



**ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2022**

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**Nutrition and Food Science**

**Assessment Unit AS 1**

*assessing*

**Principles of Nutrition**

**[SNF11]**

**TUESDAY 24 MAY, AFTERNOON**

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**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.

### **COVID-19 Context**

Given the unprecedented circumstances presented by the COVID-19 public health crisis, senior examiners, under the instruction of CCEA awarding organisation, are required to train assistant examiners to apply the mark scheme in case of disrupted learning and lost teaching time. The interpretation and intended application of the mark scheme for this examination series will be communicated through the standardising meeting by the Chief or Principal Examiner and will be monitored through the supervision period. This paragraph will apply to examination series in 2021–2022 only.

**Section A**

**AVAILABLE MARKS**

1 (a) What is meant by the term Estimated Average Requirements (EARs) for energy? (AO1)

- it is an estimate of the average requirement of energy needed by a group of people.
- approximately 50% will require more or less [2]

(b) State **two** vitamins needed for metabolism of carbohydrates. (AO1)

- vitamin B<sub>1</sub>
- vitamin B<sub>2</sub>

All other valid points will be given credit [1] for each correctly named vitamin [2]

(c) Analyse the data below and suggest reasons for the decreasing figures for older adults. (AO1, AO2, AO3)

**Estimated Average Requirements (EARS) for adults**

Age (years)	Males (kcal)	Females (kcal)
55–64	2581	2079
65–74	2342	1912
75+	2294	1840

*Source: British Nutrition Foundation 2019*

- for healthy older people, energy requirements decrease with advancing age. This is due to changes in body composition; a decrease in lean body tissue and an increase in fat tissue. Therefore older adults tend to have less muscle and more fat leading to a fall in basal metabolic rate (BMR). More energy is required for making muscle than fat
- older males will usually have less body fat and more muscle than older women of the same age and weight, which means men require more calories
- many older people also become less active as they get older

All other valid points will be given credit  
 [0]–[2] basic analysis  
 [3] –[4] competent analysis  
 [5]–[6] highly competent analysis [6]

(d) Explain **two** main functions of carbohydrate as a nutrient. (AO1, AO2)

- energy source; starches and sugars are the main energy-providing carbohydrate sources and supply 4 kilocalories (17 kilojoules) per gram
- energy storage; glycogen is stored in the liver and muscles as a readily available reserve of carbohydrate; when glycogen stores are full, further excess is converted into fat and stored all over the body in fatty cells of the adipose tissue
- protein sparing; a moderate carbohydrate intake ensures that most of the dietary protein can be used for growth

All other valid points will be given credit

[0]–[2] basic explanation

[3] competent explanation

[4] highly competent explanation

[4]

14

2 (a) Identify suitable sources of protein below:(AO1)

- example of an animal source, e.g. beef
- example of a novel source, e.g. quorn

All other valid points will be given credit

[1] for each correctly named source

[2]

(b) Explain how combining plant proteins can improve their overall biological value. (AO1, AO2)

- combining plant proteins improves the overall Biological Value (BV) because plant proteins usually have a lower BV than animal proteins (with the exception of soya protein)
- when two or more different plant proteins are mixed, the resulting BV will be higher than the average BV of the components with all indispensable amino acids present
- one plant protein may have a surplus of the amino acid which is the limiting amino acid in the other plant proteins

All other valid points will be given credit

[0]–[1] basic explanation

[2]–[3] competent explanation

[4]–[5] highly competent explanation

[5]

AVAILABLE  
MARKS

7

3 (a) Describe the role of **two** micronutrients in the formation of bone. (AO1, AO2)

- calcium is the most prevalent mineral present in the bones. Calcium is essential for the mineralisation of bone particularly during the peak growth spurt
- vitamin D plays a key role in assisting calcium absorption from food, ensuring the correct renewal and mineralisation of bone tissue

All other valid points will be given credit

[0]–[2] basic description

[3] competent description

[4] highly competent description [4]

(b) Outline the effect on health of both a deficiency and an excess of fluorine. (AO1, AO2)

**Deficiency**

- may cause tooth enamel to weaken and increase risk of dental caries

**Excess**

- in rare cases very large amounts of fluoride can cause fluorosis. Symptoms could include mottling and crumbling of teeth or more severe causing skeletal changes such as calcification of ligaments and tendons leading to muscle, joint and bone problems

All other valid points will be given credit

[0]–[2] basic outline

[3] competent outline

[4] highly competent outline [4]

(c) (i) Explain why infants around 6 months old have additional requirements for iron. (AO1, AO2, AO3)

- at around 6 months of age, the stores of some nutrients, such as iron, start to run out and therefore additional sources are needed from solid foods (weaning)

All other valid points will be given credit

[0]–[1] basic explanation

[2] competent explanation [2]

(ii) State **two** food sources of iron suitable for infants around 6 months old. (AO1)

