OCR
RECOGNISING ACHIEVEMENT

GCE

Home Economics (Food, Nutrition and Health)

Advanced GCE

Unit **G004:** Nutrition and Food Production

Mark Scheme for June 2011

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Section A					
Question			**Expected Answers**	**Marks**	**Rationale**
1	**(a)**	**(i)**	**Retinol and beta carotene are types of vitamin A.** **Name <u>one</u> good food source of retinol.** One mark for naming one good food source of retinol • Cheese • Eggs • Oily fish (such as mackerel)/cod liver oil • Milk • Margarine • Butter • Liver/pâté	**[1]**	**Do not accept skimmed or semi skimmed milk**
1	**(a)**	**(ii)**	**Name one good food source of beta carotene.** One mark for naming one good food source of beta carotene. • Spinach/green leafy vegetables • Carrots • Red peppers • Mango • Melon • Apricots • Broccoli • Pumpkin • Sweet potato **Credit awarded for all correct responses**	**[1]**	

Section A					
Question			**Expected Answers**	**Marks**	**Rationale**
1	**(a)**	**(iii)**	**Identify <u>two</u> dietary functions of vitamin A.** Two marks are available for describing two different functions. • Vitamin A helps vision, especially in dim light. • Retinol is associated maintenance of the retina in the eye/rhodopsin. • It maintains mucous membranes that line any openings to the body e.g. nose, throat, lungs, mouth, stomach and urinary tract. • It helps tissue, bone and skin cell formation. • It is important for growth and it is essential for embryo development. • It maintains the immune system and helps fight infections. • An antioxidant prevents damage by free radicals.	**[2]**	**Do not accept protects against cancer** **Do not accept improves vision**
1	**(a)**	**(iv)**	**Identify <u>one</u> possible symptom of a vitamin A deficiency in the body.** Award one mark for one possible symptom. • Night blindness/blindness • Weakened immune system • Poor bone/tissue growth in children • Mucus membrane will deteriorate/rupture	**[1]**	**Description of night blindness is acceptable**
1	**(b)**		**Explain the relationship between vitamin C and iron in the body.** Award **one mark** for a limited statement about vitamin C and iron. • Vitamin C has a relationship with iron regarding its **absorption** into the body. Award **2 marks** for a reference to the ferrous state for adequate absorption. • Iron needs to be in a reduced ferrous state for adequate absorption. • Vitamin C helps the absorption of non haem iron because it reduces ferric iron to the absorbable ferrous state. • Haem iron (ferrous iron) is present in meat, liver, offal and meat products. • Non-haem iron (ferric iron) is found in plant foods such as cereals, vegetables, pulses, dried fruit.	**[2]**	

Section A					
Question			**Expected Answers**	**Marks**	**Rationale**
1	**(c)**		**Describe <u>two</u> reasons why foods may be fortified.** Two marks are available for explaining two different reasons. • **Restore nutrition (1).** Important nutrients are lost during processing so must be restored e.g. by law in the UK, iron, thiamine and niacin must be added back to white and brown flour (1). • **Provide alterative choice (1).** To produce a substitute product with similar nutritive value. In the UK it is compulsory by law that margarine has vitamins A and D added to levels comparable with butter (1). • **To reduce deficiency diseases (1).** Nutrients may be added to foods irrespective of whether or not the nutrients are originally present in the food to help prevent disease (1). • **To offer technical benefit/improves shelf life (1).** Vitamin C is an antioxidant and can reduce the rate of spoilage in some products (1). • **To cater for special nutritional needs (1).** Meal replacements, sports drinks, slimming products, and foods aimed at particular groups, are often fortified making an important contribution to the diet of people who eat them (1). • **To make a marketing claim (1).** It provides the food manufacturer with an opportunity to make a claim, which may help to sell a product (1). • **Nutrients added by law (1)** to ensure people consume enough of the nutrients required for a balanced diet eg white flour and calcium (1) • **To improve the nutritional quality of the product**. Calcium added to bread. Vitamins A & D added to margarine.	**[4]**	
1	**(d)**	**(i)**	**Give <u>two</u> reasons why sensory analysis tests are used in food production.** Two marks are available for **fully** explaining two different reasons. • Evaluating new and established food products/ways to improve (1) • Save the manufacturer money if a new product tastes unacceptable consumer will not purchase it again (1). • Analyse a test kitchen sample for improvements (1)	**[2]**	**Do not accept**, to see if it is good or bad/edible

