Pearson Edexcel

Mark Scheme (Results)

January 2019

Pearson Edexcel International GCSE

In Biology (4BI0) 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. smaller; 2. has protein coat / capsid / envelope; 3. no cell wall / no ribosomes / no flagellum / no plasmids / no circular chromosome / no nucleoid / no cell membrane / no capsule / no pili / non-cellular / no vacuole / no cytoplasm / no organelles / eq; 4. virus contains DNA <u>or</u> RNA / bacteria DNA <u>and</u> RNA / virus contains DNA <u>only</u> virus contains RNA <u>only</u> / only one kind of nucleic acid;	1. Allow converse 1. Ignore shape 3. Allow converse 3. Ignore no tail / no mitochondria / no nucleus 4. Ignore virus contains DNA/RNA	3 max
(b)	increased / high(er) / rising temperature / increased / high(er) / rising humidity / increased / high(er) / rising rainfall / global warming / eq;	Ignore mosquitoes reach biting age sooner / virus multiplies more / climate change / greenhouse effect / greenhouse gases	1
(c)	(43 ÷ 1300 × 100 =) 3.3 / 3.31 / 3.308 / 3.3077 / 3.30769 / 3.307692 / 3.3076923 / 3.30769231	Correct answer gains full marks Allow one mark for 43 ÷ 1300 / 3 / 3.3 recurring / 3.30	2

(d)	1. temperature / heat / warmth / warmer climate; 2. humidity; 3. rainfall / rain / drought;	 2. Ignore moisture / water / standing water / pools of water / swimming pool 3. Ignore storm alone	2 max
(e)	1. birds contain virus / birds carry virus / birds have disease / birds are infected (with virus) / eq; 2. mosquitoes feed on birds / mosquitoes bite birds (and transfer to humans);		2
(f)	1. place for mosquito to reproduce / lay eggs / breed / hatch eggs / eq; 2. standing water / not drained / not cleaned / stagnant / not disturbed / untreated / eq;	 2. Ignore abandoned / not monitored	2

(g)	1. modified / weakened / attenuated / non-harmful <u>virus</u> / dead / modified / weakened / attenuated / non-harmful / <u>pathogen</u> / eq; 2. <u>memory</u> cells / lymphocytes / white blood cells; 3. antigen; 4. antibodies produced quicker / sooner / more / eq; 5. <u>secondary immune response</u>;	1. Ignore cells / small amount of virus / 1. Ignore dead virus eg. weak or dead form of the virus = 1 4. Ignore faster response / faster immune system / antitoxins	3 max

Total 15 marks

Question number	Answer	Notes	Marks
2 (a)(i)	A <u>fetus</u> / <u>embryo</u>; B uterus / uterine lining / uterus wall / womb / placenta / eq; C amniotic fluid / amniotic sac;	 C Allow amniotic liquid	3
(ii)	1. oxygen / glucose / amino acids / mineral ions / vitamins / water to (fetus / baby / embryo) / eq; 2. <u>carbon dioxide</u> / <u>urea</u> from (fetus / baby / embryo) / eq; 3. blood from / to placenta;	1. Ignore food / nutrients 2. Ignore waste 3. Reject blood from / to mother	1
(b)	(16.6 – 2.0 = 14.6 14.6 × 60 × 24 =) 21 024 / 21 000;;	Correct answer gains full marks Allow one mark for 23 904 / 2 880 / 14.6 in working	2

(c)	1. (more) oxygen / glucose; 2. respiration / energy / ATP; 3. amino acids; 4. growth; 5. named mineral + function; 6. named vitamin + function; 7. remove <u>carbon dioxide</u> / <u>urea</u>;	Ignore food / nutrients Ignore exchange of oxygen and carbon dioxide	4

