



LEVEL 3 MARKING SCHEME

SUMMER 2023

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

INTRODUCTION

This marking scheme was used by WJEC for the 2023 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

UNIT 1 – HUMAN HEALTH AND DISEASE

SUMMER 2023 MARK SCHEME

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

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
1.			Any 3 for 1 mark: headache / feeling sick/ being sick / nausea / vomiting /aura increased sensitivity to light and sound/ sweating/ poor concentration/ feeling very hot or very cold/ abdominal pain/ diarrhoea/ dizziness/ vision problems/ difficulty speaking/ numbness/	1			1			
2.			Any 3 × (1) from: Females can be prone to monthly hormone changes / changes in oestrogen level (1) during periods/menstrual cycle (1) on-set of the menopause (1) taking the contraceptive pill (1)	3			3			
3.	(a)	(i)	Electroencephalogram/ EEG (1)	1					1	
		(ii)	{Sensors/electrodes} attached to the {scalp/head} (1) pick up <u>electrical signals</u> which are then {recorded / analysed} (1) Allow ecf: for TMS: hold small electrical device to head which delivers magnetic pulse (1) Allow ecf: for CAT scan: multiple X-rays of head (1) Allow ecf: PET scan: use of radioactive tracer (1) Allow ecf: NCS: electrodes placed on head (1) Allow ecf: MRI: magnetic field applied (1)	2					2	
	(b)		Epilepsy Accept: Parkinson's, brain damage, brain tumour, brain abnormality, motor neuron disease, encephalitis, sleep apnoea Not: stroke / dementia / unnamed cancer	1					1	

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
4.	(a)		Flashing lights/ zig-zag patterns/ blind spots/ aura / temporary vision loss / increased sensitivity to light (1)	1					1	
	(b)	(i)	Reading chart / Ophthalmic imaging/ Angiographic tests / Tonometry / Visual field test (1) Allow: Colour blindness tests	1					1	
		(ii)	Reading chart: using lenses to test vision on chart (1) Ophthalmic imaging/ Angiographic tests: are used to measure the blood flow through the eye/ A dye is injected (into the arm and its progress through) the vessels of the eye is recorded using a retinal camera (1) Tonometry: tests pressure (of fluid) inside the eye (1) Visual field test: tests peripheral vision (by concentrating on a central point) (1) Colour blindness tests: coloured dots (predominantly red and green) are shown to the patient / colour blind can't see coloured dots (1)	1					1	
5.	(a)		Any two × (1) from: Bright lights (1) flickering screens e.g. computer screens (1) loud noises (1) strong smells / working with foods that trigger migraines (1) (High) stress jobs (1) shift work / missed or delayed meals (due to shifts) (1) tired employees / lack of sleep / poor quality sleep (1) Poor posture (1) Drinking too much caffeine (at work) (1) AVP Accept: jet lag (due to travel for work)	2			2			

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
	(b)		Advantage: do not eat dairy products e.g. cheese/ <u>processed</u> meats/ nitrates so less likely to have migraines. (1) Not: lack of iron Do not accept: do not eat foods that cause migraines Disadvantage: could eat {more bread/ gluten/ citrus fruits/red-skinned apples/bananas/dried fruit}/ does not gain correct {vitamins/ minerals} / deficiency diseases / lack of protein /lack of nutrients (1) Do not accept: not enough iron	2			2			
	(c)		Any three for 1 mark from: Reduce alcohol intake/ cut out chocolate/ reduce caffeine intake / less nitrates / less additives / less gluten / less MSG /do not take certain medications {e.g. HRT /sleeping tablets / contraceptive pills}/ any valid point from improve sleep quality/ work-related changes e.g. reduce loud noises/ eat at regular intervals / reduce bright lights / avoiding smoking / exercise <u>more</u>/ less screen time / stress management / better posture Not: eat organic food	1			1			
6.	(a)		Selection of 23.3% (1) $46\,000\,000 \times 0.233 = 10\,718\,000$ / 10.7 million (1) 1.0718×10^7 / 1.072×10^7 (1) Accept: Selection of 23% (1) $46\,000\,000 \times 0.23 = 10\,580\,000$ (1) 1.058×10^7 / 1.06×10^7	3						3

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
	(b)		Any 2 × (1) from: people miss work due to migraine which costs the employers / sick pay costs (1) less productivity (1) cost of over-the-counter medication (1) Do not credit references to private healthcare	2				2		
7.	(a)		Could cause (named) side-effects / could interact with other drugs / may not want to take many medications / allergic (to some painkillers) / avoid dependence Do not accept: some medicines trigger migraines	1			1			
	(b)		(As this is usually a private treatment the) patient would have to pay for the acupuncture / scared of needles / lack of availability.	1			1			
	(c)		has to be used in conjunction with other treatments / some people may see it as a waste of time / fear of an unfamiliar treatment (e.g. electric shock) / doesn't work for everyone / unclear how effective it is to treat migraines / most effective against migraines with aura Do not accept: unsuitable for person's with internal electrical devices	1			1			
Total Section A				24	0	0	12	2	7	3

