

# **Home Economics (Food, Nutrition and Health)**

Advanced GCE

Unit **G004/01**: Nutrition and Food Production

## **Mark Scheme for January 2012**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

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.

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## Annotations

Annotation	Meaning
	Unclear
	Benefit of doubt
	Caret sign to show omission
	Significant amount of material which doesn't answer the question
	Not answered question
	Benefit of doubt not given
	Repeat
	Noted but no credit given
	Tick

**Marking crossed out and duplicated answers**

OCR currently provides examiners with 'rules' for marking crossed out answers (which may be partially or wholly correct) and duplicated answers. Duplicated answers refer to two (or more) alternative responses to the same question, or responses to more optional questions than required within the paper rubric.

The rules are as follows:

***Crossed out answers***

- where a candidate crosses out an answer and provides an alternative response the crossed out response is not marked and gains no marks
- where a candidate crosses out an answer to a whole question, but makes no second attempt and the inclusion of the answer would not cause a rubric infringement, the assessor should attempt to mark the crossed out response and award marks appropriately.

***Duplicated answers***

- normally all responses are marked and the highest mark given
- where alternate answers are provided to a multiple choice question, no mark should be awarded (for example: following a request to tick one box, the candidate ticks two or more boxes)
- where the candidate provides contradictory responses, no mark should be awarded (for example: the candidate writes a statement such as 'water freezes at 0°C this means it is a liquid at -10°C'). The candidate, here, does not seem to understand the context of the 'question'
- where the candidate has adopted a 'scattergun' approach by providing multiple answers to a single response question, no mark should be awarded.

Question			Answer	Mark	Guidance
1	(a)	(i)	Two marks are available. One mark for each nutrient. <ul style="list-style-type: none"> <li>• Carbohydrate</li> <li>• Fats</li> <li>• Protein</li> </ul>	2	
		(ii)	One mark is available for the definition.  Energy balance is concerned with having an <b>energy intake which matches energy expenditure</b> so there is no weight gain or loss.	1	
		(iii)	<b>One mark</b> is available for each correctly identified dietary change.  <b>One mark</b> for an explanation of how each change may affect energy intake. Examples may include: <ul style="list-style-type: none"> <li>• Change whole milk to skimmed/semi skimmed (1) to reduce fat intake (1)</li> <li>• Change to lean meats (1) to reduce fat (1)</li> <li>• Change fat spread to reduced or low fat spread (1) to reduce fat intake (1)</li> <li>• Use sugar substitutes in drinks (1) to reduce sugar intake (1)</li> <li>• Eat small portions of meat/bread (1) to reduce overall energy/calorie intake (1)</li> <li>• Change high fat cooking (1) Low fat cooking methods (1)</li> <li>• Increase fibre (1) reduce likelihood of snacking (1)</li> <li>• Choose fruit as a snack (1) to reduce fat intake (1)</li> <li>• Eat fewer energy dense foods (1) to reduce energy intake (1)</li> </ul> Credit will be given for all valid points	6	

Question		Answer	Mark	Guidance
	(b)	<p><b>Two</b> marks are available. <b>One</b> mark for stating each function.</p> <ul style="list-style-type: none"> <li>• The development of the spinal cord in the embryo.</li> <li>• Folic acid is essential for the formation of red blood cells/haemoglobin.</li> <li>• Folic acid works with vitamin B12 in the process of cell division.</li> </ul>	2	
	(ii)	<p><b>Two</b> marks are available. <b>One</b> mark for stating each food source.</p> <ul style="list-style-type: none"> <li>• Spinach</li> <li>• Green leafy vegetables</li> <li>• Sprouts</li> <li>• Asparagus</li> <li>• Broccoli</li> <li>• Green beans</li> <li>• Pulses/lentils</li> <li>• Peas and beans</li> <li>• Fortified Bread and breakfast cereals.</li> </ul> <p><b>Credit will be given for all valid points</b></p>	2	
(c)	(i)	<p><b>Two</b> marks are available. <b>One</b> mark for stating each source.</p> <ul style="list-style-type: none"> <li>• Omega 3 fatty acids (Alpha linolenic acid). Rapeseed oil (canola), mustard seeds, pumpkin seeds, soya bean, walnuts, green leafy vegetables and grains are all good sources. Coldwater and oily ocean fish including tuna, salmon and sardines are also good source of omega 3.</li> <li>• Cod liver oil</li> <li>• Omega 6 fatty acids (Linoleic acid) is found in oils made from sunflower, corn, soya, pumpkin and wheat germ.</li> </ul>	2	

