Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2013

Health and Social Care

Assessment Unit AS 14

assessing

Unit 14: Understanding Human Physiology

[A3H81]

TUESDAY 21 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)** Write down the name and **one** function of A, B, C and D. (AO1, AO2)

A Name: Golgi apparatus/body
Function: processes/packages macromolecules, e.g. proteins and lipids
[1] For name
[1] For function

B Name: Nucleolus
Function: cell division/involved with the synthesis of ribosomes
[1] For name
[1] For function

C Name: Rough Endoplasmic Reticulum/RER (also accept ribosome)
Function: Involved in the synthesis of proteins
[1] For name
[1] For function

D Name: Mitochondrion/mitochondria
Function: produces energy in the form of ATP by aerobic respiration
[1] For name
[1] For function
(8 × [1]) [8]

(b) Complete the table below to identify **one** function of each of the blood components shown. (AO1)

Blood components	Function
	Transports oxygen
	Produces antibodies
	Phagocytosis (also accept engulfs bacteria/germs)
	Clots blood

(4 × [1])

Figure from: © ORG Biology, through Diagrams by W R Pickering (OUP, 1996), reproduced by permission of Oxford University Press

[4]

AVAILABLE MARKS

(c) (i) Name parts A, B, C and D. (AO1, AO2)

A Name: pituitary gland
B Name: cerebral hemisphere
C Name: cerebellum
D Name: medulla oblongata/pons
(4 × [1]) [4]

(ii) Write down the two main physical causes of a stroke. (AO1)

Bleed on the brain [1]; Blood clot/blockage [1]
(2 × [1]) [2]

(iii) Analyse the role of the pituitary gland in the homeostatic control of water in the body. (AO1, AO2, AO3)

Answers may address some of the following points:

- hypothalamus detects low concentration of water in the blood
- hypothalamus sends message to the pituitary to increase the release of ADH
- ADH travels to the kidney via the blood
- more ADH affects the permeability of the collecting duct in the kidney nephron making it more permeable
- more water is reabsorbed, urine becomes more concentrated
- hypothalamus detects high concentration of water in the blood
- hypothalamus sends message to the pituitary to decrease the release of ADH
- less ADH travels to the kidney via the blood
- less ADH effects the permeability of the collecting duct in the kidney nephron making it less permeable
- less water is reabsorbed
- urine becomes less concentrated.

All other valid points will be given credit

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

- displays limited understanding of how ADH affects homeostatic control of water
- there is limited discussion
- quality of written communication is basic. The candidate makes a limited selection 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

- displays adequate understanding of how ADH affects homeostatic control of water. Should make reference to the effect of the hormone on the kidney/nephron/collecting duct
- there is adequate discussion
- 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 appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning evident.

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

- displays competent understanding of how ADH affects homeostatic control of water. Reference is made to the effect ADH has on the permeability of the collecting duct and therefore the re-absorption of water
- 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 and ensure that the meaning is clear.

[0] is awarded for a response not worthy of credit [9]

AVAILABLE MARKS

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AVAILABLE MARKS

2 (a) (i) Identify parts A, B, C and D. (AO1, AO2)

A Dendrites
B Cell membrane/cell body
C Schwann cell/myelin sheath/node of Ranvier
D Axon
(4 × [1]) [4]

(ii) Write down the muscle type shown in the diagram. (AO2)

Skeletal/striated
(1 × [1]) [1]

(iii) Describe how messages travel from the nerve fibre to the muscle. (AO1, AO2, AO3)

Answers may address some of the following points:
- the impulse travelling along the axon is an electrical impulse
- the electrical impulse reaches the pre synaptic knob/end of the first neurone
- the neurotransmitter/acetylcholine/chemical is released from the vesicle
- the chemical diffuses across the synaptic cleft/synapse
- the neurotransmitter/acetylcholine/chemical attaches to receptors on the muscle
- this stimulates a response in the muscle which contracts.

All other valid points will be given credit

Level 1 ([1]–[2])
Overall impression: basic
- displays limited understanding of how the electrical impulse travels along the neurone or how the chemical impulse travels across the synapse
- there is limited description of the mechanism.