SECTION B

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
8.	(a)		Glycogen Correct spelling	1	1					
	(b)		(Alpha) glucose Correct spelling Beta: neutral	1	1					
	(c)		Glycosidic	1	1					
Total Question 8				3	3					

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3							
9.	(a)		Bases are A, T, C and G (1) The (pentose) sugar is deoxyribose (1) Do not credit incorrect spelling of bases	2	2												
	(b)		One original strand / one template strand (1) Not: old strand One new(ly synthesized) strand (1)	2	2												
	(c)		<table border="1"><tr><td>D</td><td>A</td><td>F</td><td>B</td><td>G</td><td>E</td><td>C</td></tr></table> 3 / 4 correct – 3 marks 2 correct- 2 marks 1 correct- 1 mark	D	A	F	B	G	E	C	3	3					
D	A	F	B	G	E	C											
Total Question 9				7	7	0	0	0	0	0							

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
10.	(a)		Cartilaginous/cartilage Accept: facet	1		1				
	(b)		Cartilage (discs) (1) cushion (the bones) / absorbs shock (between bones) / reduce friction (between bones) (1)	2		2				
	(c)		X fibrous / fixed / immovable (1) Y synovial / hinge (1)	2		2				
Total Question 10				5	0	5	0	0	0	0

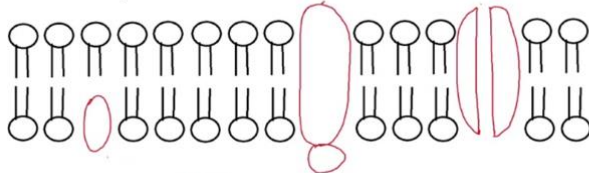
Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3								
11.	(a)		1 mark for each correct mode of transmission (max 2) and 1 mark for each correct method for reducing the risk of becoming infected with HIV (max 2). <table><tr><th>Mode of Transmission of HIV</th><th>Method for reducing the risk of becoming infected with HIV</th></tr><tr><td><i>Sharing needles for intravenous drugs.</i></td><td><i>Do not share needles.</i></td></tr><tr><td>(Unprotected) sexual intercourse/ contact (1)</td><td>Use condoms (1)</td></tr><tr><td>Contact with bodily fluids e.g. blood/ contaminated blood transfusion (1)</td><td>Do not touch blood/ bodily fluids/ use gloves if you need to come into contact with bodily fluids/ test all blood donations to ensure they are not contaminated before use. (1)</td></tr></table> Accept: pass to offspring (1) as mode of transmission	Mode of Transmission of HIV	Method for reducing the risk of becoming infected with HIV	<i>Sharing needles for intravenous drugs.</i>	<i>Do not share needles.</i>	(Unprotected) sexual intercourse/ contact (1)	Use condoms (1)	Contact with bodily fluids e.g. blood/ contaminated blood transfusion (1)	Do not touch blood/ bodily fluids/ use gloves if you need to come into contact with bodily fluids/ test all blood donations to ensure they are not contaminated before use. (1)	4			4			
Mode of Transmission of HIV	Method for reducing the risk of becoming infected with HIV																	
<i>Sharing needles for intravenous drugs.</i>	<i>Do not share needles.</i>																	
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Contact with bodily fluids e.g. blood/ contaminated blood transfusion (1)	Do not touch blood/ bodily fluids/ use gloves if you need to come into contact with bodily fluids/ test all blood donations to ensure they are not contaminated before use. (1)																	
	(b)		Any 2 × (1) from: Affects immune system – makes them more prone to infections. (1) Causes problems with digestive system - that leads to loss of appetite or weight loss. (1)	2			2											

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
	(c)		Any 2 × (1) from: More people being screened/ screening more readily available (1) less stigma with the disease / normalised (1) more people using protection during sexual contact (1) developments in medication (1) virus less virulent (1) More educated (1)	2				2		
	(d)		6 000 – 4 139 / 1861 (1) selection of data $\frac{1861 (ecf)}{6000} \times 100$ (1) = (-) 31/ 31.02 (%) (1) Accept 31.0166667 (to any number of dp) 32 / 31.1 seen on answer line (2)	3				3		
	(e)	(i)	Bar chart plotted (1) Axis labelled (x axis: region/ region of England / area; Y axis: newly diagnosed HIV cases / number of people / number of cases) (1) Suitable scale – at least 7 boxes on y axis, 4.5 boxes x axis. Value given at origin (1) Plots ($\pm$ <1 small square) (1) Max 2 marks if line graph drawn: Axis labelled (1) Suitable scale (1) Minimum thickness of 2 small squares for the bars, ignore spacing between bars on x axis	4				4		

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
		(ii)	Higher number of cases in London due to higher population density/ more people means more risk of transmission due to presence of {more drug addicts/ people sharing needles}/ORA Accept: testing more readily available	1				1		
Total Question 11				16	0	0	6	10	0	0