Section A					
Question			**Expected Answers**	**Marks**	**Rationale**
			• Establish consumer response to a product/acceptability/specific quality/appearance/texture e.g. crispiness (1). • Check that a product meets its original specification (1) • To monitor and maintain quality (1) ensure outcomes are consistent (1). • After changes to the production process or ingredients used (1)		

Section A					
Question			**Expected Answers**	**Marks**	**Rationale**
1	**(d)**	**(ii)**	**Describe <u>two</u> different types of sensory analysis test.** One mark for a **correctly identified test** and one mark for a description. **Preference tests or acceptance.** These tests are used to evaluate the acceptability of a product by finding out opinions. The information gathered is subjective and large numbers of consumers are required to complete the testing. • **Paired preference tests**. A tester is presented with two samples and asked which they prefer. • **Hedonic ranking** or descriptors allow the consumer to rank the product in order of preference. These tests are used to screen the best samples from a group. **Differences tests** can also be conducted to highlight specific change to a product eg reduced sugar. They are objective tests. • **Paired comparisons** help a product developer confirm what they can predict about a particular product eg reduced fat may make a biscuit harder. • **Triangle test /Duo -Trio Test** can be used to demonstrate small differences between products. Three coded samples are presented together; one is the odd one out. This is used to detect small differences between products. • **Duo-trio test** can be used when a smaller sample is required. 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, which is different from the control. • **Two Out of Five test** is used to see if differences can be detected between two products. Three samples are identical and two are the same. • **Taste threshold test**. This test is occasionally used to find out the lowest minimum quality of an ingredient or substance which can be added to a product before a noticeable change occurs eg Flavour, colour.	**[4]**	

Section A					
Question			Expected Answers	Marks	Rationale
			Grading tests can be used to produce a ranking, rating and profiling of a product. Trained testers can also assess the flavour or texture of a product to provide a sensory profile. These tests assess the intensity of specific sensory qualities. • **Ranking test** is used to sort a variety of foods into order (eg Different flavoured crisps made by one manufacturer) • **Ranking Test with descriptor** used to place a variety of one type of food into order eg Flavour of tomato soups processed by different methods. • **Rating test** allows people to show how much they either like or dislike a variety of products eg Tasting the flavour of different biscuit bases in a cheesecake. • **Rating Test with descriptor** used to show how much tasters like or dislike several aspects of one product eg flavour, colour, nutrition of a cold dessert or an aspect of several products. • **Star diagram/profile is** used to describe the appearance, taste and texture of a food product. It can be used to record the suitability of other products eg packaging.		

Section A					
Question			**Expected Answers**	**Marks**	**Rationale**
1	**(e)**		**Describe <u>three</u> different methods used to advertise and launch new food products in a supermarket.** One mark for a correctly identified method and one mark for a description. Answers may include: • **Price promotions** include 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/ frequent user/loyalty cards** with personalised mail shots may help to promote a new food product. Money off coupons can be found in a number of sources including on food packaging, newspapers, till receipts, magazines, leaflet and flyers in store. • **Gift with purchase** can be products aimed at children and brand collectables. • **Competitions and prizes** may appeal to families with children eg days out at theme parks. • **Link promotions** can be used to increase sales, for example 'Dine in for £10' deal, from any three products. • **Product placement** in the entrance to the store can be used to promote a special offer as the consumer has to walk past this area to shop. End of aisles displays or eye level shelving are effective areas for marketing new products or special offers. A promotional area linking food products or a "theme" display could also be used. Point-of-sale displays for small inexpensive snack products. • **In store televisions with the touch screen/announcements** to display offers, ideas and information to the consumer is also used by some retailers. • **Displays and In-store signage/carpark** on the floor, ceiling, doors and shelving can be used to promote goods. In large supermarkets even the shopping trolley can carry information about deals available in store. • **Price comparisons with other supermarkets** to show value/enhance loyalty. • **In store demonstrations and taste sessions/free samples** are a valuable method of promoting a new food product.	**[6]**	**IN the supermarket - do not accept TV, radio, magazines**

Section A					
Question			**Expected Answers**	**Marks**	**Rationale**
			• **Free recipe leaflets/supermarket magazine** may be available in store or recipes can be included on the food packaging to give further ideas for use. • **Charity endorsement and quality assurance schemes** e.g. British Heart Foundation. The use of logos and symbols such as the 'Red Tractor' logo or RSPCA 'Freedom Food' symbol can also influence purchasing.		
1	**(f)**		**Explain the term malnutrition.** One mark for an explanation that acknowledges a **deficiency or excess/imbalance** of nutrients (1). One mark for malnutrition causes **adverse effects on health and wellbeing** (1).	**[2]**	**Accept do not have a balanced diet – 1 mark**

