



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2018**

Health and Social Care

Assessment Unit AS 7

assessing

Understanding the Physiology of Health and Illness

[SHC71]

WEDNESDAY 23 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.

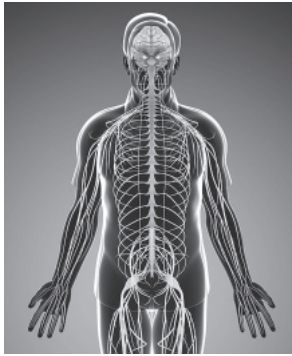
The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

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.

1 (a) (i) Identify each of the body systems shown below. (AO1)



Nervous System

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Endocrine System

(2 × [1])

[2]

(ii) Explain what is meant by the following terms. (AO1)

Tissue – a group of cells, working together to perform a common function.

Organ – a group of tissues, working together to perform a common function.

(2 × [2])

[4]

(b) Describe the defining features of each of the muscle tissues shown. (AO1, AO2)

Examples of suitable responses to be included in the descriptions:

Skeletal muscle

- Bound by sarcoplasmic reticulum
- Long thin cells
- Regular striations
- Multiple Nuclei along the length of the fibre/cell
- Many mitochondria
- Under voluntary control

[1] basic description, [2] adequate description, [3] competent description.

Cardiac muscle

- Long cylindrical cells
- Striations
- One nucleus
- Intercalated discs at ends
- Involuntary control/myogenic

[1] basic description, [2] adequate description, [3] competent description.

(2 × [3])

[6]

- (c) (i) Identify the parts labelled A – C and state their functions. (AO1, AO2)

A Name: Kidney

Function: Carries out excretion/osmoregulation/filters the blood.

[1] for name, [1] for function.

B Name: Bladder

Function: Stores urine until it is ready to be excreted.

[1] for name, [1] for function.

C Name: Urethra

Function: Carries urine out of the body.

[1] for name, [1] for function.

(6 × [1])

[6]

- (ii) Using the diagram and your knowledge of the nephron, discuss how filtration, reabsorption and osmoregulation occur in the kidney. (AO1, AO2, AO3)

Examples of suitable responses to be included in the discussion:

Filtration

Blood entering the kidney is put under pressure due to the difference in diameter of the afferent and efferent arterioles feeding into the glomerulus. This pressure forces small substances like glucose, water, salt, urea and water out of the blood vessels and into the Bowman's capsule, this is called ultra-filtration. Large substances like blood cells and proteins are not filtered out of the blood as they are too large.

Reabsorption

80% of reabsorption will occur along the proximal convoluted tubule which is only one cell thick for a short diffusion pathway. Many of the substances that are filtered are needed for the body to function. Glucose is reabsorbed in the proximal convoluted tubule by diffusion and active transport as it is needed for respiration. Some salt and water are also reabsorbed in the proximal convoluted tubule and the rest in the loop of Henle and distal convoluted tubule. None of the urea is reabsorbed.

Osmoregulation

The amount of water secreted in urine depends on the amount of water in the blood. Osmoregulation in the collecting duct is controlled by ADH. If there is too little water more ADH is released from the pituitary and travels via the blood to the kidney, where it causes the collecting duct to become more permeable. As a result more water is reabsorbed and a smaller volume of more concentrated urine is produced. If there is excess water in the

blood less ADH is released from the pituitary so the collecting duct becomes less permeable. As a result less water is reabsorbed and a larger volume of less concentrated urine is produced.

