



Rewarding Learning

ADVANCED SUBSIDIARY (AS)

General Certificate of Education

2011

Health and Social Care

Assessment Unit AS 14

assessing

Unit 14: Understanding Human Physiology

[A3H81]

TUESDAY 24 MAY, AFTERNOON

**MARK
SCHEME**

- 1 (a) This is a cross sectional diagram of a cell from the digestive system:

The cell contains organelles labelled A, B and C.

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

A Cell/plasma membrane

Function: permeable barrier/ holds the cell in shape/ separates intra and extra cellular materials

accept cytoplasm

- Function: contains all other parts of cell
 - Protects organelles
 - Controls what goes in and out of cell
- and

- Where chemical reactions take place

B Golgi body

Function: processes/packages macromolecules, e.g. proteins and lipids

C Nucleus

Function: Control centre of cell/ contains chromosomes/ genetic material (DNA)/ cell division

[1] For name

[1] For function

(6 × [1])

[6]

- (b) Discuss the functions of each of the following substances found in the human body. (AO1, AO2, AO3)

Answers may address some of the following points:

Enzymes:

- Are biological catalysts produced by cells in the digestive tract
- They speed up the break down of nutrients
- They remain unchanged
- They are specific i.e. each one acts on only one type of nutrient
- Clear correct example e.g. amylase acts on starch

Bile:

- Is produced in the liver
- It emulsifies fat by breaking it into fat droplets
- But is not an enzyme and does not break the fat into simpler substances
- This aids digestion in the duodenum because the fat is in smaller molecules
- helps neutralise stomach acid

Adrenaline:

- Is a hormone produced in the adrenal gland
- It is released by the body when danger/stress is detected
- It prepares the body for “fight or flight”
- Clear correct example e.g. Blood is diverted from the stomach to the muscles/heart speeds up

[1] For key phrase(s)/ [2] for explanation [3] for full discussion

(3 × [3])

[9]

- (c) Explain two ways that the functioning of the endocrine system differs from that of the nervous system. (AO1, AO2)

Answers may address any two of the following:

- The nervous system functions via fast reactions. The endocrine system has much slower responses
- Nerve messages are via electric impulse. Endocrine messages are sent by chemicals in the blood. The endocrine system sends messages from glands to specific effector organs
- Nervous system controlled by brain. Endocrine pituitary kick starts other glands. The nervous system sends messages from the brain to muscles

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

[4]

19

- 2 (a) Identify and write down **one** function of each of the cells labelled A, B and C. (AO1, AO2)

A neutrophil

Function: They ingest/eat germs

B lymphocyte

Function: produce toxins/antibodies to kill germs

C Erythrocyte/red blood cell

Function: Carries oxygen

[1] For name

[1] For function

(6 × [1])

[6]

- (b) George is concerned he may have either an ulcer or cirrhosis of the liver. Explain what is meant by: (AO1, AO2)

an ulcer:

- caused by acid
- damage to the lining/epithelial tissue in the stomach/upper digestive tract
- a hole develops in the lining of the digestive tract
- this is usually caused by the bacteria *Helicobacter pylori*
- becomes infected

Cirrhosis of the liver:

- scarring of the liver tissue/damaged cells
- fibrous scar tissue forms instead of normal liver cells so the liver cannot function fully
- usually caused by alcohol abuse

[1] For key phrase/[2] for full explanation

(2 × [2])

[4]

(c) Discuss the functions of the liver. (AO1, AO2, AO3, AO4)

Answers may address some of the following points:

- A major role in metabolism / heat production
- Storage of glycogen formed by the action of insulin on excess blood glucose
- Decomposition of erythrocytes to eliminate bilirubin
- Deamination of proteins to form urea
- Filtration of harmful substances e.g. alcohol from blood
- Storage of vitamins and minerals
- Manufacture of proteins and blood clotting factors
- Synthesis storage and metabolises of fatty acids and cholesterol
- Formation and release of bile via the biliary duct

All other valid points will be given credit

[0] will be awarded for a response not worthy of credit

Level 1 ([1]–[3])

Overall impression: basic understanding

- Displays a limited knowledge of the functions of the liver
- 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 knowledge and understanding

- Displays some knowledge of the role of the liver
- Adequate discussion
- Quality of written communication is adequate. The candidate makes a reasonable selection and use of 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 knowledge and understanding

- Displays a good knowledge of the role of the liver
- Competent discussion
- Quality of written communication is competent. The candidate successfully selects and uses an appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a high standard to make meaning clear.