Section B					
Question			**Expected Answers**	**Marks**	**Rationale**
2			**Explain the nutritional and dietary needs of pregnant and lactating women.** **High 19-25** The candidate demonstrates an accurate knowledge of the nutritional and dietary needs of pregnant and lactating women. 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. **Middle 13-18** The candidate demonstrates a good knowledge of the nutritional and dietary needs of pregnant and lactating women. 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. **Middle 7-12** The candidate demonstrates some knowledge of the nutritional and dietary needs of pregnant and lactating women. 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. **Low 0-6** The candidate demonstrates superficial knowledge of the nutritional and dietary needs of pregnant and lactating women. 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.	**[25]**	

Section B					
Question			Expected Answers	Marks	Rationale
			Answers may include: **Nutritional and dietary needs of pregnant women** • The nutrients required the pregnant woman needs will be provided by a healthy balanced diet. The daily diet should consist of – Fresh fruit and vegetables eg dark green vegetables are a good source of folate. – Starchy carbohydrates eg bread, pasta, potatoes and cereals. – Dairy products eg milk, yoghurt and cheese. – Lean meat and fish. – Fish is an excellent source of essential fatty acids, the advice is not to have more than two portions of oily fish per week – Drink water to keep fluid levels up. • Energy intake should be increased from the 28 weeks into the pregnancy by 200kcals. • Protein intake should increase during pregnancy by 6g a day. • Vitamin B1 should increase after 28 weeks and B2 from the onset. • Vitamin A, C and D also increase slightly. • Weight gain is recommended to be no more than 12kg. • Current advice is that women who are planning to become pregnant or who are pregnant should take a 400mcg folic acid until the twelfth week of pregnancy. • Most women would get sufficient quantities of iron from a balanced and varied diet. Haem iron is easily sourced from red meat. Non-haem iron is obtained from sources such as eggs, cereals, green vegetables, nuts and pulses. It is important to remember that if vitamin C is consumed from fruit, fruit juices and vegetables this will enhance the absorption of non-haem iron. • Whole meal products aid digestion and help prevent constipation. Avoid shark, swordfish and marlin and limit tuna to no more than two tuna steaks per week, or four medium sized cans. This is because of the levels of mercury which can harm a babies developing nervous system. • Cook meat thoroughly and wash all fruit and vegetables before eating to avoid toxoplasmosis which can affect the unborn baby.		

Section B					
Question			Expected Answers	Marks	Rationale
			• Pregnant woman are advised not to take supplements of vitamin A or eat liver which is extremely rich in vitamin A due to the possible risks of birth defects. • Brie, Camembert, mould ripened goats and sheep's milk cheeses such as Chevre, and blue veined cheeses such as stilton should be avoided because of the possible risk of food poisoning bacteria which can lead to premature birth and miscarriage. • If ready meals are eaten make sure they are stirred well and cooked till they are piping hot because ready meals can also be a food poisoning risk. • Part cooked meats should also be avoided to minimise the risk of food poisoning. • Do not drink unpasteurised milk, only drink pasteurised or UHT milk. • Raw eggs should not be eaten either because of the risk of salmonella. • There is some evidence to suggest that it may be safer to avoid peanuts in pregnancy if there is a family history of peanut allergy. • Advice from the Food Standards Agency suggests that pregnant women should limit their intake of caffeine. It is recommended that a pregnant woman should drink no more that four cups of coffee a day. • Continuous heavy drinking of alcohol can cause permanent brain damage and developmental damage in the foetus. Avoid all alcohol if possible. **Nutritional and dietary needs during lactation** • During pregnancy fat reserves are laid down to provide some of the energy requirement needed for breast milk production. • As the baby is weaned the energy requirements will reduce to pre pregnancy levels. Current research suggests that an extra 300 to 400 kcal per day is adequate during lactation. • Protein intake should increase during lactation initially by 11g a day, after 4 months by 8g a day. • Additional requirements of protein, all the vitamins (except B6), calcium, phosphorus, magnesium and zinc are required. • Whilst breastfeeding the same balanced and healthy diet ideally followed during pregnancy should be continued.		