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
12.	(a)	(i)	A: Plasma (1) B: Leucocytes (1) Accept named leucocyte C: Erythrocytes (1)	3		3				
		(ii)	Any 2 × (1) from: Plasma Function: Transports blood cells/ hormones/ digested food products/ carbon dioxide (1) Leucocytes Function: Part of the immune system/ fight infection/ produces antibodies (1) Erythrocytes Function: Transport oxygen around the body. (1) Accept ecf for Platelets/thrombocytes Function: clotting (1)	2		2				
	(b)	(i)	prevent the blood flowing backwards/ prevent backflow Do not accept: prevent blood flowing the wrong way	1		1				
		(ii)	Veins / named vein	1		1				
		(iii)	(when the heart muscle/ cardiac muscle) beats due to electrical signals in the heart (not from stimulation from nerve impulses) Accept: beats involuntarily / beats automatically	1		1				

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
		(iv)	Coronary arteries (not: coronary veins)	1		1				
		(v)	Any 4 × (1) from: Electrical signals control heartbeat (1) (Activity starts at) {SAN/pacemaker} (1) sends a wave of {electrical activity/depolarisation} across the atria (causing atrial contraction) (1) The non-conducting tissue stops the immediate contraction of the ventricles OWTTE (1) (Electrical activity channeled to) AVN (1) delays the impulse (whilst the blood leaves the atria and fills the ventricles.) (1) {depolarization/impulse} moves through Bundles of His/Purkinje tissue (1) {Depolarization/impulse} spreads up ventricle walls (from apex) (1)	4					4	
	(c)	(i)	Spleen	1		1				
		(ii)	Lymph nodes	1		1				
		(iii)	Any 4 × (1) from: Process starts at the arterial end of the capillary bed (1) hydrostatic pressure is higher than osmotic pressure (1) {Water / small (soluble) molecules} are forced (through the capillary walls) (1) Proteins and cells in the plasma are too large to be forced out (1) Forming tissue fluid between the cells(1)	4		4				
Total Question 12				19	0	15	0	0	4	0

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3															
13.	(a)		<table><thead><tr><th>Name of organelle</th><th>Letter</th></tr></thead><tbody><tr><td>Nucleus</td><td>B</td></tr><tr><td><u>Smooth</u> endoplasmic reticulum / accept smooth ER</td><td>F</td></tr><tr><td>Mitochondrion</td><td>D</td></tr><tr><td>Golgi body</td><td>E</td></tr><tr><td>Rough endoplasmic reticulum</td><td>G</td></tr><tr><td>Cytoplasm</td><td>C</td></tr></tbody></table> 1 mark for each correct row	Name of organelle	Letter	Nucleus	B	<u>Smooth</u> endoplasmic reticulum / accept smooth ER	F	Mitochondrion	D	Golgi body	E	Rough endoplasmic reticulum	G	Cytoplasm	C	6	6						
Name of organelle	Letter																								
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Cytoplasm	C																								
	(b)	(i)	protein/ channel protein/ carrier protein/ intrinsic/ extrinsic (at least 1)  phospholipid bilayer 1 mark for phospholipid bilayer – accept bilayer drawn but labelled as hydrophilic heads and hydrophobic tails 1 mark for protein(s) in the bilayer either intrinsic / extrinsic Do not accept heads with only one tail	2	2																				

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
		(ii)	Osmosis (1) {Movement of water} {from high concentration to low concentration/ high water potential to low water potential/ down a concentration gradient} (through a selectively permeable membrane) (1) or Active Transport (1) Movement against a concentration gradient (using a channel protein) and ATP (1) Accept reference to endocytosis / exocytosis phagocytosis / pinocytosis / bulk transport (1) Accept description of method (1)	2	2					
Total Question 13				10	10	0	0	0	0	0

Question			Answer	Marks	LO1	LO2	LO3	LO4	Unit 2	Unit 3
14.	(a)		Any 3 × (1) from: informed consent (1) confidentiality (1) protection of participants / data protection (1) right to withdraw (1) potential benefits (social/scientific value) / potential harm (1)	3						3
	(b)		Any 3 × (1) from: Mean / mode / median (1) measures of dispersion (variance, range, standard deviation / error bars) (1) normal distribution curves / skewed distribution curves (1) probability (1) significance levels (1) confidence limits (1) parametric test (1) specific non-parametric (inferential) test (1) correlation (1) named statistical tests - allow three marks for three named tests (1)	3						3
Total Question 14				6	0	0	0	0	0	6

UNIT 1 – HUMAN HEALTH AND DISEASE

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	TOTAL MARK	LO1	LO2	LO3	LO4	Unit 2	Unit 3
Section A	24	0	0	12	2	7	3
8.	3	3	0	0	0	0	0
9.	7	7	0	0	0	0	0
10.	5	0	5	0	0	0	0
11.	16	0	0	6	10	0	0
12.	19	0	15	0	0	4	0
13.	10	10	0	0	0	0	0
14.	6	0	0	0	0	0	6
TOTAL	90	20	20	18	12	11	9
TARGET	90	18-23	18-23	18-23	10-15	8-12	8-12