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

- limited knowledge and understanding of how each of the processes occurs in the kidney
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- displays a limited ability to discuss the processes with little detail of how the nephron structure aids the process
- quality of written communication is basic. The candidate makes only a limited attempt to select and use 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 each of the processes occurs in the kidney
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- displays an adequate ability to discuss the processes with some detail on how the structure of the nephron aids the process including detail of some of the substances involved in the processes
- in order to achieve at this level at least two of the processes must be addressed
- 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 ([9]–[12])

Overall impression: competent

- competent knowledge and understanding of how each of the processes occurs in the kidney
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- displays a competent ability to discuss each of the processes with excellent detail of the structure of the nephron and how

it aids each process including detail of all the substances involved in the process

- in order to achieve at this level all three processes must be addressed
- 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. [12]

(d) (i) Explain the physiological cause of incontinence. (AO1)

Examples of suitable points to be included in the explanation:

- Incontinence can occur due to infection, muscle weakness or damage to the CNS
- The sphincter muscles between the bladder and the ureter are no longer under voluntary control and urine can leak out without conscious control.

[1] basic explanation, [2] competent explanation. [2]

(ii) Describe how Mary's incontinence could impact on her leisure. (AO1, AO2)

Examples of suitable points to be included in the description:

Mary may not want to be on the golf course for a long period of time in case she is incontinent. She may stop playing golf all together to avoid the embarrassment. Mary may also no longer want to meet friends for long lunches and she may be concerned about the incontinence. Mary may use hygiene products when on the golf course or out to see friends and may not allow the incontinence to have any impact on her leisure activities. Mary, however, could visit the GP and get medication to help with her incontinence or she may be referred to a urologist to look at other ways of treating her condition, allowing her to carry on as normal with her leisure activities.

[1] basic description, [2] adequate description, [3] competent description.

(1 × [3]) [3]

- (e) Discuss **how** and **why** a diagnosis of renal failure should impact on an individual's diet. (AO2, AO3)

Examples of suitable responses to be included in the discussion:

An individual should make changes to their diet if their kidneys have failed. They should limit the amount of protein they eat to help decrease waste in the blood. Urea is a byproduct of the excess protein we consume, reducing protein will reduce the amount of urea in the blood needing to be filtered. They should also decrease the amount of salt, potassium and phosphorous (electrolytes) in their diet as this will impact on the osmotic value of the blood and make them retain fluid. Most people will also need to limit the amount of liquids they drink each day. If your body retains fluids, you will have swelling and fluid may build up in your lungs causing other health problems, therefore to prevent fluid buildup, the amount of fluid consumed, needs to be reduced.

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 and why a diagnosis of renal failure should impact on an individual's diet
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to discuss how and why a diagnosis of renal failure should impact on an individual's diet.

Level 2 ([3]–[4])

Overall impression: adequate

- adequate knowledge and understanding of how and why a diagnosis of renal failure should impact on an individual's diet
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to discuss how and why a diagnosis of renal failure should impact on an individual's diet.

Level 3 ([5]–[6])

Overall impression: competent

- competent knowledge and understanding of how and why a diagnosis of renal failure should impact on an individual's diet
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to discuss how and why a diagnosis of renal failure should impact on an individual's diet.

(1 × [6])

[6]

