Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2014

Health and Social Care

Assessment Unit AS 14

assessing

Unit 14: Understanding Human Physiology

[A3H81]

TUESDAY 20 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.

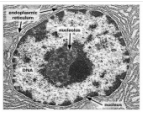
The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends 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)** Complete the table by writing down the **name** and **one** function of each organelle. (AO1, AO2)

Organelle	Name	Function
	Golgi apparatus	Packages or modifies protein and fat
	Mitochondria	Carries out respiration/ Produces energy
	Rough endoplasmic reticulum (accept RER)	Protein synthesis and transport
	Nucleus	Controls cell activities

(8 × [1]) *Adapted from © D. J. Taylor, N. P. O. Green, G. W. Stout, "Cells", R. Soper (ed.,), (1997), "Biological Science 1 and 2", (3rd edition), Cambridge : Cambridge University Press.* [8]

(b) Write down the name of muscle types A, B and C. (AO1)

A Cardiac
B Smooth
C Skeletal/striated
(3 × [1]) [3]

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

A Name Lens
Function Focuses light onto retina (allow focuses light)
B Name Iris
Function Controls the amount of light entering the eye
C Name Fovea (allow retina)
Function Where the image is focussed
D Name Optic Nerve
Function Carries messages to the brain
(8 × [1]) [8]

(ii) Circle the correct options in the boxes below to demonstrate your knowledge of accommodation. (AO1, AO2)

When focusing on a near object the suspensory ligaments

are [**slack**] and the ciliary muscles are [**contracted**]

making the lens appear [**thicker**]

[3]

(iii) Explain what is meant by the following terms (AO1, AO2)

AVAILABLE MARKS

Answers may address the following points:
Myopia
- short-sightedness
- this is when the eye is unable to focus on distant objects correctly
- due to an error of lens focus length
- eyeball is an incorrect shape
- cornea is more curved
- image formed in front of retina

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

Answers may address the following points:
Presbyopia
- this is when eyes show a decreased ability to focus on near objects
- due to loss of lens flexibility
- as a result of age
- object held at arm's length

[1] for key phrase
[2] for full explanation
(1 × [2]) [2] 26

2 The diagram shows the structure of the skin.

(a) Use the diagram to discuss the role of the skin in controlling body temperature. (AO1, AO2, AO3, AO4)

Answers may address some of the following points:
If temperature drops below normal
- receptors in the skin detect a drop in temperature and send messages to the hypothalamus
- erector pili muscles contract pulling the hair upwards, causing goose bumps
- this traps a layer of air next to the skin, the air acts as an insulator preventing heat radiating from the skin surface
- sweat glands cease producing sweat
- blood vessels vasoconstrict keeping blood flow away from the surface of the skin, this prevents heat loss by radiation and the skin will appear pale
- muscles under the skin contract releasing heat (shivering)

If temperature rises above normal
- receptors in the skin detect a rise in temperature and send messages to the hypothalamus
- erector pili muscles relax making hair lie flat
- no air is trapped next to skin, this allows heat to be lost by radiation from the skin surface
- sweat glands produce sweat which seeps onto the skin surface through the pores and evaporation of the sweat allows heat loss
- blood vessels vasodilate allowing blood flow to the surface of the skin, this allows increased heat loss by radiation and the skin will appear red

All other valid points will be given credit

AVAILABLE MARKS

Level 1 ([1]–[3])
Overall impression: basic
- Displays limited understanding of how structures in the skin facilitate temperature control
- 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 structures in the skin facilitate temperature control.
- 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 organized 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 good understanding of how structures in the skin facilitate temperature control.
- Candidates achieving in this mark band should show an awareness of the mechanism of heat loss.
- There is competent discussion
- Quality of written communication is competent. The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organized 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]

(b) (i) Write down the normal range for body temperature. (AO1)

36.4°C – 37.6°C
(2 × [1]) [2]

(ii) Explain why it can be more difficult for infants to control their body temperature. (AO1, AO2)

Answers may address the following points:
- infants have a larger surface area to body ratio (infants are small)
- therefore lose heat much faster

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

AVAILABLE MARKS

(iii) Explain what is meant by the following terms (AO1, AO2)

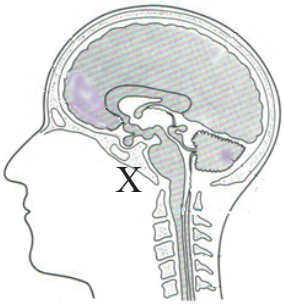
Pyrexia
Answers may address the following points:
- a fever, or febrile condition.
- present if body temperature is in excess of 37°C on the surface or 37.5°C at core

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

Hypothermia
Answers may address the following points:
- occurs when body temperature falls below 35°C
- usually due to exposure to cold conditions

[1] for key phrase
[2] for full explanation
(1 × [2]) [2] 17

3 (a) (i) On the diagram mark the position of the pituitary gland with an X. (AO1)



(1 × [1]) [1]

(ii) Write down the name of the hormone released by the pituitary gland and the organ it reaches that is responsible for the homeostatic control of water content in the urine. (AO1, AO2)

Name antidiuretic hormone (ADH)
Organ kidney
(2 × [1]) [2]

(iii) Complete the table by identifying glands A, B and C and writing down the name of one hormone released by each. (AO1, AO2)

Gland	Name	Hormone released
A	thyroid gland	thyroxine/ calcitonin
B	adrenal gland	adrenaline/ noradrenaline/ corticosteroids
C	pancreas	insulin/ glucagon/ somatostatin/ pancreatic polypeptide

(6 × [1]) [6]

AVAILABLE MARKS

(iv) Explain two ways the endocrine and nervous systems differ.
(AO1, AO2)

Answers may address two of the following:
- endocrine system uses chemical messages whilst the nervous system uses electrical messages
- the endocrine system is slow to act whereas the nervous system acts very quickly
- the effects of the endocrine system are long acting whereas the effects of the nervous system are short acting
- the nervous system targets a specific area whilst the endocrine system acts over a wide area

[1] for key phrase
[2] for full explanation
(2 × [2]) [4]

(b) (i) Discuss the role of the following parts of the nervous system.
(AO1, AO2, AO3)

The sympathetic nervous system
Answers may address some of the following points:
- the sympathetic nervous system is responsible for controlling many of the internal organs and glands in the body
- stimulated by adrenaline
- it is involved in the fight or flight response
- it will stimulate the heart to beat faster
- stimulates secretion of sweat
- makes pupils dilate
- makes hairs stand up
- decreases blood flow to stomach/intestines
- complementary to the parasympathetic nervous system

The parasympathetic nervous system
Answers may address some of the following points:
- the parasympathetic nervous system is responsible for controlling many of the internal organs and glands in the body
- it helps the body to relax; sometimes called 'rest and digest'
- it will make the heart beat slower
- makes pupils contract
- causes salivation
- stimulates digestion and egestion
- stimulates tears
- complementary to the sympathetic nervous system

All other valid points will be given credit
[1] for key phrase
[2] for explanation
[3] for discussion
(2 × [3]) [6]

AVAILABLE MARKS

(ii) Identify the part of the nervous system where reflex reactions occur. (AO1)

Autonomic nervous system (allow any division of the autonomic i.e. parasympathetic or sympathetic)
(1 × [1]) [1]

(c) Use the letters in the diagram above to identify the following structures. (AO1, AO2, AO3)

1 This neurone is found only in the central nervous system D
2 This detects the stimulus of the hot plate A
3 This neurone carries information to the central nervous system C
4 This is called the effector B
5 This is the motor neurone E
(5 × [1]) [5]

(d) Describe the physiological process that leads to an individual developing MS. (AO1, AO2, AO3)

Answers may address some of the following points:
- the body's immune system attacks and damages myelin
- a hole develops in the myelin sheath
- this reduces the effectiveness of electrical conductivity so that messages get to and from the brain more slowly
- scar tissue forms around the damaged myelin
- this is progressive – only one nerve may be affected at first but over time other nerves may be damaged too
- degeneration of nerve cells in central nervous system

Level 1 ([1]–[2])
Overall impression: basic
- Displays limited understanding of the physiological process that leads to MS
- There is limited description

Level 2 ([3]–[4])
Overall impression: adequate
- Displays adequate understanding of the physiological process that leads to MS.
- There is adequate description

Level 3 ([5]–[6])
Overall impression: competent
- Displays good understanding of the physiological process that leads to MS.
- There is competent description

[0] is awarded for a response not worthy of credit [6] 31

AVAILABLE MARKS

4 (a) Discuss the normal mechanism for regulating blood glucose levels. (AO1, AO2, AO3, AO4)

Answers may address some of the following points

- blood glucose levels will normally increase following a meal/sugary drink
- the body detects the increase in blood sugar (glucose)
- the pancreas releases insulin
- excess glucose is converted to glycogen by the insulin, this occurs in the liver
- the blood sugar level will be corrected
- if levels begin to drop after a period with no food or a period of exercise the body detects the fall in blood glucose levels
- the adrenal gland secretes glucagon
- the stored glycogen is converted into glucose by the glucagon in the liver
- the glucose is released from the liver into the blood and the blood sugar level will be corrected

All other valid points will be given credit

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

- Displays limited understanding of how blood glucose levels are normally regulated
- 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 blood glucose levels are normally regulated and should correctly name the hormones
- 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 organized 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 good understanding of how glucose levels are normally regulated and should correctly name the hormones and their site of production
- There is a competent discussion
- Quality of written communication is competent. The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organized 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

(b) Write down two symptoms of renal failure. (AO1)

Answers should address any two of the following
- nausea
- weight loss
- problems urinating
- swelling of the legs, ankles, feet, face and/or hands
- shortness of breath due to extra fluid on the lungs (may also be caused by anaemia)
- feeling tired and/or weak
- memory problems
- difficulty concentrating
- dizziness
- low blood pressure
- appetite loss, a bad taste in the mouth
- difficulty sleeping
- excess protein in the blood

All other valid points will be given credit
(2 × [1]) [2]

(c) **(i)** Explain why there is a selectively permeable membrane in the dialysis machine. (AO1, AO2)

To allow substances to move out of the blood and into the dialysis machine in the same way that the kidney acts as a filter.
[1] for key phrase
[2] for explanation
(1 × [2]) [2]

(ii) Write down why protein remains in the blood. (AO1)

Protein is too large to pass through the selectively permeable membrane
(1 × [1]) [1]

(d) Analyse the potential impact of renal failure on Anya's lifestyle. (AO1, AO3, AO4)

AVAILABLE MARKS

Answers may address some of the following points:

- Anya will need kidney dialysis, this could mean lengthy trips to the hospital a few days a week which could impact on her work and family life
- she may need to move back to the city to be nearer a hospital and may be concerned about her children's education if the family need to move back
- she may struggle to manage looking after the children and may have to pay for child care
- if Anya is unable to work they may find it hard to afford leisure activities
- Anya's diabetes may be even harder to control and she may suffer complications which affect her ability to work or take part in leisure activities
- Anya may feel anxious that she may die as a result of the kidney failure which could put strain on her relationships
- Anya may want to move to be nearer family especially because her husband is away for so long everyday which may strengthen her relationship with the extended family
- Anya's family may support her with child care to help relieve her stress again strengthening their relationship
- she will have to follow a low protein diet and maintain a low fluid intake
- a successful transplant should allow Anya to return to normal life and her previous lifestyle
- may be difficult to arrange and go on a family holiday

All other valid points will be given credit

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

- Displays limited understanding of how renal failure will impact on lifestyle
- There is limited analysis of the effect on 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 ([5]–[8])
Overall impression: adequate

- Displays adequate understanding of how renal failure will impact on lifestyle
- There is adequate analysis of the effect on lifestyle
- 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 organized 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.

		AVAILABLE MARKS
Level 3 ([9]–[12]) Overall impression: competent • Displays good understanding of how renal failure will impact on lifestyle • There is a competent analysis of the effect on lifestyle • Quality of written communication is competent. The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organized 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	[12]	26
Total		**100**