Mark Scheme (Results)

Summer 2018

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

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

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Summer 2018
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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)	(all) organisms / (all) species / community + environment;		1
(ii)	tree, grass, shrub;	Allow any order	1
(iii)	secondary consumer / 2º consumer;		1
(iv)	baboon / leopard;		1
(v)	grass ⟶ grasshopper ⟶ baboon ⟶ leopard;;	Incorrect arrows = 1	2
	grass → mouse → caracal → snake → baboon → (leopard) = 1		
(b)	1. energy lost / not all energy transferred / only 10% energy transferred / eq;		max 4
	2. movement;		
	3. heat loss / respiration;		
	4. (not) eaten / teeth / bones / hair / death / eq;		
	5. (not) digested / egestion / faeces / assimilated / absorbed / eq;		
	6. excretion / urine;	excrete faeces = 1	

Total 10 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>Blood vessel</th><th>Organ</th></tr>
<tr><td>hepatic artery</td><td>liver;</td></tr>
<tr><td>renal artery</td><td>kidney(s);</td></tr>
<tr><td>pulmonary artery</td><td>lung(s);</td></tr>
<tr><td>hepatic portal vein</td><td>liver;</td></tr>
</table>
</td><td></td><td>4</td></tr>
<tr><td>(b)(i)</td><td>1. artery needs more mass to break /
artery does not break as easily / artery stretches more /
artery stronger;

2. artery (walls) thick(er);

3. artery (more) muscle;

4. artery (more) elastic;</td><td>1. Ignore longer time to break
1. Allow converse</td><td>max 3</td></tr>
<tr><td>(ii)</td><td>repeat investigation / use more rings / obtain average;</td><td>Ignore ref to anomalies / repeat by using different masses / different sized rings = 0</td><td>1</td></tr>
<tr><td>(iii)</td><td>use smaller masses / use 5g masses / eq;</td><td></td><td>1</td></tr>
</table>

Total 9 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>3 (a)</td><td>1. digested / breakdown / broken down / eq;
2. protease / pepsin / peptidase;
3. amino acids / (poly)peptides;
4. hydrochloric acid / HCl;
5. <u>optimum</u> pH;</td><td>2. pepsin and trypsin = 0</td><td>max 4</td></tr>
<tr><td>(b)</td><td>A cell wall;
B cytoplasm;
C starch / carbohydrate;</td><td></td><td>3</td></tr>
<tr><td>(c)(i)</td><td><table><tr><th>Chip</th><th>Surface area in cm^2</th><th>Volume in cm^3</th><th>Surface area to volume ratio</th></tr><tr><td>A</td><td>(28.0)</td><td>(8.00)</td><td>(3.50:1)</td></tr><tr><td>B</td><td>(34.0)</td><td>(8.00)</td><td>(4.25:1)</td></tr><tr><td>C</td><td>24(.0);</td><td>8(.00);</td><td>3(.00):1;</td></tr></table></td><td>Allow one mark for correctly calculated SA:Vol ratio from any numbers student provides in first two columns</td><td>3</td></tr>
<tr><td>(ii)</td><td>1. chip C;
2. small(est) / low(est) surface (area) / SA: Vol;
3. less lipid / oil / fat (on surface);</td><td>1. Allow chip 3
Allow converse for Mps 2 and 3</td><td>3</td></tr>
</table>

Total 13 marks

Question number	Answer	Notes	Marks
4 (a)	1. (photosynthesis) more in red / blue light / (photosynthesis) less in green / (photosynthesis) affected by colour of light; 2. (photosynthesis) produces oxygen;	red and blue light produce more oxygen = 1	max 2
(b)	1. respond / sensitive; 2. move / mobile / motile / swim / eq; 3. respire;	Ignore other characteristics of living organisms	max 2
(c)	1. cell wall; 2. cell membrane; 3. cytoplasm; 4. nucleoid / circular chromosome; 5. plasmid; 6. flagella / pili; 7. ribosomes; 8. slime capsule / slime layer;	4. Ignore DNA 7. Ignore RNA	max 2

