



LEVEL 3 MARKING SCHEME

SUMMER 2022

**LEVEL 3 DIPLOMA/CERTIFICATE IN MEDICAL
SCIENCE - UNIT 6
4463U60-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2022 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 6 – MEDICAL CASE STUDY

SUMMER 2022 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

Case study 1			Answer	Marks	LO1	LO2	LO3	LO4	LO5
1.			Any 4 × (1) from: helicase (1) Unwinds DNA/separates strands (1) breaks (hydrogen) bonds (1) RNA polymerase (1) Attaches to {template/one} strand (1) adding RNA nucleotides (1) Complementary base pairing (1) Ends at stop codon (1)	4	4				
2.	(a)		yellow/orange	1					1
	(b)		Stimulates the sweat glands/produce sweat	1				1	
	(c)	(i)	Mean calculation 1.75 (accept 1.745) (1) 74 (accept 73-75) (ecf) (1)	2					2
		(ii)	indicative of CF (ecf) linked marks with c(i)	1					1

Case study 1			Answer	Marks	LO1	LO2	LO3	LO4	LO5
3.	(a)		Any 4 × (1) from: Restriction enzymes / cut DNA (1) DNA sample is added to {wells /the gel} (1) {Voltage/current/electricity/charge} applied (1) DNA attracted to {+ve end / anode} / DNA is -ve (1) Smaller fragments move further than larger ones (1) DNA ladder/calibration (1) Gel may be stained / radio-labelling (1)	4					4
	(b)		Non-sufferer 63 bp and CF patient 60 bp / non-sufferer has 3 more bp than CF patient (1) CF carrier - 63 and 60 bp / two bands (in same positions as non-sufferer and patient) (1)	2					2
4.	(a)		Keeps CFTR channels open (1) Chloride ions transported out of cells/more water leaves by osmosis (1) dilute mucus produced (1)	3				3	
	(b)	(i)	hydrolyses DNA in mucus (1) Reduces viscosity/ mucus becomes thinner/dilutes mucus (1)	2				2	
		(ii)	directly affects the mucus in the lungs	1				1	

Case study 1			Answer	Marks	LO1	LO2	LO3	LO4	LO5
5.			Any 4 × (1) from: For all - Median age of death has increased (1) For non-sufferers females age of death always higher than males (1) Median age of non-sufferers is always (significantly) higher than sufferers (1) For CF sufferers – median age of death increased (for males and females) (1) For CF sufferers – the difference in median age of death has increased /gap is wider (1) CF Male age of death is higher compared to females (1)	4			4		
Total Case Study 1				25	4	0	4	7	10

Case study 2			Answer	Marks	LO1	LO2	LO3	LO4	LO5										
6.	(a)		Receptor: detect stimulus / convert vibrations to nerve impulses / create impulse (1) Sensory neuron: Carry impulses (from receptor) to {CNS/brain/relay neuron} (1)	2	2														
	(b)	(i)	<table><tr><td>Component</td><td>Function</td></tr><tr><td>Myelin sheath</td><td>Insulating layer</td></tr><tr><td>Nodes of Ranvier</td><td>speed up nerve transmission / saltatory conduction (1)</td></tr><tr><td>Cell body</td><td>Controls the activities of the cell /holds the nucleus (1)</td></tr><tr><td>Schwann cell</td><td>(Produces) myelin (1)</td></tr></table>	Component	Function	Myelin sheath	Insulating layer	Nodes of Ranvier	speed up nerve transmission / saltatory conduction (1)	Cell body	Controls the activities of the cell /holds the nucleus (1)	Schwann cell	(Produces) myelin (1)	3	3				
Component	Function																		
Myelin sheath	Insulating layer																		
Nodes of Ranvier	speed up nerve transmission / saltatory conduction (1)																		
Cell body	Controls the activities of the cell /holds the nucleus (1)																		
Schwann cell	(Produces) myelin (1)																		
		(ii)	An arrow from receptor cell to dendrites	1	1														
		(iii)	Synapse	1	1														

