OCR
Oxford Cambridge and RSA

GCE

Home Economics (Food, Nutrition and Health)

Unit **G004:** Nutrition and Food Production

Advanced GCE

Mark Scheme for June 2016

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All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotations

Annotation	Meaning
BP	Blank Page – this annotation **must** be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	Unclear
BOD	Benefit of doubt
	Caret sign to show omission
NAQ	Not answered question
REP	Repeat
SEEN	Noted but no credit given
	Tick
	Cross
L1	Level 1
L2	Level 2
L3	Level 3
L4	Level 4
VG	Vague

SECTION A

Question			Answer	Mark	Guidance
1	**a**	i	State **one** good **vegetable sources** of vitamin C. • Potatoes • Red and green peppers/peppers • Broccoli • Brussels sprouts • Kale • Spinach • Cabbage • Peas • Cauliflower • Tomatoes	1	**ONE MARK** for one source. **ONE** Maximum. Green leafy vegetables not specific enough. Accept for Vitamin K only.
1	**a**	ii	Identify **two** different dietary functions of vitamin C. • Required to make collagen. • Repair of body tissues/healing of wounds/development of scar tissue. • Repair and maintenance of cartilage/bones/teeth. • Formation of red blood cells. • Helps the absorption of iron from the intestines. • Vitamin C has a vital role in the immune system/ fighting infections. • Vitamin C is an antioxidant/may reduce the risk of coronary heart disease/block the damage of free radicals	2	**TWO MARKS** available. **ONE** Maximum for each function. No membranes No healthy skin/digestive system

Question			Answer	Mark	Guidance
1	a	iii	Explain **two** ways vitamin C can be retained during the cooking of vegetables. • Use minimal amounts of water (1) smallest amount of water should be used in cooking vegetables to prevent vitamin C from dissolving away (1). • Place fruit and vegetables in boiling water/blanch (1) By placing vegetables into a small amount of very hot water immediately after preparation, the enzyme oxidase is destroyed (1). • The use of the cooking water to make gravies, soups and sauces (1) can help to ensure that some of these water soluble vitamins are consumed (1). • Cook quickly/minimal amount of time (1) prolonged cooking process can reduce the vitamin C content (1). • Use a tightly fitting saucepan lid on the saucepan to speed up the cooking process (1) prolonged cooking process can reduce the vitamin C content (1). • *Choose an appropriate cooking method* (1). Steaming uses very little water so in theory the loss of water soluble vitamins should be smaller (1). • Cooking utensils made of Pyrex, stainless steel, aluminium or enamel or lined with a non-stick coating have little effect on vitamin content(1) the use of iron or unlined copper saucepans can destroy vitamin C (1). • Never add bicarbonate of soda to cooking water (1) Vitamin C or ascorbic acid is a weak acid and it is easily destroyed by a mild alkali such as bicarbonate of soda (1).	4	**TWO MARKS** for each explanation x 2. **FOUR** Maximum. **Explanations must be linked to cooking**. A repeat of two cooking methods only credited once. Roast vegetables (1) because vitamin cannot leach (1) This is a repeat: Steam vegetables/because vitamin is water soluble

Question			Answer	Mark	Guidance
1	a	iv	Explain the process of enzymic browning in fruit and vegetables. The enzyme **ascorbic acid oxidase** will destroy the vitamin C content (1). Ascorbic acid oxidase is released from plant cells by bruising/cutting/slicing and exposure to the **air/oxygen/oxidation** causes browning (1).	2	**TWO MARKS** for the explanation. Must **name** the enzyme (1) 'enzymes', 'oxidase' not acceptable air/oxygen/oxidation (1)
1	b	i	State **one** good source of vitamin K. • green leafy vegetables • green peas • beans • broccoli • spinach • vegetable oils • cereals	1	**ONE MARK** for one source. **ONE** maximum.
1	b	ii	Identify **one** dietary function of vitamin K. • Helps blood clotting • Helps wounds to heal • Helps bone health/density/osteoporosis • Prevents VKDB in new-borns	1	**ONE MARK** for one function. **ONE** maximum. Not immune system Not cell membranes