[0] awarded to responses not worthy of credit

[9]

19

3 (a) This is a diagram of the eye:

(i) Identify and write down **one** function of each of the parts labelled A, B and C. (AO1, AO2)

A Pupil

Function: allows light to pass into the eye

B Retina

Function: turns image into electrical impulse

- allows colour/black & white vision
- image detected

C Optic nerve

Function: carries nerve impulse to the brain

[1] For name

[1] For function

(6 × [1])

[6]

(ii) Jane has always had myopia but as she has become older she has also developed a cataract in one of her eyes.

Explain what is meant by: (AO1, AO2)

a cataract:

Answers may address some of the following points:

- A clouding of the front of the eye resulting in blurred vision
- The lens becomes cloudy
- Age related

Myopia

- Short sightedness
- The inability to see far objects clearly
- Near objects can be seen clearly
- Image is formed in front of the retina
- Lens bends light too much
- Eye ball is too short to allow focusing on retina

[1] for key phrase/[2] for full explanation

(2 × [2])

[4]

(b) (i) Analyse the information shown by the graph. (AO1, AO2, AO3, AO4)

Answers may address some of the following points:

Simon's reaction time

- Is slow
- Is slower than the average man of his age
- Is slower than a woman of his age
- May indicate he has M.S.

The relationship between reaction rate and age

- Reaction rate varies with age
- As you age your reaction time declines/gets slower
- The younger you are the faster your reaction time
- Reaction time stays relatively steady up to the age of 40 after this it deteriorates
- The deterioration is gradual up to the age of 65/70
- After this deterioration is rapid

The relationship between men and women:

- Men consistently have a faster reaction rate than women
- [0] is awarded to answers not worthy of credit

Level 1 ([1]–[3])

Overall impression: basic understanding

- A limited analysis of some of the patterns seen in the graph
- 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
- Little use of data.

Level 2 ([4]–[6])

Overall impression: adequate knowledge and understanding

- Adequate analysis of most of the patterns seen in the graph
- Quality of written communication is adequate. The candidate makes a reasonable selection and use of 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
- Adequate use of data.

Level 3 ([7]–[8])

Overall impression: Competent knowledge and understanding

- Competent analysis of accurately the patterns seen in the graph
- Quality of written communication is competent. The candidate successfully selects and uses an appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a high standard to make meaning clear
- Competent use of data. [8]

- (ii) Discuss what happens to the nervous system to cause MS.
(AO1, AO2, AO3)

Answers may address some of the following points:

- The myelin sheath becomes damaged/worn away in neurones in the peripheral nervous system
- The speed at which nerve impulses are transmitted is much slower in consequence
- Motor function is reduced
- Immune system attacks myelin sheath

[1] For key phrase/ [2] for discussion [3] for full discussion [3]

- (iii) Examine the possible impact of MS on Simon's lifestyle.
(AO1, AO2, AO3, AO4)

Answers may address some of the following points:

- Simon may not be able to work as a plumber because of deteriorating motor skills
- He may feel discriminated against
- He may have periods where he is too ill to work
- He may never leave home
- He may be dependent upon his parents for support care and finance
- He may be wary of forming new relationships
- He may be depressed and anxious and give up his work/treatment /interests
- He may be too tired to work/take part in social activities

However

- He may be supported by employer and work colleagues
- MS can have intermittent symptoms with long periods of remission
- Simon may be able to continue work
- Or retrain within his work to do a more appropriate job with support from disability legislation
- His computer knowledge may be an advantage if he cannot continue in his job as he could retrain to work in this area
- He could go to an MS day centre
- He could make new friends through voluntary organisations
- He could find independent sheltered accommodation

All other valid points will be given credit

[0] is awarded for answers not worthy of credit

Level 1 ([1]–[3])

Overall impression: basic understanding

- Displays a limited knowledge of the impact of MS on Simon’s lifestyle
- Limited examination of some of the effects MS may have upon Simon’s lifestyle/lists effects
- In this mark band effects may be limited to the physical and the candidate may show little understanding of the consequences of having MS
- 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 knowledge and understanding

- Displays some knowledge of the impact of MS on Simon’s lifestyle
- Adequate examination of the effects MS may have upon Simon’s lifestyle
- In this mark band effects should extend beyond the physical and the candidate should have some understanding of the consequences of having MS
- Quality of written communication is adequate. The candidate makes a reasonable selection and use of 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 knowledge and understanding

- Displays a good knowledge of the impact of MS on Simon’s lifestyle
- Competent examination of the effects MS may have upon Simon’s lifestyle
- In this mark band effects should be wide ranging and the candidate should have understanding of the consequences of having MS
- Quality of written communication is competent. The candidate successfully selects and uses an appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a high standard to make meaning clear. [9]

30

4 (a) This is a diagram of the urinary system.

