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# Level 3 Certificate/Extended Certificate

## APPLIED SCIENCE

### ASC4

Unit 4 The Human Body

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Mark scheme

January 2023

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Version: 1.0 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](http://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 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 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.

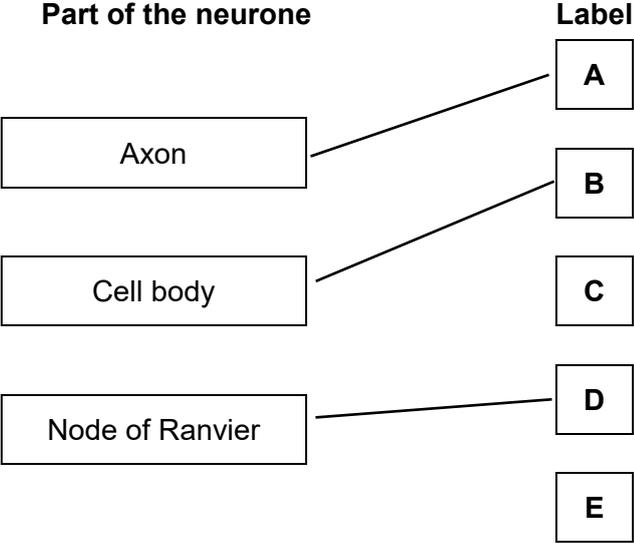
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

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	electrical signal		1	AO1 5a

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.2	<p><b>Part of the neurone</b></p>  <p>do <b>not</b> accept more than one line from a box on the left</p>	<p><b>Label</b></p> <p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p>	<p>1</p> <p>1</p> <p>1</p>	AO1 5a

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.3	<p>(1) peripheral nervous system</p> <p>(2) somatic nervous system</p> <p>(3/4) sympathetic nervous system</p> <p>(3/4) parasympathetic nervous system</p>	<p>} allow in either order</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	AO1 4a, b, c

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

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.5	visual processing	ignore vision unqualified	1	AO1 4g

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.6	brain stem	allow pons / medulla	1	AO1 4i

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.7	any <b>two</b> from:  problems with	ignore reference to side of the body affected	2	AO2
	<ul style="list-style-type: none"> <li>• reasoning skills</li> <li>• planning skills</li> <li>• problem-solving skills</li> <li>• movement</li> <li>• emotions</li> </ul> (because) the frontal lobe has been damaged	allow change in personality allow increased aggression allow problems with memory  allow (because) the frontal lobe has been affected	1	AO3 4g

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
01.8	as a neurotransmitter to transfer impulses from neurone to neurone		1	AO1 5h

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<b>01.9</b>	less acetylcholinesterase / enzyme  (so) there will be more acetylcholine in the synapse (which reduces the symptoms)	allow less acetylcholine broken down  allow (so) there will be more acetylcholine in the brain	1  1	AO2 AO3  5k

<b>Total Question 1</b>		<b>17</b>
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**Question 2**

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.1	(A) oesophagus		1	AO1 1a
	(B) pancreas		1	
	(C) gall bladder		1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.2	bile emulsifies the lipids / fats	allow bile breaks up / down droplets of lipid / fat into smaller droplets do <b>not</b> accept bile breaks down lipids / fats	1	AO1 1d, e
	(so) there is a larger surface area (for the lipase)		1	
	lipase breaks down the lipids / fats to glycerol and fatty acids <b>or</b> lipase hydrolyses / breaks the ester bonds in the lipid / fat (molecules)		1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.3	(calcium) milk / cheese / kale / pilchards / sardines		1	AO1 1k
	(vitamin C) oranges / lemons / strawberries / blackcurrants / peppers / broccoli / spinach / sprouts / potato		1	
	(vitamin D) salmon / sardines / herring / mackerel / red meat / liver / eggs		1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.4	any <b>two</b> from: <ul style="list-style-type: none"><li>• heart disease / attack / failure</li><li>• stroke</li><li>• aneurysms</li><li>• kidney disease</li><li>• vascular dementia</li></ul>		2	AO1 1l

