Rewarding Learning

**ADVANCED SUBSIDIARY (AS)**
**General Certificate of Education**
**2015**

# Health and Social Care

## Assessment Unit AS 14

*assessing*

## Unit 14: Understanding Human Physiology

**[A3H81]**

**THURSDAY 28 MAY, AFTERNOON**

# 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)** Write down the name and **one** function of the organelles labelled A, B and C. (AO1, AO2)

A Name: Rough Endoplasmic Reticulum / RER
Function: Involved in the synthesis of proteins
[1] For name; [1] For function

B Name: Golgi Apparatus
Function: processes/packages macromolecules, e.g. proteins and lipids/ organelle synthesis
[1] For name; [1] For function

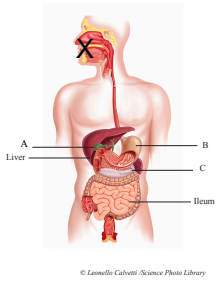
C Name: Smooth Endoplasmic Reticulum / SER
Function: Involved in the synthesis of lipids
[1] For name; [1] For function
(6 × [1]) [6]

**(ii)** Explain how the epithelial cell is specialised to enable it to perform its function. (AO1, AO2)

Specialisation: The cell has microvilli on its surface
Function: to increase the surface area for absorption of digested food
(2 × [1]) [2]

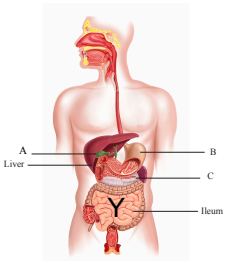
**(b) (i)** Label the diagram with an X where digestion begins and a Y where digestion ends. (AO1, AO2)

1. Answer: X at mouth





2. Answer: Y at small intestine





(2 × [1]) [2]

**(ii)** Identify organs A, B and C. (AO1, AO2)

A Name: Gall Bladder
B Name: Stomach
C Name: Pancreas
(3 × [1]) [3]

AVAILABLE MARKS

**(iii)** Complete the table to show where the enzyme is first released and the food group on which it acts. (AO1, AO2)

| Enzyme | Where enzyme is first released | Food group on which enzyme acts |
|---|---|---|
| Carbohydrases | **Mouth** | Carbohydrates |
| Lipases | Small intestine | **Fats** |
| Proteases | **Stomach** | **Proteins** |

(4 × [1]) [4]

**(c) (i)** Discuss the role of the liver in the deamination of excess amino acids. (AO1, AO2)

Answers may address some of the following points:
- this is the process by which excess amino acids are broken down in the liver
- the amino acids are broken down into carbohydrates and ammonia
- the carbohydrates are used for energy or stored in the liver
- the ammonia is converted to urea and will be sent to the kidneys for excretion.

**(ii)** Discuss the role of bile in digestion. (AO1, AO2)

Answers may address some of the following points:
- bile is made by the liver and is then sent to be stored in the gall bladder via the bile duct
- bile is used to emulsify fats, producing a larger surface area on which enzymes may act.

All other valid points will be given credit
[1] For key phrase/s [2] for adequate discussion [3] for full discussion
(2 × [3]) [6]

**(d) (i)** Write down two common causes of cirrhosis of the liver. (AO1)

Answers may address any two of the following
- long term alcohol abuse
- hepatitis B
- hepatitis C
- inherited haemochromatosis
- non-alcoholic steatohepatitis (NASH).

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

**(ii)** Write down two symptoms of cirrhosis of the liver. (AO1)

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Answers may address any two of the following

- tiredness and weakness
- loss of appetite
- weight loss
- feeling sick
- very itchy skin
- tenderness or pain around the liver
- tiny red lines (blood capillaries) on the skin above waist level
- jaundice
- a tendency to bleed and bruise more easily, such as frequent nosebleeds or bleeding gums
- hair loss
- fever and shivering attacks – because you're more prone to infections
- oedema – a build-up of fluid in the legs, ankles and feet
- ascites – a build-up of fluid in your abdomen, which can make you look heavily pregnant.

All other valid points will be given credit

(2 × [1]) [2]

**(iii)** Suggest two ways to reduce the risk of developing cirrhosis of the liver. (AO1, AO2)

Answers may address any two of the following

- stick to the recommended daily allowance for alcohol consumption
- avoid unprotected sex
- avoid needle sharing
- hepatitis B vaccination.

All other valid points will be given credit

(2 × [1]) [2] 29

**2 (a)** Discuss the mechanisms by which the eye accommodates to view both near and far objects. (AO1, AO2, AO3)

AVAILABLE MARKS

**Near objects:**
Answers may address some of the following points
- light rays entering the eye will be diverging and will require significant refraction
- the ciliary muscles will contract
- the suspensory ligaments will relax
- the lens will become fatter in shape allowing increased refraction
- this allows the light to be focussed onto the retina
- pupil appears smaller.

**Far objects:**
Answers may address some of the following points
- the light rays entering the eye will be parallel and require little refraction
- the ciliary muscles will relax
- the suspensory ligaments will contract
- this will pull the lens into a thinner shape decreasing the amount of refraction
- this allows the light to be focussed on the retina
- pupil appears larger.

