



## **2007 Health & Food Technology**

### **Advanced Higher**

### **Finalised Marking Instructions**

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## **Instructions to markers.**

### **General Instructions**

Each question is marked out of 25. Markers should use the full range of marks available as indicated in the mark descriptors for an A, B and C response at the top of each question.

Candidates should be awarded according to the quality of thought revealed in their answers. They should not be rewarded solely, or even mainly, according to the quantity of knowledge conveyed. In progression from Higher a more advanced grasp of the skills of analysis, synthesis and interpretation is required. Credit will be awarded according to the degree of success with which the candidate:

- gives an answer which is relevant to the question and is explicitly related to the terms of the question
- is able to make the various distinctions required by the question
- responds to all the elements in the question in a coherent manner
- applies knowledge and explains, analyses, discusses rather than simply stating facts
- develops the skills of analysis and evaluation through critical appraisal.

## Section A

(a) Outline the main issues identified in the report.

**Mark allocation:** 5 marks

**A – 4-5 marks**

The candidate is able to clearly outline the majority of the main issues of the report.

**B – 3 marks**

The candidate is able to outline most of the issues of the report.

**C – 2 marks**

The candidate is able to list some of the main issues of the report.

**Answers should make reference to the following points:**

1. scientists think there may be link between poor diet at crucial stages of pregnancy and obesity
2. it is thought dietary habits during pregnancy may 'programme' babies to have larger appetites in adulthood
3. imbalance in appetite controlling hormones of pregnant women may affect the baby's ability to regulate their own appetite
4. the baby can't control its appetite when in the womb as nutrition comes from the placenta, hormones from the mother may over/desensitise its own control pathway
5. it is hoped research may be able to identify when and how the baby's brain is affected during pregnancy and what levels of nutrition are appropriate
6. Scotland has one of the highest obesity levels in Europe – 21% of adults are obese
7. by 2020 it is predicted that 33% of adults and 50% of children will be obese
8. a diet rich in saturated fats during pregnancy has been linked with later development of breast cancer in children
9. fats and carbohydrates eaten during pregnancy may increase risk of maternal diabetes
10. children are more likely to become overweight adults if their parents are obese
11. diet during pregnancy may be one explanation of this
12. genetics may also impact on obesity
13. overeating is the main cause of obesity, implying it is caused in the womb may give people an excuse to do nothing about it
14. consumption of oily fish for girls and women should be limited due to potential damage from PCB's and dioxins
15. some people believe pregnancy is a stressful enough time and pressure about diet will increase this stress.

(b) Discuss the long term implications for health which may result from a poor diet during pregnancy.

**Mark allocation:** 10 marks

**A – 8-10 marks**

The candidate is able to develop a full and coherent discussion of the implications for health of a poor diet during pregnancy. The discussion shows good analysis and the identification of the main points with full explanations.

**B – 6-7 marks**

The candidate is able to develop a discussion of the implications for health of a poor diet during pregnancy. Most of the main points will be identified with some explanation.

**C – 4-5 marks**

The candidate will be able to identify some of the main points with limited explanation.

1. A diet deficient in folic acid before conception and in the first 3 months of pregnancy may increase the risk of the baby being born with neural tube defects.
2. A diet low in vitamin D can lead to low birth weight and tetany in the baby.
3. A diet low in vitamin D may result in poor calcium absorption and as a result the formation and calcification of the baby's bones may be affected.
4. A diet low in calcium may result in the formation and calcification of the baby's bones being affected.
5. A diet low in calcium/Vitamin D may lead to decalcification of teeth of mother.
6. A diet low in calcium/Vitamin D may lead to osteomalacia/osteoporosis for mother in later life.
7. A diet high in fat/sugar may result in the mother gaining weight during pregnancy which may be difficult to lose after the birth and so she may have long term weight and associated health problems such as varicose veins, diabetes, arthritis.
8. A diet high in fat and sugar may result in the mother becoming overweight. This may increase her risk of high blood pressure which in turn increases the risk of pre eclampsia. This could involve the baby being low birth weight/premature and many long term complications could arise.
9. Saturated fats during pregnancy has been linked to later development of breast cancer in children.
10. A diet very high in vitamin A is associated with birth defects many of which have long term implications.
11. Diet low in iron during pregnancy can affect brain development of foetus due to lack of oxygen.
12. An adequate supply of protein is essential for the normal growth and development of the foetus.
13. A diet low in NSP may result in constipation and in the longer term haemorrhoids.
14. Poor diet during pregnancy may lead to obesity problems linked to CHD, HBP for the baby in later life.
15. Essential fatty acids are required throughout pregnancy for brain growth and development.
16. Too much oily fish consumed during pregnancy because of the high level of contaminants could cause the development of the unborn baby to be affected.
17. Drinking alcohol during pregnancy, especially in large quantities (alcoholism) may in some cases result in foetal alcohol syndrome, this may affect growth, brain development, mental retardation and organ defects.
18. Unpasteurised dairy products which may be contaminated by listeria can cause miscarriage or the baby itself can become infected.

