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Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in Biology (5BI3H/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.
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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)	**B** ☒ arrow head		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	**A suggestion including two of the following** hunting/fighting/defence (1) {preparing/ cooking/foraging for} food (1) making clothes (1) construction of {shelters/new tools/sharpening tools} (1) making fire (1)	 accept weapons accept skinning animals for food/scrapping bones accept skinning for clothes accept chopping wood	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)	**An explanation linking two of the following** **higher** abundance (1) **more** stable over time/**less** susceptible to decay (1) high mutation rate (1) inheritance down female line (1)	 accept **easier** to extract accept idea of maternal inheritance accept no recombination (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(c)	**A description including two of the following** show **changes** in body structure (1) **changes** in stone tools (1) a specific example eg Ardi/Lucy/*Homo erectus* (1)	 accept development of named structural changes	**(2)**

Total for Question 1 = 7 marks

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	an increase in cases until **October** and then a decrease (in the number of cases) (1)	accept an increase in cases till **November** when it decreases	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	1320 (1) 1320 – 168 = 1152	**2 marks for correct answer**	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)	exponential (growth)	log / logarithmic (growth)	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(c)	**A suggestion including two of the following** not everyone has been immunised (1) immigration introduces people who are not immunised (1) immunisation not fully effective (1) immunity can decrease with age (1)	 accept no herd immunity accept bacteria mutates (making immunisation ineffective) accept immunity requires boosters/loss of memory lymphocytes	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(d)	**A description including the following** (immunisation) introduces an antigen/(immunisation) causes an immune response (1) (B) lymphocytes (1) production of antibodies (1) (the production of) <u>memory lymphocytes</u> (1)	 accept immune system recognises an antigen (in the immunisation) ignore white blood cells	**(3)**

Total for Question 2 = 9 marks

Question Number	Answer	Acceptable answers	Mark
3(a)	**A description to include three of the following** selection of individuals with {favourable characteristics/largest cobs}/collect seeds from plants with large cobs (1) cross breeding (of selected individuals)/plant seeds together (from maize with large cobs) (1) selection of offspring (1) repeat process over time (1)	accept selective breeding	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(b)	**An explanation including two of the following** reduce number of pests (1) reduced damage to crop/maize (1) increased yield (1) OR kills weeds (1) reduces competition for {light/space/named resource}(1) increased yield (1)	accept kill pests/insects/named pest/deters animals **reject** predators	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(c)	**A discussion to include a maximum of two from Advantages:** removes CO_2 when growing (1) less use of {fossil fuels/named fuel} (1) reduced SO_2 emissions (1) renewable / can be regrown quickly /sustainable (1) **A discussion to include a maximum of two from Disadvantages:** reduced food production (1) takes up land (1) reduced biodiversity (1) crop growth is weather dependent (1)	accept carbon neutral **reject** CO^2 **reject** SO^2 accept deforestation ignore references to cost and energy content	**(4)**

Question Number	Answer	Acceptable answers	Mark
3(d)	**A** ☒ *Agrobacterium tumefaciens*		**(1)**

Total for Question 3 = 10 marks

Question Number	Answer	Acceptable answers	Mark
4 (a)(i)	**A** ☒ FSH		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	**An explanation linking two of the following** more than one egg {released / fertilised }(1) multiple birth / pregnancy (1) increased risk of complications for mother/babies (1) OR women affected by side effects (1) treatment has to be stopped reducing chance of pregnancy (1)	accept headaches, mood swings, nausea, abdominal pain, diarrhoea, weight gain ignore references to cost	**(2)**

Question Number	Answer	Acceptable answers	Mark
4 (a)(iii)	**D** ☒ progesterone		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(b)(i)	**An explanation linking three from the following** urine sample (1) coloured bead attached to a (mobile monoclonal) antibody (1) antibody {specific to/detects/binds to} { hormone/hCG} (1) immobile antibody at test strip (1) colour accumulates in positive test window (1)	accept named female sex hormones	**(3)**