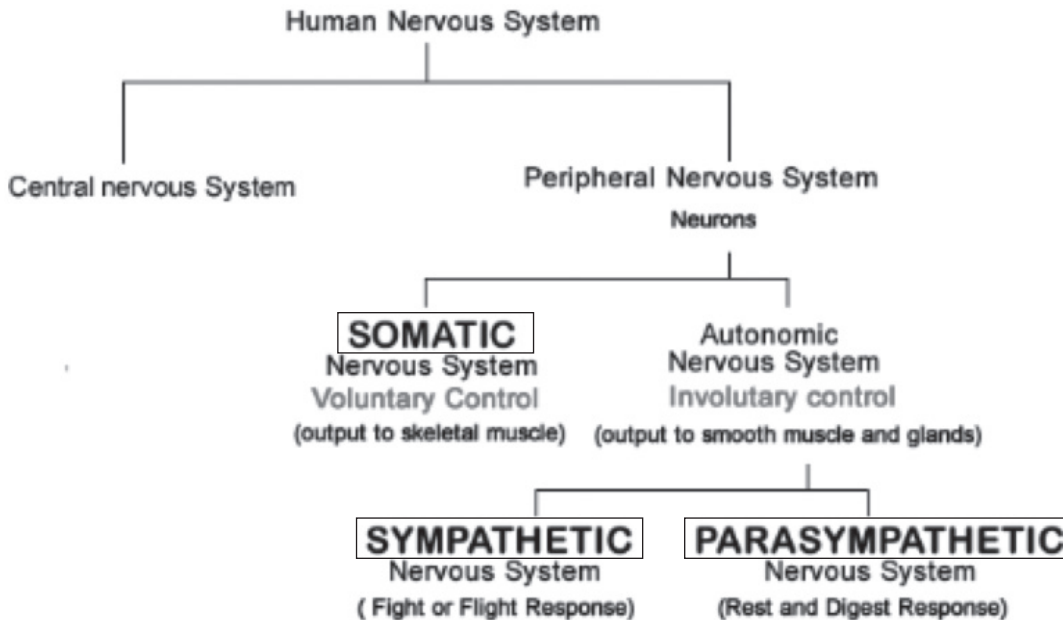
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2 (a) (i) Identify the two parts of the central nervous system. (AO1)

1. Brain
 2. Spinal cord
- (2 × [1])

[2]

(ii) Complete the diagram by identifying the divisions of the nervous system. (AO1)



(3 × [1])

[3]

(iii) Name the system which is made up of hormone-releasing glands. (AO1)

Endocrine System
(1 × [1])

[1]

(iv) Explain what is meant by the following, giving an example of each. (AO1, AO2)

Examples of suitable responses to be included in the explanation:

Reflex reaction – this is a reaction that will occur automatically without conscious thought. Reflex reactions are controlled by the CNS and are very fast. Examples include sneezing, blinking, pulling a hand away from a hot object.

[1] basic explanation, [2] competent explanation.

Voluntary reaction – this is a reaction that requires conscious thought. Voluntary reactions are controlled by the brain. Examples include writing, talking, reaching out for an object.

[1] basic explanation, [2] competent explanation.

(2 × [2])

[4]

- (b) Identify the name and one function of each of the parts labelled A – C. (AO1, AO2)

A Name: Cerebrum

Function: Controls visual and auditory processing and the control of speech. Thinking part of brain.

[1] for name, [1] for function.

B Name: Pituitary gland

Function: releases many hormones, e.g. ADH involved in osmoregulation, gonadotrophins involved in puberty, growth hormone and thyroid stimulating hormone and is sometimes called the ‘master gland’.

[1] for name, [1] for function.

C Name: Hypothalamus

Function: Controls the autonomic nervous system. Also controls feeding, sleeping and aggression, temperature control and monitors the composition of blood.

[1] for name, [1] for function.

(6 × [1])

[6]

- (c) (i) Use the diagram to explain why damage to the spinal cord is rare. (AO2)

Examples of suitable responses to be included in the explanation:

- The spinal cord is protected by the vertebrae of the spine
- The bone is very hard and acts as a shock absorber to prevent damage to the spinal cord.

[1] basic explanation, [2] competent explanation.

[2]

- (ii) Using the diagram to help you, explain the physiological cause and effect of both quadriplegia and paraplegia. (AO1, AO2)

Examples of suitable responses to be included in the explanation:

Quadriplegia: Quadriplegia will occur when the spinal cord is damaged between C1 and C4 bones of the spinal column (cervical spine). Damage at this level will leave the person with little or no movement of all four limbs.

[1] basic explanation, [2] competent explanation.

Paraplegia: If someone suffers an injury where the spinal cord is damaged between T2 to T12 (in the thoracic spine) they will lose function in their lower limbs but will still have movement in their upper body.

[1] basic explanation, [2] competent explanation.