Question			Answer	Mark	Guidance
1	c	i	Explain **one** disadvantage to the consumer of sugar substitutes. • They can have a slight bitter after taste (1) which some consumers find unpleasant (1). • Cannot easily be used in baking or cooking (1) so they are not ideal for home baking (1). • Can be expensive to purchase (1) because they cost more produce and make • They could stimulate appetite for sweetness (1) increase snacking/weight gain (1)	2	**TWO MARKS** are available for one explanation. **ONE** maximum. Do not accept they are 'not natural' Do not accept they 'don't provide energy'
1	c	ii	Explain **the** difference between intrinsic and extrinsic sugars. Intrinsic sugars are those present naturally within the cellular structure of food, these sugars are mainly found in fruits and vegetables (1). Extrinsic sugars are those which are free in food/milk/fruit juice/honey or added to food during processing and enhancing sweetness (1).	2	**TWO MARKS** are available for the explanation. **ONE** maximum.
1	d	i	Describe **two** advantages to a consumer of the use of plastic as a packaging material. • Plastic packaging can improve a product's resistance to oxygen/extend the shelf life (1) less food wastage/longer storage at home (1). • Plastics are lightweight (1) easy to transport home (1). • Plastics are strong and robust food storage/don't break easily (1) less damage during storage/can freeze at home (1) cook from frozen (1) • Resistant to moisture (1) food is secure/shelf-life longer/fewer shopping trips (1). • Plastic are transparent (1) consumer can see product (1)	4	**TWO MARKS** are available for each description. **FOUR** Maximum. Be careful that the 'manufacturer' is not implied.

Question			Answer	Mark	Guidance
			• Plastics are cheap (1) link to consumer – products are inexpensive (1) • Some plastics can be used as cooking/serving vessel/preparing e.g nozzles (1) saves time with washing up (1) • Plastics can be microwaved/some are ovenable (1) saves time cooking (1) • Versatile/convenience for the consumer (1) can be washed and reused to store other food/saves money for consumer/less storage (1)		
1	**d**	ii	Describe **one** disadvantage to a food retailer of using plastic as a packaging material. • Plastics do not suggest high quality (1) unattractive selling point for consumers/low prices (1) • Could be crushes/pierced during storage (1) less profits (1) • Plastics are generally non-biodegradable (1) pollute the environment/not ethically choice for retailer/consumer may be put off purchase (1). • Biodegradable plastics are expensive for the food retailer (1) and can add costs to consumer (1). • Majority are difficult to recycle (1) because the variety of types/facilities for recycling plastic does not cover all types/waste increases (1). • Non-renewable resource (1) not ethically choice for retailer/consumer may be put off purchase (1). • Educating the consumer about recycling plastics is a challenge (1) as there are so many types of plastic (1).	2	**TWO MARKS** are available for the description. **TWO** Maximum.

Question			Answer	Mark	Guidance
1	e	i	Describe **one** difference test used in food production. **Examples of difference tests:** • *Paired comparisons/paired preference* help a manufacturer confirm what they can predict about a particular product, for example, a reduced fat content may make a biscuit harder. • *Triangle test* demonstrate small differences between products/compete with a brand leader. Three coded samples are presented, with one sample the odd one out. Used to detect small differences between products. • *Duo-trio test* used with strong flavours. The tester is presented with a control sample and two further samples are given, one identical to the control. The tester must identify the sample that is different from the control. • *Two Out of Five test* used to see if differences can be detected between two products. Three samples are identical and two are the same. • *Taste threshold test* used to find out the lowest minimum quality of an ingredient or substance that can be added to a product before a noticeable change occurs to its flavour or colour, for example.	2	**TWO MARKS** are available for the description. One Mark for **accurate name** of the test and one mark for description. **TWO** Maximum. An accurate description (1) only Not just 'taste test'

