



**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2023**

Nutrition and Food Science

Assessment Unit AS 1

assessing

Principles of Nutrition

[SNF11]

THURSDAY 18 MAY, AFTERNOON

**MARK
SCHEME**

General Marking Instructions

Introduction

The main purpose of the mark scheme is to ensure that examinations are marked accurately, consistently and fairly. The mark scheme provides examiners with an indication of the nature and range of candidates' responses likely to be worthy of credit. It also sets out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for Nutrition and Food Science.

Candidates should be able to demonstrate:

- AO1** knowledge and understanding of the specified content
- AO2** the ability to apply knowledge, understanding and skills in a variety of situations and to analyse problems, issues and situations using appropriate skills
- AO3** the ability to gather, organise and select information, evaluate acquired knowledge and understanding, and present and justify an argument

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity that may reasonably be expected of a 17 or 18-year-old, the age at which the majority of candidates sit their GCE examinations.

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 17 or 18-year-old GCE candidate.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Types of mark schemes

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response

In deciding which level of response to award, examiners should look for the 'best fit' bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement.

The following guidance is provided to assist examiners.

- **Threshold performance:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- **Intermediate performance:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.
- **High performance:** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Quality of written communication

Quality of written communication is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form. These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level 1: Quality of written communication is basic.

Level 2: Quality of written communication is adequate.

Level 3: Quality of written communication is competent.

Level 4: Quality of written communication is highly competent.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

Level 1 (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 the intended meaning is not clear.

Level 2 (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 (Competent): The candidate makes a good attempt to select and use an appropriate form and style of writing. Relevant material is organised with a good degree of clarity and coherence. There is widespread use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

Level 4 (Highly competent): The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is succinct, well organised and displays a high degree of clarity and coherence. There is extensive and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of the highest standard and ensure that meaning is absolutely clear.

Section A

AVAILABLE
MARKS

- 1 (a) State the current Dietary Reference Value for saturated fat as a percentage of energy intake. (AO1)
- Not more than 11% [1]
- (b) Describe the structure of a monounsaturated fatty acid. (AO1, AO2)
- A fatty acid having one carbon double bond in its carbon chain
[0]–[1] basic description
[2] competent description [2]
- (c) Outline the effects of trans fatty acids on blood cholesterol levels. (AO1, AO2)
- Trans fatty acids increase harmful LDL cholesterol and lower protective HDL cholesterol
[0]–[1] basic outline
[2] competent outline [2]
- (d) Explain **three** important functions of fat as a nutrient. (AO1, AO2)
- energy; fat is the most concentrated source of energy providing 9 kcal per 1 g consumed, protein or carbohydrate (4 kcal per gram)
 - source of essential fatty acids; the body cannot produce essential fatty acids which are important in the formation of cell membranes
 - formation of adipose tissue; excess fat which is not immediately required for energy, is stored in the adipose tissue where it acts as an energy reserve, forms an insulating layer, preventing heat loss from the body and protects delicate organs from physical damage, such as the kidneys
- [0]–[2] basic explanation
[3]–[4] competent explanation
[5]–[6] highly competent explanation
All other valid points will be given credit [6]

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- 2 Explain the difference between positive nitrogen balance and negative nitrogen balance in relation to protein requirements: (AO1, AO2)

When the balance is positive nitrogen is being retained in the body indicating tissue synthesis whereas negative nitrogen balance occurs when there is a net loss of protein from the body either because there is catabolism or because protein intakes are insufficient to meet daily needs

[0]–[2] basic explanation

[3] competent explanation

[4] highly competent explanation

All other valid points will be given credit

[4]

AVAILABLE
MARKS

4

- 3 (a) Identify the type of sugar found in each of the following foods.
Tick (✓) only **one** box for each food. (AO1)

	Lactose	Intrinsic sugar	Free sugar
Dried fruit		✓	
Glass of semi-skimmed milk	✓		
Honey			✓
Orange juice			✓

[4]

- (b) Explain why NHS Choices recommend the gradual introduction of wholegrains into the diet of children under the age of two years. (AO1, AO2)

