



## Mark Scheme (Results)

January 2019

BTEC Level 3 National in Applied  
Science/Forensic and Criminal  
Investigation

Unit 1: Principles and Applications of  
Science I – Biology (31617H/1B)



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# Unit 1: Applications of Science I – sample marking grid

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## 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

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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.

Question Number	Answer	Additional Guidance	Mark
1 (a)(i)	golgi (body/apparatus)	Allow phonetic spelling	1
1 (a)(ii)	C – mitochondrion		1
1 (a)(iii)	B – makes RNA and ribosomes		1
1 (b)(i)	Any <b>two</b> from: large or permanent vacuole (1) chloroplast(s) (1) (cellulose) cell wall (1) tonoplast (1) amyloplasts/starch grains/plastid (1) plasmodesmata (1) pits (1)	allow vacuole reject vesicle	2
1 (b)(ii)	Any <b>one</b> from: centriole(s) centrosome cilia		1
Total			6 marks

Question	Answer	Additional	Mark
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Number		Guidance	
2 (a)	specific/ different/ certain/ particular (1)  differentiation (1)	ignore modified/ adapted/special/ specialised	2
2 (b)(i)	C – Endothelial		1
2 (b)(ii)	Award one mark for identification and 1 mark for linked expansion. Any two from:  lobed/flexible nucleus (1)  makes cell flexible (1)  they can squeeze/fit (through pores in the capillaries) (1)	ignore “move through”	2
2 (b)(iii)	Award one mark for identification and 2 marks for linked expansions. Any <b>three</b> from:  (lysosomes) contain {enzymes/ chemicals} (1)  that are used to {digest/ kill/ destroy/ breakdown} (1)  (digest) {pathogens/bacteria/foreign substances} (1)  that have been {ingested/engulfed} (by the neutrophil) (1)  (lysosome) fuses with endosome /phagosome/ forms phagolysosome (1)	Accept named examples     In the context of MP2  Allow endocytosis	3

2 (c)	<p><b>difference (1)</b>  <math>6.1 \times 10^{10} - 3.5 \times 10^9</math></p> <p><b>division (1)</b>  <math>\frac{5.75 \times 10^{10}}{3.5 \times 10^9}</math></p> <p><b>percentage (1)</b>  <math>\times 100</math></p> <p><b>OR</b></p> <p><b>difference (1)</b>  <math>6.1 - 0.35</math></p> <p><b>division (1)</b>  <math>\frac{5.75}{0.35}</math></p> <p><b>percentage (1)</b>  <math>\times 100</math></p> <p><b>OR</b></p> <p><b>division (1)</b>  <math>\frac{6.1 \times 10^{10}}{3.5 \times 10^9}</math></p> <p><b>Percentage(1)</b>  <math>\times 100</math></p> <p><b>difference (1)</b>  <math>-100</math>  allow alternative methods</p>	<p>Allow full marks for any value between 1642 and 1643 (%)</p> <p>Award 2 marks for any power of 10 error</p> <p>If no other mark awarded allow 1 mark for:  (difference divided by original) <math>\times 100</math></p> <p>Award 2 marks for 1742.86</p>	3
Total			11 marks

Question Number	Answer	Additional Guidance	Mark
3 (a)	Node of Ranvier	Accept phonetic spellings	1
3 (b)	Any four from:  (made from/consists of) Schwann cells (1)  (Schwann cells are) flattened (1)  mainly cell surface membrane/ little cytoplasm/loss of organelles (1)  (with) high lipid/fat content (1)  has a nucleus (1)  wrapped around/surrounds/spirals/insulates (axon) (1)  has many layers/ thick layer (1)	Allow fatty	4

3 (c)	<p>Award one mark for identification and 1 mark for linked expansion</p> <p><i>identification</i></p> <p>lack of insulation (1)</p> <p>and any one from:</p> <p><i>amplification</i> which causes:</p> <p>{no saltatory conduction/impulse unable to 'jump'} (1)</p> <p>{loss/leakage} of <u>ions</u>/ less shielding (1)</p> <p>loss of {sodium ion/electrochemical} gradient (1)</p> <p>decrease in {number of action potentials/depolarisation} (1)</p> <p>local currents travel faster (in myelinated sections of axon) than membrane depolarisation (in non-myelinated sections) (1)</p>	<p>ORA throughout</p> <p>do not accept myelin as in stem</p> <p>Ignore signal</p> <p>do not accept conduction is slower as in stem</p>	2
Total			7 marks



Question number	Indicative content
4	<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 or all of the indicative content but learners should be rewarded for other relevant answers.</p> <p><b><u>Development of atherosclerosis</u></b>  damage to endothelial cells (of artery)  triggers inflammatory response  (and) migration of white blood cells into the area</p> <p>phagocytosis of LDLs and formation of foam cells</p> <p>build up of cholesterol detail in relation to HDL and LDL</p> <p>formation of atheroma plaque in wall of the artery/under endothelium of artery</p> <p>narrowing of lumen so increase in blood pressure</p> <p>need for heart to work harder</p> <p><b><u>Smoking</u></b></p> <p>modifiable/lifestyle choice/hard to give up</p> <p>addictive so makes people keep smoking, exposing them to all the risk factors caused by tobacco smoke</p> <p>cigarette smoke aggravates/increases the risk of several other risk factors for atherosclerosis</p> <p>the nicotine and carbon monoxide in cigarette smoke damages the endothelium, which sets the stage for the build-up of plaque</p> <p>(the toxins in) tobacco smoke lower a person's high-density lipoprotein cholesterol (HDL or 'good' cholesterol) while raising levels of low-density lipoprotein cholesterol (LDL or 'bad' cholesterol)</p> <p>carbon monoxide binds to haemoglobin so lowers the oxygen-carrying capacity of blood and causes the heart to work harder – strain</p> <p>may lead to increased blood pressure, which damages endothelium</p> <p>nicotine is a stimulant/mimics acetylcholine and causes an increase in heart rate and blood pressure</p> <p>if plaque is already there high blood pressure could rupture the membrane over the plaque exposing it and then red blood cells get caught up, forming a thrombus</p>

	<p>nicotine makes red blood cells stickier/more likely to form a clot/thrombus</p> <p>smoking can reduce circulation by narrowing blood vessels</p> <p>can have beneficial effects – increases angiogenesis/formation of new small blood vessels</p> <p>within one year of quitting smoking, risk drops to half that of a smoker</p> <p>between 5 and 15 years of quitting, risk drops to that of non-smoker</p>
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**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\*.

<b>Level</b>	<b>Mark</b>	<b>Descriptor</b>
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 argument 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 argument 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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