Question			Answer	Mark	Guidance
1	e	ii	Describe **one** grading test used in food production. **Examples of Grading tests** • *Ranking test* used to sort a variety of foods into order of popularity by taste etc. • *Ranking test with descriptor* used to place a variety of one type of food into order. • *Rating test* allows people to rate the extent to which they either like or dislike a variety of products. • *Star profile* used to describe the appearance, taste and texture of a food product. • *Hedonic Test* determines degree of acceptability of one or more products. Consumers rate the product on a scale.	2	**TWO MARKS** are available for the description. **TWO** Maximum. One Mark for **accurate name** of the test and one mark for description.

Question			Answer	Mark	Guidance
2			**SECTION B** Discuss how the nutritional value, choice and use of proteins and alternative protein sources can contribute to maintaining good health. • Amino acids are the building blocks of protein and there are about twenty different types. • Indispensable (essential) amino acids cannot be made by the human body in sufficient amounts for health. • The quality of protein (i.e. its biological value) depends upon whether it can supply all of the indispensable amino acids in the quantities needed. • If a protein contains the indispensable amino acids in the approximate amount needed, it is said to have a high biological value. • If it is low in one or more of the indispensable amino acids, it is said to have a low biological value. • Protein can be obtained from animal or plant sources. Animal sources of protein are meat, fish, cheese, eggs and milk. • Plant sources of protein include pulses (peas, beans and lentils), cereals (wheat, maize and rice) and nuts. • The average daily intake of protein in the UK diet is 85 g for men and 62 g for women. • One type of protein food may be deficient in a particular amino acid, but when eaten with another protein food the amino acids of one protein may compensate for the other. The result is that the mixture becomes of a high biological value as the proteins complement each other – this is known as the complementary action of proteins. The three main functions of protein are: • the growth of body cells, particularly during the growth spurts of adolescence and in a growing fetus	**25**	**Level 4** **19-25 marks** The candidate demonstrates an accurate knowledge of the nutritional value, choice and use of proteins/protein foods and protein alternatives in maintaining good health The discussion of their nutritional needs will be detailed. The information will be presented in a fluent and well structured manner. Subject specific terminology will be used accurately. There will be few, if any errors of grammar, punctuation and spelling. **Level 3** **13-18 marks** The candidate demonstrates a good knowledge of the nutritional value, choice and use of proteins/protein foods and protein alternatives in maintaining good health. The discussion will show understanding. The information will be presented clearly and some subject specific terminology will be used. There may be occasional errors of grammar; punctuation and spelling. **Level 2** **7-12 marks** The candidate demonstrates some knowledge of the nutritional value, choice and use of proteins/protein foods and protein alternatives in maintaining good health. The discussion will show a limited understanding and may lack detail. The information will be presented simply and some subject specific terminology will be used, although not always used appropriately. There will be errors of grammar, punctuation and spelling.

Question			Answer	Mark	Guidance
			• the maintenance and repair of the body cells and tissues as a result of wear and tear or injury • To provide a source of energy. If other sources of energy are lacking in the diet protein is used first to meet energy needs.1 gram provides 17 kJ (4 kcal). • A deficiency of protein is extremely rare in the UK. • In developing countries protein deficiency can occur - Marasmus and Kwashiorkor. **Protein sources** • Meat is HBV, high in B vitamins, iron (red meat), (chicken) low fat, B12, zinc, calcium and potassium. • The choices include beef, lamb, pork and poultry. • The cooking methods include roast, grill, fry, braise. • Expensive source of protein. • Fish is HBV, high in calcium, B vitamins, phosphorus. • It may be classed as either whitefish, oily or shellfish. Whitefish contains very little fat (usually less than 1%) whereas oily fish, such as sardines, contain between 10-25%. • Oily fish contains a range of fat-soluble vitamins (A, D, E and K) and essential fatty acids • Eggs provide HBV protein, vitamin A, riboflavin, vitamin B12, phosphorus, zinc and vitamin D. • Eggs have a wide range of properties e.g. coagulation, emulsification and aeration. • Dairy products provide HBV protein, calcium, vitamin D and potassium. • Products include fromage frais, yoghurt, milk, cheese. **Alternative protein sources** Low if fat/calories products. In a lacto vegetarian diet protein can be obtained from dairy products including milk, cheese, yoghurts and eggs. The foods which commonly supply the most protein in a		**Level 1** **1-6 marks** The candidate demonstrates superficial knowledge of the nutritional value, choice and use of proteins/protein foods and/or protein alternatives in maintaining good health. They will show very limited understanding. The information will be poorly expressed with little or no use of subject specific terminology. Errors of grammar, punctuation and spelling may be intrusive. **0=no response worthy of credit**