- it is advised not to exclusively give wholegrain starchy foods to children under the age of two years as they may fill the child up before they have consumed the calories and nutrients they need

[0]–[1] basic explanation

[2] competent explanation

[2]

6

- 4 (a) Analyse the data below and comment on the differences in calcium requirements throughout the age groups. (AO1, AO2, AO3)

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Reference Nutrient Intakes (RNI) for Calcium		
Group	Age (years)	Calcium (mg/day)
Children	7–10	550
Adolescents	11–18	800 (girls) 1000 (boys)
Adults	19+	700
Women past the menopause		1200

Source: © British Dietetic Association, 2021 <https://www.bda.uk.com/resource/calcium.html>

- children; have relatively high requirements for calcium as they are growing rapidly and therefore bones are also developing
- adolescents; there is a notable increase as bone assimilates most of its minerals at this stage and achieves most of its final peak bone mass;
- boys have a bigger skeletal frame than girls thus have an increased requirement
- adults; the requirement is reduced as most calcium is deposited at this stage. Adequate calcium is needed to maintain the density of bones
- women past the menopause; osteoporosis risk increases post menopause due to age-related bone loss. Oestrogen levels drop and this increases the loss of calcium

[0]–[2] basic analysis of data

[3]–[4] competent analysis of data

[5]–[6] highly competent analysis of data

All other valid points will be given credit

[6]

- (b) Suggest **one** reason why spinach might not be an ideal source of calcium in the diet. (AO1, AO2)

Spinach contains oxalate as well as calcium. Oxalate affects the bioavailability of calcium. The oxalate binds to calcium making it unavailable to the body

[0]–[1] basic reasons suggested

[2] competent reasons suggested

[2]

8

5 (a) Describe the symptoms of a deficiency of folate in the body. (AO1, AO2)

- deficiency leads to megaloblastic anaemia
- extreme tiredness and a lack of energy
- a sore and red tongue, mouth ulcers
- muscle weakness, pins and needles (paraesthesia)
- disturbed vision
- psychological problems, which may include depression and confusion
- problems with memory, understanding and judgement

[0]–[2] basic description

[3] competent description

[4] highly competent description

All other valid points will be given credit

[4]

(b) Outline **two** functions of potassium in the body. (AO1, AO2)

- potassium helps regulate fluid balance. It is the main electrolyte in the intracellular fluid and determines the amount of water outside the cells
- potassium plays an essential role in activating impulses throughout the nervous system. Nerve impulses help regulate muscle contractions

[0]–[2] basic outline

[3] competent outline

[4] highly competent outline

All other valid points will be given credit

[4]

8

6 (a) Present **two** nutritional benefits of consuming low fat milk during lactation. (AO1, AO2, AO3)

- energy; low fat milk is lower in calories than full fat version. This can be useful for the mother to assist with losing weight post-partum
- calcium; low fat milk is a good bioavailable source of calcium which is important for the mother to replenish calcium stores after birth. Also, the baby can benefit as the mother's milk will be a rich source of calcium for developing bones and teeth

[0]–[2] basic presentation of nutritional benefits

[3] competent presentation of nutritional benefits

[4] highly competent presentation of nutritional benefits

All other valid points will be given credit

[4]

(b) State **three** functions of water in the diet. (AO1)

- acts as a lubricant for joints and eyes
- main component of saliva which helps us swallow
- helps regulate body temperature

All other valid points will be given credit

[3]

7

AVAILABLE
MARKS

7 (a) Summarise the role of vitamin C in the body. (AO1, AO2)

- the body needs vitamin C to produce collagen. This is the main component of connective tissue and makes up 1–2% of muscle tissue. Collagen is a vital component in fibrous tissues such as: tendons, ligaments, skin, bones, blood vessels
- collagen plays a vital role in wound healing. People with a low intake of vitamin C may experience slower wound healing, as their bodies will be less able to produce collagen
- vitamin C’s antioxidant activity may help reduce inflammation and lowers the risk of developing various conditions, including some cancers
- vitamin C enhances the absorption of non-haem iron from plant sources

[0]–[2] basic summary

[3]–[4] competent summary

[5]–[6] highly competent summary

All other valid points will be given credit [6]

(b) Describe the importance of the antioxidant nutrients lycopene and selenium for an adult male. Provide examples of appropriate food choices to support your answer.

