



*Rewarding Learning*

**ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2018**

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## **Life and Health Sciences**

Assessment Unit AS 2  
*assessing*  
Human Body Systems

**[SZ021]**

**TUESDAY 15 MAY, AFTERNOON**

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# **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	
<b>1</b>	<b>(a)</b>	<b>(i)</b> Low vitamin C can lead to swollen and sore gums/bleeding gums/easy bruising/tiny red-blue bruises/spots [1]	10	
		<b>(ii)</b> Tiredness (is a symptom of anaemia due to iron deficiency) [1]		
		<b>(iii)</b> More fruit/vegetables/more citrus fruits/more citrus fruit juices [1]		
		<b>(iv)</b> More leafy green vegetables named, e.g. spinach/red meat/iron fortified foods, e.g. cereals [1]		
	<b>(b)</b> Any <b>three</b> from:	• Mental health problems/or described – mood/anxiety/social isolation effect on relationships		10
		• Cardiovascular problems or stated examples – direct physiological effect on cardiovascular system, e.g. high blood pressure		
		• Cancer – byproducts of alcohol/toxins, transform cells/make cancerous		
		• Liver problems or examples – direct damage of liver leading to poisoning and scarring of liver/cirrhosis		
		• Malnourishment/nerve damage – negative dietary change/inadequate nutrient intake		
		• Damage to brain – direct effect on brain cells/tissue		
• Sexual problems – direct effect of alcohol on libido/indirect emotional effects				
• Conception/pregnancy – negatively affected/effect on foetus explained				
	Or any other appropriate response with explanation [6]			
<b>2</b>	<b>(a)</b>	$1108/2000 \times 100 = 55/55.4\%$ [1]	10	
	<b>(b)</b>	Daily intake is below the recommended 2000 kcal/55.4% of the recommended [1]		
		2.8 lower than the 5-a-day fruit and vegetable recommendations [1]		
		Total fat: Mean intake of total fat met the 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/No more than 30 g/d/consumption of sugar-sweetened beverages should be minimised in children [1]		
		<b>(c)</b>		<b>(i)</b> 4.0–6.5 [2]
				<b>(ii)</b> diet: reduce fat intake/avoid saturated fats/increase low fat food/substitution, e.g. fruit and vegetables/reduce named fatty food [1]
		lifestyle: exercise/lose weight/increase physical activity level [1]		

- 3 (a) (i) Any **two** from:  
 Increased cardiac output  
 Increased heart rate  
 Increased ventilation rate  
 Increased basal metabolic rate/increased BMR  
 Potentiates the effects of the catecholamines (i.e. increases sympathetic activity)  
 Potentiates brain development/brain development  
 Thickens endometrium in females  
 Increased metabolism of proteins and carbohydrates  
 Promotes growth [2]
- (ii) A Thyroid releasing hormone [1]  
 B Thyroid stimulating hormone [1]
- (iii) Thyroid [1]
- (b) Any **one** from:  
 Reduce hypothalamus production of TRH/hormone/hormone A/signal  
 Reduce pituitary production of TSH/hormone/hormone B/signal  
 Reduce action of TSH on thyroid/gland 3  
 Reduce production of thyroxine by thyroid/gland 3/given [1]
- (c) (i) Woman needs  $57 \times 5 = 285$  mg of drug per day [1]
- (ii)  $285/50 = 5.7$  (ecf from (i)) [1]  
 $5.7 \times 2.5 = 14.25$  ml of suspension contains 285 mg  
 285 mg = [2] [1]

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

- Woman is currently doing  $3 \times 20 + 30 = 90$  minutes of physical activity
- Woman needs to **add** 60 min or more per week of moderate/vigorous activity/weekly routine/current activity
- Could increase walking by 3 ( $3 \times 20$  min)/increase swimming by 2 ( $2 \times 30$  min)/or combination as appropriate
- Increased activity on the days she is not walking or swimming, so the activity is spread throughout the week
- Add vigorous activity
- Provide examples of vigorous activities are: brisk walking, jogging, running, exercise classes, cycling, sports activities
- Muscle strengthening activities should be done involving major muscle groups on 2 or more days a week

Level	Response	Marks
Excellent	Candidates gave 5 or more points from the indicative content. Presentation, spelling, punctuation and grammar are excellent.	[5]–[6]
Good	Candidates gave 3–4 points from the indicative content. Presentation, spelling, punctuation and grammar are sufficiently competent to make the meaning clear.	[3]–[4]
Basic	Candidates gave 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]