(c) Critically discuss the role of the parent in preventing childhood obesity.

**Mark allocation:** 10 marks

**A – 8-10 marks**

The candidate is able to critically discuss the statement giving full analysis.

**B – 6-7 marks**

The candidate is able to critically discuss the statement giving some analysis.

**C – 4-5 marks**

The candidate is able to critically discuss the statement giving limited analysis.

**Development of sensible eating habits**

1. Parent's eating habits are passed on to their children and children learn to like foods made by parents, there is an opportunity to make the foods eaten lower in fat.
2. Lifelong eating habits are established in childhood so it is vital good habits are established in childhood.
3. Encouraging the eating of a variety of foods at an early age is likely to promote good eating habits throughout life.
4. Eating the correct balance of foods/nutrients contributes to the maintenance of a healthy weight/reduces risk of obesity.
5. Eating proper meals will reduce the need to snack on fatty sugary foods which are high in calories.
6. Children may be unwilling to try new healthy options if they have not seen and tried them at home, so offer a wide range of foods to children.
7. Financial situation of the family may mean that foods consumed at home are limited, these limited choices may be a cause for similar unhealthy choices at school.
8. Sensible eating habits during pregnancy reduce the risk of childhood obesity.
9. Educating children by encouraging them to work with food and help cook their own meals can lead to an informed attitude towards food and its function in the body.
10. Education from parents – teaching children about nutrition and teaching about foods/food choices.
11. Foods purchased by parents can affect foods eaten.

**Attitudes towards food**

1. If food is used as a comfort it can lead to eating for the wrong reasons and may lead to obesity.
2. If food is used as a treat it can lead to eating for the wrong reasons and may lead to obesity.
3. Encouraging meals to be a social occasion may mean more time is spent eating so a greater feeling of fullness which leads to less snacking/grazing.
4. If meals are seen as a social occasion then there is less eating on ones own which is often when overeating takes place.
5. Family meals encourage children to try new foods so this could reinforce good eating habits.

**Changes to exercise patterns**

1. Parents can encourage children to exercise more by setting a good example and exercising themselves.
2. Parents can walk children to school instead of taking the car.
3. Parents can take children to the park, swimming lessons etc and make exercise part of their life.

## Section B

1. “Average intake of fruit and vegetables to double to more than 400 grams per day”

*Scottish Dietary Targets, Meeting the Challenge (2005)*

(a) Discuss the implications for health of a diet rich in fruit and vegetables.

**Mark allocation:** 10 marks

### **A – 8-10 marks**

Candidates are able to develop a full and coherent discussion of the implications for health of a diet rich in fruit and vegetables. The discussion shows good analysis and the identification of the majority of the main points with full explanations.

### **B – 6-7 marks**

Candidates are able to develop a discussion of the implications for health of a diet rich in fruit and vegetables. Most of the main points will be identified with some explanations.

### **C – 4-5 marks**

Candidates are able to identify some of the main points with limited explanations.

### **Answers should make reference to the following points:**

- usually have a high water content so will contribute to liquid intake for the day/help prevent constipation
- their content of indigestible carbohydrate (cellulose) makes them important due to the production of NSP
- high NSP content fills you up and helps to prevent snacking on high fat/sugary foods – prevents obesity
- low in fat can help prevent obesity and CHD
- NSP can bind with the bile salts to lower cholesterol levels
- good source of Vitamin C and beta carotene – anti-oxidants
- Vitamin C will help prevent anaemia
- add variety to the diet – crunchy texture/colour encouraging their consumption
- vegetables can be good source of mineral elements particularly iron, folate
- vegetables such as peas, beans, corn, potatoes contain varying amounts of carbohydrate needed by the body for energy. In nature they contain sugar which is replaced by starch on maturity.
- pulses are a good source of cheap protein – growth, repair and maintenance of body cells and tissue
- pulses are a good source of lysine – protein
- pulses when eaten in combination can supply all the essential amino acids
- pulses have the lowest fat content of any protein food
- pulses are a good source of NSP – prevents bowel disorder
- naturally sweet – prevents snacking on processed sugars which increase tooth decay
- cruciferous vegetable (cauliflower, brussel sprouts, cabbage and broccoli) contain indoles a type of phytochemical which may offer some protection against cancer
- indoles prevent carcinogens from damaging DNA
- phytochemicals are not considered nutrients but can reduce the risk of cardiovascular disease, cancers and problems associated with ageing
- brussel sprouts can protect against some types of breast cancer. The indoles stimulate the liver to break down the hormone oestrogen
- yellow and red vegetables/fruits are high in carotenoids which function as anti-oxidants and can be converted into retinol (vitA) in the small intestine