Total 6 marks

Question number		Answer	Notes	Marks
5	(a)	T bladder / urinary bladder; U sperm duct / spermatic duct / vas deferens;	Reject gall bladder Ignore sperm tube	2
	(b)	1. urine; 2. semen / seminal fluid;	1. Ignore urea / water 2. Reject sperm	2
	(c)	1. sperm / male gamete / male sex cell; 2. testosterone; 3. secondary sexual characteristics / named secondary sexual characteristic;	1. Ignore semen 3. e.g. body hair / deep voice / muscular development	3

Total 7 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>6(a)</td><td>1. oestrogen;
2. ovary / follicle;
3. fallopian / oviduct;
4. zygote;
5. 46 / forty six;
6. mitosis;
7. X and Y;
8. 50% / 0.5 / half / ½ / eq;</td><td>1. Allow estrogen / estradiol

8. Ignore 1:1</td><td>8</td></tr>
<tr><td>(b) (i)</td><td><table><tr><th>Genotypes of parents</th><th>Possible phenotypes of offspring</th></tr><tr><td><u>Bb</u> and <u>bb</u>;</td><td>one with bars, one with no bars;</td></tr></table></td><td>Allow phenotypes if written</td><td>2</td></tr>
<tr><td>(ii)</td><td>BB, Bb, (Bb) and bb;</td><td></td><td>1</td></tr>
<tr><td>(iii)</td><td>75% / 0.75 / three quarters / ¾ / eq;</td><td>Ignore 3:1</td><td>1</td></tr>
</table>

Total 12 marks

Question number	Answer	Notes	Marks
7 (a)	S scale for yield linear and half the grid; L lines neat and bar tops level; A axis labelled yield of wheat; P accurate heights of six bars for yield of wheat; K1 axis / indication of (mass of nitrate as) 0, 30 and 60; K2 axis / indication of (seed density as) 200 and 400;	L for any data / any number of bars	max 5
(b)	1. increase (in yield) up to 30; 2. 30 is the best / highest yield at 30 / eq; 3. decrease in yield from 30 (to 60) / lowest yield at 60;	increases to 30 and then decreases = 2	3
(c)	1. more seeds reduces yield / less yield at 400 / eq; 2. competition; 3. (less) nitrate / mineral ions / fertiliser / light / water / carbon dioxide;	Allow converse 3. Ignore food / nutrients	max 2

Total 10 marks

Question number	Answer	Notes	Marks
8(a)	1. keep sizes / ages / sexes apart; 2. provide sufficient food;	1. Ignore species / separate by nets alone	max 1
(b)	1. prevent <u>disease</u> / <u>infection</u>; 2. increase fish growth / yield; 3. (antibiotic) resistance (in bacteria); 4. <u>antibiotic</u> / <u>resistant</u> bacteria into <u>humans</u>;	1. Ignore kill bacteria / pathogens	max 3

(c)	C	plus and minus <u>faeces</u> / range of <u>faeces</u>;		max 6
	O	same species of fish / same age / same mass / same size / same sex;		
	R	repeat investigation / use more than one tank / use more than one fish (per tank) / same number of fish (per tank);		
	M1	measure mass / weight / length;	M1 Ignore number that survive / size / growth	
	M2	same stated time period greater than one day;		
	S1	same type of food / same frequency / same mass of food / same diet / same protein / same number of pellets / eq;	S1 / S2 Allow amount	
	S2	same oxygen / same temperature / same light / / same volume of water/tank / same size of tank / eq;	S2 Ignore same quality of water / pH / type of faeces	