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.5	processed meat		1	AO1 1l

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
02.6	sphygmomanometer		1	AO1 3k

<b>Total Question 2</b>			<b>13</b>	
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**Question 3**

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.1	any <b>two</b> from: <ul style="list-style-type: none"> <li>• support</li> <li>• protection</li> <li>• blood cell production</li> <li>• ossification</li> <li>• resorption</li> </ul>	} allow bone remodelling  allow calcium reservoir	2	AO1 2b

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.2	any <b>two</b> from: <ul style="list-style-type: none"> <li>• ligament to hold bones in place</li> <li>• cartilage as a shock absorber</li> <li>• (synovial) fluid to lubricate the joint <b>or</b> (synovial) fluid to reduce friction</li> <li>• shapes of the bones are complementary</li> </ul>	allow ligaments stretch when bones move allow cartilage prevents bones wearing away or cartilage protects the ends of the bones	2	AO1 2c

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.3	movement in one plane <b>or</b> movement side to side		1	AO1 2c

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.4	calcium ions / $\text{Ca}^{2+}$ binds with troponin		1	AO1 2f
	(causing) tropomyosin to change shape <b>or</b> (which) move tropomyosin		1	

	(so) binding sites are unblocked		1	
Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.5	myosin / thick filament / head attach to the actin / thin (filament)		1	AO1 2e
	myosin / thick (filament) heads change shape	ignore power stroke unqualified	1	
	myosin / thick (filament) pulls on the actin / thin (filament)	allow the myosin / thick (filaments) slide over the actin / thin (filaments)  allow the myosin / thick (filaments) and actin / thin (filaments) slide over each other	1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.6	any <b>two</b> from: <i>slow-twitch fibres</i> <ul style="list-style-type: none"> <li>• keep working over long periods of time</li> <li>• (can maintain) aerobic respiration</li> <li>• can respire fat stores</li> <li>• have a good blood supply (to provide oxygen)</li> <li>• have many mitochondria</li> <li>• store glycogen (as a metabolic food store)</li> <li>• have myoglobin</li> </ul>		2	AO1 2j, n

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
03.7	releases phosphate ions		1	AO1 2l
	(which) can be used to make ATP		1	

<b>Question</b>	<b>Answers</b>	<b>Extra information</b>	<b>Mark</b>	<b>AO/ Spec. Ref.</b>
<b>03.8</b>	phosphate removed from ATP	allow creatine kinase catalyses the conversion (of creatine to creatine phosphate)	1	AO1 2m
	is added to the creatine		1	

<b>Total Question 3</b>		<b>17</b>
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## Question 4

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
04.1	95%		1	AO2 3h

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
04.2	(method 1 =) 128 (s)	allow in range 145 to 150	1	AO2 3i
	(method 2 =) 146 (s)		1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
04.3	(95 – 56 =) 39  $\frac{39}{56} \times 100 = 69.64\%$  70 (%)		1	AO2 3i
			1	
			1	

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
04.4	any <b>three</b> from: (method 1) <ul style="list-style-type: none"> <li>• brings oxygen saturation to normal faster</li> <li>• not as many fluctuations in oxygen saturation</li> <li>• does not cause the oxygen saturation to drop at any point</li> <li>• oxygen saturation is higher at the end</li> </ul>	allow increase is faster	3	AO3 3i

Question	Answers	Extra information	Mark	AO/ Spec. Ref.
<p><b>04.5</b></p>	<p>(more) mucus obstructs / blocks the airway / bronchioles <b>or</b> thicker wall obstructs / blocks the airway / bronchioles</p>	<p>allow (so) space inside the bronchioles is reduced</p> <p>allow (so) less oxygen passes through (to the lungs)</p> <p>allow (so) less oxygen is absorbed into the blood</p>	1	<p>AO2 3j</p>
	<p>(so) the lumen is narrower</p>		1	
	<p>(so) less air enters (the lungs)</p>		1	
	<p>(so) less oxygen diffuses into the blood</p>		1	
<b>Total Question 4</b>			<b>13</b>	