	
	7. female nucleus / female gamete / female sex cell / ovum / egg;		
	8. ovary becomes fruit;		Max 5

Question number	Answer	Notes	Marks
5 (a)	S y axis scale linear and at least half grid; L line straight, neat and through points; A1 axes correct way; A2 axes labelled (time in) <u>months</u> + <u>% fire ant</u> (population); P points plotted accurately; K key shown;	no L if not to origin or beyond 30 if bar graph no L and no P allow plots to within one square	6
(b)	1. killed / poisoned / eq; 2. some have mutation / are resistant; 3. reproduce / breed / mate / produce offspring; 4. pass on gene / DNA / allele; 5. pesticide degrades / washed away / some areas missed / eq;	1. ignore not survived 2. ignore immune 3. ignore generations / increase in number 4. ignore pass on mutation unless defined / characteristic	Max 3

(c)	1. greater decrease in pest numbers / kills more ants / eq; 2. lasts longer / ant numbers stay low / eq; 3. no resistance; 4. no need to reapply; 5. specific / only kills pest / does not kill other living organisms / less effect on food chains / no bioaccumulation / eq;	ignore cheaper 5. ignore less harm to people / environment / ecosystem / pollution	Max 2
(d)	1. quadrat / trap / jar / plate with food / eq; 2. several / average / repeat; 3. random; 4. count / number / how many / amount; 5. multiply to get total (for area);	quadrats = Mp1 and Mp2 random samples = Mp2 and Mp3	Max 4

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>6 (a)</td><td><table><tr><th>Event</th><th>Letter</th></tr><tr><td>ultrafiltration</td><td>A;</td></tr><tr><td>glucose reabsorption</td><td>B;</td></tr></table></td><td></td><td>2</td></tr>
<tr><td>(b)</td><td>1. (diuretic) enters blood / travels in blood;

2. pituitary / hypothalamus;

3. <u>less</u> ADH;

4. collecting <u>duct</u>;

5. less permeable;

6. less water (re)absorbed / less water into blood;</td><td>ignore references to urine</td><td>Max 5</td></tr>
</table>

Question number	Answer	Notes	Marks
7 (a) (i)	ventricle / chamber B wall is thinner / ventricle / chamber B has thinner walls / ventricle / chamber B less muscular / heart diagrams always have RHS on the left / vena cava attached / pulmonary artery attached;	allow converse for LHS of heart ignore references to blood ignore references to chamber size / valve	1
(ii)	left ventricle;		1
(iii)	pulmonary artery correctly labelled;		1
(iv)	1. (left ventricle/chamber A/it) more muscle; 2. generate more pressure / create more force / stronger pumping / eq; 3. pumps blood to body / pumps blood further / eq;	allow converse for right ventricle 1. ignore thicker wall 2. ignore withstand pressure	Max 2
(b) (i)	atrioventricular valve / AV valve / tricuspid valve;	ignore valve alone	1
(ii)	prevent backflow / blood flows in one direction / allows blood to flow from atrium to ventricle / eq;	prevents backflow into ventricles = 0	1

Question number	Answer	Notes	Marks
7 (c)	1. allows blood to mix / eq; 2. oxygenated and deoxygenated blood / deoxygenated into left ventricle/chamber A / oxygenated blood into right ventricle/chamber B; 3. less oxygen (to body / to cells); 4. less respiration / less energy / ATP / more anaerobic respiration / more lactic acid; 5. less growth / smaller size;	3. ignore reference to oxygen to lungs	Max 3
(d) (i)	1. (place fingers on) artery / wrist / neck / chest / use heart monitor / eq; 2. count pulse/beat/pumps/heart rate for stated time period/ one minute / measure in bpm;	allow appropriate technology	2
(ii)	1. repeat / use many people / group / calculate average / remove anomalies / eq; 2. same duration / intensity / type of exercise; 3. use same gender / age / size / mass / fitness / eq;	ignore rest period ignore same person / same people	Max 2

Question number	Answer	Notes	Marks
8	fossil; sulfur dioxide / nitrogen oxide / nitrogen dioxide; acid rain / sulphuric acid / nitric acid; carbon monoxide; haemoglobin; oxygen / O_2; global warming; greenhouse; methane / CH_4; CFCs / CFC's / CFC / chlorofluorocarbons / chlorinated fluorocarbons;		10