All other valid points will be given credit

**Level 1 ([1]–[3])**
Overall impression: basic
- Displays limited understanding of how the eye accommodates either a near or far object
- There is limited discussion of the mechanisms
- 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 the eye accommodates both near and far objects
- Candidates who address only one aspect of the question cannot achieve at the top of this level
- There is adequate discussion of the mechanisms
- 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 the eye accommodates both near and far objects

- There is a competent discussion of the mechanisms
- 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)** Explain the physiological process that leads to the development of cataracts. (AO1, AO2)

Cataracts occur when there is a build-up of protein on the surface of the lens making it cloudy, preventing light from passing clearly through the lens and causing some loss of vision.

[1] For key phrase/s; [2] for explanation [2]

**(ii)** Explain the term hypermetropia. (AO1, AO2)

- hypermetropia means long sight
- it is where the image of a nearby object is formed behind the retina
- this could be because the lens is too thin and does not refract the light sufficiently

[1] For key phrase/s; [2] for explanation [2]

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**3** **(a)** Write down the name and **one** function of parts A, B and C. (AO1, AO2)

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A Name: **Cerebellum**
Function: Controls motor movement/coordination
[1] For name; [1] For function

B Name: **Hypothalamus**
Function: The hypothalamus maintains many physiological functions, such as:

- body temperature,
- blood pressure,
- fluid and electrolyte balance,
- regulation of digestion,
- stimulates the pituitary gland.

[1] For name; [1] For function

C Name: **Pituitary Gland**
Function: Answers may address **one** of the following points

- Master gland that controls other glands in the body
- Releases hormones such as adrenocorticotropic hormone which stimulates the adrenal glands to secrete steroid hormones, principally cortisol
- Growth hormone which regulates growth, metabolism and body composition
- Luteinising hormone and follicle stimulating hormone, also known as gonadotrophins. They act on the ovaries or testes to stimulate sex hormone production and egg and sperm maturity
- Prolactin which stimulates milk production

Stores hormones such as

- Anti-diuretic hormone which controls water balance and blood pressure. It is made by the hypothalamus but is stored in the posterior pituitary gland prior to being released into the bloodstream.
- Oxytocin which stimulates uterine contractions during labour and milk secretion during breastfeeding. It is made by the hypothalamus but is stored in the posterior pituitary gland prior to being released into the bloodstream

[1] For name; [1] For function
(6 × [1]) [6]

**(b)** **(i)** Explain the following. (AO1, AO2)

**Ischemic stroke**: this is a stroke caused by a blockage that prevents blood flow to parts of the brain.
[1] For key phrase/s [2] for explanation

**Haemorrhagic stroke**: this is a stroke that is caused by a bleed on the brain preventing areas of the brain from receiving blood.
[1] For key phrase/s [2] for explanation
(2 × [2]) [4]

**(ii)** Analyse how David's stroke may affect his lifestyle. (AO1, AO2, AO3, AO4)

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Answers may address some of the following points

Work:
- David will most likely have to give up working as his job is a physical one and he will not be able to manage those activities for some time
- Even if David regains some movement in his right side it is unlikely that he will be able to fulfil the duties of a caretaker

Income:
- David will lose his income as he is no longer able to work
- However as David has worked for the school for so long and is close to retirement age he may be able to access his pension early
- David will be able to receive benefits as he is no longer fit for work and will be disabled

Care needs:
- David will be unable to care for himself in the immediate future
- He may have a lengthy stay in hospital to recover
- He may be able to return home in time as he lives in a bungalow so all his facilities will be on one level
- His home will need to be fitted with aids to allow him to live independently

Leisure:
- David may no longer want to socialise in the pub as he may feel embarrassed about his disability
- He may still be able to play darts if he can throw with his left hand however it is unlikely he will be able to hold a snooker cue
- David may find another hobby that he enjoys doing that does not require him to have use of his right side such as reading

Diet:
- David will need to eat more healthily if he is to avoid another stroke
- He may be able to get healthy meals delivered by meals on wheels if he is unable to cook
- He needs to avoid alcohol to reduce the risk of a further stroke

Relationships:
- David will need to rely on his daughter if he is to live at home again
- This may put a strain on their relationship as she is likely to already have a busy life looking after her own family
- David's friends may help him as he is so valued in their team so they may all do their bit to help him.

