New Specification

Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Health and Social Care

Assessment Unit AS 7

assessing

Understanding the Physiology of Health and Illness

[SHC71]

WEDNESDAY 24 MAY, MORNING

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

AVAILABLE MARKS

1 (a) (i) Name the structures labelled A, B, C and D. (AO1)

A Rough Endoplasmic Reticulum/RER
B Nucleolus
C Mitochondria
D Cell membrane

(4 × [1]) [4]

(ii) Explain the link between the functions of A and B. (AO2)

Examples of suitable points to be included in explanation:
- the nucleolus (B) is involved in the synthesis of ribosomes
- these ribosomes then attach to the ER to make RER (A)
- RER is responsible for synthesis of proteins.

[1] basic explanation [2] competent explanation
(1 × [2]) [2]

(iii) Structure C is found in large numbers in a muscle cell. Explain why a muscle cell has so many of these. (AO2)

Examples of suitable points to be included in explanation:
Mitochondria produce energy by respiration.
Muscle cells need many mitochondria so they have the energy needed to contract.

[1] basic explanation [2] competent explanation
(1 × [2]) [2]

(b) (i) Circle the correct answer. The cell shown in the diagram is a…. (AO1)

(motor neurone) association neurone sensory neurone

(1 × [1]) [1]

(ii) Explain how this cell is specialised in order to perform its function. (AO1, AO2)

Examples of suitable points to be included in explanation:
- Specialisation: elongation of the cell membrane/myelinated axon
- Function: to allow impulses to travel quickly/to allow the impulse to jump between nodes allowing faster transmission
- Dendrites: to allow impulses to be collected from several neurones

[1] basic explanation [2] competent explanation
(1 × [2]) [2]

AVAILABLE MARKS

(iii) Explain what is meant by a reflex action. (AO1, AO2)

Examples of suitable points to be included in explanation:

- a reflex action is an involuntary action that does not involve conscious thought.
- these reactions are controlled by the spinal cord and not by the brain.
- the reactions are controlled by the autonomic nervous system
- reflex reactions are often a safety mechanism such as pulling a hand from a hot plate or blinking when something goes into our eye or any other example.

[1] basic explanation [2] competent explanation
(1 × [2]) [2]

(c) (i) Write down the names of the neurones labelled A, B and C. (AO1)

A: sensory neurone
B: relay/association neurone/intermediate neurone
C: motor neurone

(3 × [1]) [3]

(ii) Discuss how the nerve impulse travels across the synapse. (AO1, AO2, AO3)

Examples of suitable points to be discussed:

Arrival at the presynaptic knob
The electrical impulse reaches the pre synaptic knob/end of the first neurone.
Vesicles in the presynaptic knob move towards the presynaptic membrane and fuse with the membrane

The synapse
The neurotransmitter/acetylcholine/chemical is released from the vesicle and diffuses across the synaptic cleft/synapse

Post synaptic membrane
The neurotransmitter/acetylcholine/chemical attaches to receptors on the post synaptic membrane (association/relay neurone) causing them to open. There will be an influx of ions into the neurone which causes an impulse to begin in the neurone.

All other valid responses will be given credit

[0] is awarded for a response not worthy of credit.

Level 1 ([1]–[2])
Overall impression: basic

- basic knowledge and understanding of how the nerve impulse travels across the synapse
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question

AVAILABLE MARKS

- displays a limited ability to discuss how the nerve impulse travels across the synapse.

Level 2 ([3]–[4])
Overall impression: adequate
- adequate knowledge and understanding of how the nerve impulse travels across the synapse
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- displays an adequate ability to discuss how the nerve impulse travels across the synapse.

Level 3 ([5]–[6])
Overall impression: competent
- competent knowledge and understanding of how the nerve impulse travels across the synapse
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- displays a competent ability to discuss how the nerve impulse travels across the synapse. [6]

(d) (i) Describe the physiological cause of MS. (AO1, AO2)

Examples of suitable points to be included in description:
- the body's immune system attacks the myelin sheath
- this damages the myelin
- a hole develops in the myelin sheath
- this reduces the effectiveness of electrical conductivity, so messages get more slowly to the effector and reflexes will be slower

[1] basic description [2] adequate description [3] competent description
(1 × [3]) [3]

(ii) Assess the potential impact of MS on each of the following for Ben. (AO2, AO3)

In terms of assessment: candidates are required to make informed judgements on the potential impact of MS on Ben's work, leisure and relationships.

