New Specification

Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Nutrition and Food Science

Assessment Unit AS 1

assessing

Principles of Nutrition

[SNF11]

WEDNESDAY 17 MAY, MORNING

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.

Fiexibility 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)** **(i)** Circle a food below which is an example of a low biological value protein. (AO1)

Rice [1]

(ii) Suggest **two** foods that could be eaten, as part of a meal, to illustrate protein complementation. (AO1)

- beans and toast;
- lentils and rice.

All other valid points will be given credit [1]

(b) Explain the importance of protein quality when planning meals for young children. (AO1, AO2)

- to ensure the provision of the indispensable amino acids, some of which have to be provided in the diet and some because children are unable to make enough to meet their needs
- failure to achieve this could result in growth retardation

All other valid points will be given credit
[1] basic explanation, [2] competent explanation [2]

(c) What is the effect of illness on nitrogen balance in relation to protein requirements? (AO1, AO2)

- negative nitrogen balance is associated with periods of illness and fasting therefore requiring additional protein intake
- this means that the amount of nitrogen excreted from the body is greater than the amount of nitrogen ingested

All other valid points will be given credit
[1] basic response, [2] competent response [2]

(d) Using the table below compare the nutritional value of Quorn and beef and explain the significance for health. (AO1, AO2, AO3)

AVAILABLE MARKS

Food	Energy (kcal/ 100g)	Total Fat (g/100g)	Saturated fat (g/100g)	Cholesterol (mg/100g)	%Energy from Total Fat	Fibre (g/100g)
Quorn mince (frozen)	94	2	0.5	0	19	6.0
Beef mince (raw)	225	16.2	6.9	60	65	0

Source: www.mycoprotein.org

- quorn is vegetable in origin and so is low in saturated fat compared with beef mince
- unlike the meat it is free from cholesterol so together, this makes quorn better for the heart
- beef mince is much higher in kilocalories and many of these are derived from the fat content. This can contribute to weight gain
- quorn contains fibre and so may help maintain blood cholesterol levels which is a risk factor for CHD and may help prevent conditions

All other valid points will be given credit
[1]–[2] basic comparison of data, [3]–[4] competent comparison of data, [5] highly competent comparison of data [5] 11

AVAILABLE MARKS

2 (a) (i) Explain the term glycaemic loading in relation to carbohydrate absorption. (AO1, AO2)

- glycaemic load has been created to take into account both the amount of carbohydrate in the food together with how quickly it raises blood glucose levels
- a food's glycaemic load is determined by multiplying its glycaemic index by the amount of carbohydrate the food contains. In general, a glycaemic load of 20 or more is high, 11 to 19 is medium, and 10 or under is low

All other valid points will be given credit
[1]–[2] basic explanation, [3] competent explanation,
[4] highly competent explanation [4]

(ii) Assess the effects on health of consuming foods with a different glycaemic index (such as those in the table below) (AO1, AO2, AO3)

Food	**Glycaemic Index per average portion**
White plain baguette	95
Whole wheat bread	71
Cornflakes	93
All Bran	55
White rice	89
Brown rice	50
Apple	39
Ripe banana	62
Grapefruit	25

- eating high glycaemic index foods, e.g. white bread, white rice and cornflakes causes significant spikes in blood sugar, can lead to an increased risk for type 2 diabetes, heart disease and overweight.
- foods with a low glycaemic index, e.g. All Bran, brown rice and some fruit have been shown to help control type 2 diabetes and improve weight loss
- low glycaemic diets may also offer anti-inflammatory benefits

All other valid points will be given credit
[1]–[2] basic assessment, [3]–[4] competent assessment,
[5] highly competent assessment [5]

AVAILABLE MARKS

(b) Identify **two** possible problems that could occur if too much fibre is consumed. (AO1)

- bloating, cramps, flatulence, loose stools
- constipation if not accompanied with an adequate fluid intake
- phytates found in wheat bran, can interfere with the absorption of certain minerals

All other valid points will be given credit
[1] basic response, [2] competent response [2]

(c) State **two** food sources of intrinsic sugars. (AO1)

Any fruit or vegetable will be accepted
[1] for each correctly identified intrinsic sugar [2]

(d) Using the table below justify the decision to choose a banana rather than a chocolate bar as the preferred source of energy. (AO1, AO2, AO3)

Food	Portion size	Energy (kcal)	Sugar (g)
Banana	100g	81	18
Chocolate bar	45g	234	25

