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# Level 3 Certificate/Extended Certificate

## APPLIED SCIENCE

### ASC4

Unit 4 The Human Body

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Mark scheme

January 2019

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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 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](http://aqa.org.uk)

## 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	Answers	Additional comments	Mark	AO
01.1	gliding	allow planar	1	AO2 E
01.2	any <b>one</b> correctly labelled <ul style="list-style-type: none"> <li>• skull / ossicles</li> <li>• jaw</li> <li>• ribs</li> <li>• sternum</li> <li>• vertebrae</li> </ul>		1	AO2 E
01.3	hinge	ignore synovial joints	1	AO1 G
01.4	blood cell production protection		1 1	AO1 A
01.5	(1450 – 1000 =) 450 $\frac{450}{1450} \times 100$ 31 (%)	an answer of 31(%) scores 2 marks	1 1 1	AO2 E
01.6	resorption	do <b>not</b> allow ossification / bone remodelling	1	AO1 E

<p><b>01.7</b></p>	<p>any <b>three</b> from</p> <ul style="list-style-type: none"> <li>• increase in bone mass / growth is rapid until 20s (for both males and females)</li> <li>• peak in bone mass in late 20's / early-mid 30's (for both males and females)</li> <li>• mass in males is (always) higher than females</li> </ul> <p><b>or</b></p> <p>peak (mass of calcium) in males is higher</p> <ul style="list-style-type: none"> <li>• steeper decrease in female bone mass (between 50 and 60 years old)</li> </ul>	<p>allow in range 20–30</p> <p>allow bone mass peaks at slightly different ages (in males and females)</p> <p>if no other marks awarded allow 1 mark for increase in bone mass to 20 / 30 and then a decrease in males / females</p>	<p>3</p>	<p>AO3 E</p>
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<p><b>01.8</b></p>	<p>(females have a) lower mass of calcium in bones</p> <p>(therefore) they are not as strong</p>	<p>allow converse if clearly describing males</p> <p>allow calcium is needed to strengthen bones</p>	<p>1</p> <p>1</p>	<p>AO2 E</p>
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<p><b>Total</b></p>			<p><b>14</b></p>	
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Question	Answers	Additional comments	Mark	AO
02.1	any <b>two</b> from: <ul style="list-style-type: none"> <li>• can respire anaerobically</li> <li>• store creatine phosphate (for anaerobic respiration)</li> <li>• (only) function for short periods of time</li> <li>• fatigue quickly</li> <li>• generate ATP quickly</li> <li>• low myoglobin stores</li> <li>• less mitochondria</li> </ul>	allow used for short bursts of activity  do <b>not</b> allow more ATP produced allow white fibres  allow large glycogen stores	2	AO1
02.2	any <b>two</b> from: <ul style="list-style-type: none"> <li>• as you age / from 40 you lose muscle (fibres)</li> <li>• there is great variation in the number of muscle fibres</li> <li>• number of muscle fibres stays relatively constant through teens / 20s / 30s / 40s</li> </ul>	allow the data shows great variation  allow you lose muscle fibres a lot faster when you are older	2	AO3
02.3	not as active (generally)		1	AO2
02.4	myoglobin		1	AO1
<b>Total</b>			<b>6</b>	

Question	Answers	Additional comments	Mark	AO
03.1	16.5 or 16.49(%)	allow correct rounding	1	AO2
03.2	(girls aged 14-18) need less (protein)  (because) they are growing at a lower rate	allow converse for 1-3 year old girls	2	AO1
03.3	rickets		1	AO1
03.4	any <b>two</b> from: <ul style="list-style-type: none"> <li>• fatty fish / tuna / mackerel / salmon</li> <li>• oysters</li> <li>• shrimp</li> <li>• beef liver</li> <li>• cheese</li> <li>• egg (yolks)</li> <li>• milk</li> <li>• tofu</li> <li>• mushrooms</li> <li>• cod liver oil</li> <li>• (fortified) cereal</li> </ul>	allow any two named fish for 2 marks	2	AO1
03.5	any <b>two</b> from: <ul style="list-style-type: none"> <li>• headache</li> <li>• fatigue</li> <li>• confusion</li> <li>• chest pain</li> <li>• difficulty breathing or short of breath</li> <li>• irregular / rapid heart rate</li> </ul>	ignore dizziness / nausea / pale / stroke / heart attack  allow nose bleeds	2	AO1
03.6	any <b>one</b> from:  <ul style="list-style-type: none"> <li>• (used in) respiration</li> <li>• converted to fat for insulation</li> </ul>	do <b>not</b> allow if reference to starch  allow to provide energy do <b>not</b> allow to produce / create energy	1	AO1

<p><b>03.7</b></p>	<p>any <b>two</b> from:</p> <ul style="list-style-type: none"> <li>• large surface area</li> <li>• (villi) have microvilli</li> <li>• good blood supply</li> <li>• thin exchange surface <b>or</b> thin lining</li> </ul>	<p>allow have many villi allow description of microvilli</p>	<p>2</p>	<p>AO2</p>
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<p><b>Total</b></p>			<p><b>11</b></p>
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Question	Answers	Additional comments	Mark	AO
04.1	central (nervous system)	ignore acronyms	1	AO1 E
	autonomic (nervous system)	ignore involuntary	1	
	parasympathetic (nervous system)		1	
04.2	(coordinating) voluntary actions		1	AO1 E
04.3	any <b>two</b> from: <ul style="list-style-type: none"> <li>• increasing heart rate</li> <li>• dilating pupils</li> <li>• increasing breathing rate</li> <li>• slow digestion</li> <li>• constrict blood vessels</li> <li>• increase perspiration</li> <li>• raise blood pressure</li> <li>• promote ejaculation <b>or</b> vaginal contractions</li> <li>• increase glucose release</li> </ul>	if no other marks awarded, allow 1 mark for idea of 'fight or flight' responses	2	AO1 E
04.4	<b>(A)</b> (synaptic) vesicles / neurotransmitter	allow named neurotransmitter, such as acetylcholine, serotonin, dopamine	1	AO1 E
	<b>(B)</b> presynaptic membrane / knob / terminal	allow presynaptic neurone do <b>not</b> allow nerve	1	
	<b>(C)</b> postsynaptic membrane / knob	allow postsynaptic neurone do <b>not</b> allow nerve	1	
04.5	any <b>two</b> from, <ul style="list-style-type: none"> <li>• (neurotransmitter) diffuses (across the synaptic cleft)</li> <li>• binds to receptors on the (postsynaptic) membrane</li> <li>• (binding to receptors) causes (Na<sup>+</sup>) channels to open</li> </ul>	allow diffuses (across the gap / synapse)  allow binds to receptors on neurone <b>Y</b>  do <b>not</b> allow potassium / chloride / calcium ions	2	AO1 E

<b>04.6</b>	any <b>three</b> from: <ul style="list-style-type: none"> <li>• (NT) leaves the (postsynaptic) receptor</li> <li>• (NT) is broken down by enzymes</li> <li>• (breakdown products) diffuses back to presynaptic membrane</li> <li>• reuptake by presynaptic neurone</li> <li>• (where) it is reformed (for reuse) <b>or</b> (where) it is stored in vesicles</li> </ul>	allow description of reuptake	3	AO1 E
<b>04.7</b>	110 (mV)		1	AO2 G
<b>04.8</b>	sodium only		1	AO1 A
<b>Total</b>			<b>16</b>	
<b>Question</b>	<b>Answers</b>	<b>Additional comments</b>	<b>Mark</b>	<b>AO</b>
<b>5.1</b>	Fe <sup>2+</sup>		1	AO1 A
<b>5.2</b>	4		1	AO1 A
<b>5.3</b>	(pulse) oximeter		1	AO1 G
<b>5.4</b>	sphygmomanometer	allow electronic blood pressure machine/cuff	1	AO1 E

5.5	(too) low <b>or</b> below the normal range <b>or</b> something is reducing his oxygen uptake	allow reference to lung disease or named lung disease	1	AO2 E
5.6	between 1 and 15  will be breathing in some of the carbon monoxide / smoke from the smoker	allow any number in range	1  1	AO3 E
5.7	pH in the muscle is lower / acidic (than lungs)  (because) there is a higher carbon dioxide concentration (due to increased respiration)  (therefore) affinity to oxygen decreases, so (more) oxygen is released / unloaded (to the tissues / muscle cells)  <b>OR</b>  (therefore) the curve shifts right, so (more) oxygen is released / unloaded (to the tissues / muscle cells)	allow converse if clearly describing what occurs in the lung tissue	1  1  1	AO2  AO1  AO1

<b>5.8</b>	lower partial pressure of oxygen (at high altitude)	allow less oxygen (at high altitude)	1	AO1
	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	
<b>Total</b>			<b>13</b>	