Level 2 ([3]–[4])
Overall impression: adequate
- displays adequate understanding of how the electrical impulse travels along the neurone and how the chemical impulse travels across the synapse
- there is adequate description of the mechanism.

AVAILABLE MARKS

Level 3 ([5]–[6])
Overall impression: competent
- displays competent understanding of how an electrical impulse travels along the neurone electrically and across the synapse chemically, should make reference to the vesicles releasing neurotransmitter/acetylcholine/chemical and that this initiates the contraction of the muscle
- there is a competent description of the mechanism.

[0] is awarded for a response not worthy of credit [6]

(b) Write down what is meant by the terms paraplegia and quadriplegia. (AO1, AO2)

Paraplegia: paralysed from the waist down/legs paralysed [1]
Quadriplegia: paralysed from the neck down/all four limbs paralysed [1]
(2 × [1]) [2]

(c) Evaluate how this may affect Allison's lifestyle. (AO1, AO2, AO3, AO4)

Answers may address some of the following points:
- Allison never be able to walk again
- she will have to use a wheelchair
- she may need to move apartment if there is no lift
- her living accommodation will have to be adapted to allow her to move freely in her wheelchair
- she may need support from family or friends at the beginning as she may feel anxious/depressed
- she will need to learn to do things without the use of her legs
- she may require a hoist/other equipment in her home
- she may no longer feel safe living alone
- she will not be able to work as a courier but may get a job somewhere else in the firm
- she may find it more difficult to find a partner
- she may find it more difficult to raise children.

However
- she could drive a specially adapted car
- could join a support group and meet people with similar needs
- could still stay active by joining a sports club/team for people in wheelchairs
- may make new friends
- as she is motivated she may well push herself to live as she used to and let the accident have a minimal effect on the quality of her life
- she is physically fit so may find it easier to use her arms than someone not physically fit.

All other valid points will be given credit

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

- displays limited understanding of how paraplegia will impact on lifestyle
- there is limited evaluation of effect on Allison's lifestyle
- quality of written communication is basic
- the candidate makes a limited selection 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

- displays adequate understanding of how paraplegia will impact on lifestyle
- there is adequate evaluation of the affect on Allison's lifestyle looking at two or more aspects, e.g. leisure, income, education, relationships
- 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 appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning evident.

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

- displays competent understanding of how paraplegia will impact on lifestyle
- there is a competent evaluation looking at several aspects of Allison's lifestyle including at least one positive effect
- 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 and ensure that the meaning is clear.

[0] is awarded for a response not worthy of credit [9]

AVAILABLE MARKS

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AVAILABLE MARKS

3 (a) (i) Explain why the stomach (B) is described as an organ. (AO3)

The stomach is a:
- group of tissues
- working together to perform a function.

[1] for key phrase(s)
[2] for explanation
(1 × [2]) [2]

(ii) Describe how an ulcer develops in the stomach. (AO1, AO2)

Answers may address some of the following points:
- infection/excess acid in stomach
- mucus production decreases
- stomach acid attacks the stomach lining – a hole forms in the epithelium
- this becomes infected.

[1] for key phrase(s)
[2] for adequate description
[3] for full description
(1 × [3]) [3]

(iii) Identify structure C. (AO1)

C: Ileum/small intestine
(1 × [1]) [1]

Write down three ways the structure has adapted to allow maximum absorption of food into the blood. (AO1, AO2)

Answers may address any three of the following:
- moisture
- large surface area
- good blood supply
- long
- one cell thick.

(3 × [1]) [3]

(iv) Complete the table below to identify the enzymes, substrates and end products produced in parts A, B and C of the digestive system. Some of the table has been completed for you. (AO1, AO2, AO3)

Those in bold are answers

Part	Enzyme	Substrate	End Products
A	Carbohydrase	**Carbohydrates**	**Glucose/simple sugars**
B	**Protease/pepsin/ other named protease**	**Protein**	Amino Acids
C	**Lipase/other named lipase**	Lipids	**Fatty acids and glycerol**

(6 × [1]) [6]

AVAILABLE MARKS

(v) Identify the organ which produces bile. (AO1)

Liver
(1 × [1]) [1]

(vi) Write down two functions of bile. (AO2)

- emulsification of lipids/fats
- neutralisation of stomach acid.