22. vegetables produce flavanoids which act as anti-oxidants to block damage by free radicals to cells
23. overwhelming evidence that plant-based diet can reduce risk of chronic disease, particularly cancer
24. cancer risk in people consuming diets high in fruits and vegetables was only one-half that in those consuming few of these foods
25. frequent consumption of cruciferous vegetables are associated with decreased cancer risk
26. citrus fruits are particularly high in class of phytochemicals known as limonoids which can have a protective effect against variety of human cancers
27. certain vegetables are high in potassium which helps to lower blood pressure
28. fruit and vegetables are low in sodium so can help lower blood pressure
29. if fruit/vegetables have been irradiated there may be a lower vitamin content
30. recent research indicates that some fruit acids eg apples can erode tooth enamel increasing the risk of tooth decay.

(b) Critically discuss the factors which may hinder the achievement of this target.

**Mark allocation:** 15 marks

**A – 12-15 marks**

The candidate is able to critically discuss the factors which may hinder the achievement of this target, giving full analysis.

**B – 9-11 marks**

The candidate is able to critically discuss the factors which may hinder the achievement of this target, giving some analysis.

**C – 7-8 marks**

The candidate is able to critically discuss the factors which may hinder the achievement of this target, giving limited analysis.

**Candidates should make reference to the following points:**

**Knowledge**

1. lack of knowledge of how much fruit and vegetables to eat, more than half the population – 52% have still to be educated about healthy eating
2. link between knowledge and practice is poor
3. effectiveness of the healthy eating message/publicity campaign re fruit and vegetables is poor
4. need to change eating habits by practical measures not just inform consumers
5. lack of fruit and vegetable advertising – strong advertising for other snacks
6. lack of understanding of what constitutes a portion of fruit and vegetables
7. lack of knowledge re preparation and cooking of some fruit and vegetables
8. lack of awareness of health benefits of eating fruit and vegetables
9. lack of awareness that frozen vegetables, particularly bulk buying, is cheaper and just as nutritious as fresh.

**Climate**

1. many fruit and vegetables cannot be grown in Scotland due to the climate – restricted range. Transportation adds to the cost.

**Cost/Perceived Cost**

1. cost issues related to initial purchase of fruit and vegetables – affects variety/range of fruit and vegetables eaten
2. cost related to wastage of fresh fruit and vegetables/fruit and vegetables do not store well – may be a problem especially if income is limited
3. pre-packed/prepared packs of fruit/vegetables may be expensive but useful for those who lack food preparation skills
4. some fruit and vegetables are seasonal and will vary in cost although canned or frozen will remain at a steady price (misconception that these types are less nutritious).

**Availability**

1. possible lack of availability or may be a limited variety in some areas eg deprived areas
2. poor quality of some fruit and vegetables in some shops/areas and quality may not be so good due to transport.

**Family influences**

1. person doing the shopping will dictate quantity and type of fruit and vegetables – may be limited
2. peer influences especially teenagers.

**Attitudes**

1. some men do not see fruit and vegetables as acceptable/filling – more fruit is generally eaten by women
2. an unwillingness to change – lack of will power and habit
3. not wanting to be told what to eat
4. perception that fruit/vegetables are expensive
5. food culture/traditions
6. likes and dislikes.

**Lifestyle**

1. pace of life may allow little time for fruit and vegetable preparation/vegetables are often seen as difficult to prepare
2. increase in food eaten away from home – snack meals/fast food and often these do not offer fruit and vegetables
3. decline in traditional family meal (meat and two veg) may result in less vegetables being eaten
4. lack of use of fruit and vegetables as snacks.

