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Mark Scheme (Results)

June 2018

BTEC Level 3 National in Applied
Science

Unit 5: Principles and Applications of
Science II – Biology (31627H1B)



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Unit 5: Principles and Applications of Science II

General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Marking grids should be applied positively. Learners must be rewarded for what they have shown they can do, rather than be penalised for omissions.
- Examiners should mark according to the marking grid, not according to their perception of where the grade boundaries may lie.
- All marks on the marking grid should be used appropriately.
- All the marks on the marking grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the marking grid.
- Where judgement is required, a marking grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the marking grid to a learner's response, a senior examiner should be consulted.

Specific marking guidance

The marking grids have been designed to assess learner work holistically. Rows in the grids identify the assessment focus/outcome being targeted. When using a marking grid, the 'best fit' approach should be used.

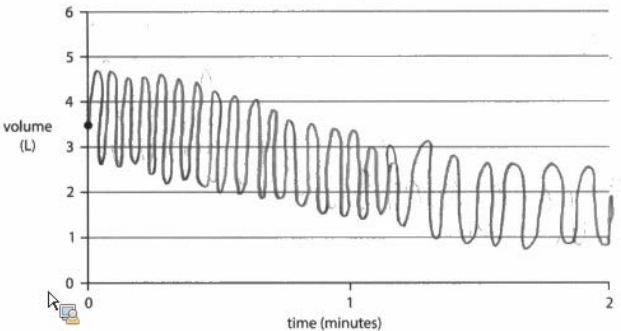
- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer, in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band, depending on how they have evidenced each of the descriptor bullet points.

BTEC mark scheme

Question Number	Answer	Additional Guidance	Mark
1 (a)	D Vesicles		1
1 (b)	exocytosis	Accept phonetic spelling Ignore 'secretion' 'bulk transport'	1
1 (c)	award one mark for each of the following up to a maximum of 2 marks: (Cilia) {beat/wave/waft/sweep/move} (1) (to move) the mucus {up /out of} airways/into throat/coughed or sneezed out (1) to remove {harmful/ named example} substances (1) accept any other appropriate response	allow stops build-up of mucus ignore cilia trap particles e.g. particles/impurities in air/pathogens/pollen/ dust	2
1 (d)	phospholipid bilayer (1) with proteins embedded (1)	allow hydrophobic tail and hydrophilic head for 1 mark accept suitable named example	2

1(e)	award one mark for each of the following up to a maximum of 2 marks: mechanical stability/membrane support/strengthens (1) regulates membrane fluidity/increases rigidity (1) prevents loss of ions/named ions/ electrolytes (1)	ignore 'to make sex hormones'	2
total			8 marks

Question Number	Answer	Additional Guidance	Mark
2 (a)	award one mark for each of the following up to a maximum of 2 marks: to {remove/absorb} carbon dioxide (1) (because carbon dioxide build up) is toxic / is acidic /can lower (blood) pH/to prevent asphyxiation (1) (carbon dioxide) can alter the breathing rate (1) so oxygen consumption can be calculated (1)	Ignore 'it is dangerous'	2
2 (b)(i)	A		1
2 (b)(ii)	substitution 12 x {0.4 to 0.6} (1) evaluation 4.8 to 7.2 (1)	4.8 to 7.2 alone gains 2 marks 4.8 to 7.2 to any factor of 10 gains 1 mark ECF	2

2 (c)	<p>Sketch shows: more breaths per minute than Figure 1.3 (1)</p> <p>higher tidal volume than figure 1.3 (1)</p> <p>(steeper) slope of trace downwards from left to right (1)</p> <p>Example which would gain 3 marks:</p> 	<p>Ignore any vital capacity traces</p> <p>Allow full marks even if line on graph not covering the full two minutes</p>	3
total			8 marks

Question Number	Answer	Additional Guidance	Mark
3 (a) (i)	<p>award one mark for each of the following up to a maximum of 2 marks</p> <p>(muscle/heart/ventricle) beat/contracts/pumps (1)</p> <p>on its own/spontaneously/rhythmically (1)</p> <p>without input/signal from {nerves/brain} (1)</p> <p>(muscle) cells are able to depolarise/generate own electric impulses (1)</p>	ignore 'involuntary'	2
3 (a) (ii)	<p>{carries/delivers/takes/supplies} blood containing {oxygen/glucose/lipids} (1)</p> <p>to {heart muscle/ventricle wall/myocardium} (1)</p>		2

3 (b)	award one mark for each of the following up to a maximum of 4 marks: less oxygen/ oxygenated blood to heart { walls/tissue/muscle/cells } (1) so {less/no} respiration (1) so {less/no} ATP/energy(1) so {part of heart/heart cells} die/scar tissue (1) so heart cannot {beat/pump/contract} (1)		4
3 (c)(i)	A (P)		1
3 (c)(ii)	B (X)		1
3 (c)(iii)	stroke volume (1) 70 (ml) heart rate (1) 60/0.8 cardiac output (1) 70 x 75	allow 75 5250 alone or 70 x 75 alone are awarded all 3 marks ECF	3
total			13 marks

Question Number	Answer	Additional Guidance	Mark
4 (a)	C = Loop of Henle (1) D = {Distal (convoluted) tubule/DCT} (1)	accept phonetic spelling ignore any refs to ascending/descending allow distant (convoluted) tubule	2

4 (b)	<p>award one mark for each of the following up to a maximum of 3 marks</p> <p>(aldosterone) acts on the (distal) { tubules/ collecting duct} (1)</p> <p>which (re)absorbs {salt/sodium/Na⁺} (1)</p> <p>water (re)absorbed (1)</p> <p>by osmosis/ due to decrease in water potential (1)</p> <p>increasing the blood volume (1)</p>	allow more sodium (ions) back into blood	3
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Question number	Indicative content
4 (c)	<p><i>Advantages:</i></p> <ul style="list-style-type: none"> • no need for regular hospital attendance (for renal dialysis) • more able to live normal lifestyle/ not attached to a dialysis machine for 8 hours each visit • eat a normal healthy diet • (overall) more cost effective/ less expensive • can have living donors/donation from relative/ people can donate one of their two kidneys • prolongs life of recipient • routine/straightforward surgery • stem cells/growing organs <p><i>Disadvantages:</i></p> <ul style="list-style-type: none"> • availability/shortage of donors • reference to opt in/opt out • not an immediate form of treatment • invasive and requires surgery • risk of anaesthetic • risk of infection (due to surgery)/need for wound care • need for tissue matching • risk of rejection • transplant may fail • need for immunosuppressant drugs • increased susceptibility to infections (due to immunosuppressants) • ethical considerations

Mark scheme (award up to 6 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.

<i>Level</i>	<i>Mark</i>	<i>Descriptor</i>
	0	<i>No awardable content</i>
Level 1	1-2	Demonstrates adequate/isolated knowledge of scientific facts/concepts with generalised comments made Generic statements may be presented rather than linkages being made so that lines of reasoning are unsupported or partially supported The discussion shows some structure and coherence
Level 2	3-4	Demonstrates good knowledge and understanding by selecting and applying some relevant scientific knowledge facts/concepts to provide the discussion being presented Lines of argument mostly supported through the application of relevant evidence The discussion shows a structure which is mostly clear, coherent and logical (could be bullet points or a table)
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting and applying relevant knowledge of scientific facts/concepts to provide the discussion being presented Line(s) of argument consistently supported throughout by sustained application of relevant evidence The discussion shows a well-developed structure which is clear, coherent and logical (could be bullet points or a table)

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