



MARKING SCHEME

**LEVEL 3 DIPLOMA/CERTIFICATE IN MEDICAL
SCIENCE - UNIT 1
4463U10-1**

SUMMER 2018

INTRODUCTION

This marking scheme was used by WJEC for the 2018 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

WJEC DIPLOMA/ CERTIFICATE IN MEDICAL SCIENCE
MARK SCHEME- UNIT 1 HUMAN HEALTH AND DISEASE SUMMER 2018

General Instructions

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao	= correct answer only
ecf	= error carried forward
bod	= benefit of doubt

SECTION A

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
1			Any 3 for 1 mark from: • loss of physical co-ordination and ataxia • muscle twitches / spasms • loss of bladder and/or bowel control • blindness • dysphagia/ difficulty swallowing • loss of speech • loss of voluntary movement/mobility • lack of awareness of surroundings • severe depression • intense feelings of despair • withdrawal from family, friends and the world around you • anxiety • irritability • insomnia • severe memory loss • confusion • feeling agitated • aggressive behavior • loss of appetite • paranoia • unusual and inappropriate emotional responses.	1			1			
2			Any 2 × (1) from: • Secondary/ tertiary structure of protein is changed. (1) • Amino acids form beta helix in diseased form compared to in a sheet form in non- diseased form / stack of beta sheets in diseased / less beta sheet in normal (1) • Three alpha helixes in normal compared to two in diseased / less alpha helix in abnormal (1)	2	2					

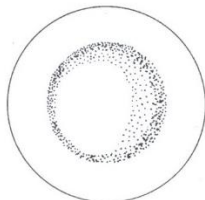
Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
3	(a)	(i)	9 correct plots $\pm < 1$ square tolerance (2) 8 correct plots $\pm < 1$ square tolerance (1) 7 or fewer correct plots $\pm < 1$ square tolerance (0) Line (1)	3				3		
		(ii)	Any 2 $\times$ (1) from: (Sporadic) numbers increase compared with vCJD numbers (1) increase then decrease (1) vCJD numbers consistently lower than sporadic / accept converse argument(1)	2				2		
	(b)		$\frac{96}{110} \times 100$ (1) = 87.27% / 87.3% / 87% (1) Correct answer only (2) Accept 87.2 for (1)	2				2		
	(c)		Different type(s) of CJD recognized pre 1995 / after 1995 vCJD was recognised (1) Link to BSE and vCJD not made until 1995/mid 1990s therefore no numbers before 1995/6(1)	2				2		
4	(a)		qualitative: participant observation/ non-participant observation/ (structured) interview/ (unstructured) interview / open questionnaires(1) quantitative: laboratory experimentation/ epidemiological/ closed questionnaires(1) Accept survey qualified as open or closed	2						2
	(b)		Any 2 $\times$ (1) from: Patient information is held under legal and ethical obligations of confidentiality (1) Patient information should only be used to provide healthcare (1) Results should only be disclosed with patient consent (1) OWTTE	2					2	

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
5	(a)		sensors attached to the scalp pick up electrical signals (1) Which are then recorded (and analysed) (1) The EEG recording shows different types of brain waves/activity (1)	3					3	
	(b)		Epilepsy detection and monitoring / Alzheimer's / brain tumors / brain cancers / degenerative conditions / encephalitis / stroke / sleep disorder s/ dementia Accept other correct example Do not accept brain damage	1					1	
6	(a)		Spain and Saudi Arabia	1				1		
	(b)		In 2000 UK had a high incidence of vCJD. (approx. 28) compared to a lower figure in 2007 (approx. 5)/ decrease in the numbers of individuals suffering from vCJD.(1) Any 2 × (1) from: In 2000, new food guidelines had only been in place for 4 years and cases of vCJD contracted before 1996 were in their latent period. (1) In 2007, most cases of vCJD that had been caused by infected meat had been diagnosed.(1) Reduction in number due to stricter guidelines on infected meat.(1) Restriction in blood donations. (1)	3						3
	(c)		Increase in France in 2005/2006 could be due to symptoms of vCJD only being diagnosed after a latent period of 10 years/ imported meat in mid 1990s could have been contaminated with vCJD/ AVP	1						1
Total Section A				25	2	0	1	10	6	6