(AO1, AO2, AO3)

- lycopene is a carotenoid which has antioxidant properties. Men who have high intakes of lycopene appear to have a lower risk of developing prostate cancer. Appropriate food sources include red fruits such as watermelon, red grapefruit, tomatoes and tomato products
- selenium has a role in fertility, research has indicated improvements in sperm motility. Appropriate food choices include Brazil nuts, seafood, meat, poultry and bread

[0]–[2] basic description

[3]–[4] competent description

[5]–[6] highly competent description

All other valid points will be given credit [6]

Section A

AVAILABLE MARKS

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Section B

AVAILABLE
MARKS

Quality of written communication is assessed in this section.

- 8 Evaluate plant-based protein in relation to nutrition and versatility. (AO1, AO2, AO3)

Mark Band ([0]–[3])

Overall impression: basic

- inadequate knowledge and understanding of plant-based protein
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to evaluate plant-based protein in relation to nutrition and versatility
- quality of written communication is basic

Mark Band ([4]–[6])

Overall impression: adequate

- adequate knowledge and understanding of plant-based protein
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to evaluate plant-based protein in relation to nutrition and versatility
- quality of written communication is adequate

Mark Band ([7]–[9])

Overall impression: competent

- competent knowledge and understanding of plant-based protein
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to evaluate plant-based protein in relation to nutrition and versatility
- quality of written communication is competent

Mark Band ([10]–[12])

Overall impression: highly competent

- highly competent knowledge and understanding of plant-based protein
- demonstrates a highly competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a highly competent ability to evaluate plant-based protein in relation to nutrition and versatility
- quality of written communication is highly competent

Examples of suitable points to be evaluated by the candidate:

Nutritional value

- fat; plant-based foods are naturally low in saturated fat and cholesterol
- fibre; plant-based foods contain fibre, which helps to keep the digestive system healthy and prevent bowel problems
- protein; plant protein sources, such as beans, lentils and nuts are considered to be of low biological value, as they lack one or more of the indispensable amino acids that the body needs. However, some plant foods such as soya have a high biological value

- iron; plant sources of iron such as dried fruits, wholegrains, nuts, green leafy vegetables, seeds and pulses contain the non-haem form of iron. This is absorbed less efficiently compared to haem iron from animal derived sources
- vitamin B12; plant foods are naturally low in this vitamin although plant-based foods can be fortified

Versatility

- shelf life; plant foods are usually available in ambient versions (dried, tinned) and refrigerated forms which provides a wide range of options including many products with a long shelf life
- food safety; ambient versions of plant foods are generally not perishable or high risk in relation to food preparation
- choice; there has been an increase in the ready availability of alternatives to meat and dairy foods such as plant-based dairy alternatives (including soya, oat, almond and coconut plant-based drinks) and plant-based oils and spreads made from them

All other valid points will be given credit

[12]

**AVAILABLE
MARKS**

12

- 9 Explain the nutritional importance of including a variety of fruit and vegetables in the diet of a school-age child. (AO1, AO2, AO3)

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MARKS

Mark Band ([0]–[3])

Overall impression: basic

- inadequate knowledge and understanding of nutritional importance of fruit and vegetables for a school-age child
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to explain the nutritional importance of fruit and vegetables in the diet of a school-age child
- quality of written communication is basic

Mark Band ([4]–[6])

Overall impression: adequate

- adequate knowledge and understanding of nutritional importance of fruit and vegetables for a school-age child
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to explain the nutritional importance of fruit and vegetables in the diet of a school-age child
- quality of written communication is adequate

Mark Band ([7]–[9])

Overall impression: competent

- competent knowledge and understanding of nutritional importance of fruit and vegetables for a school-age child
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to explain the nutritional importance of fruit and vegetables in the diet of a school-age child
- quality of written communication is competent

Mark Band ([10]–[12])

Overall impression: highly competent

- highly competent knowledge and understanding of nutritional importance of fruit and vegetables for a school-age child
- demonstrates a highly competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a highly competent ability to explain the nutritional importance of fruit and vegetables in the diet of a school-age child
- quality of written communication is highly competent