Section B					
Question			**Expected Answers**	**Marks**	**Rationale**
			• Foods rich in starchy carbohydrates, protein, calcium and iron are important. • Fluid is very important, so it is recommended that between eight to twelve glasses of water a day are drunk, this helps the body produce the milk needed to feed the baby. • Substances such as caffeine, and alcohol can pass from the blood in to breast milk so excessive amounts should be avoided. • Soft cheeses and pate do not need to be avoided as they were in pregnancy. • If there is a peanut allergy in the family then it may be beneficial to avoid eating peanuts when breastfeeding. • With regard to alcohol, there is no evidence to suggest that small quantities of alcohol affect the baby. It is advisable to either not drink at all, or wait a couple of hours before feeding after a drink. **Credit will be given for all valid points.**		

Section B					
Question			**Expected Answers**	**Marks**	**Rationale**
3			**Explain the nutritional value, choice and use of eggs.** **High 19-25** The candidate demonstrates an accurate knowledge of the nutritional value, choice and use of eggs. 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. **Middle 13-18** The candidate demonstrates a good knowledge of the nutritional value, choice and use of eggs. 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. **Middle 7-12** The candidate demonstrates some knowledge of the nutritional value, choice and use of eggs. 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. **Low 0-6** The candidate demonstrates superficial knowledge of the nutritional value, choice and use of eggs in the diet. 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. Answers may include: **Nutritional value** • Eggs contain valuable amounts of iron and high biological value protein. They are also a good source of fat, vitamin A and calcium, and contain a small amount of vitamin D and B group vitamins.	**[25]**	

Section B					
Question			Expected Answers	Marks	Rationale
			• A medium-size egg has an energy value of 76 kcal. • The fat content of an egg is 10.8 per cent, which is found almost entirely in the yolk; less than 0.05 per cent fat is contained in the albumen. • Egg white mainly consists of water, dissolved salts, and proteins called ovalbumin and ovomucoid. It also contains the B vitamin riboflavin. • Egg yolk is approximately half water, one-third fat and one-sixth protein. It also contains calcium, iron, vitamin A, vitamin D, vitamin E, riboflavin, thiamine and niacin. **Choice** • The term 'egg' applies to all edible eggs of birds such as hens, ducks, quails, geese. Hens' eggs are most commonly eaten in the UK • Eggs are graded by size and quality according to European Union regulations, Small 53 g or under, Medium 53–63g, Large 63–73g, Very large – 73g and above. • There has been much publicity about the systems of egg production in the UK. The main systems of egg production in the UK are battery farming (intensive), deep litter (semi-intensive), barn and free range. **Uses of eggs** **Coagulation** • Quality baked products containing eggs should be a smooth, tender, non-porous gel. • The egg products used in the manufacture of baked products are pasteurised dried, frozen or liquid chilled. • The proteins in an egg coagulate during the cooking process. • The egg white will coagulate at temperatures between 60°C and 65°C. This result in the egg white losing its transparency, when the egg reaches 70°C it becomes firm. • The egg yolk proteins coagulate at a slightly higher temperature than egg white proteins. Coagulation begins at 65°C and finishes at 70°C.		

Section B					
Question			Expected Answers	Marks	Rationale
			• In the preparation of baked dishes containing eggs it is important to avoid overcooking. The protein will denature. • If egg is over cooked the process of syneresis may occur. The texture will become porous and as the protein shrinks pockets of water are left in the baked product. • Other ingredients in the mixture can affect the coagulation process. A firmer set can be achieved at a lower temperature if the there is an increased concentration of egg proteins or an acid is added. • A looser set is achieved and higher coagulation temperature by the addition of sugar to the mixture. **Foam Formation** • A foam is formed when gases are dispersed through the liquid. The egg white foams very easily. • Egg white can be used for aeration due to the ability of the ovalbumin to stretch and hold air eg meringues and mousses. • When egg white is whisked the proteins are denatured and uncoil. This forms a 3D air/liquid matrix. This can hold air when folded into food mixtures. • The foam is unstable but the properties can be manipulated with the use of additional ingredients: – **Salt** will decrease the pH of the egg white and this increases the resistance so the foaming time is increased. This makes the foam more stable and gives a better flavour. – **Sugar** will interfere with the bonds that form as the whites uncoil. Therefore the whisking time is increased and the resulting foam is denser. However, the foam is much more stable. The property is used in the production of meringues. – **Fat** including egg yolk interferes with the development of the foam structure. It prevents new bonds being formed in the 3D matrix. Often full foam will not develop. – **Alkalis** will increase the pH of the foam decreasing the foaming time but making the foam more unstable. – **Acids** like tartaric and acetic (vinegar) will soften the foam.		