Examples of suitable points to be included in assessment of each aspect:

Work
Whilst Ben's reflexes are slower, it would be unsafe for him to drive a bus, however as MS is a progressive disease, with periods of remission, it may be that Ben will recover his reflexes and be able to return to work in some capacity. In the long term it is likely that Ben will no longer be able to continue his current job as a bus driver as his symptoms are likely to get worse. As he works for a company he may be able to be employed in some other position or he may be able to seek other employment in the tourist industry, as he has so many years experience.

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Leisure
Ben may be able to stay active and enjoy his golf for quite some time, however as time goes on Ben may find it difficult to control his coordination and may have to stop playing golf. Ben may find other hobbies that he enjoys that do not involve hand eye coordination, for example swimming. He may have more time to spend on leisure activities if he cuts down on work, e.g. more time for days out with his family. He could take up new leisure activities related to his condition, e.g. through an organisation for people with MS.

Relationships
If Ben has to give up work he will miss the relationships he had with his clients from the bus tours, however, if he manages to get another position he may develop new working relationships that he never had before. As Ben is unlikely to continue travelling for a living in the longer term, he will be at home more and this will allow Ben to strengthen his relationships with his wife and children. Ben will also be able to see friends and extended family more often if he is no longer travelling. Over time, Ben may become dependent on his family for care which may put a strain on their relationships or alternatively bring them closer. Ben may develop new relationships with other people with MS.

All other valid points will be given credit

[0] is awarded for a response not worthy of credit.

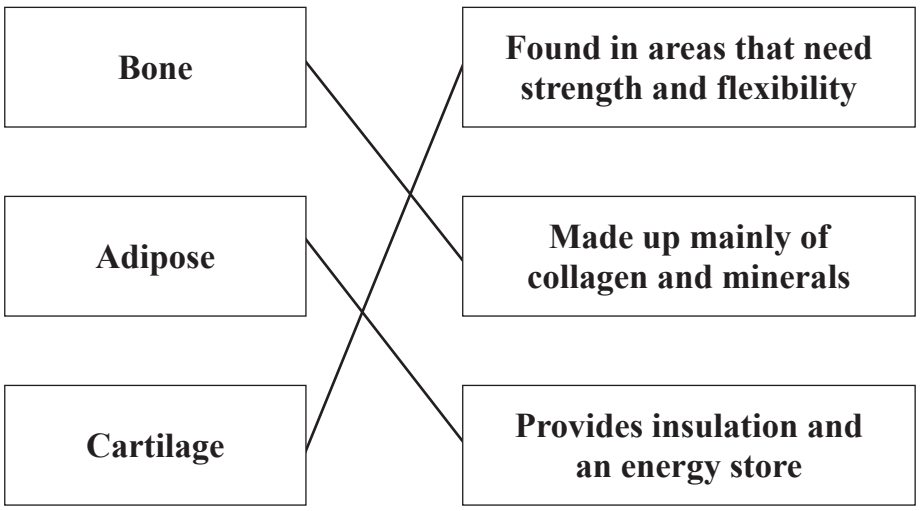
Level 1 ([1]–[4])
Overall impression: basic
- basic knowledge and understanding of how MS will impact on Ben
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- displays a limited ability to assess the potential impact of how MS will impact on Ben
- candidates who focus on only one aspect cannot achieve beyond this level
- quality of written communication is basic. The candidate makes only a limited attempt to select and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

Level 2 ([5]–[8])
Overall impression: adequate
- adequate knowledge and understanding of how MS will impact on Ben
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- displays an adequate ability to assess the potential impact of how MS will impact on Ben
- candidates who focus on only two aspects cannot achieve beyond this level
- quality of written communication is adequate. The candidate makes a reasonable attempt to select and use an appropriate form and style