All other valid points will be given credit

**Level 1 ([1]–[4])**
Overall impression: basic
- displays limited understanding of how stroke will impact on lifestyle
- there is limited analysis of 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 some understanding of how stroke will impact on lifestyle
- There is adequate analysis of the effect on lifestyle looking at more than one aspect, e.g. work, income, care needs, diet, relationships, leisure
- 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 ([9]–[12])**
Overall impression: competent

- Displays good understanding of how stroke will impact on lifestyle
- There is a competent analysis looking at a range of aspects of lifestyle, such as work, income, care needs, diet, relationships, leisure
- 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]

**(iii)** Explain the physiological process that causes urinary incontinence. (AO1, AO2)

Urinary incontinence is the loss of nervous control of the sphincter muscles around the urethra which means urine will leak out of the bladder.
[1] for key phrase/s; [2] for full explanation [2]

**(c) (i)** Identify parts A, B and C. (AO1)
A: Bladder
B: Ureter
C: Urethra
(3 × [1]) [3]

**(ii)** Identify blood vessels D and E. (AO1, AO2)
D: Vena Cava
E: Renal Artery
(2 × [1]) [2]

**(d)** Using the diagram and your knowledge of the kidney nephron, complete the following sentences. (AO1, AO2)

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Blood enters the kidney through the ***renal artery***. Substances are filtered out of the blood under high pressure into the ***Bowman's capsule***. Some substances like protein are not filtered out of the blood because they are too ***large***. Urea, salts, glucose and water are all filtered out. ***Glucose*** needs to be reabsorbed back into the blood as it is needed to produce energy. ***Urea*** needs to be removed as it is poisonous to the body if not removed. The re-absorption of water will depend on the permeability of the ***collecting duct*** which will change depending on the release of anti-diuretic hormone (ADH) from the pituitary gland.

(6 × [1]) [6] 35

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**4** **(a)** Match each statement below with the correct letter in the diagram. (AO1, AO2)

- This part of the ear is involved in balance: **C**
- This part of the ear is known as the pinna: **A**
- This part of the ear vibrates off the ossicles sending the message into the inner ear: **B**
- This part of the ear carries messages to the brain: **D**

(4 × [1]) [4]

**(b)** Discuss how sound waves travel through the ear from A to D. (AO1, AO2, AO3)

Answers may address some of the following points:

- sound/vibrations of the air, are directed into the ear through the pinna
- the vibrations pass along the outer ear to the tympanic membrane/ ear drum
- the tympanic membrane vibrates and these vibrations are passed to the ear ossicles in the middle ear
- the ossicles (malleus/hammer, incus/anvil, stapes/stirrup) vibrate and in doing so the vibrations are amplified
- the final ossicles bone (the stapes) vibrates against the oval window/ fenestra ovalis into the inner ear
- the oval window transmits the vibrations into the cochlea
- fluid in cochlea vibrates
- tiny hairs in the cochlea move up and down due to the vibrations
- these movements stimulate receptor cells which send messages along the auditory nerve to the brain/cochlea converts vibrations into electrical impulses.

All other valid points will be given credit

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

- Displays limited understanding of how sound travels from the pinna to the auditory nerve
- There is limited discussion

**Level 2 ([3]–[4])**
Overall impression: adequate

- Displays adequate understanding of how sound travels from the pinna to the auditory nerve. There is reference to sound causing vibrations and some of the parts of the ear have been named
- There is adequate discussion

**Level 3 ([5]–[6])**
Overall impression: competent

- Displays good understanding of how sound travels from the pinna to the auditory nerve. There is reference to sound causing vibrations and most of the parts of the ear have been named in the correct sequence.
- There is a competent discussion

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

**(c)** Explain the following terms: (AO1, AO2)

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Answers may address some of the following points

**Conductive hearing loss**

- failure to conduct sound through the internal ear due to frozen/ruptured ear drum/damaged/frozen ear ossicles/round/oval window damage/ear wax /glue ear/ear infection blocking the pathway.

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

**Sensorineural hearing loss**

- sound cannot be changed into electrical impulses due to damage to the inner ear/the cochlea or the auditory nerve
- the electrical impulses from the auditory nerve cannot be transmitted to the brain
- sound waves cannot be processed by the brain
- this may be caused by illness, e.g. mumps/measles or may be a congenital defect

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

**(d)** Analyse the information in the chart, suggesting reasons for the data shown. (AO1, AO3, AO4)

Answers may address some of the following points:

- the chart shows that most people develop hearing loss between the ages of 40–59.
- at birth only 2% of individuals have hearing loss and there is no difference between the sexes.
- between birth and the age of five there is a slight increase in the number of girls developing hearing loss boys remain at 2 % but girls increase to 3%
- between the age of 6 and 19 there is a significant rise in the number of individuals developing hearing loss with females rising to 12% and males to 11%. This could be due to exposure to loud sounds such as teenagers going to concerts
- between the age of 20–39 there is a shift in the gender issue with 32% of males developing hearing loss while only 20% of females. This may be due to more men working in jobs where there is exposure to loud sounds, such as the construction industry
- between the age of 40–59 the gender difference closes, females are at 30% and males at 32%. As this is the age that the majority of people with hearing loss develop it, it is likely this can be attributed to age
- above the age of 60 the gender issue switches once again and it remains this way above 70. This is likely to be due to the fact that females have a longer life expectancy than males and therefore a bigger proportion of that age range is female.

All other valid points will be given credit

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

- Displays limited analysis of the chart
- There is description but little explanation
- 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 some analysis of the chart
- There is adequate analysis of the chart with some explanation of the data in relation to age or gender
- Candidates who address only age or gender 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 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 analysis of the chart
- There is a competent analysis of the chart with matching explanation of the data in relation to age and gender
- 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 |
| --- |
| 23 |
| **100** |

**Total**