- minced beef
- dark green leafy vegetable e.g. spinach

All other valid points will be given credit

[1] for each correctly named source [2]

(d) Describe the role of vitamin B<sub>6</sub> in the body. (AO1, AO2)

- allows the body to use and store energy from protein and carbohydrates in food – has a central role in metabolism of amino acids and breaking down glycogen and has a role in the modification of steroid hormone action
- forms haemoglobin, the substance in red blood cells that carries oxygen around the body and metabolises and transports iron

All other valid points will be given credit

[0]–[1] basic description

[2] competent description

[3]–[4] highly competent description

[4]

AVAILABLE  
MARKS

16

- 4 (a) "In the UK, saturated fatty acids currently contribute 12.7% of food energy in adults, which is above the recommendation of 11%." (AO1, AO2, AO3)

Source: Scientific Advisory Committee on Nutrition 2019

Discuss the health implications of this information.

- blood cholesterol; saturated fat is the dietary component with the greatest negative influence on total blood cholesterol and LDL cholesterol levels
- raised LDL cholesterol contributes to the formation of fibrous plaques which narrows the artery
- heart disease; high levels of cholesterol can increase risk of atherosclerosis, heart disease, heart attack and stroke

All other valid points will be given credit

[0]–[1] basic discussion

[2]–[3] competent discussion

[4]–[5] highly competent discussion

[5]

- (b) State **two** effects on health resulting from an excess intake of vitamin A. (AO1)

- drowsiness
- irritability
- skin or bone disorders
- enlarged liver

All other valid points will be given credit

[1] for each correctly stated effect

[2]

- (c) Name **two** essential fatty acids. (AO1)

- Omega-3
- Omega-6

All other valid points will be given credit

[1] for each correctly named fatty acid

[2]

- (d) Discuss the importance of essential fatty acids during pregnancy. (AO1, AO2, AO3)

- maternal essential fatty acids are required for cell growth and development
- formation of retina in foetal eye development
- critical building block of foetal brain and nervous system
- lowered risk of pre-eclampsia, reduced risk of pre-term birth and low birth weight

All other valid points will be given credit

[0]–[1] basic discussion

[2]–[3] competent discussion

[4] highly competent discussion

[4]

AVAILABLE  
MARKS

13

5 Comment on fortified breakfast cereal with milk as an appropriate food choice for a school-age child. (AO1, AO2, AO3)

- fortified breakfast cereals typically have B vitamins and iron added. These have benefits for a school-age child to assist with energy release to meet needs during levels of physical activity
- iron is also important for growing children to increase blood volume and prevent iron deficiency anaemia
- cereal is usually consumed with milk which is an excellent source of calcium for developing teeth and bones
- some fortified cereals can be misleading in failing to declare high levels of sugar which can lead to dental caries and weight gain in school-age children

All other valid points will be given credit

[0]–[2] basic comment

[3]–[4] competent comment

[5]–[6] highly competent comment

[6]

**Section A**

**AVAILABLE  
MARKS**

6

**56**

## Section B

AVAILABLE  
MARKS

Quality of written communication is assessed in this section.

Answer **two** questions from this section.

- 6 Explain the health benefits of consuming an adequate intake of fibre-rich foods for an adult. (AO1, AO2, AO3)

### Mark Band ([0]–[3])

Overall impression: basic

- inadequate knowledge and understanding of the health benefits of consuming an adequate intake of fibre-rich foods for an adult
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to explain the health benefits of consuming an adequate intake of fibre-rich foods for an adult
- quality of written communication is basic

### Mark Band ([4]–[6])

Overall impression: adequate

- adequate knowledge and understanding of the health benefits of consuming an adequate intake of fibre-rich foods for an adult
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to explain the health benefits of consuming an adequate intake of fibre-rich foods for an adult
- quality of written communication is adequate

### Mark Band ([7]–[9])

Overall impression: competent

- competent knowledge and understanding of the health benefits of consuming an adequate intake of fibre-rich foods for an adult
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to explain the health benefits of consuming an adequate intake of fibre-rich foods for an adult
- quality of written communication is competent

### Mark Band ([10]–[12])

Overall impression: highly competent

- highly competent knowledge and understanding of the health benefits of consuming an adequate intake of fibre-rich foods for an adult
- demonstrates a highly competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a highly competent ability to explain the health benefits of consuming an adequate intake of fibre-rich foods for an adult
- quality of written communication is highly competent

### Examples of suitable points to be explained by the candidate:

- digestive health; fibre can act as a bulking agent and help prevent constipation. Some types of fibre can be fermented by gut bacteria and may have a beneficial effect on gut flora
- bowel health; eating a diet low in fibre is associated with diverticulitis (where

the bowel wall becomes inflamed and ultimately damaged) and bowel (colo-rectal cancer) cancer. Evidence suggests a protective effect of eating a diet rich in fibre in relation to diverticulitis and colo-rectal cancer

