



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2023**

Life and Health Sciences

Assessment Unit AS 2
assessing
Human Body Systems

[SZ021]

THURSDAY 25 MAY, MORNING

**MARK
SCHEME**

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

			AVAILABLE MARKS
1	(a) (i)	Any two from:	
		<ul style="list-style-type: none"> • Small size/allows extensive network/large surface area [2] • Thin wall/one cell thick/shorter diffusion distance [2] • Permeable wall/allows gases and small molecules to pass between capillary and cells [2] • Narrow/slower flow/more time for diffusion [2] 	
		Correct explanation with adaptation.	[4]
	(ii)	<ul style="list-style-type: none"> • Cuff on upper arm [1] • Cuff inflated to high pressure (to stop blood flow down artery in arm) [1] • Pressure reduced slowly/until blood flow (surge) detected again [1] • Systolic pressure (upper figure)/ventricular contraction [1] • Pressure reduced further/until constant blood flow [1] • Diastolic pressure (lower figure)/pressure between heart beats [1] 	[6]
(b) (i)	Normal blood pressure	[1]	
	(ii) Bradycardia/low resting heart rate/<60 bpm	[1]	12
2	(a)	A. Stimulus	[1]
		D. Effector	[1]
	(b)	Any two from:	
		<ul style="list-style-type: none"> • Increased glucose uptake into cells; • Increased rate of use of glucose in cellular respiration; • Increased rate of conversion of glucose to glycogen (in liver or muscle); • Increased rate of conversion of glucose to fat (for storage). 	[2]
	(c)	Control centre/pancreas/beta cells detect set point has been reached; Insulin production (by beta cells) stops/returns to normal level	[2]
(d)	To prevent over-correction/prevent going below set point/prevent blood glucose decreasing too much.	[1]	7
3	(a) (i)	Vitamin D/vitamin E	[1]
		(ii) Can be lost/washed away during food storage/preparation/not retained by body/easily lost by body	[1]
	(b) (i)	Any two from:	
	<ul style="list-style-type: none"> • Above 100% RNI for all age groups; • 20–29 lowest RNI%/lower than all 30–39, 40–49, 50–59/108 vs 115, 117, 125; • RNI % increases with age/108–125. 	[2]	

- (ii) Any **one** from:
- More likely/have more time available, to cook meals using fresh ingredients (that contain vitamin B2);
 - Less likely to have poor dietary habits/eat processed food/avoid food groups;
 - More likely to eat complete meals/less likely to eat snacks.
- Answer must refer **directly to behaviour of 50–59 year olds.** [1]

- (iii) Any **one** from:
- Avoidance of red meat/increased adoption of vegetarianism/veganism/plant-based foods;
 - More likely to have poor dietary habits/eat processed food/eat more snacks (fewer complete meals);
 - Greater impact of social media/body image on dietary habits (avoidance of food groups).
- Answer must refer **directly to behaviour of 20–29 year olds.** [1]

- (c) (i) Vitamin B2 – Fortified breakfast cereals/eggs/spinach/dairy products/mushrooms [1]

- (ii) 400 µg/day [1]

- (iii) To help development of the baby's spinal cord/prevent spina bifida in the baby [1]

9

- 4 (a) (i) Transport medium/allows nutrients and waste products to be exchanged between capillaries and cells (tissues)/provides a moist environment for exchange of materials. [1]

- (ii) • Inspiration (ventilation) brings oxygen-rich air into lungs (alveoli)/blood arriving at alveoli low in oxygen (deoxygenated) [1]
• Blood moving through capillaries removing oxygen-rich blood [1] [2]

- (b) (i) Values at Day 0 for patients needing oxygen is 73, but for ventilation is 59. [1]

- (ii) • Appropriate scaling of *y* axis starting at (0) [1]
• Axes labelled appropriately including correct units [1]
• Points plotted correctly UMC (+/-1 small square) [2]
• Points plotted correctly UMC + Drug A (+/-1 small square) [2] [6]

- (iii) All groups show improvement [1]