- the banana is the preferred source of energy as it is a source of intrinsic sugar, compared to the chocolate bar which is a source of free sugar and contains empty calories
- the concentration of sugar in the bar of chocolate is far higher than in the banana
- the energy (kcalorie) content of the bar of chocolate is significantly higher than in the banana. This excess energy contributes to weight gain and risk of obesity, which is a major health concern in the UK
- the banana is a bigger portion and so increases satiety helping in weight control

All other valid points will be given credit
[1]–[2] basic justification, [3]–[4] competent justification,
[5] highly competent justification [5]

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AVAILABLE MARKS

3 **(a)** Discuss the effects of a deficiency of vitamin B_1. (AO1, AO2)

- beriberi – when glucose is only partially oxidized, the breakdown stops at a substance called pyruvic acid. A build up of this in the blood causes muscular weakness, palpitations of the heart and degeneration of the nerves
- wet Beriberi – the patient suffers oedema (fluid in the tissues)
- dry Beriberi – results in severe emaciation and wastage of the tissues

All other valid points will be given credit
[1] basic discussion, [2] competent discussion,
[3] highly competent discussion [3]

(b) Explain the role of potassium in the body. (AO1, AO2)

- normal functioning of muscles and nerves
- maintenance of fluid and electrolyte balance
- neutralises effects of sodium and therefore helps reduce the risk of hypertension

All other valid points will be given credit
[1] basic explanation, [2] competent explanation,
[3] highly competent explanation [3]

(c) Name **three** factors that enhance the absorption of calcium. (AO1)

- lactose
- vitamin D
- dietary protein

All other valid points will be given credit
[1] for each correctly named factor [3]

(d) Propose and justify the nutritional advice you would give to a pregnant woman in relation to vitamins. (AO1, AO2, AO3)

- folate (400 µg every day, up to 12 weeks of pregnancy); start taking this before conception as it helps to reduce the risk of the baby developing spina bifida and other neural tube defects
- vitamin D (10 µg every day) – this is important to help the baby grow strong bones. If a mother is pregnant in winter months, this could be particularly low
- avoid excessive intake of vitamin A; high intake of retinol may lead to birth defects

All other valid points will be given credit
[1]–[2] basic proposal and justification, [3]–[4] competent proposal and justification, [5] highly competent proposal and justification [5]

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AVAILABLE MARKS

4 **(a)** Discuss the importance of achieving an adequate energy intake for a frail elderly person during an acute illness. (AO1, AO2)

- muscle wasting can occur if they lose too much weight
- they could have lost weight after an illness and so need to regain this weight to prevent further deterioration
- a lack of energy intake could result in a greater risk of infection and affect the immune system
- start a vicious cycle of exhaustion, poor mobility, poor appetite and depression

All other valid points will be given credit
[1]–[2] basic discussion, [3] competent discussion,
[4] highly competent discussion [4]

(b) Explain why a supplement of vitamin K is usually given to a newborn infant. (AO1, AO2)

- babies are born with naturally low levels of this vitamin, particularly premature babies
- vitamin K is given to assist with blood clotting and prevent a serious disease called haemorrhagic disease of the newborn (HDN)

All other valid points will be given credit
[1] basic explanation, [2] competent explanation [2]

(c) State **two** reasons why children might be at risk of developing rickets. (AO1, AO2)

- overuse of sunblock
- too much time spent indoors, including too much screen time

All other valid points will be given credit
[1] for each reason stated [2] 8

5 Discuss the role of essential fatty acids in the diet. (AO1, AO2)

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- essential for the maintenance of cell membranes
- they make hormone-like substances such as prostaglandins and other eicosanoids which are involved in a number of functions in the body such as the clotting of the blood and regulation of cholesterol
- they are needed for metabolism, stimulation of smooth muscle contraction, effects on the immune system and the nervous system
- there is evidence that eating EFA reduces the risk of death from heart attacks by decreasing the tendency of the blood to clot
- omega 3 fatty acids are important in the membranes of the nervous system, brain and retina

[1]–[2] basic discussion, [3]–[4] competent discussion,
[5] highly competent discussion [5]

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Section B

AVAILABLE MARKS

6 Explain how Dietary Reference Values (DRVs) and Estimated Average Requirements (EARs) should be used to evaluate diets. (AO1, AO2, AO3)

Mark Band ([0]–[3])
Overall impression: basic
- basic knowledge and understanding of DRVs and EARs
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to explain how these values should be used to evaluate diets
- quality of written communication is basic

Mark Band ([4]–[6])
Overall impression: adequate
- adequate knowledge and understanding of DRVs and EARs
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to explain how these values should be used to evaluate diets
- quality of written communication is adequate