2. Discuss the stages involved in the product development process of a new dessert.

**Mark allocation:** 25 marks

**A – 18-25 marks**

The candidate is able to develop a full and coherent discussion of the stages in the development of a new dessert. The discussion shows good analysis and the identification of the majority of the main points with full explanation.

**B – 15-17 marks**

The candidate is able to develop a discussion of the stages in the development of a new dessert. Most of the main points will be covered with explanation.

**C – 12-14 marks**

The candidate is able to identify some of the main points with limited explanation.

**Answers should make reference to the following points:**

**Market research**

1. development of ideas from market analysis, perhaps even trialling of popular desserts, looking at, for example why chocolate flavour is popular, looking for something similar but new
2. to find out if there is a gap in the market which could be filled by this dessert eg indulgence/economy market
3. to find out consumers opinions regarding a suitable product
4. to find out about the competition, what is available and what could be adapted
5. it could also be used to evaluate the product gaining important public opinions on for example, its sensory qualities, cost, packaging etc.

**Concept generation**

1. this is an important stage as it involves developing ideas for new products
2. thinking stage – thinking up new ideas, perhaps even looking for a gap in the market
3. brainstorming sessions by individuals or teams may take place
4. manufacturers do not want to replicate something which is already on the market, they must put a new slant on it
5. things such as cost, portion size, method of reheating/cooking, flavour, texture and appearance will be considered at this stage
6. this is one of the initial stages and without it the development process cannot take place.

**Concept Screening**

1. consider all ideas, keep some and discard some
2. this stage is important as it allows the production process to move away from initial ideas to actual development issues
3. allows the manufacturer to develop a specification against which to develop ideas
4. specification allows manufacturer to eliminate ideas that might be costly, difficult to process/not meet other constraints
5. the best ideas are taken forward and a specification is written
6. allows product ideas to be generated so that a prototype can be developed.

**Development of a prototype**

1. this is an example or specimen of what the dessert will be like
2. this would be done in a test kitchen and the dessert is developed here and measured against the specification
3. the dessert will be tested for appeal, perhaps using a small experienced team to carry out a sensory evaluation, and it may be further modified, accepted or rejected.

**Product testing**

1. many manufacturers test new products on potential consumers before moving on to large scale production, so various opinions can be obtained
2. this would allow the dessert to be further refined or eliminated as a result of consumer opinions
3. it allows for a range of possible solutions to be further refined with the most suitable dessert being kept.

**Packaging design**

1. this is when the packaging design team would consider the image of the dessert and the target market and start to create a design which will attract customers and help to sell the dessert
2. the type of packaging will be investigated, tested and costed
3. legal labels will be designed and produced.

**First production run**

1. this allows for the production of an actual dessert for the first time as a full production run so the item can be assessed under factory conditions
2. it enables the quality assurance team to test the dessert to ensure quality, safeguard staff health and uniformity of standards during the manufacturing processes
3. it allows the manufacturer to maintain food safety standards and to consider HACCP issues
4. this stage allows for potential production problems to be sorted out before large scale production begins as this may in future result in 'down time' when production has to be stopped
5. this is a vital stage as it is here that changes may take place which could affect other aspects of the product eg changes to the ingredients will result in changes having to be made to the ingredients list on the label.

**Marketing plan**

1. this allows for a range of activities to be developed to promote the product eg where it will be sold, position in the shop, special introductory offers etc
2. this is important as it may help determine the initial price of the product eg low to attract new customers, higher to denote quality
3. packaging can now be finalised to take account of marketing plans.

**Product launch**

1. it may be launched in one region initially (piloted) to allow its performance to be monitored before a national launch is considered and the plan can be adjusted as necessary
2. market monitoring, once the dessert is finally launched onto the national market place sales figures will be monitored carefully to provide regular feedback so the manufacturer can continually rethink and readapt the marketing approach
3. it allows for regular feedback which enables the dessert to be refined and improved.

### **Use of computer technology in food production**

The candidate could include reference to the use of computer technology at some of the stages in the product development process previously outlined.

1. Computer Aided Design (CAD) software encompasses all areas of product development, from idea generation and research, investigating the functionality and interactivity of different ingredients, producing manufacturing flow-charts to assess food safety issues, knowledge-based systems and innovative imaging systems for product quality and fault diagnostic purposes.
2. CAM is increasingly used by the food industry to help in the manufacture of food products. There has been an increasing demand for machines to take over the more complex operations previously carried out by hand, eg piping cream onto a chilled dessert. This would improve product consistency and quality control, reduce overheads and increase production capacity. Advantages of CAM within the food industry include: reduced food wastage through efficient manufacture; improved product consistency; avoidance of downtime; reduction in overheads, eg labour costs; increased production capacity; no fatigue from repetitive manufacturing demands; improved food safety and hygiene standards.