Question	Answer	Mark	Guidance
	(ii) <b>One</b> mark is available for stating <b>one</b> function. <ul style="list-style-type: none"> <li>• Reduce the symptoms of arthritis</li> <li>• Lowers cholesterol in the blood.</li> <li>• Reduce risk of risk of heart disease.</li> <li>• Essential for the proper functionin/development of the brain.</li> <li>• Assist in the development of the nervous system in the foetus.</li> <li>• Assist with production of hormone-like chemicals/prostaglandins.</li> <li>• Essential fatty acids regulate body cholesterol metabolism.</li> </ul>	1	
(d)	(i) <b>Two</b> marks are available. <b>One</b> mark for each advantage. <ul style="list-style-type: none"> <li>• Metal is available in different sizes, thicknesses, shapes and with direct surface decorations (1) offers versatility (1).</li> <li>• Metal is a shock resistant/strong (1) robust protection (1) long storage (1) easy to transport (1)</li> <li>• The food products stored inside metal cans have a long shelf life/impermeable to air.</li> <li>• Metals can be recycled (1) lessen impact on environment (1).</li> </ul> <b>Credit will be given for all valid points</b>	2	
	(ii) <b>One</b> mark is available. <b>One</b> mark for describing one disadvantage. Explanations with examples required. <ul style="list-style-type: none"> <li>• Metal are expensive to produce as the raw materials are costly.</li> <li>• There is an environmental impact on the production of metals.</li> <li>• Metals are heavy for the consumer to carry.</li> <li>• Some foods are not suitable for metal packaging.</li> </ul> <b>Credit will be given for all valid points</b>	1	

Question		Answer	Marks	Guidance	
				Content	Levels of response
1	(e)	<p><b>Points may include:</b></p> <ul style="list-style-type: none"> <li>• Less packaging on food products.</li> <li>• Biodegradable, compostable or recyclable materials used in food packaging.</li> <li>• Clear labelling allows consumers to identify the origins of food eg air miles</li> <li>• Promotion of local produce and seasonal produce.</li> <li>• Supporting food produced from sustainable sources eg marine fishing policy</li> <li>• Supporting farming practices which are environmentally responsible eg LEAF</li> <li>• Increasing the range of organic products.</li> <li>• Minimising food waste through accurate ordering and having partnerships with charities that support disadvantaged people in the community eg FareShare</li> <li>• The responsible sourcing of food products which protect the natural environment.</li> <li>• Reducing or eliminating the use of GM crops, or ingredients or additives from GM crops in food.</li> <li>• Collaboration between trading partners in the transport of food can be used to reduce fuel emissions.</li> <li>• Reducing carbon emissions during the processing and manufacturing of food products.</li> </ul> <p><b>Credit will be given for all valid points</b></p>	6		<p><b>Level 3 (5-6 marks)</b> Candidates should be able to demonstrate clear knowledge on how food manufacturers are responding to these concerns. The explanation will show detailed understanding. The information will be expressed clearly and fluently with relevant details used to illustrate the explanation. Subject specific terminology will be used and there will be few, if any, errors of grammar, punctuation or spelling.</p> <p><b>Level 2 (3-4 marks)</b> Candidates should be able to demonstrate satisfactorily knowledge on how food manufacturers are responding to these concerns. The explanation will show understanding. The information may be expressed well and appropriate details used. Some subject specific terminology will be used and there will be occasional errors of grammar, punctuation or spelling.</p> <p><b>Level 1 (0-2 marks)</b> Candidates should be able to demonstrate superficial knowledge how food manufacturers are responding to concerns. They will show very limited understanding. The information may be poorly expressed and errors of grammar, punctuation and spelling will be intrusive.</p>
			<b>Total</b>		
			<b>25</b>		