Total 10 marks

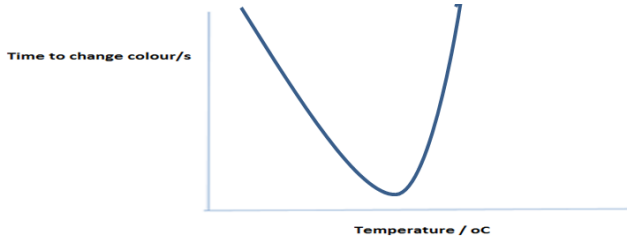
Question number	Answer	Notes	Marks
9(a)(i)	1. reduce water loss / reduce transpiration / reduce evaporation; 2. protection from pathogens / named pathogen;	Allow waterproof	max 1
(ii)	B palisade (mesophyll / cell(s) / layer); C spongy (mesophyll / cell(s) / layer); D guard (cell);		3
(b) (i)	1. stomata; 2. open in light / close in dark; 3. carbon dioxide in / oxygen out; 4. prevent water loss / transpiration / evaporation;	2. Allow day or night	max 3
(ii)	1. xylem <u>only</u>; 2. transport mineral ions / named mineral ion / minerals / ions / salts / eq; 3. transport water; 4. to <u>leaves</u> / <u>leaf</u>;	2. Ignore nutrients	max 3

Total 10 marks

Question number	Answer	Notes	Marks
10(a)(i)	carbon (cycle);		1
(ii)	X combustion / burning / eq; Y respiration; Z photosynthesis;	Y Ignore decomposition	3
(b)	1. more carbon dioxide; 2. (increased) greenhouse effect / global warming; 3. ice caps melt / flooding / sea levels rise / affects pH in sea / coral bleaching / desertification / eq; 4. habitat destruction; 5. migration / redistribution of pests / insects / mosquitoes / eq; 6. food chain disruption / extinction / loss of species / species become endangered / affects crop growth; 7. climate change / extreme weather / drought / storms / typhoons / hurricanes / rainfall pattern / eq;	5. Ignore disease	max 5

Total 9 marks

Question number	Answer	Notes	Marks
11(a) (i)	temperature;		1
(ii)	1. <u>volume</u> / drops of indicator; 2. <u>volume</u> of milk; 3. <u>volume</u> of sodium carbonate / pH; 4. <u>volume</u> of lipase / <u>volume</u> of enzyme;	Ignore amount / mass Ignore temperature / time	max 2
(iii)	1. mix lipase/enzyme + milk/lipid/substrate; 2. ensure even temperature / distribute heat / eq;		max 1
(b)	1. <u>digestion</u> / <u>breakdown</u> of milk / lipid; 2. by lipase; 3. fatty acids; 4. lowers <u>pH</u>;	4. Ignore neutralise	max 3

(c)	(i)	1. line down from lower temperature; 2. line up at higher temperatures;  	Only award Mp2 if Mp1 correct	2
	(ii)	1. low temperature takes long(er)(time) / as temperature rises takes less time (until optimum) / above optimum takes long(er) (time) / optimum takes least time / highest temperature takes long(er)(time); Three from: 2. less (kinetic) energy; 3. fewer collisions / less movement / eq; 4. enzyme <u>denatures</u>; 5. bonds break at <u>active site</u> / <u>active site</u> changes shape / eq; 6. substrate can no longer bind / fit / attach / eq;	1. Ignore rate / fast / slow Allow converse for Mps 2 and 3	max 4

(d)	1. emulsification; 2. increase surface area (to volume ratio) / (large drops to) small drops; 3. neutralise acid / optimum pH;	2. Reject molecules	max 2

Total 15 marks

Question number	Answer	Notes	Marks
12(a) (i)	1. positive; 2. phototropism;		2
(ii)	1. light; 2. photosynthesis;	1. Allow (sun)light 1. Ignore sun	2
(iii)	method ensures unilateral light / place by window / box with slit / lamp on one side / eq;		1
(b)	(animal response) 1. uses nerves / neurones; 2. involves eyes / muscles / brain / eq; 3. electrical / uses impulses / eq; 4. faster / nerve transmission faster; 5. short duration;	(plant response) 1. phloem / cells 2. growth / stem 3. auxin / chemical / hormone / growth regulator 4. response is slower 5. long duration	max 4

Total 9 marks

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