Question number	Answer	Notes	Marks
9 (a) (i)	movement of particles/ions/molecules/gas from a high concentration to a low concentration / down a concentration gradient;	ignore substances / liquid ignore along / across	1
(ii)	3 mm;		1
(iii)	must be clear in middle and not drawn outside cube;	allow if border not shaded	1
(b)	cube shows more penetration of dye at any one edge and clear in middle;	allow if uneven allow if border not shaded	1
(c)	1. temperature (increased); 2. particles have more (kinetic) energy / move faster / more movement / eq; OR 3. concentration of dye (increased); 4. increased gradient / more particles / eq; OR 5. concentration of agar (increased); 6. reduces speed of particle movement / eq;	allow converse ignore more collisions	maximum of two factors Max 4

Question number	Answer	Notes	Marks
9 (d)	1. dye does not reach middle of cube / takes longer to reach middle of cube / reaches lower proportion; 2. large organisms / large cubes have small SA:VOL; 3. (in large organisms) <u>diffusion</u> is slow / <u>diffusion</u> takes too long / <u>diffusion</u> is insufficient / <u>diffusion</u> is affected by distance / eq; 4. need to get <u>oxygen</u> / <u>glucose</u> to cells / all of the body;	allow converse	Max 3

Question number	Answer	Notes	Marks
10 (a)	1. (individual fish) can control size / age / mass / species / growth / faster production / grow faster / control health / control disease / control protein content / control feeding / control quality of fish; 2. can selectively breed / genetically modify; 3. reduce overfishing / does not reduce wild stocks / sustainable / less risk to food chains / less chance of catching other species / less chance of catching rare fish / prevent extinction; 4. high yield / large numbers of fish / guaranteed harvest / regular supply / available all year; 5. safer / less risk for fishermen / eq;	ignore cheaper 4. ignore less time consuming / easier to catch	Max 2

(b) (i)	fewer pathogens / bacteria / algae / less eutrophication / less fertiliser / less sewage / less human waste / less faeces / less chance of disease / less chance of infection / eq;	ignore cleaner / less minerals / less waste / less pollutants / less contamination	1
(ii)	1. humans do not want to eat antibiotics; 2. passes along food chain / bioaccumulation; 3. less chance of (bacteria) resistance;	ignore safer to eat / cost / rivers / environment	Max 2

Question number	Answer	Notes	Marks
10 (c) (i)	37.9 / 38 / 38.0 %;;	allow if in table allow one mark for 1.1 as numerator / 2.9 as denominator in working / 37.93;	2
(ii)	C traditional and new type of farm; O (waste from) same species / same fish / same number / mass / age / size / same size of fish farm / eq; R repeat experiment; M1 (what is measured): mass of algae / mass of pondweed / oxygen level / CO_2 level / nitrate level / phosphate level / mineral level / turbidity / biodiversity / number of species / number of fish / number of organisms / eq; M2 same time of day / same time of year / each month / same length of sampling time / eq; S1 same mass of food (in farm / tank) / same type of food / same diet / same antibiotics; S2 same distance from farms / same depth in water / same light / temperature;	allow amount	Max 6

Question number	Answer	Notes	Marks
11 (a)	$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$;; $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$ = 1	correct formula equation for photosynthesis = 1 if this formula equation is correctly balanced = 2 accept CO2 reject CO^2 word equation = 0 respiration = 0	2
(b) (i)	Two from: 1. temperature 2. light (intensity) 3. carbon dioxide / CO_2;; Then: 4. indication of level of abiotic factor during the day; 5. stated effect on rate of photosynthesis;		Max 4
(ii)	1. less <u>photosynthesis</u>; 2. (more) transpiration / evaporation / loss of water / eq; 3. wilting / loss of turgor / stomata close / less mineral ion transport; 4. less carbon dioxide uptake; 5. enzymes denature / change in shape of active site / eq;	1. ignore less respiration 4. ignore gas exchange	Max 4

Question number	Answer	Notes	Marks
12 (a)	mitosis;		1
(b)	1. A produces two daughter cells; 2. A has one round of division / A splits once; 3. A produces cells with four chromosomes / diploid cells / full set of chromosomes / eq;	allow converse for B use of 'it' assumes A ignore ref to size of cells ignore identical / varied as not shown in the diagram	Max 2

Question number	Answer	Notes	Marks
12 (c)	A any correctly named plant part; B anther / ovule / ovary;	eg growing region tip / stem / root / buds / leaf / embryo / cuttings / callus / bulb / pollen tube	2

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