



Mark Scheme (Results)

January 2021

Pearson BTEC Nationals

In Applied Science (31617H1B)

Unit 1: Principles and Applications of Science I -
Biology

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Unit 1: Principles and Applications of Science I

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 Next Generation Mark Scheme

Question Number	Answer	Additional Guidance	Mark
1 (a)(i)	A ●		1
1 (a)(ii)	QRS (complex)	<p>allow (ventricular) contraction/ systole/ depolarisation</p> <p>allow S wave sinus wave action potential any value above -90mV</p> <p>ignore hyperpolarisation T wave</p>	1
1 (b)(i)	B endothelial		1
1 (b)(ii)	<p>A cholesterol/LDL(s)/lipoproteins (1)</p> <p>B plaques/atheroma (1)</p> <p>C narrow/blocked/ obstructed (1)</p>	<p>allow lipid Ignore fats</p> <p>allow fatty deposits</p> <p>accept other relevant responses, e.g. clogged, smaller</p> <p>ignore clotted, damaged</p>	3
Total			6 marks

Question Number	Answer	Additional Guidance	Mark
2 (a)	conversion (1) 13200 (μm) substitution (1) 13200/33 evaluation (1) 400(x) OR conversion (1) 0.033 (mm) substitution (1) 13.2/0.033 evaluation (1) 400(x)	400 (x) alone gains all 3 marks ECF from first MP to max 2 400(x) to any factor of 10 (2)	3
2 (b)(i)	Any two from: can observe live specimens/specimens don't need to be in a vacuum (1) can observe colour of specimen (1) quick/ simple preparation of the slide (1) stains not (highly) toxic (1) unaffected by magnetic fields (1) portable (1) (specialist) training not required (1)		2

<p>2 (b)(ii)</p>	<p>Award one mark for identification and one additional mark for appropriate expansion.</p> <p>Any two from</p> <p>low {resolution/resolving power} (1)</p> <p>can't have very high magnification (1)</p> <p>(so) {small structures/virus/some organelles} cannot be viewed/ (image/specimen) less detailed (1)</p> <p>Because of longer wavelength of light (compared to electrons)/because uses light and not electrons (1)</p> <p>OR</p> <p>depth of field is restricted/can't focus on two objects (in a cell) if they are at different depths (1)</p> <p>due to the diffraction of light (1)</p>	<p>accept named examples of small structures</p>	<p>2</p>
<p>Total</p>			<p>7 marks</p>

Question Number	Answer	Additional Guidance	Mark
3 (a)	myosin	<i>phonetic spellings, cross out rule and list rule- remind clerical markers</i>	1
3 (b)	C nucleus and mitochondrion		1
3 (c)	made up of (different) tissues/ part of an organ system (1) carries out a (particular) function/ pumps blood around the body (1)	accept more than one named example allow role/job for function ignore 'for body to function'	2
Total			4 marks

Question Number	Answer	Additional Guidance	Mark
4 (a)	sodium (ion)/Na ⁺	ignore charges on sodium/Na	1
4 (b)	<p>Award one mark for identification point and one for an expansion point. Each of the following could be an identification point or an expansion point, depending on how the learner shapes their response.</p> <p>so there is no serotonin to fit onto receptors (on postsynaptic membrane) (1)</p> <p>(so) no (continuing) depolarisation (1)</p> <p>(so) prevents {succession of/too many/regulating the number of} action potentials/prevents overstimulation (of post synaptic neurone) (1)</p> <p>allows resynthesis of serotonin/enables the process to repeat (1)</p>	<p>accept neurotransmitter throughout</p> <p>Allow receivers for receptors</p> <p>allow neurone rests for resting potential</p> <p>allow impulse</p> <p>allow reuse/recycle</p>	2

<p>4 (c)</p>	<p>Award one mark for identification point and up to three marks for expansion points. Each of the following could be an identification point or an expansion point, depending on how the learner shapes their response.</p> <p>serotonin stays <u>in cleft</u> (1)</p> <p>(so not reabsorbing serotonin allows it to) attach to receptors (1)</p> <p>(serotonin receptors) on <u>postsynaptic</u> membrane (1)</p> <p>so produces more action potentials (1)</p> <p>in postsynaptic <u>neurone</u> (1)</p> <p>causing (normal) stimulation of neurones/brain (1)</p> <p><u>serotonin</u> {elevates the mood/makes person happy} (1)</p> <p>accept any other valid response e.g. Drug F blocks the receptors/carrier proteins (on the presynaptic membrane)</p>	<p>ORA throughout</p> <p>allow neurone</p> <p>accept electrical signals/impulse allow depolarisation continues</p>	<p>4</p>
Total			7 marks

Question number	Indicative content
5	<p>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 but probably not all of the indicative content, but learners should be rewarded for other relevant answers. Answers can be presented in a table</p> <p>similarities</p> <p>structure</p> <ul style="list-style-type: none"> ○ have nuclei/mitochondria/RER/ribosomes ○ made in bone marrow/originate from {stem cells/haemotocytoblasts} <p>function</p> <ul style="list-style-type: none"> ○ involved in defence against pathogens ○ available/transported in blood plasma ○ migrate into tissue fluid as required ○ present in lymphatic system <p>differences</p> <p>lymphocytes</p> <p>structure</p> <ul style="list-style-type: none"> ○ T and B cells ○ large nucleus ○ smaller than neutrophils/less cytoplasm than neutrophils ○ antigen receptors on surface <p>function</p> <ul style="list-style-type: none"> ○ part of specific/adaptive immune response ○ immunological memory ○ T_H cells send signals to B cells ○ B cells produce antibodies ○ B cell proliferation - some of which (plasma cells) make antibodies, and some become memory cells ○ T_H and T_C cells have different functions ○ T_C cells destroy infected/cancerous cells ○ T regulatory cells <p>neutrophils</p> <p>structure</p> <ul style="list-style-type: none"> ○ the most common type of white blood cell (3 x as many as lymphocytes) ○ nucleus has several lobes ○ flexible, mobile – can squeeze between cells in the capillary wall ○ contain many lysosomes (for digestion of ingested pathogens)

	<p>function</p> <ul style="list-style-type: none"> ○ migrate to areas of infection through capillary walls ○ phagocytic – engulf and destroy pathogens ○ release chemicals involved in inflammation ○ part of non-specific immune response
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<p>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*.</p>		
Level	Mark	Descriptor
Level 0	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> • Demonstrates adequate knowledge and understanding of scientific facts/concepts to the given context with generalised comments made. • Generic statements may be presented rather than linkages to the context being made so that lines of reasoning are unsupported or partially supported • The comparison will contain some similarities and differences showing some structure and coherence
Level 2	3–4	<ul style="list-style-type: none"> • Demonstrates good knowledge and understanding by selecting and applying some relevant scientific facts/concepts to provide the comparison being presented • Lines of argument mostly supported through the application of relevant evidence drawn from the context • Demonstrate an awareness of both similarities and differences leading to a comparison which has a structure which is mostly clear, coherent and logical
Level 3	5–6	<ul style="list-style-type: none"> • Demonstrates comprehensive knowledge and understanding by selecting and applying relevant knowledge of scientific facts/concepts to provide the comparison being presented. • Line(s) of argument consistently supported throughout by sustained application of relevant evidence drawn from the context • The comparison shows a logical chain of reasoning which is supported throughout by sustained application of relevant evidence



Llywodraeth Cynulliad Cymru
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