Question		Answer	Marks	Guidance	
				Content	Levels of response
2		<p><b>Answers may include:</b>  <b>The main minerals:</b>  <b>Iron</b></p> <ul style="list-style-type: none"> <li>• Iron from animal sources (<i>haem iron</i>) is better absorbed than iron from plant sources (<i>non-haem iron</i>). The main sources of iron are meat, offal, dried fruit, red kidney beans, cocoa, bread, cereal products, potatoes and vegetables.</li> <li>• Non-haem iron is present in the food as ferric iron, which cannot be absorbed by the body. Before it can be absorbed, it has to be changed into ferrous iron. Vitamin C is required in this process.</li> <li>• Iron is needed for the formation of <i>haemoglobin</i> in red blood cells, which transport oxygen from the lungs to body tissues.</li> <li>• Iron is required for normal energy metabolism, and for metabolism of drugs and foreign substances that need to be removed from the body.</li> <li>• The immune system also requires iron for normal function.</li> </ul> <p><b>Calcium</b></p> <ul style="list-style-type: none"> <li>• Vitamin D promotes the absorption of calcium</li> <li>• Calcium is the main constituent of <i>hydroxyapatite</i>, the principal mineral essential for building and maintaining healthy bones and teeth.</li> <li>• Calcium is needed for contraction of the muscles, including the maintenance of a regular heart beat, and for nerve function. It is involved in blood clotting.</li> </ul>	25		<p><b>Level 4 (19-25 marks)</b>  The candidate demonstrates an accurate knowledge of the role of mineral elements in maintaining good health. The explanation will show detailed understanding. 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.</p> <p><b>Level 3 (13-18 marks)</b>  The candidate demonstrates a good knowledge of the role of mineral elements in maintaining good health. The explanation 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 are able to explain satisfactorily.</p> <p><b>Level 2 (7-12 marks)</b>  The candidate demonstrates some knowledge of the role of mineral elements in maintaining good health. The explanation 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.</p>

Question		Answer	Marks	Guidance	
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		<ul style="list-style-type: none"> <li>• Too little calcium in the diet of children can result in stunted growth and rickets. In adults, too little calcium in the diet can result in osteomalacia.</li> </ul> <p><b>Phosphorus</b></p> <ul style="list-style-type: none"> <li>• Phosphorus is essential for bone and tooth structure. Calcium phosphate provides the strength of bones and teeth.</li> <li>• It is needed for the release of energy from cells.</li> </ul> <p><b>Potassium</b></p> <ul style="list-style-type: none"> <li>• Potassium has a complementary action with sodium in the functioning of cells, including nerves.</li> <li>• It is essential for water and electrolyte balance.</li> <li>• Potassium has a beneficial blood pressure-lowering effect in people with raised blood pressure because it can counter the effects of sodium.</li> </ul> <p><b>Zinc</b></p> <ul style="list-style-type: none"> <li>• Zinc is an essential constituent of over 100 enzymes, and plays a part in protein and carbohydrate metabolism.</li> <li>• It is needed for the functioning of the immune system and in the structure and function of the skin and, therefore, in wound healing.</li> </ul> <p><b>Magnesium</b></p> <ul style="list-style-type: none"> <li>• Magnesium is an essential constituent of all cells and is needed for the functioning of some enzymes involved in normal energy metabolism and electrolyte balance.</li> <li>• It is also needed for nerve, muscle and brain function.</li> </ul>			<p><b>Level 1 (0-6 marks)</b> The candidate demonstrates superficial knowledge of the role of mineral elements 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.</p>

Question		Answer	Marks	Guidance	
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		<p><b>Fluoride</b></p> <ul style="list-style-type: none"> <li>• Fluoride is also found in most types of toothpaste.</li> <li>• Fluoride contributes to the maintenance of bone health by supporting bone mineralisation.</li> <li>• By combining with calcium phosphate to form calcium fluorapatite, fluoride protects the teeth by hardening tooth enamel, thereby increasing resistance against dental decay (caries)</li> </ul> <p><b>Sodium.</b></p> <ul style="list-style-type: none"> <li>• Sodium and potassium are involved in the transmission of nerve impulses and muscle contraction.</li> <li>• Sodium is present in the soft tissues and body fluids and helps regulate body water content and electrolyte balance.</li> <li>• Low intakes of sodium results in muscle cramps; a deficiency of sodium is linked with heat exhaustion.</li> </ul> <p><b>Iodine</b></p> <ul style="list-style-type: none"> <li>• The amount of iodine in plant foods such as vegetables and cereal grains depends upon how much is present in the soil or water.</li> <li>• Rich sources of iodine are seafood's and edible seaweed; some iodine is also found in meat, eggs, milk and dairy products.</li> <li>• Iodine is absorbed in the thyroid gland in the neck where it is converted into two hormones – <i>Triiodothyronine</i> and Thyroxine.</li> <li>• The swollen neck is called a <i>goitre</i>.</li> </ul> <p><b>Credit will be given for all valid points</b></p>			