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	**An explanation linking two of the following** chemotherapy/radiotherapy drug attached to the monoclonal antibody (1) less use of the drug (1) only binds to cancer cells/doesn't target normal cells (1) reduces side effects/named side effects (1)	monoclonal antibody binds to {**tumour markers/cancer antigens**} (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)(iii)	hybridoma (cell)		**(1)**

Total for Question 4 = 10 marks

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	(5.2 + 2.8 + 4.9 + 3.5 =) 16.4 (1) (16.4/4 =) 4.1	two marks for correct answer	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	**A suggestion including two of the following** variation in human population/different body sizes (1) hydration level (1) salt intake (1) drug influence (1)	 accept genetic variation accept fluid / food intake / level of exercise accept levels vary depending on the time of day (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	**C** ☒ pituitary gland		**(1)**

Question Number	Answer	Acceptable answers	Mark
5(a)(iv)	dehydration / thirst / increased volume of urine	accept dilute urine/frequent urination/tiredness/dizzy/headache	**(1)**

Question Number		Indicative Content	Mark
QWC	***5(b)**	An explanation to include some of the following points • negative feedback Hydration • increased water/decreased salt in blood • detected by hypothalamus • acts on the pituitary gland • decreased release of ADH • decreased permeability of collecting duct/renal tubules/nephron • less re-absorption of water • Increased volume of urine Dehydration • decreased water/increase salt in blood • detected by hypothalamus • acts on the pituitary gland • increased release of ADH • increased permeability of collecting duct/renal tubules/nephron • more re-absorption of water • decreased volume of urine	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of increase in ADH **OR** decrease in ADH **OR** the role of the pituitary gland, hypothalamus or negative feedback in the release of ADH • 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 of both ADH increase **and** decrease **OR** a detailed explanation of either an increase or decrease • 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 both ADH increase **and** decrease including mention of permeability of the renal tubules and role of the hypothalamus or pituitary gland • 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
6(a)(i)	**D** ☒ 25.0 %		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(a)(ii)	An explanation linking the following to lower cholesterol levels/the man's cholesterol level exceeds government recommended levels (1) (mycoprotein) lower in {fat / saturated fat} / mycoprotein contains {no/less} cholesterol (1) which reduces chances of heart attack / stroke / named health condition (1)	 accept the man's cholesterol level is 6 (mmol per dm^3) accept atherosclerosis/stroke/angina ignore heart disease/heart problems	**(2)**

Question Number	A description	Acceptable answers	Mark
6(b)	A description including three of the following use of fermenter (1) *Fusarium* (fungus) (1) supplied with {sugar source/ammonia/oxygen} (1) maintain optimal conditions / aseptic conditions/without stirring (1) (after growth) processed to produce mycoprotein (1)	 ignore air ignore nutrients accept named conditions e.g. pH, temperature ignore references to paddles stirring	**(3)**

Question Number		Indicative Content	Mark
QWC	***6(c)**	An explanation including some of the following points Data trends • pH of milk is 6.8 • pH reduces to pH 4.5 in 6 hours at 40°C • pH reduces to pH 4.5 in 9 hours at 20°C • pH not significantly reduces at 60°C Interpretation • fermentation faster at the optimum temperature • optimum temperature for bacteria growth at 40°C • enzymes more active at optimum temperature • no fermentation/bacteria killed/enzymes denature at high temperatures Yogurt production • lactose in the milk • converted into lactic acid • by bacteria/named bacteria • reduces pH • thickens/clots/coagulates the milk	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation of the data **OR** the interpretation of the data **OR** the production of yogurt e.g. At 60°C the pH does not decrease or bacteria causes the milk to thicken • 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 of the data trends linked to the interpretation **OR** a detailed description of the production of yogurt • 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 the data/interpretation linked to the production of yogurt including the production of lactic acid causing the decrease in pH • 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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