SECTION B

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
7.	(a)	(i)	Humans consume {undercooked/ raw} meat/ could drink infected water that is contaminated with the tapeworm. (1)	1			1			
		(ii)	Any 2 × (1) from: Stomach/intestinal pain(1) nausea(1) vomiting/ weight loss(1) diarrhea(1) malnutrition(1) insomnia(1) jaundice(1) fatigue (1) deficiency diseases (1)	2			2			
	(b)		One mark for method and one mark for explanation Handling food safely in work environments / suitable example (1) To prevent transmission from uncooked to cooked products (1) OR Improved personal hygiene/washing hands (1) Prevents transmission from person to food / food to food (1) OR Cooking thoroughly (1) Cooking kills tapeworm eggs (1) OR treatment of drinking water (1) Prevents transmission through water (1)	2			2			

			OR							
			Correct treatment/disposal of human/animal waste Prevents transmission from fecal matter to animal							
Total Question 7				5			5			

Question			Answer			Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
8.	(a)		Appearance	Name	Function	6		6				
				Erythrocyte	Carry oxygen (around the body) Accept Carbon dioxide (ecf)							
				Leucocyte Accept named leucocyte	Fights infection/ protects against infection/ produces antibodies/ part of the immune system/phagocytosis of pathogens (ecf)							
				Thrombocyte	Involved in clotting to (prevent bleeding)(ecf)							
			(1 mark per box)									
	(b)		Any one method (1) with corresponding description (1): • Skin (1) physical barrier prevents microbes entering (1) • Blood clotting (1) seal wounds/description (1) • Inflammation (1) localized where barrier is broken/description (1) • Phagocytosis (1) destroys invading microbes (1) • Cilia / mucous (1) trap microbes in inhaled air (1) • Lysozyme in tears (1) kills bacteria (1) • Stomach acid (1) kills bacteria (1)			2			2			

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
	(c)	(i)	Cause: Lack of vitamin C/ Vitamin C deficiency (1) Symptoms: fatigue/feeling irritable and miserable/ pain in your limbs / small red-blue spots on the skin/ swollen gums – which become soft and vulnerable to bleeding/tooth loss/ shortness of breath/ easily bruised skin (1)	2			2			
		(ii)	Cause: Lack of vitamin D/ Vitamin D deficiency (1) Symptoms: skeletal deformities/ dental problems/poor growth and development/ fragile bones/ bone pain / brittle bones / weak bones. (1)	2			2			
Total Question 8				12		6	6			

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
9	(a)		10.5 million children suffer with allergies. 8% have food allergies $\frac{8}{100} \times 10\,500\,000$ (1) = 840 000 children (1) = 8.4×10^5 (1)	3				1		2
	(b)		$\frac{900000000}{365} = \text{£}2\,465\,753$ per day total (1) Per allergy sufferer = $\frac{2465753}{21000000} = 11.7 \text{ p} / 12 \text{ p}$ (1) Accept calculation when a year is 365.25 Accept 11 p for (1) Accept 11.7/12 without unit for (1)	2				2		
Total Question 9				5				3		2

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3																									
10	(a)		<table><tr><th>Enzyme(s)</th><th>Site of enzyme production</th><th>Biological molecules broken down</th><th>Product(s) of digestion</th></tr><tr><td>pepsinogen</td><td>Gastric glands</td><td>protein/peptide</td><td>amino acid</td></tr><tr><td>Trypsinogen</td><td>pancreas (1)</td><td>protein/peptide (1)</td><td>amino acids</td></tr><tr><td>Lactase</td><td>Small intestine</td><td>Lactose</td><td>glucose and galactose (1)</td></tr><tr><td>sucrose (1)</td><td>small intestine</td><td>sucrose (1)</td><td>fructose, α-glucose</td></tr><tr><td>maltase (1)</td><td rowspan="2">small intestine</td><td rowspan="2">maltose</td><td rowspan="2">α – glucose</td></tr><tr><td>ignore amylase</td></tr></table>	Enzyme(s)	Site of enzyme production	Biological molecules broken down	Product(s) of digestion	pepsinogen	Gastric glands	protein/peptide	amino acid	Trypsinogen	pancreas (1)	protein/peptide (1)	amino acids	Lactase	Small intestine	Lactose	glucose and galactose (1)	sucrose (1)	small intestine	sucrose (1)	fructose, α-glucose	maltase (1)	small intestine	maltose	α – glucose	ignore amylase	6	1	5				
			Enzyme(s)	Site of enzyme production	Biological molecules broken down	Product(s) of digestion																													
			pepsinogen	Gastric glands	protein/peptide	amino acid																													
			Trypsinogen	pancreas (1)	protein/peptide (1)	amino acids																													
			Lactase	Small intestine	Lactose	glucose and galactose (1)																													
			sucrose (1)	small intestine	sucrose (1)	fructose, α-glucose																													
			maltase (1)	small intestine	maltose	α – glucose																													
ignore amylase																																			
	(b)	(i)	Mucosa	1		1																													
		(ii)	Forms a protective lining for the stomach wall from damage by {hydrochloric acid / protease / abrasion} Do not accept lubrication	1		1																													
	(c)		Enzymes are specific and require a specific pH to remain active- there are different enzymes within the digestive system (1) pH away from optimum can alter the active site of the enzyme leaving the enzyme either temporarily or permanently inactivated. (1) Accept references to low pH in the stomach to kill pathogens (1) Accept references to alkaline pH of bile to neutralise acid (1)	2	2																														
Total Question 10				10	3	7																													

