



Level 3 Certificate/Extended Certificate

APPLIED SCIENCE

ASC4

Unit 4 The Human Body

Mark scheme

June 2023

Version: 1.1 Final



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 Examiner.

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

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Level of response marking instructions

Level of response mark schemes are broken down into levels, each of which has a descriptor. The descriptor for the level shows the average performance for the level. There are marks in each level.

Before you apply the mark scheme to a student's answer read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1 Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 content.

Step 2 Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do not have to cover all of the points mentioned in the Indicative content to reach the highest level of the mark scheme.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question 1

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.1	<p>Nutrient in food</p> <p>Carbohydrate</p> <p>Vitamin C</p> <p>Vitamin D</p>	<p>Role in the body</p> <p>Used for cell growth and repair of tissues.</p> <p>Used in respiration to provide energy.</p> <p>Used to make skin and blood vessels.</p> <p>Used to provide insulation.</p> <p>Used to regulate calcium uptake.</p> <p>Extra line from a box on the left negates the mark for that box</p>	3	AO1 1i

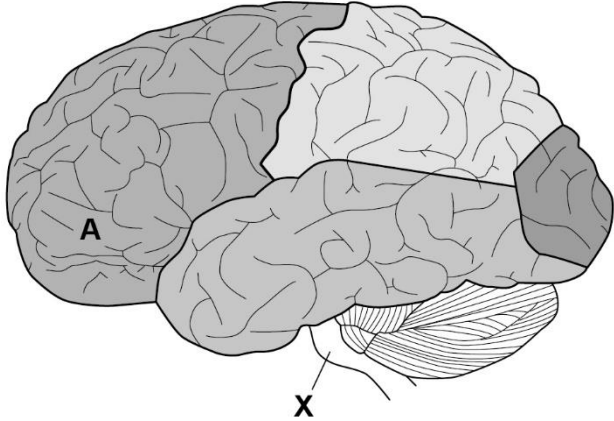
Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.2	scurvy		1	AO1 1l

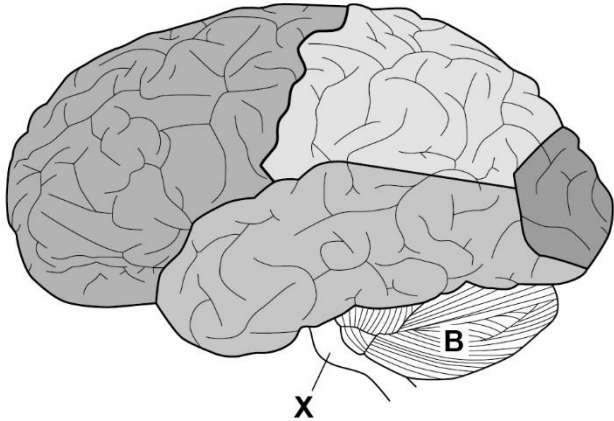
Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.3	vitamin C		1	AO3 1k
	vitamin D		1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.4	any two from: <ul style="list-style-type: none"> • (small intestine) has villi • (which have) microvilli • (villi / microvilli) give a large surface area (for absorption) • has a good blood supply • (small intestine) has thin walls 		2	AO1 1f

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.5	(soya milk = $\frac{0.55}{0.025} \times 100 =$) 2200 (g) (cow's milk = $\frac{0.55}{0.125} \times 100 =$) 440 (g) (2200 – 440 =) 1760 (g)		1 1 1	AO2 1k
		allow 2 marks for 22 – 4.4 = 17.6 (g)		

Question 2

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.1			1	AO1 4f

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.2			1	AO1 4g

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.3	any two from: <ul style="list-style-type: none"> • breathing will stop / increase or breathing will become erratic • heart will stop / increase or heart rate will become erratic • blood pressure will become erratic or blood pressure will increase / decrease • loss of consciousness 	allow difficulty breathing allow abnormal breathing rate allow poor balance / staggering allow problems with swallowing / speech / hearing	2	AO2 4f

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.4	visual processing		1	AO1 4g