(2 × [2])

[4]

- (iii) Assess how paraplegia will impact on Alan's work, leisure and relationships. (AO2, AO3)

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

Examples of suitable responses to be included in the assessment of each aspect:

Work

Alan will be off work for a considerable time while he adjusts to life as a paraplegic. However once Alan adjusts to his change in lifestyle he should be able to return to work as the paralysis will have no impact on his cognitive ability. Alan may be unable to return to his current position, as travelling to different businesses may be difficult. However, as Alan works as part of a large company the company may be able to redeploy him to a position that will not require him to travel or he may be able to use a specially adapted vehicle. He may also be able to work from home as IT specialists can sometimes work remotely on computers. His paralysis may change his work but will not prevent him from working in the long term.

Leisure

Alan will no longer be able to ride a mountain bike as he has no movement in his lower limbs but he may continue to cycle in a suitably adapted bike. However, Alan may take up another sport that he is able to compete in. He may meet new people during his recovery with similar disabilities and start to engage in leisure activities with them, e.g. wheelchair basketball. Alan may not want to partake in any sporting activity as he may feel he is unable to do it. There are lots of other leisure activities that Alan could do that do not involve sport but it is important he remains active and busy.

Relationships

Alan will be away from his family whilst he is in recovery in hospital and this may put a strain on their relationships. Alan's wife may be needed to care for him when he returns home and whilst this could bring them closer it may also make their relationship difficult. Alan may spend more quality time with his children as he is at home more and may become closer to them. Alan may become isolated from friends if he is no longer able to mountain bike. Alan's family may rally round him and they may all start to do other things together to build their relationships and support Alan in his recovery.

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 paraplegia will impact on Alan's work, leisure and relationships
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- displays a limited ability to assess how paraplegia will impact on Alan's work, leisure and relationships
- quality of written communication is basic. The candidate makes only a limited attempt to select and use 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 paraplegia will impact on Alan's work, leisure and relationships
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- displays an adequate ability to assess how paraplegia will impact on Alan's work, leisure and relationships
- to achieve at this level at least two aspects must be addressed
- 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 ([9]–[12])

Overall impression: competent

- competent knowledge and understanding of how paraplegia will impact on Alan's work, leisure and relationships
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- displays a competent ability to assess the impact of paraplegia on Alan's work, leisure and relationships
- to achieve at this level all three aspects must be addressed
- 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.

(1 × [12])

[12]

34

3 (a) (i) Explain what is meant by digestion. (AO1)

Examples of responses to be included in the explanation:

- Digestion is the breakdown of large insoluble molecules into small soluble molecules

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

(ii) Identify the part of the digestive system where digestion is completed. (AO1)

- Ileum (small intestine)
(1 × [1]) [1]

(iii) Complete the table to explain the function of each of the organs involved in digestion. (AO1, AO2)

Examples of suitable responses to be included in the explanation are given in the table:

Organ	Function in digestion
Stomach	The stomach begins the digestion of protein. Food remains in the stomach for 4 – 6 hours. Acid in the stomach gives the correct pH for the enzymes to break down the protein into amino acids.
Small intestine	Enzymes released into the duodenum complete the process of digestion. The digested food is absorbed into the blood via the highly adapted ileum.
Large intestine	Water is reabsorbed back into the blood in the colon of the large intestine. Faeces is then stored in the rectum ready for egestion.

[1] Basic explanation [2] competent explanation
(3 × [2]) [6]

(b) Discuss the physiological causes of the following conditions of the digestive system. (AO1, AO2, AO3)

Examples of suitable responses to be included in the discussion:

Pancreatitis

- Pancreatitis is a result of inflammation of the pancreas, often due to long-term alcohol abuse. The inflammation means the pancreas cannot release its secretions and so the enzymes and hormones it usually secretes start to digest the tissues of the pancreas.

