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)

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk for our BTEC qualifications.
Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

If you have any subject specific questions about this specification that require the help of a subject specialist, you can speak directly to the subject team at Pearson.
Their contact details can be found on this link: www.edexcel.com/teachingservices.

You can also use our online Ask the Expert service at www.edexcel.com/ask. You will need an Edexcel username and password to access this service.

Pearson: helping people progress, everywhere
Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

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)(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 **two** 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 **one** from: centriole(s) centrosome cilia		1
		Total	6 marks

Question	Answer	Additional	Mark

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 **three** 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) | **difference (1)**

 $6.1 \times 10^{10} - 3.5 \times 10^9$

 division (1)
 $\dfrac{5.75 \times 10^{10}}{3.5 \times 10^9}$

 percentage (1)
 x 100

 OR

 difference (1)

 $6.1 - 0.35$

 division (1)
 $\dfrac{5.75}{0.35}$

 percentage (1)
 x 100

 OR

 division (1)
 $\dfrac{6.1 \times 10^{10}}{3.5 \times 10^9}$

 Percentage(1)
 x100

 difference (1)
 -100 <br> allow alternative methods | Allow full marks for any value between 1642 and 1643 (%)

 Award 2 marks for any power of 10 error

 If no other mark awarded allow 1 mark for: (difference divided by original) x 100

 Award 2 marks for 1742.86 | 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)	Award one mark for identification and 1 mark for linked expansion	ORA throughout	2
	identification		
	lack of insulation (1)	do not accept myelin as in stem	
	and any one from:		
	amplification which causes:		
	{no saltatory conduction/impulse unable to 'jump'} (1)		
	{loss/leakage} of <u>ions</u>/ less shielding (1)	Ignore signal	
	loss of {sodium ion/electrochemical} gradient (1)		
	decrease in {number of action potentials/depolarisation} (1)		
	local currents travel faster (in myelinated sections of axon) than membrane depolarisation (in non-myelinated sections) (1)	do not accept conduction is slower as in stem	
		Total	7 marks

Question number	Indicative content
4	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. **Development of atherosclerosis** damage to endothelial cells (of artery) triggers inflammatory response (and) migration of white blood cells into the area phagocytosis of LDLs and formation of foam cells build up of cholesterol detail in relation to HDL and LDL formation of atheroma plaque in wall of the artery/under endothelium of artery narrowing of lumen so increase in blood pressure need for heart to work harder **Smoking** modifiable/lifestyle choice/hard to give up addictive so makes people keep smoking, exposing them to all the risk factors caused by tobacco smoke cigarette smoke aggravates/increases the risk of several other risk factors for atherosclerosis the nicotine and carbon monoxide in cigarette smoke damages the endothelium, which sets the stage for the build-up of plaque (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) carbon monoxide binds to haemoglobin so lowers the oxygen-carrying capacity of blood and causes the heart to work harder – strain may lead to increased blood pressure, which damages endothelium nicotine is a stimulant/mimics acetylcholine and causes an increase in heart rate and blood pressure 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

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

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 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.

For more information on Edexcel qualifications, please visit our website
www.edexcel.com