	AVAILABLE MARKS
of writing. Relevant material is organised with some clarity and coherence. There is some use of specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning evident.	
Level 3 ([9]–[12]) Overall impression: competent • competent knowledge and understanding of how MS will impact on Ben • demonstrates a competent ability to apply appropriate knowledge and understanding to the question • displays a competent ability to assess the potential impact of how MS will impact on Ben • to achieve at this level, all three aspects must be assessed, and at least two competently • quality of written communication is competent. The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is extensive and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a high standard to ensure that meaning is clear. [12]	37

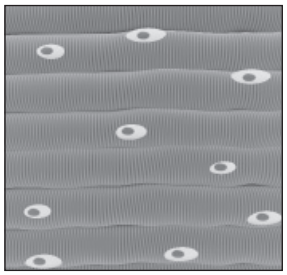
AVAILABLE MARKS

2 **(a)** Match each of the connective tissues with its description by joining them with a line. (AO1)



(3 × [1]) [3]

(b) Write down the name of each of the muscle tissues shown below. (AO1)



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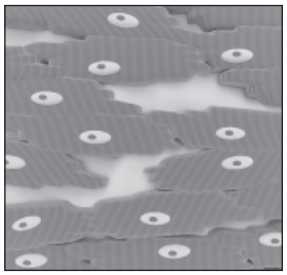
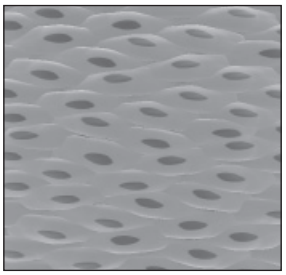
Skeletal muscle tissue Striated



© Science Photo Library

Cardiac muscle tissue



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Smooth muscle tissue

(3 × [1]) [3]

(c) **(i)** Identify the cells A, B, and C. (AO1)

A monocyte/phagocyte
B red blood cell/erythrocyte
C neutrophil

(3 × [1]) [3]

(ii) Explain the role of the lymphocyte labelled in the photograph. (AO1; AO2)

Examples of suitable points to be included in explanation:
Lymphocytes can ingest and destroy viral infections/some cancer cells, they can also clone to produce antibodies which will agglutinate/clump foreign molecules for ingestion by phagocytes.

[1] basic explanation [2] competent explanation
(1 × [2]) [2]

AVAILABLE MARKS

(d) **(i)** Explain the role of bile in digestion. (AO1; AO2)

Examples of suitable points to be included in explanation:
Bile emulsifies fats/breaks fat into smaller globules, in order to give a larger surface area on which enzymes can act.

[1] basic explanation[2] competent explanation
(1 × [2]) [2]

(ii) Explain the role of the liver in deamination of excess amino acids. (AO1; AO2)

Examples of suitable points to be included in explanation:
- the liver breaks down excess amino acids into carbohydrate and ammonia
- the ammonia is converted into urea which is excreted via the kidneys and the carbohydrate is stored in the liver.

[1] basic explanation[2] competent explanation
(1 × [2]) [2]

(e) Describe the physiological process that leads to the development of a stomach ulcer. (AO1, AO2)

Examples of suitable points to be included in description:
- there is an infection/use of non-steroidal anti-inflammatory that leads to the stomach producing excess acid
- as a result of the excess acid, mucus production decreases
- the stomach acid attacks the stomach lining causing a hole/ulcer.

[1] basic description [2] adequate description [3] competent description
(1 × [3]) [3]

(f) Describe how the ileum is adapted to allow faster absorption of food into the bloodstream. (AO1, AO2)

Examples of suitable points to be included in description:
- only one cell thick which gives a shorter diffusion pathway
- good blood supply to maintain a diffusion gradient
- highly folded to give a larger surface area for diffusion
- moist to allow substances to dissolve.
- long to allow time for absorption

[1] basic description [2] adequate description [3] competent description
(1 × [3]) [3] 21

AVAILABLE MARKS

3 (a) (i) Write down the name of the glands A, B and C. (AO1)

A pituitary gland
B pancreas gland
C adrenal gland

(3 × [1]) [3]

(ii) Describe the effect that the release of anti-diuretic hormone (ADH) will have on the kidney and urine output. (AO2)

Examples of suitable points to be included in description:

- increased secretion of ADH by the pituitary will decrease the concentration in the blood
- the ADH will travel to the kidney and cause the collecting ducts to become more permeable to water
- this will mean more water will be reabsorbed back into the blood
- urine will be more concentrated.

