Mark Scheme (Results)

Summer 2017

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

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2017
Publications Code 4BI0_2BR_1706_MS
All the material in this publication is copyright
© Pearson Education Ltd 2017

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)	1505 / 1504.7 / 1504.68;;	Allow one mark for 0.12 / 12 ÷ 100 in working	2
(b)	1. haemoglobin; 2. oxygen; 3. (aerobic) respiration ; 4. energy / ATP; 5. (less) <u>anaerobic</u> respiration / (less) lactic acid / less oxygen debt;	5. Ignore cramp	max 4
(c)	1. less oxygen; 2. cold / low temperature; 3. microorganisms / pathogens / infection / aseptic / eq; 4. reduce enzyme action / (kinetic) energy / collisions / reactions / eq;	3. Ignore disease 3. Allow sterile	max 3

(d)	iron / Fe;		1
(e)	1. (prevent) rejection / (prevent) <u>immune response</u> / (prevent) coagulation; 2. same antigens / same blood group / same blood type; 3. less chance of infection / disease / named disease / eq;	1. Ignore clotting	max 2
(f)	1. less water <u>in blood</u> / eq; 2. increases conc. of rbcs / increases concentration of blood / blood more viscous / blood thickens / rbcs stick together / eq; 3. increases blood pressure / heart works harder / eq;		max 2
(g)	1. less blood to lungs; 2. less gas exchange / less oxygen <u>in blood</u> / high carbon dioxide <u>in blood</u>;	1. Allow no blood to lungs	max 2
(h)	blood / plasma;		1

Total 17 marks

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>2 (a)</td><td>protease / pepsin / trypsin;</td><td></td><td>1</td></tr>
<tr><td>(b)</td><td>
<table>
<tr><th>Description of stage</th><th>Stage number</th></tr>
<tr><td>cutting a gene</td><td>(1)</td></tr>
<tr><td>cell division by mitosis to produce an embryo</td><td>6 / six only;</td></tr>
<tr><td>implantation into a surrogate mother</td><td>7 / seven only;</td></tr>
<tr><td>enucleation of a haploid cell</td><td>4 / four only;</td></tr>
<tr><td>production of milk containing silk</td><td>10 / ten only;</td></tr>
<tr><td>use of an electric shock</td><td>5 / five or 6 / six / 5 and 6 only;</td></tr>
</table>
</td><td></td><td>5</td></tr>
</table>

Total 6 marks

Question number	Answer	Notes	Marks
3 (a)	A nitrogen fixation / nitrogen fixing / nitrogen fixing (bacteria); B nitrification / nitrifying / nitrifying (bacteria); C denitrification / denitrifying / denitrifying (bacteria);		3
(b) (i)	no/less oxygen;	Ignore air	1
(ii)	(denitrifying) bacteria;	Fungi and bacteria = 0 Nitrifying / nitrogen fixing bacteria = 0 Allow *Pseudomonas / Bacillus*	1

(c) (i)	1. leaching / washed into rivers / eq; 2. eutrophication / algal bloom / water plant growth / eq; 3. loss of water from plant roots / less absorption into roots / eq;		max 1
(ii)	1. manure / animal waste / faeces / dung / seaweed / compost / organic fertiliser / eq; 2. legumes / crop rotation;	Allow plants with nodules / plants containing nitrogen fixing bacteria	max 1

Total 7 marks

Question number	Answer	Notes	Marks
4 (a) (i)	Parents: $C^R C^R$ and $C^W C^W$; Gametes: C^R and C^W; Offspring: $C^R C^W$;	Allow R and W for alleles Allow transfer error (TE) for max 2 Allow marks from Punnett square Ignore C^{WR}	3
(ii)	$C^R C^W$ and $C^R C^W$ and $C^W C^W$ and $C^R C^R$; roan roan white red;		2
(iii)	0.5 / 50% / ½ / 2/4 / 1 in 2 / eq;	Ignore 1:1	1

(b)	1. alleles are dominant (and recessive) / complete dominance; 2. only two phenotypes possible / tall or short; 3. F_2 ratio 3 : 1;	1. alleles show codominance 1. Ignore gene 2. three phenotypes possible / red, roan and white 3. F_2 ratio 1 : 2 : 1	max 2
(c)	1. produce more offspring / faster reproduction / short generation time; 2. easier to maintain / cost qualified / smaller / easier to handle / eq;		max 1

Total 9 marks

Question number	Answer	Notes	Marks
5 (a)	1. safety goggles / protective eye wear / protect eyes / wear eye protection; 2. gloves / tongs / clamps; 3. tie hair back / heat proof mat / lab coat / do not point tube toward a person;		max 2
(b) (i)	336;;	Allow one mark for 4 x 4.2	2
(ii)	1. samples have different mass / any amount may be used / eq; 2. allows (valid) comparison / comparable / eq;		2

(c) (i)	1. heat / energy lost (from tube/needle) / in transferring food / held too far from tube / eq; 2. not all food sample burnt; 3. not in oxygen / incomplete combustion; 4. not reading thermometer correctly / water not stirred / food mass not measured correctly / water mass not measured correctly; 5. not covered / not in calorimeter / no insulation;		max 3
(ii)	1. lid / eq; 2. fix needle / eq; 3. stir water / eq; 4. insulation / enclose / eq; 5. burn in oxygen; 6. larger mass of water / eq;	Ignore relight food	max 2

Total 11 marks

Question number	Answer	Notes	Marks
6 (a)	4.7 / 4.75 / 4.747;;	Allow one mark for 2170 in working	2
(b)(i)	uterus / womb / endometrium / uterus lining / uterus wall;		1
(ii)	1. diffusion; 2. large surface area; 3 villi; 4. blood supply / capillaries / vascular; 5. thin / one cell thick;	5. Reject thin cell walls short diffusion distance = 2	max 4

(c)	1. calcium for bones / teeth; 2. carbohydrates/lactose for respiration/energy; 3. protein for growth / for muscles / for tissue / for enzymes / for DNA; 4. lipid for energy / insulation / protection; 5. antibodies to protect from disease / infection / provide immunity / eq; 6. named vitamin for stated function;	2. Ignore sugar / glucose	max 3

Total 10 marks

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL