



Level 3 Certificate/Extended Certificate

APPLIED SCIENCE

ASC4

Unit 4 The Human Body

Mark scheme

June 2019

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.

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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 | Answers | Additional comments | Mark | AO | ID |
|--------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------|-------------|----|
| 01.1 | A frontal lobe | | 1 | 4g AO1 | A |
| | B temporal lobe | | 1 | | |
| 01.2 | controlling the skeletal muscles | | 1 | 4i AO1 | A |
| 01.3 | the symptoms observed / presented (indicate the area) | allow MRI / CT / PET scan | 1 | 4j AO1 | E |
| 01.4 | myelin(ated) | allow insulated | 1 | 5c,d AO1 | E |
| | (so) the impulse jumps from node to node | allow saltatory (conduction) | 1 | | |
| | | if no other mark awarded allow 1 mark for increased diameter of the axon | | | |
| 01.5 | P (synaptic) vesicle | max 2 marks if presynaptic and postsynaptic incorrectly stated | 1 | 5e AO1 | E |
| | Q (synaptic) cleft / synapse | | 1 | | |
| | R (neurotransmitter) receptor | | 1 | | |
| 01.6 | break down acetylcholine or hydrolyses acetylcholine | | 1 | 5g AO2 | E |
| | (so products) can be recycled / reused or (products) can be re-uptaken (by the presynaptic knob) | | 1 | | |
| 01.7 | Alzheimer's | allow other correct disorders | 1 | 5i AO1 | E |
| Total | | | 12 | | |

| Question | Answers | Additional comments | Mark | AO | ID |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------|-----------|----|
| 02.1 | fatty acids | in either order | 1 | 1e AO1 | E |
| | glycerol | allow monoglyceride | 1 | | |
| 02.2 | hydrolysis | | 1 | 1c AO1 | G |
| 02.3 | any two from: <ul style="list-style-type: none"> • (stimulate) release of hydrochloric acid • (stimulate) release of bile (from gall bladder) • increase muscle contractions of the stomach (to churn food) • pepsin(ogen) secretion | if neither mark awarded, allow 1 mark for release of gastric juices allow stimulate growth of stomach lining | 2 | 1h AO1 | E |
| 02.4 | any two from: <ul style="list-style-type: none"> • (orlistat) reduces lipase activity • (orlistat) keeps lipase activity lower than normal / placebo • (orlistat) keeps lipase activity more stable | | 2 | 1e AO3 | E |
| 02.5 | $(40 - 7) = 33$ | an answer of 471.4 or 471 scores 2 marks allow \pm half a small square for readings | 1 | 1e AO2 | E |
| | $\frac{33}{7} \times 100 = 471.4(\%)$ | | 1 | | |
| 02.6 | lipids / fats / oils are not broken down and cannot be absorbed | allow lipids / fats / oils are not broken down so they are egested | 1 | 1e AO2 | E |
| | (because) lipase activity is reduced / inhibited (by orlistat) | | 1 | | |

| | | | | | |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------|----------|
| <p>02.7</p> | <p>any two from:</p> <ul style="list-style-type: none"> • (increase) vitamin D supplements • stop taking orlistat • eat foods that are high in vitamin D | <p>allow any two named examples for 1 mark each, such as:</p> <ul style="list-style-type: none"> • eat more) egg (yolks) • (eat more) fatty fish / tuna / mackerel / salmon • oysters • shrimp • cheese • liver • milk • tofu • mushrooms • cod liver oil • fortified food example, eg orange juice, cereals <p>allow increase time spent in sunlight</p> | <p>2</p> | <p>1k AO1</p> | <p>E</p> |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------|----------|

| | | | |
|---------------------|--|--|------------------|
| <p>Total</p> | | | <p>13</p> |
|---------------------|--|--|------------------|

| Question | Answers | Additional comments | Mark | AO | ID |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------|-----------|----|
| 03.1 | (actin) thin line labelled | | 1 | 2d AO1 | E |
| | (myosin) thick line labelled | | 1 | | |
| 03.2 | the actin filaments slide over the myosin filaments or actin filaments slide / move along the myosin filaments so they overlap more | allow actin filaments move closer to the centre of the sarcomere | 1 | 2e AO1 | E |
| 03.3 | breaks the actin – myosin links / bridges | | 1 | 2e AO1 | E |
| | (so that) the myosin head moves (back) to its normal / cocked position | if no other marks awarded allow 1 mark for 'powerstroke' or description of powerstroke | 1 | | |
| 03.4 | calcium <u>ions</u> are released | allow Ca ²⁺ released | 1 | 2f AO1 | E |
| | (which) binds to troponin | | 1 | | |
| | (causing) tropomyosin to change shape | allow tropomyosin moves away from binding site | 1 | | |
| 03.5 | respire aerobically | | 1 | 2j AO1 | E |
| | respire fat stores in the body | | 1 | | |
| | large stores of glycogen | | 1 | | |
| Total | | | 11 | | |

| Question | Answers | Additional comments | Mark | AO | ID |
|--------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|----------|-----------|----|
| 04.1 | any one from: <ul style="list-style-type: none">• blood cell production• resorption / ossification | allow calcium storage | 1 | 2b AO1 | E |
| 04.2 | A <u>synovial</u> fluid B <u>synovial</u> membrane | | 1 1 | 2c AO1 | E |
| 04.3 | movement in all directions or 360-degree movement | do not accept flexion / extension | 1 | 2c AO2 | E |
| Total | | | 4 | | |

| Question | Answers | Additional comments | Mark | AO | ID |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------|--------------|----|
| 06.1 | oxygen saturation is too low or below the normal range or something is reducing the child's oxygen uptake | ignore ref to cystic fibrosis | 1 | 3h, i AO2 | E |
| 06.2 | more mucus or narrower lumen so less air taken into (and out of) the lungs (therefore) less oxygen for respiration OR mucus restricts airflow (so) greater effort for intercostal muscles / diaphragm to contract so higher demand for energy / ATP | allow less <u>aerobic</u> respiration | 1 1 1 | 3j AO2 | E |
| 06.3 | oxygen does not dissolve (well) | | 1 | 3a AO1 | E |
| 06.4 | 10.4 (mmHg) | allow in range 10.2 to 10.6 (mm Hg) | 1 | 3c AO2 | G |

| | | | | | |
|-------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------|---|
| 06.5 | first oxygen binds to haemoglobin / Hb | | 1 | 3d AO1 | E |
| | (which) alters the shape of the haemoglobin | | 1 | | |
| | (therefore) it is easier for subsequent oxygen molecules to bind | allow this increases the affinity to oxygen for the other binding sites (of Hb) allow more difficult for the fourth oxygen molecule to bind if no other marks awarded allow positive cooperativity | 1 | | |

| | | | | | |
|-------------|------------------------------------------------------------------------------------------|---------------------------------------------------------------|---|-----------|---|
| 06.6 | respiration produces carbon dioxide (in the muscle cells) | allow respiration lowers the pH (in the muscle cells / blood) | 1 | 3e AO1 | E |
| | which decreases the affinity of haemoglobin for oxygen (so it is released to the muscle) | allow which causes (more) oxygen to be unloaded / released | 1 | | |

| | | | | | |
|--------------|--|--|-----------|--|--|
| Total | | | 11 | | |
|--------------|--|--|-----------|--|--|