(i) Explain the function of each of the following: (AO1, AO2)

Answers may address some of the following points:

The kidney:

- Filters the blood
- Removes waste products/excretory function
- Removes excess water
- Produces urine

The renal artery:

- Carry blood to the kidney
- The renal artery brings waste products dissolved in the blood to the kidney

The ureter:

- Transports urine
- From kidney to bladder for storage

The bladder:

- Collects urine
- Stores urine until there is sufficient to release out of body

[1] For key phrase/[2] for full explanation

(4 × [2])

[8]

(ii) Discuss the meaning of the term semi-voluntary as it applies to the bladder. (AO1, AO2, AO3)

Answers may address some of the following points:

- The bladder at birth is involuntary. It opens when it needs.
- Humans learn to control this process – it becomes voluntary
- However when unconscious/deep sleep the bladder can revert to involuntary control

[1] For key phrase/ [2] for explanation [3] for full discussion

(1 × [3])

[3]

(iii) Write down the names of the two main constituents of normal urine. (AO1)

1 Urea

2 Water

(2 × [1])

[2]

- (b) (i)** Afya aged 44 years has Type II diabetes. This means he has an increased risk of glaucoma.

Explain the following terms: (AO1, AO2, AO3)

Answers may include some of the following points:

Type II Diabetes

- Also called late onset diabetes/develops in people over 40
- Body makes insufficient insulin to meet needs
- the body does not use insulin properly (insulin resistant)
- So higher than normal insulin levels are needed to keep blood glucose controlled
- Body cannot meet this need
- Blood glucose level becomes unregulated
- Cannot control blood glucose levels
- Non-insulin dependent

Glaucoma

- Damage to the nerve cells at the back of the eye
- Caused by increased pressure in the eye
- Created by a build up of fluid in the eye

[1] For key phrase(s)/ [2] for full explanation

(2 × [2])

[4]

- (ii)** Discuss two ways that Afya may have to modify his lifestyle to manage Type II diabetes (AO1, AO3, AO4)

Answers may address any two of the following:

Diet:

- Need for carefully controlled balanced diet
- Need to eat a diet with complex carbohydrates spread through the day rather than simple sugars. Regular meals
- Complex carbohydrates have a low glycemic index and slowly release glucose to blood
- The body can produce sufficient insulin to control blood glucose levels when this diet is followed
- Reduce alcohol consumption

Avoid being overweight:

- Being overweight increases the levels of blood glucose
- This gives extra work for the pancreas to do to convert blood glucose to glycogen.
- People with type II diabetes have insufficient insulin to maintain this control

Exercise:

- Regular exercise helps to “burn off” glucose in the blood stream.
- There is less to be converted to glycogen by the body’s limited supply of insulin
- Blood glucose levels are more likely to stay within normal range

Management of Condition:

- Monitoring of blood glucose levels

All other valid responses will be given credit.

[1] For key phrase(s)/ [2] for explanation [3] for full discussion

(2 × [3])

[6]

- (iii) Discuss how the control mechanism inside the body has failed when someone like Afya develops Type II diabetes. (AO1, AO2, AO3, AO4)

Answers may address some of the following points:

- High levels of blood sugar stimulate the production of insulin/
Cells in the islets of Langerhans in the pancreas produce insulin
- Insulin aids the diffusion of glucose through cell membranes/
Insulin converts glucose into glycogen
- Glycogen is stored in the liver/skeletal muscle fibres
- A fall in blood sugar levels stimulates the production of another hormone – glucagon
- Glucagon reverses the action of insulin
- Glucagon converts glycogen back into glucose
- As blood sugar levels go back to normal Glucagon production decreases
- This is an example of negative feedback

N.B. Glucose/blood sugar are interchangeable terms

Level 1 ([1]–[3])

Overall impression: very basic understanding

- Displays limited knowledge of the control of blood glucose
- Limited discussion of the mechanism
- 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 knowledge and understanding

- Displays adequate knowledge of the control of blood glucose
- Adequate discussion of the mechanism
- Quality of written communication is adequate. The candidate makes a reasonable selection and use of 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 ([8]–[9])

Overall impression: competent knowledge and understanding

- Displays very good knowledge of the control of blood sugar
- Competent discussion of the mechanism
- Quality of written communication is competent. The candidate successfully selects and uses an appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a high standard to make meaning clear.

[0] is awarded for answers not worthy of credit

[9]

32

Total

100

AVAILABLE
MARKS