



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2025**

Life and Health Sciences

Assessment Unit AS 2
assessing
Human Body Systems

[SZ021]

FRIDAY 30 MAY, AFTERNOON

**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) A Septum. [1] B Left ventricle wall/thick muscle wall. [1]	[2]	8	
		(ii) Valves (into and out of heart/between atria and ventricles) – prevent backflow of blood [1] Electrical activity – (myogenic) allows contraction (continuously without need for nerve impulses). [1]	[2]		
1	(b)	Any four from: <ul style="list-style-type: none"> • Hold out hand with palm facing upwards; • Press the first (index) finger and middle finger of the other hand on the inside of the wrist (at base of thumb); • Press (skin) lightly until feel pulse; • Count number of beats; • for 60 seconds/for 30 seconds and multiply by 2. 	[4]		9
	2	(a)	(i) (Male) 4 mg/(female) 3 mg		
(ii) Any two from: <ul style="list-style-type: none"> • plant oils (named) • nuts and seeds (named) • wheatgerm (cereals) • eggs • prawns • spinach • broccoli 		[2]			
2	(b)	low fat diet/fat malabsorption condition (named).	[1]		
	(c)	Bone health/support immune system.	[1]		
2	(d)	(i) June-Sept. [1] Vitamin D levels at/above optimum. [1]	[2]		
		(ii) Vitamin D levels above optimum for all months. [1] Vitamin D levels are always higher (than other 2 groups). [1]	[2]		

			AVAILABLE MARKS
3	(a) (i)	The metabolic rate when an animal is at rest which supports vital functions (heartbeat, breathing, kidney function, nerve transmissions, cellular repair and maintaining body temperature). [1]	
	(ii)	Any two from: <ul style="list-style-type: none"> • Chemical messenger; • Produced by endocrine cells; • Carried in the blood; • Acts on target cells; • Target cells have (specific) hormone receptors; • Slow acting/long-lasting effects. [2] 	
	(b)	Control Centre – hypothalamus/pituitary gland [1] Effector – thyroid gland [1] [2]	
	(c) (i)	Any two from: <ul style="list-style-type: none"> • Negative feedback <i>by thyroxine</i>; • Thyroxine inhibits TRH production (by hypothalamus); • Thyroxine inhibits TSH production (by the pituitary); [2] 	
	(ii)	To prevent over-correction/prevent going below set point. [1]	8
4	(a)	Fibre/vitamin(named)/mineral (named)/water. [2]	
	(b) (i)	Females higher for all age groups/converse. [1] >65 (male and female) highest of age groups. [1] >65 (male and female) closest to recommended (5-a-day). [1] 11-18 (male) lowest. [1] [4]	
	(ii)	11-18 (female) lowest. [1] >65 (female) highest. [1] Increases with age for both genders. [1] Males higher in 11-18/females higher in 19->65. [1] [4]	
	(iii)	Any one from: <ul style="list-style-type: none"> • More likely/have more time available, to cook meals using F&V; • Less likely to have poor dietary habits/eat processed food/avoid F&V; • More likely to eat complete meals/less likely to eat snacks. 	
		Answer must refer directly to the behaviour of >65 year old. [1]	11

5	(a)	(i) It keeps the pH at a constant value/maintains constant pH/keep at normal pH	[1]
		(ii) 7.35 to 7.45	[1]
		(iii) Blood pH falls.	[1]
		(iv) Chemoreceptors/receptors (detect fall in blood pH) send impulses/signals/messages [1] to the medulla/brain/hypothalamus [1] CO ₂ released from lungs/increased breathing rate [1]	[3]
	(b)	(i) artery/capillary	[1]
		(ii) The percentage of haemoglobin-bound oxygen compared to the total oxygen-binding capacity of the haemoglobin.	[1]
	(c)	(i) Infra-red light (threshold) [1] 75% absorbed (only 25% detected) [1]	[2]
		(ii) emphysema/ cystic fibrosis/ pneumonia/ (other acceptable response) [1]	[1]
	(d)	(i) Physical activity increases/increase in temp/lower pH	[1]
		(ii) Bohr (right) shift means haemoglobin has a lower affinity for oxygen [1] More oxygen released to the tissues [1]	[2]

AVAILABLE
MARKS

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- 6 (a) Appropriate scaling of y-axis starting at (0). [1]
 Axes labelled appropriately including correct units. [1]
 Points plotted correctly 2018/19. [2]
 Points plotted correctly 2019/20. [2] [6]

- (b) (i) $350,000/4 = 87,500$ [1]
 $87,500 \times 10 = 875,000$ [1]
 Correct answer [2]

- (ii) Any **one** from:
 • Desire to increase physical activity level/time;
 • Concerns regarding polluting/environmental effects of fossil fuels (petrol/diesel);
 • Lack of accessible (public/private) transport;
 • Cost of (public/private) transport. [1]

(c) **Indicative content**
 Must have at least one point from each section to access top band.

Short-term

- Weight maintenance/tonne;
- Health/muscle development;
- Improved bone density/mass;
- Respiratory function;
- Improved cardiovascular function;
- Reduced risk of social isolation/loneliness;
- Reduced risk of mental health issues.

Any other appropriate response

Long-term:

- Increased life expectancy;
- Reduced risk of cardiovascular disease (or heart attack/stroke);
- Reduced risk of respiratory disease (or named);
- Reduced risk of obesity/type 2 diabetes/cancer (or named);
- Reduced risk of joint and bone (musculoskeletal) conditions.

Any other appropriate response

Level of Response	Level of Response	Marks
Excellent	Candidates give 5–6 points from the indicative content. Presentation, spelling, punctuation and grammar are excellent.	[5]–[6]
Very Good	Candidates give 3–4 points from the indicative content. Presentation, spelling, punctuation and grammar are very good.	[3]–[4]
Good	Candidates give 1–2 points from the indicative content. Presentation, punctuation and grammar are sufficiently competent to make the meaning clear.	[1]–[2]
Response is not worthy of credit.		[0]

[6]

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			AVAILABLE MARKS
7	<p>(a) Link reaction/Krebs cycle. [1] Mitochondrial matrix. [1]</p>	[2]	
	<p>(b) glucose is 6 carbon (molecule)/6C, pyruvate is 3 carbon (molecule)/3C/ 6C to 2 × 3C (or idea of)</p>	[1]	
	<p>(c) (i) The conversion of triose phosphate to pyruvate/productive phase produced 4 molecules of ATP [1] <i>But</i> 2 molecules of ATP were used for the phosphorylation of glucose to produce triose phosphate (glyceraldehyde 3 phosphate)/ preparatory reaction [1]</p>	[2]	
	<p>(ii) Oxygen absent: Pyruvate converted to lactate [1] Oxygen present: Pyruvate enters the link reaction/aerobic respiration [1]</p>	[2]	
	<p>(d) Any three from:</p> <ul style="list-style-type: none"> • Krebs cycle inhibited (NAD and FAD not regenerated); • Insufficient energy generated/available for ATP production; • By oxidative phosphorylation; • Processes that require ATP (heart contraction) cannot take place. 	[3]	10
		Total	75