Mark Scheme (Results)

June 2018

BTEC Level 3 National in Applied Science
Unit 1: Principles and Applications of Science – Biology

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Unit 1: Applications of Science I – sample marking grid

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.

Section A- Structures and Functions of Cells and Tissues

Question Number	Answer	Additional Guidance	Mark
1(a)	{contains/has/with} membrane-bound organelles	accept named examples, such as nucleus ignore (70s) ribosomes Ignore references to multicellular or organisms, such as animal, plant.	1
1(b)	C Mitochondria		1
1(c)	conversion (1) 15 000(μm) substitution (1) 15 000 / 25 evaluation (1) 600(x) OR conversion (1) 0.0025(cm) substitution (1) 1.5/0.0025 evaluation (1) 600(x)	600(x) alone gains all 3 marks ECF from first MP 600(x) to any factor of 10 (2)	3
			Total 5 Marks

Question Number	Answer	Additional Guidance	Mark
2(a)	A		1
2(b)	contain beneficial/ extra {genes/genetic info/DNA} (1) allows {genes/genetic info/(beneficial) characteristics} to be transferred (1)	reject only source of DNA allow named example of benefit, e.g. antibiotic resistance (1)	2
2(c)	B		1
		Total 4 marks	

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	actin(1) myosin (1)	accept phonetic spellings reject mylin can be given in either order if thin and thick alone award 1 mark ignore thick/thin if actin/ myosin have been given	2
3 (aii)	sarcolemma (1)	accept phonetic spelling reject sarcomere reject sarcoplasm	1
3(b)	any two from: (glycogen is a) source of energy/energy store/ source of glucose (1) (glucose used for) respiration/produces ATP (1) which is used for {muscle contraction/movement} (1)	can be aerobic or anaerobic or unqualified allow specific details of the process of sliding filaments	2

3(c)	award one mark for identification and up to 2 marks for linked expansion		3
	identification point (mitochondria site of aerobic) respiration (1)	reject gives more energy <u>for</u> respiration reject anaerobic	
	linked expansion produces {more} ATP/energy (1)		
	producing less lactic acid (1)		
	(slow twitch muscle fibres) take a long time to fatigue/ tire (1)	allow muscles ignore exhaustion	
			Total 8 marks

Question Number	Answer	Additional Guidance	Mark
4(a)	<u>synaptic cleft</u>	accept phonetic spellings ignore synapse gap/ synaptic gap	1
4(b)	any two from: (serotonin) released from one side/pre-synaptic neurone/ axon terminal/released from synaptic vesicles (1) move down a concentration gradient/ diffusion of (serotonin) across the synaptic cleft (1) only receptors on the other side/ postsynaptic neurone (1)	allow next neurone	2
4(c)	either: *identification point* lower levels of serotonin (1) *linked expansion* (Causes) fewer receptors (in brain) to be stimulated/ less neurotransmitter across synapse (1) (so) fewer impulses in the brain (1) (so) may lead to depression/ anxiety (1) OR *identification point* higher levels of serotonin (1) *linked expansion* (Causes) more receptors (in the brain) to be stimulated (1) (so) more impulses in the brain (1) (so) may lead to feeling of happiness (1)	reject imbalances as in stem reject stress	4
			Total 7 marks

Question number	Indicative content
5	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some or all of the indicative content but learners should be rewarded for other relevant answers.
	contains (lots of) haemoglobin to bind oxygen
	each haemoglobin molecule contains 4 oxygen molecules
	no nucleus/ mitochondria/ ribosomes/ ER/ RER/ organelles
	increased space for haemoglobin
	more efficient transport of oxygen
	biconcave (allow concave or a descrption)
	flexible discs
	manoeuvre/squeeze through capillaries
	small size
	manoeuvre/squeeze through capillaries
	high number of red blood cells (5mil per ml)
	(biconcave/ shape/small size)
	gives increased surface area to volume ratio
	so haemoglobin molecules are close to the cell membrane
	short diffusion distance of oxygen to haemoglobin
	increase rate of diffusion across plasma membrane

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*.

Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1–2	Demonstrates adequate 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 reasoning mostly supported through the application of relevant evidence The discussion shows a structure which is mostly clear, coherent and logical
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 reasoning consistently supported throughout by sustained application of relevant evidence The discussion shows a well-developed structure which is clear, coherent and logical

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