Question	Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
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11	(a)		Fluid mosaic model	1	1					
	(b)		hydrophilic heads (attracted to water form a layer) on the outside of the bilayer (1) Hydrophobic tails (repelled by water and form a bilayer) on the inside of the bilayer (1)	2	2					
	(c)		Any 2 × (1) from plus 1 mark for each correct position: Channel proteins/ Carrier proteins/ intrinsic proteins (1) Through the membrane (1) Extrinsic proteins (1) on surface of membrane/ partly embedded in membrane (1)	4	4					
	(d)	(i)	Rate of diffusion increases as temperature increases. (1)	1	1					
		(ii)	Molecules gain <u>kinetic energy</u> when heated / molecules <u>gain energy</u> and move more (1) ORA Molecules will collide more often with the plasma membrane (and so diffusion rate will increase)(1) ORA	2	2					
		(iii)	Any 2 methods (2) with corresponding difference (2) Facilitated diffusion (1): involves carrier proteins/ channel proteins (1) Active transport (1): (involves carrier proteins and) ATP/energy (1) Osmosis (1): water movement only.(1) Phagocytosis/pinocytosis (1): invagination of cell membrane OWTTE (1)	4	4					
Total Question 11				14	14					

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
12	(a)	(i)	Any 3 × (1) from: Plaque in the coronary artery bursts (1) This causes a blood clot to form(1) Plaque /blood clot restricts blood flow into the heart muscle.(1) Heart muscle starved of (blood and) oxygen (1)	3			3			
		(ii)	Any 2 × (1) from: Eat a low fat diet/ low salt diet(1) Do more physical activity (1) Maintain a healthy weight / lose weight (1) Give up smoking (1) Reduce alcohol consumption (1) Control blood pressure/ diabetes (1) Take prescribed medication (1)	2			2			
	(b)	(i)	Any 3 × (1) from: Sit patient (with left arm uncovered resting on a table). (1) Fit the cuff around the arm (1) Inflate the cuff until blood flow stops (1) Deflate the cuff (1) Record the (systolic and diastolic) values and analyse taking into consideration time of day. (1) + Order(1)	4					4	
		(ii)	Systolic: maximum arterial pressure (during contraction of the left ventricle of the heart)(1) Diastolic: minimum arterial pressure (during relaxation and dilatation of the ventricles of the heart) (1)	2					2	

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
		(iii)	Any 5 × (1) from: Blood in aorta at highest pressure. (1) Left side of heart exert higher pressure on blood due to muscle layer being thicker. (1) As blood travels in the artery the pressure drops (1) Rise and fall in pressure corresponds with contraction and relaxation of ventricles in the heart. (1) Smoothing of pulse due to stretch and recoil of artery walls (1) Arterioles have lower pressure due to friction with the vessel walls. (1) Capillaries have lower pressure (1) Caused by large cross-sectional area (1) Blood flows slowly in capillaries (1) Pressure in the veins and vena cava is low (1) Caused by return blood flow to heart being non- rhythmic (1) Pressure can be increased here by the massaging effect of muscles (1) Valves ensure one-way flow of blood (1)	5		5				
	(c)		Any 3 × (1) from: 1 mark for each correct lifestyle choice and its effect: Alcohol/ recreational drugs and addiction/ liver disease/ kidney disease/ leads to CVD. (1) Smoking and lung disease/ lung cancer/ copd/ emphysema/ stunted growth in unborn babies/ premature births. (1) Exercise/ physical activity/inactivity and obesity/ hypertension/ CVD/ type 2 diabetes/ arthritis/ CHD. (1) Type of employment and correct effect on health. (1) Diet and correct effect .(1)	3			3			
Total Question 12				19		5	8		6	