Mark Band ([7]–[9])
Overall impression: competent
- competent knowledge and understanding of DRVs and EARs
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to explain how these values should be used to evaluate diets
- quality of written communication is competent

Mark Band ([10]–[12])
Overall impression: highly competent
- clear knowledge and understanding of DRVs and EARs
- demonstrates a highly competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a highly competent ability to explain how these values should be used to evaluate diets
- quality of written communication is highly competent

Examples of suitable points to be explained by the candidate:

- targets for nutrient intakes at population level may be set for public health planning and assessment. These are estimates used as guidance, not exact recommendations and they show the amount of nutrient that specific groups of people need for good health and they only apply to healthy people
- when evaluating diets in relation to energy it should be noted that the recommendation for energy is in the form of an EAR as it will vary between individuals due to differences in energy output and BMR
- nutrient recommendations are typically targets for the nutrient intakes of individuals, for example less than 10% energy for saturated fatty acids
- these may not always be communicated directly to the consumer, but rather are for use by healthcare professionals and policymakers

	AVAILABLE MARKS
• in groups of people, the distribution of nutrient intakes among the population is considered more important than a fixed recommended intake level • they have been considered in setting regulations for feeding programmes, setting standards for feeding in group facilities (nursing homes, school cafeterias, correctional facilities) • in dietary planning for individuals or groups, the Population Reference Intake (or Adequate Intake) can be used as a goal for adequate intakes of vitamins, minerals or protein All other valid points will be given credit [12]	12

AVAILABLE MARKS

7 Consider the nutritional benefits derived from consuming a range of fluids, other than water. (AO1, AO2, AO3)

Mark Band ([0]–[3])
Overall impression: basic
- basic knowledge and understanding of a range of fluids, other than water
- demonstrates a limited ability to apply appropriate knowledge and understanding to the question
- demonstrates a limited ability to consider the nutritional benefits derived from consuming a range of fluids in the diet
- quality of written communication is basic

Mark Band ([4]–[6])
Overall impression: adequate
- adequate knowledge and understanding of a range of fluids, other than water
- demonstrates an adequate ability to apply appropriate knowledge and understanding to the question
- demonstrates an adequate ability to consider the nutritional benefits derived from consuming a range of fluids in the diet
- quality of written communication is adequate

Mark Band ([7]–[9])
Overall impression: competent
- competent knowledge and understanding of a range of fluids, other than water
- demonstrates a competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a competent ability to consider the nutritional benefits derived from consuming a range of fluids in the diet
- quality of written communication is competent

Mark Band ([10]–[12])
Overall impression: highly competent
- clear knowledge and understanding of a range of fluids, other than water
- demonstrates a highly competent ability to apply appropriate knowledge and understanding to the question
- demonstrates a highly competent ability to consider the nutritional benefits derived from consuming a range of fluids in the diet
- quality of written communication is highly competent

Examples of suitable points to be considered by the candidate:

- tea or coffee delivers water, and even though these drinks can contain caffeine, in moderate amounts caffeine doesn't affect hydration.
- herbal teas can provide antioxidants and fluoride
- milk and yoghurt contain protein, B vitamins and calcium, as well as being a source of water
- fruit juices and smoothies provide water plus some vitamins, minerals and natural plant substances from the fruit. Smoothies may also contain pureed fruit, which adds fibre
- soft drinks are a source of water but it is a good idea to limit consumption of standard sugar-containing soft drinks and to choose lower sugar or sugar-free (low calorie) versions instead

- soups, stews and casseroles have a high water content and usually also have water from fruit and vegetables
- fruit and vegetables – certain fruit and vegetables may have a high water content

All other valid points will be given credit [12]

AVAILABLE MARKS

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

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Mark Band ([0]–[3])
Overall impression: basic
- basic 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 describe 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 describe 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 describe the specific nutritional requirements of a teenager
- quality of written communication is competent

Mark Band ([10]–[12])
Overall impression: highly competent
- clear 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 describe the specific nutritional requirements of a teenager
- quality of written communication is highly competent

Examples of suitable points to be examined by the candidate:

- 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, failure to consume adequate calcium could lead to peak bone mass (PBM) not being achieved and subsequently present a greater risk of developing 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 presents a further stress in the iron status of teenage girls; there is also evidence to suggest that borderline iron levels can have

		AVAILABLE MARKS
adverse effects on cognitive function, this 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 levels • zinc; is needed for normal growth and sexual development, this mineral is also associated with boosting the immune system • energy; adequate energy is important as low energy density could limit growth during teenage years, energy is important for the rapid growth spurt and synthesis of new tissue All other valid points will be given credit	[12]	12
Total		**80**