Stomach ulcers

- Stomach walls begin to secrete too much acid – this is caused by a bacterial infection called *H. pylori* which irritates the stomach wall making it secrete more acid than it normally would. The excess acid depletes the protective mucus layer around the stomach lining. The acid attacks the lining causing a hole to develop in the stomach wall.
- The second most common cause of stomach ulcers is the protective layer around the stomach (mucosa) becoming weakened, often due to the use of Non-steroidal Anti-inflammatory Drugs (NSAIDs) such as ibuprofen, naproxen, and diclofenac. As the mucus layer in the stomach becomes depleted the acid normally found in the stomach attacks the lining and again a hole develops.

Cirrhosis of the liver

- The liver produces collagen fibres within the liver cells, preventing them from working. Over time fibres in many cells, cause fibrosis and the scarring begins to reduce the ability of the liver to function. When the scar tissue is formed it can block the flow of substances between the blood and the liver.

All other valid points will be given credit.

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

Level 1 ([1]–[3])

Overall impression: basic

- basic knowledge and understanding of the physiological causes of the conditions
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to discuss the physiological causes of the conditions
- 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 the physiological causes of the conditions
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to discuss the physiological causes of the conditions
- to achieve at this level at least two conditions must be addressed

- 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.

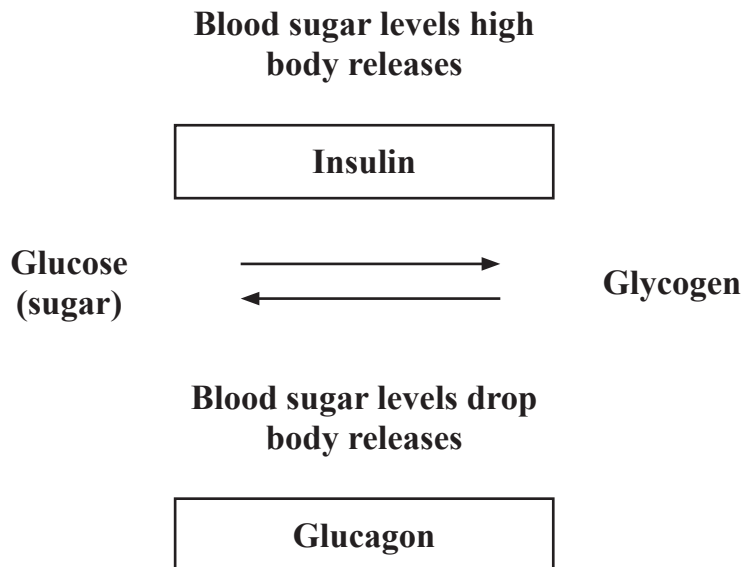
Level 3 ([7]–[9])

Overall impression: competent

- competent knowledge and understanding of the physiological causes of the conditions
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to discuss the physiological causes of the conditions
- to achieve at this level all three conditions must be addressed
- 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.

[9]

- (c) (i) Complete the diagram below by naming the hormones which control each of the processes shown. (AO1, AO2)



(2 × [1])

[2]

- (ii) Explain why the doctor suspects Lorraine may have diabetes. (AO2)

Examples of suitable responses to be included in the explanation:

Lorraine's blood glucose level is high. The normal blood glucose range for a healthy person is between 4–7 m mol /L when a person has been fasting. As Lorraine has not eaten for a number of hours her body should have converted excess sugar into glycogen to bring her blood glucose level back to normal; this has not happened.

[1] basic explanation, [2] competent explanation.

[2]

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

Examples of suitable responses to be included in the description:

Type 1 diabetes occurs when the pancreas is unable to produce insulin. It occurs as a result of an autoimmune condition. It is not fully understood why this occurs but it is thought it may be as a result of a viral infection. The white blood cells attack and destroy the α cells in the pancreas and even when the body tries to replace them they will continue to destroy them. Once these are destroyed the pancreas can no longer produce insulin.

[1] basic description, [2] adequate description, [3] competent description.

[3]

Total

AVAILABLE
MARKS

25

100