Section B					
Question			Expected Answers	Marks	Rationale
			• The ability of the whole egg to trap air can also be used in cake making by creaming and whisking methods eg Swiss roll, sponge cakes • If an egg mixture is under whisked the baked product will have poor volume. • The fat in the yolk exerting a shortening effect on the flour can enhance the texture of the baked product. • Eggs can also act as emulsifiers to assist the formation of a stable emulsion in a creamed cake mixture containing fat and sugar. • Sponge batters must be baked shortly after preparation. During baking the steam produced from the liquid in the egg expands. • The coagulated egg will also contribute to the structure of a baked product and the egg yolk to the golden colour. **Emulsification** • An emulsion is formed when one liquid is dispersed in small droplets into a second liquid with which it will not normally mix. The most common emulsion is oil in water eg milk, salad dressings or egg yolks. Emulsions usually cannot exist without an emulsifying agent. • Egg yolk has emulsification properties, which means it has the ability to hold large quantities of fat in an emulsion. • The yolk contains **lecithin**, which has a hydrophobic (water hating) component and hydrophilic (water loving) component. • When fat or oil is whisked into the yolk the lecithin can hold it in suspension and prevent it from separating out. This property is used in mayonnaise and other salad dressings. **Credit will be given for all valid points.**		

Section B					
Question			**Expected Answers**	**Marks**	**Rationale**
4			**Explain the reasons for the changes in the availability and supply of food and food products in the UK.** **High 19-25** The candidate demonstrates an accurate knowledge of the reasons for the changes in the availability and supply of food and food products in the UK. 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. **Middle 13-18** The candidate demonstrates a good knowledge of the reasons for the changes in the availability and supply of food and food products in the UK. 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. **Middle 7-12** The candidate demonstrates some knowledge of the reasons for the changes in the availability and supply of food and food products in the UK. 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. **Low 0-6** The candidate demonstrates superficial knowledge of the reasons for the changes in the availability and supply of food and food products in the UK. 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.	**[25]**	

Section B					
Question			**Expected Answers**	**Marks**	**Rationale**
			Answer may include: • More awareness about food allergies has affected food choice and supply increasing demand for 'additive free' products. • Supply chains have changed due to concerns about food safety. Food scares have the most important impact on the food industry. BSE (Bovine Spongiform Encephalopathy) crisis in1996 and foot and mouth disease in 2001 dramatically affected the UK meat industry leading to a significant fall in the sale of British meat. • The traceability of food has become significant because of food scares. • Technological developments mean that food manufacturers have been able to supply a wide range of foods products. • More food from overseas is available due to better transport systems and developments in storage environments. • Rapid transportation in a controlled environment of food perishable products increases consumer choice and food availability. • Packaging extending the shelf life of a product means less frequent shopping eg modified atmospheric packaging for raw meats and salads. • Food additives and the use of preservatives extend shelf life and product ranges. • The collaboration between suppliers and retailers to supply new products that the consumer requires is increasing eg own brands. • Food industry has increased the supply of convenience foods to respond to the trend of reduced time spent in the kitchen eg Microwave meals and cook chill meals. • Many households have Internet access and can arrange shopping and home delivery of food products. Home deliveries have increased. • Genetic modification of plants/animals can be used to reduce production costs and increase the supply of foods. Climate change presents one of the greatest threats to agricultural production and the supply of food. • Climate change and agricultural production are closely linked. Small changes in global temperatures could adversely affect areas of the world where agriculture depends upon rainfall. Many developing countries would be affected and their yields reduced.		

Section B					
Question			Expected Answers	Marks	Rationale
			• The growing demand for biofuels has meant the use of agricultural land has changed. Land that was previously used for growing cereals and staples is now used for growing crops that can be converted into biofuels. • An increase in oil prices will affect the cost and supply of food. The production, processing and distribution all require the use of energy from oil and petrol. Increases in the price of oil result in high fuel, fertiliser, transport, packaging and storage costs. Many of these costs are added to the price of food. • The expansion of the European Union to include more countries means the removal of existing trade barriers and a further opening up of markets. • Food manufacturers in the UK will operate in a barrier-free market, providing access to a wider range of suppliers as well as export opportunities. UK consumers may have access to a wider range of food products. • Fish stocks continue to decline due to over fishing. Fishing quotas have placed restrictions on the type and quantity of fish caught and this may affect the choice available to the consumer and manufacturer when developing products containing fish or purchasing fish. • New exotic species will appear in many processed fish products and be available for retail sale. • European legislation aims to make the food we eat safer and reduce the impact of food production on the environment. • European laws on pesticides and food additives are currently being modernised and as a result, restrictions on the types and levels of pesticide approved for use on food may change. • European laws restricting the use of some artificial food colourings have already resulted in the removal of some products from the UK market. • Global agricultural systems are using cereals and staple food to feed farm animals to meet the demand for meat and dairy products. This reduces the affordability of cereals and staples to the poorest consumers across the globe and can cause shortages in the UK.		

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