(2 × [1]) [2]

(b) (i) Complete the diagram by naming the two hormones which control the processes shown. (AO2)

Top box: Insulin
Bottom box: Glucagon
(2 × [1]) [2]

(ii) Write down the part of the body where deamination takes place. (AO1)

Liver
(1 × [1]) [1]

(iii) Describe how urea is removed from the body. (AO1, AO2)

Answers may address some of the following points:

- urea is taken from the liver to the kidney
- via the blood
- urea is filtered out of the blood by the kidney
- urea is mixed with other substances to form urine
- urine is carried to the bladder via the ureters
- urine is stored in the bladder
- urine is released via the urethra.

[1] for key phrase(s)
[2] for adequate description
[3] for full description
(1 × [3]) [3] 24

AVAILABLE MARKS

4 **(a)** Explain the term homeostasis. (AO1, AO2)

The mechanism of returning internal body conditions to their norm/equilibrium, also known as negative feedback mechanisms.
[1] for key phrase(s)
[2] for full explanation
(1 × [2]) [2]

(b) **(i)** Write down the name and function of parts A, B and C. (AO1, AO2)

A Name: Kidney
Function: Filters/cleans blood
[1] For name
[1] For function

B Name: Ureter(s)
Function: Carries urine away from kidney/to the bladder
[1] For name
[1] For function

C Name: Bladder
Function: Stores urine
[1] For name
[1] For function
(6 × [1]) [6]

(ii) Explain the cause of his condition. (AO3)

- sphincter muscle no longer under voluntary control
- urine leaks out meaning person is incontinent.

[1] for key phrase(s)
[2] for explanation
(1 × [2]) [2]

(c) Use your knowledge of filtration in the kidney nephron to explain the following. (AO3)

- no plasma proteins in urine as they are too large to be filtered out to blood
- no glucose in urine as it is needed by body/is actively transported into or diffuses into the blood
- higher concentration of urea in urine than blood because less water in urine/more water in blood.

(3 × [2]) [6]

AVAILABLE MARKS

(d) (i) State the normal range for blood glucose levels in a healthy person. (AO4)

Between 4–7 mmol dm^{-3} (accept 70-110 mg/litre)
(1 × [1]) [1]

(ii) Which of the two lines represents the individual with diabetes? (AO3, AO4)

Line A [1]

(iii) Analyse the information shown in the graph for individuals A and B. (AO1, AO2, AO3, AO4)

Answers may address some of the following points:
Individual A

- at 0 minutes – blood sugar level is higher than that of individual B
- higher initial blood glucose as diabetics do not release enough insulin to maintain blood glucose levels within a normal range
- after 0 minutes blood glucose levels rise as a meal has been eaten
- 0-80 minutes – blood glucose level increases to 18 mmol/dm^{-3}
- the increase is due to food being digested and glucose is passing into the blood
- blood sugar levels remain high for the remaining time
- the levels stay high as no insulin is produced by the diabetic person to store the glucose.

Individual B

- at 0 minutes – blood sugar level is lower than that of individual A
- blood glucose level is at 5 mmol/dm^{-3} within the normal range (4-7 mmol/dm^{-3})
- lower initial blood glucose as an individual who is not diabetic releases enough insulin to maintain blood glucose levels within a normal range
- after 0 minutes blood glucose levels rise as a meal has been eaten
- 0-60 minutes – blood sugars increases to 10 mmol/dm^{-3}
- the increase is due to food being digested and glucose is passing into the blood
- 60-80 minutes blood glucose level returns to normal level of 7 mmol/dm^{-3}
- the drop in glucose levels is due to the release of insulin
- the insulin stores the excess glucose as glycogen.

All other valid points will be given credit

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

- displays limited analysis of the graphs
- there is limited analysis of at least one of the lines
- quality of written communication is basic
- the candidate makes a limited selection 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

- displays adequate analysis of the graphs
- there is adequate analyses of both lines with description and some explanation of the main trends
- 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 appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning evident.

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

- displays competent analysis of the graphs
- there is a competent analysis of both lines with description and matching explanation of the main trends
- 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 and ensure that the meaning is clear.

[0] is awarded for a response not worthy of credit [9]

AVAILABLE MARKS
27
100

Total