Level 3

Applied Science

Unit 4 The Human Body

Mark scheme

Version/Stage: SAM

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Question	Answer	Additional guidance	Marks
1(a)(i)	95–99 (%)		1
1(a)(ii)	(pulse) oximeter		1
1(b)(i)	Suitable, even scale X axis mmHg, y axis % oxygen saturation Correct plotting for both people		1 1 1
1(b)(ii)	to be checked when graph drawn		1
1(c)	smaller SA of alveoli diffusion is slower so have to breathe faster to get the required oxygen		1 1 1
1(d)(i)	Iron		1
1(d)(ii)	presence of carbon dioxide causes the affinity of Hb to drop **or** means it is harder for oxygen to bind to Hb **or** it is easier for oxygen to dissociate from Hb		1 1
1(d)(iii)	person is enclosed in a room temperature rise is measured		1 1
		Total	**14**

Question	Answer	Additional guidance	Marks
2(a)	Large intestine Correct label line	 allow ecf	1 1
2(b)	any **two** from: • (circular) muscles contract • behind the food/bolus • antagonistic action described in correct context • (longitudinal) muscles restore shape • peristalsis/wave of contraction along gut		2
2(c)(i)	No/small villi so surface area is small rate of nutrient uptake is slower		1 1 1
2(c)(ii)	any **two** from: • bread • pasta • biscuits • cake • beer	 allow two named foods containing wheat/flour	2
2(c)(iii)	any **two** from: • eat more dairy products • dark, leafy greens/ broccoli/kale/spinach • take calcium supplements • increase vitamin D	 allow specific examples, eg cheese/milk/yoghurt	2
		Total	**11**

Question	Answer	Additional guidance	Marks
3(a)	Occipital lobe		1
3(b)	Heart rate increases Bronchi dilate		1 1
3(c)	(action potential) causes calcium channels to open calcium ions diffuse/move in (to the presynaptic knob) (causing) vesicles to move to/fuse with (presynaptic) membrane Neurotransmitter diffuses across synapse (NT) binds with receptors causing an action potential to form in the postsynaptic neurone	calcium must be mentioned once to gain both mark points accept any named neurotransmitter	1 1 1 1 1 1
3(d)	prevent acetylcholinesterase/enzyme from breaking down acetylcholine so acetylcholine builds up in the synapse	 allow 'neurotransmitter' for acetylcholine	1 1 1
		Total	**12**

Question	Answer	Additional guidance	Marks
4(a)	any **two** from: • protection • support • marrow/blood cell production		2
4(b)	(resorption) is the breaking down of old bone (ossification) is the formation of new bone		1 1
4(c)	less cartilage so bones rub together		1 1
4(d)(i)	hinge		1
4(d)(ii)	bend/extend in one direction/plane very little sideways movement		1 1
4(d)(iii)	any **two** from: • gliding • ball and socket • pivot		2
		Total	**11**

Question	Answer	Additional guidance	Marks
5(a)	D		1
5(b)	fast-twitch fibres breakdown creatine (phosphate) during anaerobic respiration to release phosphate for the formation of ATP therefore more energy can be released for fast running/muscular contraction		1 1 1 1 1 1
5(c)	(calcium) is needed to bind to tropomyosin this causes the tropomyosin to change shape revealing the binding site below if this does not happen, myosin heads cannot bind to actin to cause the filaments to slide over each other		1 1 1 1 1
		Total	**12**

Assessment outcomes coverage

Assessment outcome	Number of marks	Percentage of total marks
AO1 Understand the digestive system and diet	11	18.3%
AO2 Understand the musculoskeletal system and movement	11	18.3%
AO3 Understand how oxygen is transported in the blood and how physiological measurements can be applied	14	23.3%
AO4 Understand the structure and function of the nervous system and brain	12	20%
AO5 Understand nerve impulses	12	20%
Total	**60**	**100%**

Question	Assessment outcome 1	Assessment outcome 2	Assessment outcome 3	Assessment outcome 4	Assessment outcome 5
1	–	–	14	–	–
2	11	–	–	–	–
3	–	–	–	12	–
4	–	11	–	–	–
5	–	–	–	–	12