Total 10 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>3 (a)</td><td><table><tr><th>Process</th><th>Letter</th></tr><tr><td>assimilation</td><td>(G)</td></tr><tr><td>decomposition</td><td>E;</td></tr><tr><td>denitrification</td><td>I;</td></tr><tr><td>excretion</td><td>D;</td></tr><tr><td>nitrification</td><td>F / H;</td></tr><tr><td>nitrogen fixation</td><td>A / B;</td></tr></table></td><td></td><td>5</td></tr>
<tr><td>(b)</td><td>1. low to high concentration / against concentration gradient;

2. energy / ATP;</td><td>low concentration gradient to high concentration gradient = 0

diffusion of molecules from low to high concentration / diffusion against a concentration gradient / diffusion against a gradient / against a diffusion gradient = 0</td><td>2</td></tr>
</table>

(c)	1. (increase) growth / yield of plants / crops; 2. fertiliser contains ammonium / nitrates; 3. amino acids / protein / DNA; 4. magnesium for chlorophyll / chloroplasts; 5. crops deplete soil minerals / ions / salts / soil lacks minerals / ions / salts / named mineral / minerals need to be replaced / eq; 6. organic fertiliser / manure retains water:	2. Ignore nitrogen 4. Allow other named mineral and function eg phosphates for ATP / DNA / calcium for cell walls / sulphates for protein / eq;	max 5

Total 12 marks

Question number		Answer	Notes	Marks
4	(a)(i)	energy (content) / temperature (rise);	Allow energy transfer Ignore heat	1
	(ii)	1. repeating / calculate mean / calculate average / increase sample size / eq; 2. identify anomalies;		2
	(iii)	1. heat / energy transferred to air / surroundings / heat / energy not transferred to water / beaker / eq; 2. less accurate / energy values are lower / smaller / less energy in popcorn / temperature change lower / less / eq;	Ignore references to time taken to transfer quicker transfer means more energy = 0 heat/energy lost during transfer = 0	2

(iv)	1. larger volume of water / use more water; 2. insulate beaker / eq; 3. provide oxygen; 4. cover (top of beaker) with lid / foil; 5. clamp food at same distance; 6. calorimeter / shield flame / ignite with electricity / eq;		max 2
(b)	mass of **water**; in g × **temperature**; rise in ˚C × 4.2 mass of **popcorn / food**; in g	Ignore mass of substance / burnt popcorn	3

Total 10 marks

Question number	Answer	Notes	Marks
5(a)	1. <u>nucleus</u> from body cell into enucleated <u>egg</u> cell / <u>female</u> gamete / eq; 2. electricity / spark; 3. mitosis; 4. embryo; 5. uterus / womb; 6. <u>surrogate</u> mother;	Allow nucleus from diploid cell / skin cell 2. Allow shock	4
(b) (i)	1. <u>cells</u> are dead / not alive / inactive / no longer respire; 2. genetic material / chromosomes / gene / allele / DNA + destroyed / mutated / damaged / degraded / eq;	Allow converse Ignore cells denatured / start to die	max 1
(ii)	1. behaviour not just due to genetic material / chromosomes / gene / allele / DNA; 2. behaviour affected by environment / learning / nurture / training;	2. Ignore personality alone	max 1

Total 6 marks

<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>Type of enzyme</th><th>Example</th><th>Site of production</th><th>Optimum pH</th></tr>
<tr><td>amylase</td><td>salivary amylase</td><td><u>salivary glands</u>;</td><td>7.0</td></tr>
<tr><td>protease / peptidase</td><td>pepsin</td><td>stomach;</td><td>1.5</td></tr>
<tr><td>lipase</td><td>pancreatic lipase</td><td>pancreas</td><td>7.0 to 9.0;</td></tr>
</table>
</td><td></td><td>4</td></tr>
<tr><td>(b)</td><td>1. pH of mouth is neutral / 7.0 or
pH of stomach is acidic / 1.5 / contains HCl;

2. enzymes <u>denature</u> (at different pH);

3. affects digestion / breakdown (of food);</td><td>1. Allow mouth not acidic or alkaline
1. pH mouth neutral and pH stomach alkaline = 0</td><td>3 max</td></tr>
</table>

Total 7 marks