- heart health; fibre eaten in large amounts can help reduce blood cholesterol levels. Soluble fibre has been shown to reduce low density lipoprotein (LDL) cholesterol and reduce risk of CVD
- type 2 diabetes; fibre has been shown to improve glycaemic control and has an important role in managing diabetes. Studies suggest that a high intake of fibre reduces the risk of developing type 2 diabetes. There is also evidence specifically for higher intakes of cereal fibre and higher wholegrain consumption and lower incidence of type 2 diabetes
- energy balance; foods high in fibre tend to have a high volume and low energy density. These foods may help to reduce hunger and promote a sense of fullness and therefore play a role in the control of energy balance. Increased fibre intake can therefore bring about a reduction of high energy foods

All other valid points will be given credit

[12]

AVAILABLE  
MARKS

12

- 7 Discuss **four** factors affecting the bioavailability and absorption of minerals. (AO1, AO2, AO3)

AVAILABLE  
MARKS

**Mark Band ([0]–[3])**

Overall impression: basic

- inadequate knowledge and understanding of four factors affecting bioavailability and absorption of minerals
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to discuss four factors affecting bioavailability and absorption of minerals
- quality of written communication is basic

**Mark Band ([4]–[6])**

Overall impression: adequate

- adequate knowledge and understanding of four factors affecting bioavailability and absorption of minerals
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to discuss four factors affecting bioavailability and absorption of minerals
- quality of written communication is adequate

**Mark Band ([7]–[9])**

Overall impression: competent

- competent knowledge and understanding of four factors affecting bioavailability and absorption of minerals
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to discuss four factors affecting bioavailability and absorption of minerals
- quality of written communication is competent

**Mark Band ([10]–[12])**

Overall impression: highly competent

- highly competent knowledge and understanding of four factors affecting bioavailability and absorption of minerals
- demonstrates a highly competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a highly competent ability to discuss four factors affecting bioavailability and absorption of minerals
- quality of written communication is highly competent

**Examples of suitable points to be discussed by the candidate:**

- food source; the bioavailability of iron from plant sources (non-haem) is relatively poor compared with iron from meat (haem)
- inhibiting factors; absorption of minerals may be compromised by phytates in wholegrain cereals, oxalic acid in spinach and chocolate. Furthermore, iron is also inhibited by phosphates in egg yolk and polyphenols in tea and coffee and medications
- competition for absorption from other minerals; calcium and zinc both compete with iron for absorption

- promoting factors; vitamin C rich foods assist iron absorption, vitamin D assists the absorption of calcium into the plasma; lactose also enhances calcium absorption by keeping it in a soluble form. Acidic environment of digestive tract also facilitates the solubility of calcium

All other valid points will be given credit

[12]

**AVAILABLE  
MARKS**

12

8 Examine the specific nutritional requirements of a teenager. (AO1, AO2, AO3)

AVAILABLE  
MARKS

**Mark Band ([0]–[3])**

Overall impression: basic

- inadequate knowledge and understanding of the specific nutritional requirements of a teenager
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to examine the specific nutritional requirements of a teenager
- quality of written communication is basic

**Mark Band ([4]–[6])**

Overall impression: adequate

- adequate knowledge and understanding of the specific nutritional requirements of a teenager
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to examine the specific nutritional requirements of a teenager
- quality of written communication is adequate

**Mark Band ([7]–[9])**

Overall impression: competent

- competent knowledge and understanding of the specific nutritional requirements of a teenager
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to examine the specific nutritional requirements of a teenager
- quality of written communication is competent

**Mark Band ([10]–[12])**

Overall impression: highly competent

- highly competent knowledge and understanding of the specific nutritional requirements of a teenager
- demonstrates a highly competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a highly competent ability to examine the specific nutritional requirements of a teenager
- quality of written communication is highly competent

**Examples of suitable points to be examined by the candidate:**

- energy: adequate energy is important as low energy diet could limit growth during teenage years, energy is important for the rapid growth spurt and synthesis of new tissue
- protein: necessary for muscle development and growth spurt
- calcium: needed for skeletal growth; bone assimilates most of its minerals at this stage and achieves most of its final mass; poor bone mass and failure to consume adequate calcium could lead to peak bone mass not being achieved and subsequently greater risk of osteoporosis later in life
- iron: both boys and girls have an increased requirement for iron due to the relatively large blood volume during periods of rapid growth, the onset of menstruation represents a further stress in the iron status of a teenager;

there is also evidence to suggest that borderline iron levels can have adverse effects on cognitive function, which could have implications in terms of learning ability and academic performance

- vitamin D: required for the efficient absorption of calcium, which in turn is required for bone development; there is some concern that some teenagers are not getting enough exposure to sunlight to achieve adequate vitamin D
- zinc: needed for normal growth and sexual development, this mineral is also associated with boosting the immune system

All other valid points will be given credit

[12]

**Section B**

**Total**

**AVAILABLE  
MARKS**

12

**24**

**80**