Question			Answer	Mark	Guidance
			vegan diet are pulses (peas, beans, lentils, soya products), grains (wheat, oats, rice, barley, pasta, bread), nuts (brazils, hazels, almonds, cashews) and seeds (sunflower, pumpkin, sesame). **Products from Soya** • Soya foods e.g. tofu, tempeh, miso, soya sauces, oil, margarines contain HBV protein and calcium, iron, thiamine, riboflavin and niacin. • Textured Vegetable Protein (TVP) is made from soya protein. Varieties of flavoured TVP are available. It is used in sausages, burgers and pasta dishes. • Tofu is produced from soya beans. Tofu is semi-solid and is available in plain and smoke form. As it is quite soft, it absorbs flavours well. It may be used as a substitute for meat e.g. in stir fries. • Tempeh is a mass of soya beans, which have been allowed to ferment. It is solid, has a white fluffy outer layer and can be sliced. It may be flavoured and cooked in a variety of ways e.g. stir fry. • Soya protein available as burgers, sausages, canned foods. Soya oil and margarine are also available. • Soya milk and soya dairy alternatives including soya desserts and yogurts made from soya milk. • Miso is a fermented condiment made from soya beans, rice or barley grains, salt and water. Varies widely in flavour and colour and is used to flavour stews, soups and sauces. **Sources from Mycoproteins** Myco-protein or Quorn (trade name) is produced by fermentation of a fungus to produce fine fibres. The myco-protein undergoes forming, cutting and texturising according to the nature of the product to be made, *e.g.* pies, mince, burgers or sausages.		

Question			Answer	Mark	Guidance
3			Discuss the processes involved in the marketing and launch of a new food product. **Answers may include:** • Market research/concept generation/developing a specification/disassembly • A marketing plan will be developed. • Packaging design. • The focus will be to balance four elements; the marketing mix. • The marketing mix includes: • **Price.** The initial price will be decided by the potential market/target group e.g. food product is priced and marketed at a high price to signify quality in order to attract a particular target group. • Pricing strategies. • **Place**. A food product may be sold in a particular region to see how well it performs and who it appeals to, before a national launch. • Instore placement. Supermarkets have to decide where the product will be situated to attract consumers. This includes the shelf, aisle or checkout position. • Product explores how the product meets the customers' needs. If this can be exploited fully during marketing then the product has a greater chance of success. • Promotion the development of a range of activities to promote the food product to ensure maximum sales. • Above the line promotion uses the media. The media includes television, cinema, radio, advertising hoardings and search engines. They are considered to be impersonal to consumers. They are: • Television advertising. Advertisements with a memorable jingle or which feature a famous celebrity. Adverts are timed during the day to suit certain target groups.	**25**	**Level 4** **19-25 marks** The candidate demonstrates an accurate knowledge of the processes involved in the marketing and launch of a new food product. The discussion of the processes will be detailed. The information will be presented in a fluent and well-structured manner. Subject specific terminology will be used accurately. There will be few, if any errors of grammar, punctuation and spelling. **Level 3** **13-18 marks** The candidate demonstrates a good knowledge of the processes involved in the marketing and launch of a new food product. The discussion will show understanding. The information will be presented clearly and some subject specific terminology will be used. There may be occasional errors of grammar; punctuation and spelling. **Level 2** **7-12 marks** The candidate demonstrates some knowledge of the processes involved in the marketing and launch of a new food product. The discussion will show a limited understanding and may lack detail. The information will be presented simply and some subject specific terminology will be used, although not always used appropriately. There will be errors of grammar, punctuation and spelling. **Level 1** **1-6 marks** The candidate demonstrates superficial knowledge of some