Examples of suitable points to be explained by the candidate:

- energy; fruit and vegetables are naturally low in fat and calories. Encouraging children to eat fruit and vegetables instead of sugary snacks and fat-laden fast food, can help children avoid obesity
- carbohydrate; fruit and vegetables contain fruit sugars (intrinsic sugars) which are released slowly into the blood stream and due to being low in free sugars helps to prevent tooth decay.
- vitamin C; vitamin C has healing properties which can aid with healing cuts and wounds. Vitamin C can also help with natural immunity helping to fight off infections. School children are in a densely populated environment, this is an important benefit

- iron; fruit and vegetables may contain non-haem iron to produce haemoglobin, which transports oxygen around the body. Iron is important due to an increase in blood volume as children grow. It is also needed for brain development and cognitive function
- vitamin A; is important to support rapid growth and to help combat infections. Inadequate intake could lead to visual impairment
- fibre; high fibre foods, such as fruits and vegetables, help the digestive system function properly. As fibre passes through the digestive system, it absorbs water and expands, which triggers regular bowel movements and relieves constipation, which can be common in children

All other valid points will be given credit

[12]

**AVAILABLE
MARKS**

12

- 10 Discuss the specific nutritional needs and energy requirements for the frail elderly. (AO1, AO2, AO3)

Mark Band ([0]–[3])

Overall impression: basic

- inadequate knowledge and understanding of nutritional needs and energy requirements for the frail elderly
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to discuss the specific nutritional needs and energy requirements for the frail elderly
- quality of written communication is basic

Mark Band ([4]–[6])

Overall impression: adequate

- adequate knowledge and understanding of nutritional needs and energy requirements for the frail elderly
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to discuss the specific nutritional needs and energy requirements for the frail elderly
- quality of written communication is adequate

Mark Band ([7]–[9])

Overall impression: competent

- competent knowledge and understanding of nutritional needs and energy requirements for the frail elderly
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to discuss the specific nutritional needs and energy requirements for the frail elderly
- quality of written communication is competent

Mark Band ([10]–[12])

Overall impression: highly competent

- highly competent knowledge and understanding of nutritional needs and energy requirements for the frail elderly
- demonstrates a highly competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a highly competent ability to discuss the specific nutritional needs and energy requirements for the frail elderly
- quality of written communication is highly competent

Examples of suitable points to be discussed by the candidate:

- energy; reduced physical activity reduces the energy requirement and the daily energy intake. However, if the energy intake is too low, frail elderly people run an increased risk of malnutrition which further enhances fragility. In frail elderly whose energy requirement is often lower than recommended, it may mean the diet is not fulfilling other nutritional needs. Frail elderly need to eat foods with high calorie value to prevent weight loss
- protein; optimal intake of protein is required to maintain skeletal muscle mass as with ageing comes the loss of lean mass. Maintaining muscle puts tension on bones and cause them to become stronger. Muscle is like protective padding in case of falls, thus may prevent fractures and further

frailty. Some elderly individuals with fractures, e.g. hip, might benefit from protein supplementation

- calcium and vitamin D; preserve bone mass and prevent osteoporosis. Vitamin D deficiency is common in the frail elderly
- B vitamins; vitamin B12 becomes harder to absorb with age. People who are deficient are at increased risk of pernicious anaemia and neurological problems such as memory loss which can exacerbate an older person's fragility. There is growing evidence of B12 and other B vitamins such as folate, involved in the ageing brain, and could enhance mood and cognitive function
- vitamin C; frail elderly need vitamin C because it protects against deficiencies in the ageing immune system. The vitamin increases white blood cell production, which wards off infection and disease. Vitamin C also provides key antioxidant protection, shielding white blood cells from free radicals. This is very important for frail elderly to aid recovery from illness and help wound healing
- omega-3; omega-3 PUFAs are able to reduce inflammation, high cholesterol, platelet aggregation, and hypertension, thus preventing vascular damage and risk of stroke

All other valid points will be given credit

[12]

**AVAILABLE
MARKS**

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Section B

24

Total

80