- (iv) • Ventilation + Drug A [1]
• 16 [1] [2]

- (v) • UMC increased by 7% (73 to 80), UMC + Drug A increased by 16% (73 to 89)/9% greater increase with UMC + Drug A vs UMC only [1]
• UMC 73-80% day 6, UMC + Drug A 73-80% day 4/reached 80 2 days sooner [1] [2]

		AVAILABLE MARKS
	(vi) More effective in ventilation (vs oxygen)/26% vs 16%/10% more effective in ventilation than oxygen	[1]
	(vii) There is still not a 100% recovery in patients	[1]
		17
5	(a) Any one from:	
	• Height;	
	• Time of day;	
	• Weight.	[1]
	(b) $610 - 580 = 30$ [1]	
	$30/5.8 = 5.2\%$ [1]	[2]
	Correct answer. [2]	
	(c) Any four from:	
	• Both groups have average (age 21) PEFR at week 0;	
	• Both programmes increased PEFR/both were effective;	
	• Programme A PEFR increased from 580 to 630 Lmin ⁻¹ (50 Lmin ⁻¹);	
	• Programme B PEFR increased from 580 to 620 Lmin ⁻¹ (40 Lmin ⁻¹);	
	• Programme B did not change PEFR at week 4;	
	• Programme A increased more than programme B at all weeks (4, 8 and 12);	
	• Programme A increased PEFR sooner than programme B (week 4 vs week 8);	
	• Programme A was more effective than Programme B/converse;	
	• 630 Lmin ⁻¹ programme A vs 620 Lmin ⁻¹ programme B.	[4]
		7

6 (a) Any **six** from:

- High cholesterol (normal range 4.5–6 mmolL⁻¹);
- Risk of CHD/heart attack/stroke;
- Reduce fat intake;
- Eat less processed food;
- Increase intake of fruit and vegetables;
- Overweight risk of high blood pressure/diabetes/cancer/mental health issues/joint problems/or same;
- Lose weight;
- Reduce calorie intake;
- Increase physical activity.

[6]

Level of Response	Marking Criteria	Marks
Excellent	Candidates give 5 or more points from the indicative content. Presentation, spelling, punctuation and grammar are excellent.	[5]–[6]
Good	Candidates give 3–4 points from the indicative content. Presentation, spelling, punctuation and grammar are sufficiently competent to make the meaning clear.	[3]–[4]
Basic	Candidates give 1–2 points from the indicative content. There may be some errors in spelling, punctuation and grammar.	[1]–[2]
	Response is not worthy of credit.	[0]

(b) **Indicative content**

- Man is currently doing $2 \times 45 = 90$ minutes of moderate physical activity;
- Man needs to add 60 min or more per week of moderate activity/weekly routine/current activity;
- Needs to add muscle strengthening activities;
- Increased activity on the days he is not playing football, so the activity is spread throughout the week.

max two from:

- Weight maintenance;
- Reduced risk of CHD/heart attack/stroke;
- Reduced risk of high blood pressure;
- Reduced risk of diabetes;
- Reduced risk of some cancers;
- Reduced risk of joint damage/osteoarthritis;
- Reduced risk of social isolation;
- Reduced risk of mental health issues.

[6]

12

				AVAILABLE MARKS
7	(a)	(i)	Glycolysis [1] Cytoplasm [1]	[2]
		(ii)	<ul style="list-style-type: none"> • ETC [1] • Inner mitochondrial matrix/cristae. [1] 	[2]
	(b)		Glucose → 2x pyruvate + 2 ATP [1] [1] [1] [1]	[4]
	(c)	(i)	<ul style="list-style-type: none"> • Respiration (of muscle cell) not occurring (as normal)/glycolysis/aerobic/anaerobic respiration not occurring (as normal)/(enough) ATP not being produced; [1] • Glycogen in muscle cell not being broken down to glucose for respiration/glucose not available for respiration (in MD muscle cells). [1] 	[2]
		(ii)	Glucose from drink, taken up/used by, muscle cell for respiration.	[1]
			Total	11
				75