Question		Answer	Marks	Guidance	
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3		<p>Answers may include:</p> <ul style="list-style-type: none"> <li>• Food additives are substances added to foods to perform specific functions.</li> <li>• Food additives allow manufacturers to produce a wide range of food products to meet consumer demands for greater choice and convenience eg margarine, ice cream, chilled ready meals</li> <li>• The three main groups of food additives <ul style="list-style-type: none"> <li>- Natural eg from natural products, paprika</li> <li>- Nature identical eg made to the same chemical formula as natural products caramel</li> <li>- Artificial made entirely from chemicals eg saccharin</li> </ul> </li> </ul> <p>The use of additives:</p> <ul style="list-style-type: none"> <li>- Maintaining the quality of food until it's ready to be eaten</li> <li>- Improving the appearance and taste of food</li> <li>- Prolonging the shelf life of a product</li> <li>- Keeping the price of the food competitive</li> <li>- Improving the nutritional profile of a food product</li> </ul> <p><b>Preservatives</b></p> <ul style="list-style-type: none"> <li>• To maintain freshness and inhibit the growth of microorganisms. Food can be transported greater distances and stored longer. eg sulphur dioxide in many processed foods</li> <li>• Are used to help keep food safe for longer. Any processed food with a long shelf-life is likely to include preservatives, unless another way of keeping it has been used, such as freezing, canning or drying. Traditional methods using sugar, salt and vinegar are still used to preserve some foods.</li> </ul>	25		<p><b>Level 4 (19-25 marks)</b> The candidate demonstrates an accurate knowledge the role and function of food additives in the food industry. The explanation will show detailed understanding. 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.</p> <p><b>Level 3 (13-18 marks)</b> The candidate demonstrates a good knowledge of the role and function of food additives in the food industry. The explanation 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 are able to explain satisfactorily.</p> <p><b>Level 2 (7-12 marks)</b> The candidate demonstrates some knowledge of the role and/or function of food additives in the food industry. The explanation 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.</p>

Question			Answer	Marks	Guidance	
					Content	Levels of response
			<p><b>Colours</b></p> <ul style="list-style-type: none"> <li>To make food look attractive, meet consumer expectations and restore colour which may have been lost during processing of some food, colour can be lost so additives are used to restore the original colour, for example canned marrow fat peas.</li> <li>Colour additives can also be used to make the existing food colour brighter, for example, enhance the yellowness of custard. Colours are either natural (eg curcumin is a yellow extract of turmeric roots), nature identical or artificial.</li> </ul> <p><b>Antioxidants</b></p> <ul style="list-style-type: none"> <li>Reduce the chance of oils and fats in foods from combining with oxygen and changing colour or turning rancid. Rancid fats smell and taste unpleasant and are a health risk.</li> <li>Antioxidants are also used in fruits, vegetables and juice to extend the shelf life. Antioxidants slow down enzyme activity in fruit and vegetables extending shelf life and delay the process of rancidity in fats</li> </ul> <p><b>Flavourings</b></p> <ul style="list-style-type: none"> <li>To improve a specific characteristic of a food product eg strawberry yoghurt with a strawberry flavour.</li> <li>Used widely in savoury foods to make the existing flavour in the food stronger. Monosodium glutamate is an example of a flavour enhancer.</li> </ul>			<p><b>Level 1 (0-6 marks)</b> The candidate demonstrates superficial knowledge of the role and/or function of food additives in the food industry. 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.</p>

Question		Answer	Marks	Guidance	
				Content	Levels of response
		<p><b>Emulsifiers, stabilisers, gelling agents and thickeners</b></p> <ul style="list-style-type: none"> <li>• Emulsifiers and stabilisers allow fat and water to be mixed together to create low fat spreads. They also give food products a smooth, creamy flavour.</li> <li>• Emulsifiers help mix together ingredients like oil and water that would normally separate; stabilisers prevent them from separating again. They are used in foods such as ice-cream.</li> <li>• Gelling agents are used to give foods a gel-like consistency while thickeners increase the viscosity of foods eg pectin in jams</li> </ul> <p><b>Nutrient enrichment</b></p> <ul style="list-style-type: none"> <li>• Vitamins and minerals are added to products to replace the nutrients lost during processing eg breakfast cereal</li> <li>• Vitamins are added to give health benefit to certain groups you may suffer a deficiency eg folic acid in bread.</li> </ul> <p><b>Sweeteners</b></p> <ul style="list-style-type: none"> <li>• Intense sweeteners (for example saccharin and aspartame) are many times sweeter than sugar and so are only used in tiny amounts. This makes them suitable for use in products such as diet drinks, which are very low in energy.</li> <li>• Bulk sweeteners (such as sorbitol) have a similar sweetness to sugar so are used in similar amounts.</li> </ul> <p><b>Other uses</b></p> <ul style="list-style-type: none"> <li>• To develop an existing product range eg potato crisps with various new flavours</li> <li>• To help maintain the consistency in large scale production eg anti foaming agents to reduce foaming in jams</li> </ul>			