Case study 2			Answer	Marks	LO1	LO2	LO3	LO4	LO5
7.	(a)		An examination of the {external ear/ tympanic membrane /auditory canal/ outer ear to ear drum/ ear drum} (1) With a {magnifying lens / light source} (1)	2		2			
	(b)		Any 2 × (1) from: (excessive) ear wax (1) discharge (1) inflammation / swelling / redness (1) other foreign bodies (1) ear drum damage (1) build-up of fluid behind the ear drum (1)	2		2			
	(c)	(i)	Movement of the ear drum	1		1			
		(ii)	Cochlea	1		1			
8.	(a)		6 correct plots (2) 5 correct plots (1) line through points (1)	3		3			
	(b)		Any 3 × (1) from: As frequency increases, hearing loss increases (1) Frequencies below 200/low frequency normal hearing (1) Sharp decrease in hearing above 500 (1) Above 3000 severe hearing loss (1) Hearing loss in left ear is worse than the right ear (1) Accept correct reference to values	3		3			

Case study 2			Answer	Marks	LO1	LO2	LO3	LO4	LO5
9.	(a)		Reduces inflammation	1				1	
	(b)		Orally / in tablet form	1				1	
10.			Any 2 × (1) from: Working or living in a noisy environment / no ear defenders (1) No health care monitoring for hearing loss (1) Higher prevalence because of genetics (1) Higher rate of complications during birth (lack of oxygen) (1) Increased viral infections (1)	2			2		
11.			Any 2 × (1) from; No side effects (1) reduced cost to NHS (1) prevention rather than treatment (1)	2				2	
Total case study 2				25	7	12	2	4	0

Case study 3			Answer	Marks	LO1	LO2	LO3	LO4	LO5
12.			Any 10 × (1) from: A: Macrophages/phagocytes present antigens on their surface (1) B: Humoral response (1) C: Mumps/antigens bind to receptors on B lymphocyte (1) D: B lymphocytes divide into plasma cells and memory cells (1) E: {B lymphocytes/Plasma cells} secrete antibodies (1) F: clumping / agglutination (1) G: Memory cells stay in circulation (and can form more plasma cells if antigen encountered again) (1) H: Cell mediated response (1) I: Activation of phagocytes, B lymphocytes/cells and T lymphocytes/cells (1) J: Phagocytes {engulf /digest} pathogens (1) K: T killer/cytotoxic cells kill cells infected by virus (1) L: T helper cells secrete {cytokines/chemicals} (1) M: T helper cell attaches to antigens on {macrophages / phagocytes} (1) N: Cause T helper cells to divide (by mitosis) (1) O: {Cytokines/chemicals} stimulate phagocytosis (1) P: Secondary response produces more antibodies (1) Q: More quickly (1) R: T helper cells activate B lymphocytes	10	10				

Case study 3			Answer	Marks	LO1	LO2	LO3	LO4	LO5
13.	(a)		Reduces pain/inhibits prostaglandin production (1) Reduces fever (1) Reduces {inflammation/swelling} (1)	3				3	
	(b)		Sofia is 2 1/2 yrs = $2.5 \times 12 = 30$ mths (1) $7.5 \times 4 \times 7$ (1) = 210 ml (1) Answer only (3)	3				3	
	(c)	(i)	Liver (1) Brain (1)	2				2	
		(ii)	stomach bleeds / ulcers / damages lining of stomach (1)	1				1	
14.	(a)		Any 3 $\times$ (1) from: Many patients not vaccinated (following scare in 90's) / Many still believe vaccinations are harmful (1) Immigration of people from countries without vaccination program (1) Shortage of mumps vaccine (1) Low herd immunity (1) More {detection/reporting} of cases (1) Accept references to allergies to vaccine / religious beliefs	3			3		

Case study 3			Answer	Marks	LO1	LO2	LO3	LO4	LO5
	(b)		Any 3 × (1) from: Make vaccination compulsory (1) Education about {positives of vaccination/harmful effects of mumps} (1) Stop any opt out of vaccinations {for religious reasons/beliefs} (1) Discourage spread of inaccurate information about vaccination / monitoring of social media (1)	3			3		
Total Case Study 3				25	10	0	6	9	0

SUMMARY OF MARKS ALLOCATED TO LEARNING OBJECTIVES

	TOTAL MARK	LO1	LO2	LO3	LO4	LO5
Total Case Study 1	25	4	0	4	7	10
Total case study 2	25	7	12	2	4	0
Total Case Study 3	25	10	0	6	9	0
TOTAL	75	20-22 (21)	9-12 (12)	8-12 (12)	20-25 (20)	8-12 (10)