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Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE in Biology (5BI3H) Paper 01 Unit 3: Using Biology

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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.

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.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question number	Answer	Notes	Marks
1 (a) (i)	do not use land needed for food production/take up less land/grow independent of the climate/easier to control growth conditions (1)	accept grow quicker ignore grown all year round/grown in water ignore renewable/ carbon neutral	(1)

Question number	Answer	Notes	Marks
1 (a) (ii)	carbon dioxide	accept correct chemical formula (CO_2) reject CO_2	(1)

Question number	Answer	Notes	Marks
1 (a) (iii)	an explanation linking two of the following prevents {contamination with/entry of} other micro organisms (1) {reduces/no} competition (1) increases yield/more product (1) prevents contamination of product (1)	accept kills unwanted micro organisms	(2)

Question number	Answer	Notes	Marks
1 (a) (iv)	Any two of the following light (1) temperature (1) pH (1) minerals/named mineral/nutrients (1)	 ignore heat/warmth ignore food ignore oxygen/carbon dioxide/water	(2)

Question number	Answer	Notes	Marks
1 (b)	A description including two of the following renewable/sustainable (1) remove carbon dioxide from atmosphere during growth/only release carbon dioxide taken in during growth when burnt (1) release less sulfur dioxide when burned/less acid rain (1)	accept regrown quickly/won't run out accept carbon neutral ignore references to global warming, climate change and cost	(2)

(total for question 1 = 8 marks)

Question number	Answer	Notes	Marks
2 (a) (i)	P – Q / 170 – 80 = 90 (1) or 80/170 x 100 = 47/47.1% (1) and 53 / 52.9 / 52.94 (%)	two marks for correct answer	(2)

Question number	Answer	Notes	Marks
2 (a) (ii)	An description including two of the following selective re-absorption/reabsorbed into the blood (1) using energy (1) by active transport/against the concentration gradient (1) in convoluted tubule/at location Q (1)	accept diffuses into the blood accept from a low concentration to a high concentration	(2)

Question number	Answer	Notes	Marks
2 (a) (iii)	A explanation including the following increases (1) water is re-absorbed (1)	 accept water is absorbed into the blood	 (2)

Question number	Answer	Notes	Marks
2 (b) (i)	A ☒ Bowman's capsule		(1)

Question number	Answer	Notes	Marks
2 (b) (ii)	ADH/antidiuretic (hormone)	accept vasopressin accept phonetically correct misspellings	 (1)

Question number	Answer	Notes	Marks
2 (b) (iii)	D urethra		(1)

(total for question 2 = 9 marks)

Question number	Answer	Notes	Marks
3 (a) (i)	A menstruation		(1)

Question number	Answer	Notes	Marks
3 (a) (ii)	pregnancy/fertilisation	accept correct reference to hormone treatments such as contraception ignore maintains the lining of the uterus	(1)

Question number	Answer	Notes	Marks
3 (a) (iii)	An explanation including three of the following maintains/thickens uterus lining (1) inhibits FSH(1) inhibits LH (1) low levels trigger menstruation/high levels prevent menstruation (1)	accept builds up uterus lining ignore uterus wall accept low levels of progesterone allow release of FSH	(3)

Question number	Answer	Notes	Marks
3 (a) (iv)	LH/luteinising (hormone)	accept phonetically correct misspellings	(1)

Question number	Answer	Notes	Marks
3 (b) (i)	melatonin levels rise in the {dark/night} / melatonin levels low in the {light/day} (1) credit correct reference to data on time or melatonin production from the graph (1)		(2)

Question number	Answer	Notes	Marks
3 (b) (ii)	circadian (rhythm)	accept phonetically correct misspellings reject cyclic/cardiac/carcadian	(1)

(total for question 3 = 9 marks)

Question number	Answer	Notes	Marks
4 (a) (i)	A X_hX_H		(1)

Question number	Answer	Notes	Marks
4 (a) (ii)	correct gametes (1) correct offspring (1) 0%/ 0 in 4 (1)	accept ecf if person F and person G switched in the Punnett square for offspring	(3)

