Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2022

Life and Health Sciences

Assessment Unit AS 2
assessing
Human Body Systems

[SZ021]

MONDAY 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.

COVID-19 Context

Given the unprecedented circumstances presented by the COVID-19 public health crisis, senior examiners, under the instruction of CCEA awarding organisation, are required to train assistant examiners to apply the mark scheme in case of disrupted learning and lost teaching time. The interpretation and intended application of the mark scheme for this examination series will be communicated through the standardising meeting by the Chief or Principal Examiner and will be monitored through the supervision period. This paragraph will apply to examination series in 2021-2022 only.

				AVAILABLE MARKS
1	(a)	(i)	Thick middle layer (tunica media is thicker) [1] Can withstand high blood pressure (from the heart) [1] **or** Narrow lumen [1] To maintain high blood pressure [1] [2]	
		(ii)	60–100 bpm [1]	
	(b)	(i)	QRS stimulates ventricles [1] Ventricles contain more muscle/thicker wall [1] [2]	
		(ii)	Distance between peaks 0.2 × 2.5 = 0.50 s (accept 0.48–0.53 s) [1] 60/0.50=120 beats per minute (accept 117–123 beats per minute) [1] 120 beats per minute = [2] [2]	
		(iii)	Tachycardia [1] Increased resting heart rate/resting heart > 100 BPM [1] [2]	9
2	(a)	(i)	17.5/30 × 100 = 58/58.3% [1]	
		(ii)	Any **one** from: • Fruit/fruit juice with pulp; • Vegetables/vegetable juice with pulp; • Wholegrain (bread/rice/pasta/cereal); • Oats (porridge) Any other acceptable answer [1]	
	(b)		4.3 lower/similar than the 5-a-day fruit and vegetable recommendations [1] Total fat: Mean intake of total fat higher than recommendation (no more than 35% food energy) [1] Mean intake of saturated fats exceeded the recommendation (no more than 11% of food energy) [1] Sugar intake exceeded recommended levels: no more than 5% of food Energy [1] Fibre intake lower than recommendation (30 $gday^{-1}$) [1] [5]	
	(c)	(i)	(any value) from 26–100/>25 [1]	
		(ii)	diet: eat vitamin D containing foods (eggs, oily fish, mushrooms)/eat foods fortified with vitamin D (cereals, milk, bread) [1] lifestyle: increase time spent outdoors/reduce time in doors/exposure to sunlight (holiday) [1]/take vitamin D supplement [2]	10

				AVAILABLE MARKS
3	**(a)**	Pituitary (gland) [1] Thyroid stimulating hormone/TSH [1] [2]		
	(b)	**(i)** Levels of homeostatic variable/named maintained at normal level/ set point [1] When level deviates from normal/set point, returns to normal/set point [1] Corrective mechanism turned off/prevents overcorrection [1] [3]		
		(ii) Arrow going from thyroxine to hypothalamus (gland 1)/thyroxine to pituitary gland (gland 2) [1]		
		(iii) • Increased heart rate • Weight loss • Swelling on neck (goitre) • Higher metabolic rate [2]		
		(iv) Any **one** from: • Increased heart rate/metabolic rate/more respiration/more ATP • Thyroxine causes increased basal metabolic rate/ increased BMR/increased metabolism of proteins and carbohydrates • Enlargement of thyroid gland [1] Any other acceptable answer with explanation		9
4	**(a)**	**(i)** A Trachea [1] B alveolus/alveoli [1] [2]		
		(ii) Rings of cartilage in (trachea) wall [1] Prevents trachea from collapsing/maintains rigidity of trachea [1] Prevents suffocation/allows clear passage of air [1] [3]		
	(b)	Any **one** adaptation from: • Thin [1]; and therefore reduces diffusion distance/short diffusion path [1] • Biconcave shape: inc SA to vol ratio [1]; increases surface area [1] • Small: inc SA [1]; increases surface area: volume ratio [1] • Non-nucleated [1]; increased space for haemoglobin [1] Correct explanation with adaptation [2] [2]		
	(c)	**(i)** Maintain pH/a solution which can keep its set pH even when acid or alkali added to it [1]		
		(ii) Allows a solution to maintain a required pH range for its operation (blood pH 7.35–7.45) [1]		
		(iii) Any **two** from: • Carbonic acid • Bicarbonate • Phosphates • Proteins (named protein) [2]		
		(iv) • Chemoreceptors/receptors detect a fall in pH/pH of blood is more acidic [1] • Carotid/aorta [1] • Impulses/signals/messages sent to the medulla/brain/ hypothalamus [1] • Increase in respiratory system activity • Increased breathing rate/more CO_2 released from the lungs [1] [5]		16

AVAILABLE MARKS

5 **(a)** Any **one** from:

- Reduced risk of falls;
- Reduced risk of bone breakage;
- Reduced risk of hospitalisation;
- Improved mobility;
- Improved ability to carry out daily tasks;
- Increases likelihood of independent living;
- Improved quality of life [1]

(b) Any **six** from:

- Man is currently doing 3 × 30 = 90 minutes of moderate-intense physical activity (swimming);
- Man is currently one muscle strengthening session (weight lifting);
- Man is currently doing one balance/coordination activity (yoga);
- Man needs to add 60 min or more per week of moderate activity/weekly routine/current activity;
- Yoga could be done on one more day a week (balance/coordination);
- Muscle strengthening activities (weight lifting session) could be done on one more day a week;
- Could increase swimming by 2 (2 × 30 min);
- Increased activity on the days he is not swimming, so the activity is spread throughout the week

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]

[6] 7

					AVAILABLE MARKS
6	**(a)**	**(i)**	polypeptide (chains)	[1]	
		(ii)	A: Haem [1] Mineral: Iron/Fe^{2+} [1]	[2]	
		(iii)	Oxyhaemoglobin	[1]	
		(iv)	4	[1]	
		(v)	Difficult for first oxygen molecule to bind [1] Once first oxygen molecule binds causes structure of haemoglobin to alter [1] so it becomes easier for second oxygen to bind [1]	[3]	
	(b)	**(i)**	Correct point from graph at 5 kPa as 70% saturation	[1]	
		(ii)	Two correct point from graph (98 and 26) [1] Correct subtraction 98–26 = 72 [1] Correct answer	[2]	
	(c)	**(i)**	Right shift of curve	[1]	
		(ii)	Increase in temp/increase in carbon dioxide/lower pH	[1]	
		(iii)	• More unloading/release of oxygen/higher ppO_2 • to muscle tissues/respiring tissues	[2]	15
7	**(a)**	**(i)**	670/100 × 40 = 268 kcal [1] 268/38 = 7.05 kcal [1] Correct answer [2]	[2]	
		(ii)	Heat produced/released	[1]	
		(iii)	2 ATP	[1]	
		(iv)	Glucose only (partly) broken down (to lactate)/only glycolysis occurs in anaerobic respiration	[1]	
	(b)	**(i)**	Directly proportional/increase in the intensity of exercise increases concentration of lactate	[1]	
		(ii)	Allows aerobic respiration to begin/more oxygen available [1] Krebs cycle occurs [1] ETC occurs [1]	[3]	9
				Total	**75**