Mark Scheme (Results)

Summer 2017

Pearson Edexcel International GCSE in Biology (4BI0) Paper 2B

Pearson Edexcel Certificate GCSE in Biology (KBI0) Paper 2B

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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)	1. block / narrow / build up / clog / reduce lumen / of an artery / eq; 2. less oxygen (to heart); 3. less (aerobic) respiration; 4. lactic acid / anaerobic respiration;	1. Reject if vein / / capillaries 1. Ignore blood vessel 1. Ignore fat deposited 2. Ignore less blood	max 3
(b)	Two from: glucose / sucrose / amino acids / fatty acids / glycerol / named vitamin / named mineral;;	Allow named sugar One named vitamin and one named mineral = 2 Two named vitamins = 2 Two named minerals = 2 Allow salt Ignore sugar / carbohydrate / monosaccharide / water	2
(c)(i)	energy (store) / insulation / protection / cell membranes / myelin;	Allow prevent heat loss / keep body warm / maintain body temperature	1
(ii)	glycerol;		1
(d)	1. (microscopic) plants/plankton/Camelina → anchovies → bigger fish/salmon; 2. arrows correct;	Ignore Sun at start / humans at end Pyramid = 1 Chain with two organisms = 0 Plankton to anchovies to human = 1	2
(e)	1. <u>overfishing</u>; 2. supply humans / supply fish farms; 3. less reproduction;	Ignore improved trawling methods / pollution / global warming	max 2

(f)	1. loss / use of energy; 2. respiration / movement; 3. egestion / not digested / faeces; 4. excretion / urine / urea; 5. uneaten / not all eaten / eq;	Allow for anchovies or salmon 2. Ignore heat	max 3
(g)(i)	1. <u>restriction</u> to cut <u>DNA</u> / <u>gene</u> / <u>allele</u> / <u>plasmid</u>; 2. <u>ligase</u> to join <u>DNA</u> / <u>gene</u> / <u>allele</u> / <u>plasmid</u>;	1. Allow remove / eq 2. Allow glue / attach / stick / insert / eq	2
(ii)	1. plasmid / virus / gene gun / eq; 2. transfer <u>DNA</u> / <u>gene</u> / <u>allele</u> into cell /organism / bacterium / eq;	Carry DNA from one organism into another organism = 1 Virus transfers plasmid into cell = 2	2

Total 18 marks

Question number	Answer	Notes	Marks
2 (a) (i)	1. iris; 2. <u>circular</u> <u>muscles</u> <u>contract</u>; 3. narrow <u>pupil</u> / constrict <u>pupil</u> / eq;	Iris gets bigger = 1	max 2
(ii)	1. <u>optic</u> nerve; 2. (no/fewer) impulses; 3. brain;	Allow optical 2. Ignore messages / signals Optic nerve sends impulses to the brain = 2	max 2
(b)(i)	1. less light / refraction (bending) of light affected / focussing affected / diffraction of light; 2. retina / fovea / photoreceptors / eq;	1. Ignore blurry vision / less vision / reflection	2
(ii)	26 million / 26 030 480 / 26.03 million / 2.603×10^7 / 26.03×10^6;;	Allow one mark for x 0.47 / 47 ÷ 100 or 151 340 000 / 151.34 million / 15.134×10^7 or x 0.172 / 17.2 ÷ 100 in working	2
(c)(i)	1. cataracts cleared / cataracts cured / rats cured; 2. 11 clear <u>and</u> only 2 with cataracts / 11 out of 13 / eq; 3. rat and humans have similar eyes / cataracts / both mammals / eq;	Most rats cured = 1 2. Allow 85% clear or 15% with cataracts	max 2

(ii)	1. humans not tested / only tested on rats / rats and humans are different / eq; 2. small number of rats / data not reliable / investigation only done once / not repeated / only 13 tested / eq; 3. not all cured / two rats still had cataracts / eq; 4. no control experiment;		max 2

Total 12 marks

Question number	Answer	Notes	Marks
3 (a) (i)	anther(s) / pollen / pollen sac;	Reject if in list with any other word Ignore stamen	1
(ii)	1. contain carbohydrate / starch / lipid / protein;	1. Ignore food store / energy store	3
	2. digested / enzymes;	2. Allow named digestive enzyme 2. Ignore broken down	
	3. respiration;		
	4. water / mineral ions (from outside seed);	Ignore nutrients	
(b)(i)	1. seed split / testa split / eq; 2. radicle / root / plumule / shoot appears / grows / emerges / sprouts / eq;		max 1
(ii)	1. Group B; 2. temperature for enzymes / kinetic energy / more collisions; 3. water for enzymes / reactions / digestion / solvent / soften seed coat / eq; 4. oxygen for respiration / active uptake;	3. Ignore water for respiration / photosynthesis	4

Total 9 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>4 (a)</td><td>
<table>
<tr><th>Component</th><th>Function</th></tr>
<tr><td>red blood cells</td><td>(transport) oxygen / O_2 / oxyhaemoglobin</td></tr>
<tr><td>white blood cells / phagocytes;</td><td>engulf bacteria</td></tr>
<tr><td>platelets</td><td>clotting;</td></tr>
<tr><td>plasma;</td><td>transport vitamins and minerals</td></tr>
</table>
</td><td>Ignore carbon dioxide

Oxygen and carbon dioxide = 1
Oxygen and nutrients = 0
Oxygen and glucose = 0

Phagocytes and lymphocytes = 0</td><td>4</td></tr>
<tr><td>(b)</td><td>1. recognise antigen / remember antigen / recognise pathogen / remember pathogen ;

2. secondary / faster immune response;

3. antibodies produced faster / quicker / sooner;

4. more antibodies produced;</td><td></td><td>max 3</td></tr>
</table>

Total 7 marks

Question number	Answer	Notes	Marks
5 (a)	homeostasis;		1
(b) (i)	1. produces sweat; 2. evaporation; 3. heat transfer / cooling;	Ignore duct	3
(ii)	1. arteriole / small artery; 2. dilate / widen / vasodilation / eq; 3. (more) blood flows to skin / surface; 4. heat transfer by radiation / convection;	Capillaries / veins dilate negates mp1 and mp2 Blood vessels dilate = 1 3. Reject if blood vessels moving close to skin	max 3
(c) (i)	osmoregulation;		1
(ii)	kidney(s);		1

Total 9 marks

Question number	Answer	Notes	Marks
6 (a)	1. contains gene / DNA / allele / genetic material; 2. from a different <u>species</u>;	DNA from another organism = 1	2
(b) (i)	1. producing (human) organs; 2. named <u>animal</u> making antibodies / proteins / hormones / eq; 3. faster growing salmon / spider silk from goats / eq;	Ignore medicine / drug Bacteria making insulin = 0 Disease resistance / frost resistance = 0	max 1
(ii)	1. <u>genetic</u>ally identical / no <u>genetic</u> variation / have same <u>gene</u>; 2. saves need to GM (each / every) organisms / only need to GM one organism;		max 2

Total 5 marks

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