Question		Answer	Marks	Guidance	
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		<ul style="list-style-type: none"> <li>• Anti caking agents ensure that dried food products or food crystals remain free flowing eg salt has calcium silicate added</li> <li>• Thickening agents are used to produce a product with desirable consistency eg tinned custards</li> <li>• Flour improvers are added to the flour during the bread making process to produce a stronger and more elastic dough</li> <li>• Raising agents produce a lighter texture to a baked product eg bicarbonate of soda</li> </ul> <p><b>Credit will be given for all valid points</b></p>			
4		<p>Answers may include: Choice of fats and oils in the diet</p> <ul style="list-style-type: none"> <li>• Animal-derived fats tend to be solid at room temperature. Animal fats consist of 50–65 per cent saturated fatty acids.</li> <li>• Butter is not pure fat, but an emulsion of water in oil. Ghee is made by heating and clarifying butter. Lard comes from pigs' fat. Suet is obtained from the shredded fat of cattle or sheep.</li> <li>• Fish oils contain a high proportion of unsaturated fatty acids. Fish oils are rich in n-3 fatty acids, vitamins A and D, and are used for vitamin supplements.</li> <li>• Nuts, pulses, seeds and cereals are used to make oil.</li> <li>• Vegetable oils are often a rich source of unsaturated fatty acids.</li> <li>• Oils are liquid at room temperature. Some of the most common oils used in food production are olive oil, sunflower oil and corn oil.</li> </ul>	25		<p><b>Level 4 (19-25 marks)</b> The candidate demonstrates an accurate knowledge of the advantages and disadvantages of the choice and use of fats and oils in food preparation and cooking the diet. The will show detailed understanding. 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.</p> <p><b>Level 3 (13-18 marks)</b> The candidate demonstrates a good knowledge of the advantages and disadvantages of choice and use of fats and oils in food preparation and cooking. The discussion will show understanding. The information will be presented clearly and some subject</p>

Question		Answer	Marks	Guidance	
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		<ul style="list-style-type: none"> <li>Margarine is made from a mixture of highly unsaturated oils such as rapeseed and sunflower oils.</li> <li>Margarine is made by the process of hydrogenation.</li> <li>Cholesterol lowering spreads.</li> </ul> <p><b>Use of fats/oils</b></p> <ul style="list-style-type: none"> <li>Aeration in creamed cakes such as Victoria sandwich need air incorporated into the mixture in order to give a well risen texture.</li> <li>Flavour as butter is often used in cakes, biscuits and sauces because it gives a richer and more distinctive flavour.</li> <li>Flakiness in flaky and puff pastry uses fat to produce separate layers of gluten and starch formed in the dough.</li> <li>Retention of moisture in bakery items, margarine can help retain a product's moisture and therefore increase its shelf life.</li> <li>Shortening – fats give food such as shortcrust pastry, biscuits and shortbread their characteristic short crumbly texture.</li> <li>Spreading low and reduced fat spreads are not suitable for frying or</li> <li>Baking because of their high water content.</li> <li>Sauce making – fat is used in the preparation of roux and all-in-one sauces. The fat prevents the flour particles from clumping together.</li> <li>Colour as butter provide a rich golden brown colour.</li> <li>Glazing as butter is sometimes used to glaze foods.</li> </ul>			<p>specific terminology will be used. There may be occasional errors of grammar; punctuation and spelling are able to explain satisfactorily.</p> <p><b>Level 2 (7-12 marks)</b> The candidate demonstrates some knowledge of the advantages and disadvantages of choice and use of fats and oils in food preparation cooking. 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.</p> <p><b>Level 1 (0-6 marks)</b> The candidate demonstrates superficial knowledge of the advantages and disadvantages of choice and use of fats and oils in food preparation and cooking. 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.</p>

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