	XH	XH
Xh	XhXH	XhXH
Y	XHY	XHY

Question number	Answer	Notes	Marks
4 (b) (i)	A description including four of the following injection of antigen into {mouse/mammal}(1) {production/collection} of B lymphocytes (1) (B-lymphocyte) fused with {tumour/cancer/myeloma} cells (1) hybridoma (1) (hybridoma) can divide and produce antibodies (1)	accept protein from blood clot for antigen accept multiply or reproduce for divide when linked to the hybridoma	(4)

Question number	Answer	Notes	Marks
4 (b) (ii)	A description including two of the following attach radioisotope to monoclonal antibody (1) inject into the blood stream (1) antibodies {binds/attaches} to the clot (1) antibody {location/accumulation} determined using a {scanner/detector/computer} (1)	ignore inject into body accept binds to platelet/fibrin	(2)

(total for question 4 = 10 marks)

Question number	Answer	Notes	Marks
5 (a)	A egg cytoplasm		(1)

Question number	Answer	Notes	Marks
5 (b)	An explanation linking three of the following {increased/forced} migration/migration was easier/migrate further (1) reduced {sea/water} levels (1) water locked up in ice/seas frozen (1) land bridges/shorter sea crossings (1)	accept migration to find warmth/food accept idea of walking across ice	(3)

Question Number		Indicative Content	Mark
QWC	*5c	A description to include some of the following points Fossil evidence Structural features of fossil Facial features Larger cranial capacity More upright Longer legs/shorter arms Changes in joints Taller than Lucy Environment Evidence of stone tools Location in the rock layer Dating from environment Leakey's fossils are found higher in the rock layer Leakey's fossils found with stone tools/more sophisticated stone tools Radiometric dating of rocks surrounding fossil	(6)
Level	0	No rewardable content	
1	1 - 2	A limited description including at least one piece of evidence from the fossil evidence OR the environment 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 including at least two pieces of evidence from the fossil structure with comparative statements to Lucy OR one piece of evidence from the fossil structure and one from the environment/dating OR two pieces of evidence from dating from the environment 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 description of the pieces of evidence including at least two comparative statements to Lucy from the fossil structure AND at least two pieces of evidence about dating from the environment. the 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	Notes	Marks
5 (d)	An explanation linking the following better parental care leads to increased survival of offspring (1) (the offspring are more likely to reproduce) and pass on the beneficial traits/genes/skills (1)		(2)

(total for question 5 = 12 marks)

Question number	Answer	Notes	Marks
6 (a)	A description linking three of the following (Agrobacterium/bacterial) plasmid cut using restriction enzymes (1) gene isolated (from Bacillus thuringiensis) using restriction enzymes (1) (restriction enzymes) leave sticky ends/complementary sticky ends (1) gene inserted into plasmid using ligase enzymes (1) plasmid placed into Agrobacterium tumefaciens (1)	accept circular DNA accept ICP for gene accept circular DNA accept circular DNA	(3)

Question number	Answer	Notes	Marks
6 (b)	D a vector		(1)

Question number	Answer	Notes	Marks
6 (c)	An explanation linking two of the following (Agrobacterium tumefaciens) infects the plant (cell)/is a vector (1) transfer of {plasmid/gene/DNA} to plant cell/incorporation of gene into plant DNA (1) growth of a {crown gall/tumour} (1)	accept leaf discs for plant cells	(2)

Question Number		Indicative Content	Mark
QWC	*6d	An explanation to include some of the following points: Advantages kills the pests that feed on the crop plants less crop plants eaten by pests reduced use of pesticides/insecticides/chemicals naturally occurring/less bioaccumulation specific/does not affect other species increased yield/reduced land use reduced pesticide levels in crops Disadvantages reduces biodiversity/impacts on food web for the ecosystem risk of cross pollination transfer to other plant species public concern/potential health risks to humans insects develop resistance unknown effects on other insects/possible reduced pollination reliance on seed companies/increased cost	(6)
Level	0	No rewardable content	
1	1 - 2	A limited explanation including at least one advantage OR one disadvantage	

		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 including at least one advantage AND one disadvantage OR a detailed explanation of the advantages OR disadvantages 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 at least two advantages AND two disadvantages including the reduced use of pesticides/insecticides and impact on crop yield and possible risk of insects developing resistance 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 6 = 12 marks)

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