Question			Answer	Mark	Guidance
			• National newspaper and magazine articles may contain advertisements for new food products and coupons to encourage a purchase. Advertising space in magazines which have a specialist readership e.g. Good Food magazine could be used to a launch a new food product. • Food manufacturer and retailers website can provide the consumer with information on the development of new products. Money off coupons may be available from the website to encourage consumers to purchase. • Social media can be used to launch and advertise new products. • Advertising hoardings can have a huge visual impact, particularly if a celebrity is used to attract consumer attention to a product. • Supermarkets' own magazines can be used to promote own brands or new food products. They may contain coupons, recipe ideas or features on new products. • Below the line promotion is more personal and uses brand-building strategies, such as direct mail, price promotions and printed media. They include: • Price promotions can be used e.g. offering a percentage extra of the product included in the normal retail price, buy one get one free (BOGOF), 3 for 2 offers and a discounted introductory price. • Money-off coupons can used. Coupons can found in a number of sources including on food packaging, newspapers, till receipts, magazines, leaflet and flyers in store. • Gift with purchase can be used to entice a purchase. Novelty packaging and brand collectables can also appeal to some consumers. • Competitions and prizes can be used to focus on specific consumers e.g. days out at theme parks.		of the processes. They will show very limited understanding. The information will be poorly expressed with little or no use of subject specific terminology. Errors of grammar, punctuation and spelling may be intrusive. **0=no response worthy of credit**

Question			Answer	Mark	Guidance
			• Frequent user/loyalty incentives. The use of loyalty cards with personalised mail shots may help to promote a new food product. • Product placement in the store can be used e.g. entrance to the store can be used to promote a special offer, end of aisles displays/eye level shelving. • Exhibitions/Trade shows can be used e.g. Good Food Show. • Displays and in-store signage on floors, ceiling, doors, the shopping trolley and shelving can be used. • In store demonstrations/taste sessions. A food product could be sampled by consumers. • Free recipe leaflets may be available in store or included on the food packaging to give ideas for use. • Charity endorsement and quality assurance schemes are included on some food packaging. **Launch** • Initially a small scale launch may suggest that the marketing strategies need to be adjusted. • The full scale national launch will be monitored closely. This information will be fed back to the manufacturer so that appropriate action can be taken, the volume of products made may need to be adjusted. • The food product may need slight adaptations which could be completed economically and effectively shortly after launch. **Credit will be given for all valid points.**		