3. Discuss the role of functional foods and their contribution to health.

**Mark allocation:** 25 marks

**A – 18-25 marks**

The candidate is able to develop a full and coherent discussion of the role of functional foods and their contribution to health. The discussion shows good analysis and the identification of the majority of the main points with full explanation.

**B – 15-17 marks**

The candidate is able to develop a discussion of role of functional foods and their contribution to health. Most of the main points will be covered with explanation.

**C – 12-14 marks**

The candidate is able to identify some of the main points with limited explanation.

**Role**

1. Functional food is a food modified in such a way that:
  - the amount of a beneficial component is increased or
  - new beneficial components are added or
  - harmful components are replaced/eliminated or
  - a component is added to preserve the beneficial effects.
2. Contain ingredients which have health promoting properties over and above their nutritional value/foods which have been altered to enhance health.
3. To improve health through diet.
4. To reduce incidence of illness/particular disease.
5. Includes a very broad range of products – from foods generated for a particular functional ingredient to staple foods which have been fortified with a nutrient.
6. Generally accepted that ‘health promoting’ claims rather than disease prevention or medical claims can be made.
7. Claims made should have scientific data to back claim.
8. No specific legislation in UK.
9. Food law does not currently specifically encompass claims about health promoting properties of functional foods.
10. Relevant food law that identifies the boundaries for such claims is embodied in Food Safety Act 1990/Food Labelling Regs 1996.
11. From a legislative point they are categorised as foods not medicines.
12. It should be possible to achieve the required level of intake within normal dietary patterns.
13. They should not be seen as alternative to a varied/balanced diet.
14. They may obscure the boundaries between food groups which inevitably will influence the ease with which simple/practical dietary advice can be formulated.
15. Many functional foods are being introduced throughout Europe. Functional foods are often defined as normal foods modified to improve their health benefits, beyond the nutrition and health supplied by the non-modified food product. Thus, low calorie foods, vitamin and mineral fortified foods and high fibre foods are strictly included in the definition of functional foods when the modification has significant health implications.

16. Examples of newer types of functional foods are pre and probiotic foods, foods containing phytosterols, foods containing antioxidants and phytochemicals or products containing soy isoflavones, omega-3 fish oils, beta-glucans etc.
17. In many cases, functional foods are more expensive and it is possible to get the same beneficial ingredients more cheaply from a balanced diet.
18. Functional foods appeal to some consumers because they are convenient for today's lifestyle in bringing about health benefits quicker than would normally be the case through eating conventionally healthy foods alone.

### **Contribution to Health –**

Candidates should include the link to health within responses.

### **Yoghurts and Probiotics/Prebiotics**

1. An increasing functional food area is that of dairy foods containing “friendly” or probiotic bacteria claiming to promote gut health.
2. Probiotics are encompassed usually in types of milk products/yoghurts.
3. Probiotics are a ‘live microbial supplement’ which improves the intestinal microbial balance.
4. History of probiotics goes back many centuries in form of fermented milk products.
5. Their effectiveness is governed by whether the bacteria present are able to survive the passage through the gut and colonise in the large bowel.
6. Evidence of health benefits of probiotics have been seen for shortened duration of diarrhoeal disease in children/inhibition of *Helicobacter pylori*/improved well being among patients with Crohn's disease/amelioration of symptoms in adults and children with allergies/increased resistance to respiratory infections in children.
7. Some trials have shown reduction in numbers who tested positive for *Clostridium perfringens*.
8. Evidence for the benefits of probiotics have been increasing in recent years (but this is an area of debate) and include:
  - Bifidobacteria may help fight a range of harmful and food poisoning bacteria, including the potentially fatal *E Coli* 0157
  - Lactobacillus GG can be helpful in treating antibiotic-associated diarrhoea
  - Lactobacillus GG has also been shown effective at treating some cases of traveller's diarrhoea
  - other studies have shown that Bifidobacteria and *Strotococcus thermophilus*, both bacteria found in bio yoghurt, can prevent young children suffering from diarrhoea in the first place
  - bio yoghurt that contains *Lactobacillus acidophilus* can reduce the incidence of vaginal infections, including thrush and bacterial vaginosis. Gut colonisation of *Candida albicans*, the thrush causing organism, also decrease significantly
  - supplementing with probiotics may also help reduce certain food allergies according to some research. This may be because the bacteria reinforce the barrier properties of the gut so that improperly digested compounds cannot leak through.
9. Prebiotics are a microbial feed supplement which helps promote the growth of current microbes.
10. Prebiotics are a non-digestible food ingredient.
11. They selectively stimulate the growth/activity of bacteria in the colon.
12. Probiotics only have a transient effect and regular daily consumption is needed to bring about health benefits.
13. Prebiotics are increasingly used in supplements and can have a more long lasting effect as they encourage the growth of Bifidobacteria already present in the gut.

