Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in Biology (5BI2H) Paper 01 Unit B2: The Components of Life

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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.
- For questions worth more than one mark, the answer column shows how partial credit can be allocated. This has been done by the inclusion of part marks eg (1).
- 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.
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Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Question Number	Answer	Acceptable answers	Mark
1(a)(i)	3 (÷ 20) (X100) (1) 15 (%)	**Accept 3** ÷ 13 Full marks for correct bald answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	Any two of the following: can photosynthesise more (1) higher light intensity / more light (1) more water / rain (1) warmer (1) more mineral ions / nutrients(1)	accept: reverse argument for woodland Accept: more competition from trees (for water / mineral ions) (1) bigger leaves (1) less flowers eaten (1) different genes (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	**A** stomata		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	diffusion / diffusing /	Accept description of diffusion eg carbon dioxide molecules move from an area of high concentration to an area of low concentration accept diffuse	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	• guard cells change shape / (guard cells) close stomata /guard cells close (1) • to reduce water loss /rate of transpiration reduced (1)	accept stop water loss / keep water in Ignore get more water	**(2)**

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2(a)	**D** haploid and haploid		**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (b)	A description linking three of the following (DNA is a) double helix (1) the sides of DNA are made from (alternating) sugars and phosphate (molecules) / sugar phosphate backbone (1) {paired / complementary} bases / A (joins to) T and C (joins to) G (1) (bases joined by/strands held together by) hydrogen bonds (1)	 Accept H bonds Ignore h or H_2 bonds	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(c)	A description including four of the following: (the process is) translation (1) (mRNA) leaves the nucleus / enters the cytoplasm (1) (mRNA joins to) ribosomes(1) tRNA carries amino acids (1) tRNA joins to mRNA / bases on tRNA matches bases on mRNA (1) (bases read as) {sets of three / triplets / idea of codons} (1) (ribosome / mRNA holds tRNA so) amino acids are joined together / to make polypeptides (1)		**(4)**

Total for Question 2 = 8 marks

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	(right) lung / lungs		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	An explanation including two of the following: blood flows into (right) atrium (1) (into right) ventricle (1) (ventricle / heart / muscle) contracts (1) (blood) pressure increased (by heart) (1) blood moves into <u>pulmonary</u> artery (1)	 **reject** references to left for either atrium or ventricle. accept blood under high pressure accept reference to valves stopping back flow	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(a)(iii)	**D** vena cava aorta		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(iv)	A description including two of the following: blood in vessel W / vena cava has: lower pressure (1) deoxygenated / low(er) concentration of oxygen (1) greater concentration of carbon dioxide (1) darker (red) (1)	 accept reverse arguments for blood vessel Y / aorta ignore low pressure accept low pressure in W and high pressure in Y accept low(er) oxygen levels accept carries carbon dioxide ignore W takes blood towards heart / Y takes blood away from heart	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	3 / x3 / three (times thicker) Accept any number between 2.5 and 3 (times thicker).		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	An explanation including two of the following: wall of {left ventricle / chamber B} is {more muscular / stronger / applies more force / more powerful} (1) blood from left ventricle / chamber B is under higher pressure (than blood from right ventricle) (1) (as) blood needs to be {pushed / pumped / forced} through {more capillaries / whole body} (1)	Accept reverse argument for right ventricle / chamber A. ignore left hand side pumps more blood than right hand side / pumps blood faster.	**(2)**