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.5	controls voluntary actions (such as voluntary) movement / walking		1 1	AO1 4b

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.6	any two from: <ul style="list-style-type: none"> • increasing heart rate • dilating pupils • increasing breathing rate • slow digestion • constrict blood vessels • increase perspiration / sweating • raise blood pressure • promote ejaculation or vaginal contractions • increase glucose release 	if no other marks awarded, allow 1 mark for idea of 'fight or flight' responses	2	AO1 4c
Total Question 2			9	

Question 3

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.1	pivot	ignore synovial	1	AO2 2c

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.2	holds the ulna and radius in place	allow holds the bones in place	1	AO1 2c

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.3	resorption	either order	1	AO1 2b
	ossification		1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.4	cartilage is thinner or cartilage has worn away	allow there is less cartilage	1	AO2 2a, c
	exposed bone moves against cartilage / bone (causing pain)	ignore more friction unqualified	1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.5	lubricant	allow shock absorber	1	AO1 2c

Total Question 3			7	
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Question 4

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
04.1	any one from: <ul style="list-style-type: none"> • tiredness / fatigue / lethargy • muscle cramps • constipation • headache • bad breath 	ignore dizziness	1	AO2 1i & 1j

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
04.2	$\frac{7.84}{0.98}$ (= 8)	allow 1 : 8 : 75	1	AO2 1i
	$\frac{74.0}{0.98}$ (= 75.5)		1	
	1 : 8 : 76		1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
04.3	any two from: <ul style="list-style-type: none"> • body mass decreases too quickly • muscle wastage / weakness • high fat could lead to coronary heart disease • lethargy / tiredness 	allow rapid loss of body mass	2	AO3 1i

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
04.4	produce ATP (very) quickly		1	AO1 2i

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
04.5	any two from: <ul style="list-style-type: none"> • can respire anaerobically • stores creatine phosphate • fatigues quickly • poor blood supply • low density of mitochondria • white in colour 	allow high levels of glycogen allow produce ATP quickly if not given in 04.4	2	AO1 2k
Total Question 4			9	

Question 5

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
05.1	P (presynaptic) membrane		1	AO1 5e
	Q vesicles		1	
	R (synaptic) cleft / gap		1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
05.2	calcium (ion) channels open		1	AO1 5f
	calcium <u>ions</u> move / diffuse into the neurone	allow Ca ²⁺ for calcium ions	1	
	vesicles move to the (presynaptic) membrane		1	
	vesicles fuse / join with the (presynaptic) membrane or vesicles release neurotransmitter into the synapse / gap		1	
		if no other marks awarded allow 1 mark for neurotransmitter is released into the (synaptic) cleft / gap		

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
05.3	(acetylcholine) Alzheimer's		1	AO1 5i
	(dopamine) Parkinson's	allow other correct disorders such as depression and schizophrenia	1	
	(serotonin) depression	allow other correct disorders such as anxiety, ADHD and PTSD	1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
05.4	acetylcholine / neurotransmitter not broken down (by the enzyme)	allow increase in acetylcholine / neurotransmitter (in the synapse)	1	AO3 5k
	so it continues to stimulate the postsynaptic receptors / neurone		1	AO2

Total Question 5		12
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Question 6

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
06.1	four protein chains	allow four polypeptide chains	1	AO1 3b
	(each with) Fe ²⁺ / iron ion	allow four haem groups	1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
06.2	line drawn to the right of the line		1	AO2 3e
	start saturation and end saturation the same level as the existing line		1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
06.3	(first one binds) changing the shape of haemoglobin		1	AO1 3d
	(which) uncovers a second binding site (for oxygen)	if no other marks awarded allow 1 mark for positive cooperativity	1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
06.4	(pulse) oximeter		1	AO1 3g

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
06.5	lower partial pressure of oxygen (at high altitude)	allow less oxygen (at high altitude)	1	AO1 3f
	more difficult to load oxygen (at low partial pressures)	allow idea of causing an increase in EPO	1	
	(therefore) there is an increase in the number of red blood cells		1	

Total Question 6		10
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