## (b) Indicative content

- Lower rates of all-cause mortality/cardiovascular disease/stroke/heart attack/type 2 diabetes/increased life expectancy/live longer
- Lower rates of cancer
- Lower rates of high blood pressure/decreased hypertension
- Improved musculoskeletal health/strengthening bones/muscles stronger
- More likely to achieve weight maintenance, have a healthier body mass and composition/reduce obesity/lose extra weight
- Improved mental health/reduced depression/reduced anxiety/reduced stress/better self-esteem
- Improved flexibility/coordination/better movement
- Improved lung function/lung capacity
- Improved social contact

[6]

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- 5 (a) (i) A Bicuspid/mitral valve/AV valve [1]  
 B Left ventricle [1]
- (ii) • vena cava to right atrium  
 • right ventricle into pulmonary artery  
 Max [1] if arrows are drawn on LHS of heart [2]
- (b) Pulmonary artery [1]
- (c) P: Atria contract/atrial systole/blood flows into ventricles/small increase in pressure  
 (in ventricles)/atrioventricular valve(s) (bicuspid and/or tricuspid) open [1]
- QRS: Ventricles contract/ventricular systole/large increase in pressure in ventricles/atrioventricular valve(s) closes/blood leaves the heart [1]
- T: Ventricles relax/ventricular diastole/heart at rest (relaxes)/pressure falls in ventricles/semilunar valve(s) (aortic and/or pulmonary) close/atria refill with blood/diastole [1]
- (d) Distance between peaks  $0.3 \times 2.5 = 0.75$  s (accept 0.72–0.78s) [1]
- $60/0.75 = 80$  beats per minute (accept 77–83 beats per minute)  
 80 beats per minute = [2] [1]
- 6 (a) (i) Any **two** from:  
 Haemoglobin is a protein  
 It contains iron/haem group  
 It binds with oxygen  
 It has 4 polypeptide chains  
 One haemoglobin molecule can bind with 4 oxygen molecules  
 It forms oxyhaemoglobin [2]
- (ii) It keeps the pH at a constant value/maintains constant pH/keep at normal pH [1]
- (iii) 7.35 to 7.45 [1]
- (b) (i) Correct point from graph at 13 kPa @ 98% saturation/99%/97% [1]
- (ii) One correct point from graph (@70%)  
 Correct subtraction  $98 - 70 = 28\%$  +/-, e.g. 29%; 27%  
 e.c.f. from (b)(i) [1]
- (iii) Any **three** from:  
 • Oxygen concentration high in blood and low in tissue  
 • Oxygen released (from haemoglobin)/dissociates  
 • Oxygen diffuses down its concentration gradient from blood into cells  
 • Release of first O<sub>2</sub> leads to conformational change [3]
- (c) (i) Physical activity increases/increase in temp/lower pH [1]
- (ii) Bohr (right) shift means oxygen has a lower affinity for haemoglobin [1]  
 More oxygen released to the tissues [1]

AVAILABLE  
MARKS

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		AVAILABLE MARKS
	<p>(d) Any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>• Chemoreceptors/receptors detect a fall in pH [1]</li> <li>• Impulses/signals/messages sent to the medulla/brain/hypothalamus [1]</li> <li>• CO<sub>2</sub> released from lungs/increased breathing rate [1] [2]</li> </ul>	14
7	<p>(a) (i) Krebs cycle/electron transport chain/oxidative phosphorylation/link reaction/citric acid cycle/TCA cycle [1]</p> <p>(ii) Any <b>four</b> from:</p> <ul style="list-style-type: none"> <li>• Does not use oxygen</li> <li>• Consists of two phases (preparatory phase and productive phase)</li> <li>• (Preparatory reaction) 2ATP consumed/two molecules of glyceraldehyde-3-phosphate produced from each molecule of glucose</li> <li>• (Productive phase) five reactions/4ATP produced/2 molecules of pyruvate produced/pyruvate produced</li> <li>• 2ATP generated per glucose molecule in glycolysis/net gain of 2ATP</li> <li>• Glycolysis is splitting the 6C to 2 × 3C (or idea of) [4]</li> </ul>	
	<p>(b) (i) Any <b>three</b> from:</p> <p>Anaerobic – no electron transport chain; ETC is where lots of ATP is produced/34/36/38 ATP Anaerobic – no oxygen to act as final electron acceptor No energy from reduced NAD [3]</p> <p>(ii) Any <b>two</b> from:</p> <p>Both involve production of ATP Both use glycolysis/glucose Both involve pyruvate Both involve (phosphorylation of) glucose Both occur in muscles Both use ATP [2]</p>	10
	<b>Total</b>	<b>75</b>