Total for Question 3 = 9 marks

Question Number	Answer	Acceptable answers	Mark
4(a)	A comparison including two of the following: both increase (1) oxygen uptake increases more when running / less when walking (from 6 to 10 km per hr) (1) from 6 to 8 km per hour running has a higher oxygen uptake (1) at 8 km per hour both running and walking have the same oxygen uptake (1) from 8 to 10 km walking has a higher oxygen uptake (1)	 accept from 6 to 10 km per hour running increase by 13 ± 1 and walking increase by 22± 1 accept quoted figures ± 1 eg at 6 running uses 2 (cm^3/kg/min) more than walking accept any speed between 6 and 7.9 (km per hr) ignore lines cross at 8 accept quoted figures ± 1 eg at 9 running uses 6 (cm^3/kg/min) less than walking accept any speed between 8.1 and 10	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	(oxygen + glucose →) water + carbon dioxide	both water and carbon dioxide are required in either order. Accept H_2O + CO_2 Ignore: energy reject wrong symbols eg H2O or H^2O	**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	an explanation linking two of the following: muscles **contract** more / faster (1) more (aerobic) respiration (1) (so) more energy (is needed from aerobic respiration) (1)	'More' only has to be stated once for MP 2 and 3 more respiration for energy is carried out = 2 marks. Reject produce / make energy	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(iii)	**B** statement 2 only		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(i)	24 ÷ 0.12 (1) = 200 (beats per minute)	two marks for correct bald answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(c)(ii)	more blood per minute / faster blood flow (1) more oxygen / glucose (transported to muscle cells) (1)	'more' only has to be stated once blood flows faster carrying oxygen /glucose = 2 marks.	**(2)**

Total for Question 4 = 11 marks

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	**D** a tissue		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	A suggestion including two from: more haemoglobin can be carried (1) {increase in surface area (to volume ratio) / biconcave shape} (1) can carry more / absorb more oxygen (1) idea that RBCs are only carriers / does not need to carry out processes like protein synthesis (1)	more only needs to be stated once eg more haemoglobin to carry oxygen = 2 marks	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)	An explanation linking the following: soft body tissue decays / decompose (1) some parts / bones may have been eaten / moved away from rest of skeleton / (by animals before fossilisation) (1) (some parts) not found / eroded / corroded / damaged / crushed / changed by pressure / heat (when in ground / excavated)(1)		**(3)**

Question Number		Indicative Content	Mark
QWC	***5(c)**	A explanation to include some of the following points Basic structure All have: • similar bone structure • humerus / femur / has one upper limb bone • radius and ulna / tibia and fibula / two lower limb bones • carpels / wrist bones • pentadactyl limb • have 5 digits Specific examples • some (eg horse) have digits reduced / missing • different shapes reflect different uses • suitable example, eg bat has extended first digit to support wing • different features caused by mutations • different environments have selected different features / mutations • idea of different features being beneficial / survival of the fittest • idea of adaptive radiation / selection of features / genes • suggests similar ancestors for all mammals /birds / reptiles / and (many) amphibians • can show how one species is related to another	**(6)**
Level	**0**	No rewardable content	
1	**1 – 2**	• a limited explanation of at least one idea from the basic structure section or the specific examples • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 – 4**	• a simple explanation from the basic structure linked to at least one specific example OR a detailed explanation of the basic structure • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 – 6**	• a detailed explanation that includes linking some of the areas of basic structure to specific examples related to evolution • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
6a	**B** Two cells that are genetically identical		**(1)**

Question Number	Answer	Acceptable answers	Mark
6bi	A description to include 2 of the following points: select a species that glows (when UV light is shone on it) (1) identify the gene location (1) cut the gene out (1) using a (restriction) enzyme (1)		**(2)**

Question Number		Indicative Content	Mark
QWC	***6(b)(ii)**	a description to include some of the following: • diploid nucleus is removed from the genetically engineered cell • making a lone nucleus • a donor egg is enucleated/its nucleus is removed • the diploid nucleus from the GE cell is inserted into the enucleated egg cell • division of the nucleus is stimulated • by electric shock/chemicals • cell divides by mitosis • cells put into surrogate mother • cells divide further and differentiates to form an embryo • Tegon born and is a glow in the dark beagle The above points could be made diagrammatically, but a written description is also required.	**(6)**
Level	**0**	No rewardable content	
1	**1 – 2**	• a limited description including at least one stage of cloning in an appropriate context • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 – 4**	• a simple description of at least two stages of cloning linked sequentially in an appropriate context • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 – 6**	• a detailed explanation of most of the stages of cloning • answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question Number	Answer	Acceptable answers	Mark
6(c)	Any three of the following points: the clones will all be genetically identical (1) so test results will be similar / not affect by genes (1) the clones could be GE to have specific human diseases /(dogs have) similar diseases / disorders to humans (1) dogs and humans are mammals / have similar anatomy / physiology / DNA (1)	accept a disease will affect dogs in a similar way to humans accept dogs could be cloned who have (specific human) diseases / disorders accept dogs are similar to humans	**(3)**

Total for question 6 = 12 marks

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