[1] basic description [2] adequate description [3] competent description
(1 × [3]) [3]

(b) Discuss how blood glucose is controlled, both directly after a meal and several hours after a meal. (AO1, AO2, AO3)

Examples of suitable points to be discussed:

Directly after a meal
Immediately after the meal the digestive system will begin to break down the carbohydrates into glucose. The glucose will be absorbed into the blood stream via the ileum and blood glucose levels will begin to rise. The pancreas will detect the rise in blood glucose levels and will release insulin, insulin will convert the excess glucose into glycogen which will be stored in the liver. The rest of the glucose will leave the liver in the blood and travel to body cells where it will be used in respiration.

Several hours after a meal
The glucose in the blood will be used up by cells in respiration, this will cause blood glucose levels to fall. The pancreas will detect the fall in blood glucose levels and release glucagon which will travel to the liver and convert the previously stored glycogen into glucose. The glucose will be released from the liver into the blood where it will be carried to cells for use in respiration.

All other valid points will be given credit

[0] is awarded for a response not worthy of credit

AVAILABLE MARKS

Level 1 ([1]–[3])
Overall impression: basic

- basic knowledge and understanding of how blood glucose is controlled
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- displays a limited ability to discuss how blood glucose is controlled
- quality of written communication is basic. The candidate makes only a limited attempt to select and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

Level 2 ([4]–[6])
Overall impression: adequate

- adequate knowledge and understanding of how blood glucose is controlled
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- displays an adequate ability to discuss how blood glucose is controlled, both directly after a meal and several hours after a meal
- candidates who focus on only one part of the question cannot achieve more than 5 marks
- quality of written communication is adequate. The candidate makes a reasonable attempt to select and use an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning evident.

Level 3 ([7]–[9])
Overall impression: competent

- competent knowledge and understanding of how blood glucose is controlled
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- displays a competent ability to discuss the normal mechanism by which blood glucose is controlled, directly after a meal and several hours after a meal
- quality of written communication is competent. The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is extensive and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a high standard to ensure that meaning is clear. [9]

AVAILABLE MARKS

(c) Describe the physiological cause of type 1 diabetes. (AO1, AO2)

Examples of suitable points to be included in description:
Type 1 diabetes is an autoimmune disease in which the body's immune system attacks the cells of the pancreas damaging or destroying them completely. This prevents the cells being able to make enough/any insulin and the body is unable to control blood glucose levels within normal limits.

[1] basic description [2] adequate description [3] competent description
(1 × [3]) [3]

(d) Describe how type 1 diabetes should impact on a person's diet. (AO2)

Examples of suitable points to be included in description:
People with type 1 diabetes need to control their sugar intake and avoid foods which are high in sugar such as fizzy drinks or sweet foods. They need to eat regularly to ensure they maintain their blood glucose levels within normal limits.

- Carbohydrate counting

[1] basic description [2] adequate description [3] competent description
(1 × [3]) [3]

(e) **(i)** Describe the physiological cause of an ischemic stroke. (AO1, AO2)

Examples of suitable points to be included in description:
An ischemic stroke is caused when a blood clot forms in blood vessels in the brain. This stops/limits blood flow to part of the brain preventing it from receiving any/enough oxygen. The part of the brain not receiving any/enough oxygen is unable to respire and will die.

[1] basic description [2] adequate description [3] competent description
(1 × [3]) [3]

(ii) Assess the potential impact of the stroke on Paul. (AO2, AO3)

In terms of assessment: candidates are required to make informed judgements on the potential impact of the stroke on Paul's income and diet.