Question			Answer	Mark	Guidance
4			Discuss the nutritional and dietary needs during adolescence and compare how they differ between adolescent males and adolescent females. **Answers may include:** • The nutritional needs of adolescents (11-18 years) are higher than those of any other group. **Dietary needs** • Eat a balanced diet/healthy eating guidelines/Eatwell guide. • Dietary fibre intake among adolescents is also low – choose high fibre foods • Low fat/sugar choices • Diet related illnesses • Adolescents have large appetites and it is important that their appetite is satisfied with balanced meals. Foods high in energy such as pasta, rice, potatoes and bread should be consumed. • Nutrition during adolescence is important to help prevent adult diet-related diseases, such as osteoporosis and obesity. • Diets consumed by many exceed current recommendations for total fat and saturated fat, cholesterol, sodium and sugar. **Nutritional needs** • Energy, protein, calcium, iron, vitamin B group differ. • Puberty is a period of change; physical growth leading to an increase in height and weight, changes in body composition and sexual development. • On average, adolescents consume diets that are inadequate in folic acid, vitamins A and E, iron, zinc and calcium.	**25**	**Level 4** **19-25 marks** The candidate demonstrates an accurate knowledge of the nutritional and dietary needs during adolescence and compare the differences between adolescent males and females. The comparison of their nutritional needs will be detailed and accurate. The information will be presented in a fluent and well-structured manner. Subject specific terminology will be used accurately. There will be few, if any errors of grammar, punctuation and spelling. **Level 3** **13-18 marks** The candidate demonstrates a good knowledge of the nutritional and dietary needs during adolescence and compare the differences between adolescent males and females. The comparison will show understanding. The information will be presented clearly and some subject specific terminology will be used. There may be occasional errors of grammar; punctuation and spelling. **Level 2** **7-12 marks** The candidate demonstrates some knowledge of the nutritional and dietary needs during adolescence and compare the differences between adolescent males and females. The comparison will show a limited understanding and may lack detail. The information will be presented simply and some subject specific terminology will be used, although not always used appropriately. There will be errors of grammar, punctuation and spelling.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td></td><td></td><td></td><td>

Calcium needs are higher because of bone development about 45% of the adult skeleton is laid down during these years.
Energy requirements continue to increase because they are becoming more active. Boys are bigger, need more.
Protein requirements increase by approximately 50% because they are growing quickly. Foods high in protein such as meat, fish, eggs, nuts, pulses, should also be consumed.
Iron requirements are particularly high because there is an increase in lean body mass, blood volume and haemoglobin.
The comparison of the nutritional requirements of adolescents can be divided into two broad groups:

11–14 years
<table>
<tr><th>Nutrient</th><th>males</th><th>females</th></tr>
<tr><td>Energy</td><td>2220kcals</td><td>1845kcals</td></tr>
<tr><td>Protein</td><td>42.1g</td><td>41.2g</td></tr>
<tr><td>Thiamin</td><td>0.9mg</td><td>0.7mg</td></tr>
<tr><td>Riboflavin</td><td>1.2mg</td><td>1.1mg</td></tr>
<tr><td>Niacin</td><td>15mg</td><td>12mg</td></tr>
<tr><td>Vitamin B6</td><td>1.2mg</td><td>1.0mg</td></tr>
<tr><td>Vitamin B12</td><td colspan="2">1.2mg</td></tr>
<tr><td>Folic acid</td><td colspan="2">200mg</td></tr>
<tr><td>Vitamin C</td><td colspan="2">35mg</td></tr>
<tr><td>Vitamin A</td><td colspan="2">600ug</td></tr>
<tr><td>Calcium</td><td>1000mg</td><td>800mg</td></tr>
<tr><td>Phosphorus</td><td>775mg</td><td>625mg</td></tr>
<tr><td>Iron</td><td>11.3mg</td><td>14.8mg</td></tr>
</table>
</td><td></td><td>
Level 1
1-6 marks
The candidate demonstrates superficial knowledge of nutritional and dietary needs during adolescence and compare the differences between adolescent males and females. They will show very limited understanding. The information will be poorly expressed with little or no use of subject specific terminology. Errors of grammar, punctuation and spelling may be intrusive.

0=no response worthy of credit

Where candidates have referred to the specific RNIs use the tables to check accuracy.
</td></tr>
</table>

Question			Answer	Mark	Guidance
			15–18 years **Credit will be given for all valid points.**		

Nutrient	**males**	**females**
Energy	2755kcals	2110kcals
Protein	55.2g	45.0g
Thiamin	1.1mg	0.8mg
Riboflavin	1.3mg	1.1mg
Niacin	18mg	14mg
Vitamin B6	1.5mg	1.2mg
Vitamin B12	1.5mg	
Folic acid	200mg	
Vitamin C	40mg	
Vitamin A	700ug	600ug
Calcium	1000mg	800mg
Phosphorus	775mg	625mg
Iron	11.3mg	14.8mg

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