Examples of suitable points to be assessed:

Income
If Paul is unable to work he will lose income. As Paul is self-employed he may not be entitled to sick pay from a company, though he may have some sort of income replacement insurance or get sickness benefits from the state. Paul will be entitled to state benefits if he has been left permanently disabled and he may still be able to take an income from his business if his son continues in the business or if he employs someone else to help.

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Diet
Paul should avoid salt in his diet as this can raise blood pressure and this increases the risk of another stroke. He should also avoid fatty foods, as these will also increase his risk of circulatory problems and therefore increase his risk of stroke further. He may have problems swallowing, so may require a diet of soft foods, at least in the shorter term. He should eat more fruit and vegetables, wholegrain cereals and breads.

All other valid points will be given credit

[0] is awarded for a response not worthy of credit

Level 1 ([1]–[2])
Overall impression: basic
- basic knowledge and understanding of how a stroke will impact on Paul
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- displays a limited ability to assess the potential impact of a stroke on Pauls income and diet.

Level 2 ([3]–[4])
Overall impression: adequate
- adequate knowledge and understanding of how a stroke will impact on Paul
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- candidates who address only one part of the question cannot achieve more than 3 marks
- displays an adequate ability to assess the potential impact of a stroke on Pauls income and diet.

Level 3 ([5]–[6])
Overall impression: competent
- competent knowledge and understanding of how a stroke will impact on Paul
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- displays a competent ability to assess the potential impact of a stroke on Pauls income and diet. [6]

(f) Analyse the causes of dehydration and its potential impact on individuals. (AO2, AO3)

AVAILABLE MARKS

In terms of analysis: candidates are required to separate their knowledge and understanding of dehydration into the components of causes and potential impact. They are required to present arguments and make reasoned judgements on the characteristics of each of these two components.

Examples of suitable points to be analysed:

Causes of dehydration
Dehydration is caused by not drinking enough fluid or by losing more fluid than you take in. Excess fluid can be lost when ill, e.g. gastroenteritis causing vomiting or diarrhoea. Sweating excessively is another cause of dehydration; this can occur because of a fever, exercising vigorously or working in hot conditions. People with diabetes are at risk of dehydration as their kidneys will try to remove the excess sugar in the blood and as a result they produce more urine and lose more water than they should. Alcohol can also lead to dehydration as it is a diuretic and causes individuals to urinate more frequently.

Potential impact on individuals
The effects of dehydration depend upon the severity of the problem. Early signs of dehydration will include thirst and urine that is dark in color and with a potent smell. If left untreated dehydration can cause the person to develop headaches and feel light-headed. The person is also likely to feel lethargic and lose stamina and they may suffer dry lips and mouth. Prolonged dehydration can lead to severe symptoms such as disorientation, confusion, change in pulse (higher or lower), dizziness, loss of consciousness or even a seizure. Urination is likely to be limited or stop and if this is a long term (chronic) issue, the person could develop kidney stones, constipation and even muscle damage. At this stage the person must be admitted to hospital as they will require IV fluids to rehydrate them. Long term damage may already have occurred.

All other valid points will be given credit

[0] is awarded for a response not worthy of credit

Level 1 ([1]–[4])
Overall impression: basic

- basic knowledge and understanding of other causes of dehydration and its potential impact on individuals
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- displays a limited ability to analyse other causes of dehydration and its potential impact on individuals
- quality of written communication is basic. The candidate makes only a limited attempt to select and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

Level 2 ([5]–[8])
Overall impression: adequate

- adequate knowledge and understanding of other causes of dehydration and its potential impact on individuals
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- displays an adequate ability to analyse other causes of dehydration and its potential impact on individuals
- candidates who address only one part of the question cannot achieve more than six marks
- quality of written communication is adequate. The candidate makes a reasonable attempt to select and use an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning evident.

Level 3 ([9]–[12])
Overall impression: competent

- competent knowledge and understanding of other causes of dehydration and its potential impact on individuals
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- displays a competent ability to analyse other causes of dehydration and its potential impact on individuals
- quality of written communication is competent. The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is extensive and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a high standard to ensure that meaning is clear. [12]

AVAILABLE MARKS
42
100

Total