**Dairy products/Margarines**

1. Spreading fats currently constitute one of the biggest functional foods sector in the UK.
2. One area is the incorporation of mono or polyunsaturated fatty acids so helping to reduce the risk of heart disease through altering cholesterol levels.
3. Some spreads provide Omega 3 fatty acids from oily fish which could help to lower triglyceride fats in the blood but the amount of Omega 3 provided is usually insignificant.
4. However they may be useful to some people who dislike oily fish and do not eat the recommended amount weekly.
5. Margarines/spreads can include the plant stanol ester, an ingredient that can lower cholesterol (and so help reduce the risk of CHD) and which is derived from plant stanols found naturally in small amounts in food like wheat, rye and corn.
6. Cholesterol lowering spreads eg Benecol/Flora Pro-Activ contain plant stanols or sterols.
7. These plant compounds lower LDL levels by reducing the amount absorbed from small intestine.
8. Using such products has been shown to reduce LDL levels by between 10-15 % in a few weeks.
9. Margarines/spreads/butter are fortified with Vitamin D – helps formation of strong bones.
10. Bovine milk may be considered functional food due to presence of number of immunomodulatory factors (conjugated linoleic acid may have potent anti-cancer and immunomodulatory properties).
11. Milks/yoghurts have Omega 3 added – role in prevention of CHD.

**Fruit/Vegetables**

1. The quality of tomatoes, cereals and other crops may be improved in the future by using new genetic modified crops with a greater content of antioxidants, such as natural flavonoids or other phenolic compounds. Because of the healthy profile of these antioxidants, which are believed to have a protective effect against cardiovascular diseases and some forms of cancers, these new crops are considered as functional foods.
2. Flavonoids are naturally present in most fruits and vegetables. They are as good antioxidants as carotenoids and vitamin E or C. These antioxidants are thought to work by scavenging oxygen radicals, thus protecting against oxidative break down of biopolymers such as DNA, proteins and lipids. Breakdown of DNA molecules in cells is believed to be the most prominent mechanism for initiation of cancer cells and oxidation of lipoproteins for increasing the risk of arteriosclerosis.
3. Scientists are trying to identify key genes responsible for flavonoid production and have started to grow the very first generation of tomato plants possibly high in flavonoids. After completion of this work, they will intend to transfer their knowledge to other crops, in particular cereals.
4. US scientists have created purple tomatoes which have the anti-oxidant pigment from red wine which is believed to prevent heart disease.
5. Biologically active plant chemicals now known as ‘phytochemicals’ can reduce cancer risk.
6. Benefits of garlic added to foods include cancer chemopreventive/antibiotic/anti-hypertensive/cholesterol lowering properties.
7. Cranberry juice is recognized as helping in the treatment of urinary tract infections and may be considered a functional food by some although no specific ingredient has been added.

### **Drinks**

1. Tea, especially green tea has beneficial effect on cancer risk and may be considered by some to be a functional food.
2. Drinks are a fast developing area of functional foods, for example some are fortified with the anti oxidant vitamins A, C and E, some with calcium (and others with herbal extracts).
3. Some drinks claim to help overcome problems ranging from PMS to a lack of energy.
4. Orange juice with added plant sterols to reduce cholesterol levels is available in USA.

### **Meat/Fish/Eggs**

1. During the last few years the scientific trend has been to improve the health profile of traditional raw materials, eg meat, vegetable oil, dairy products and grains, using traditional breeding or changed animal feeding.
2. Improvement of the health profile of beef - to produce a functional red steak. The objective will be met through improvement of the fat composition by decreasing saturated fatty acids and increasing conjugated fatty acids (CLA) as well as omega-3 fatty acids (PUFA) with related health benefits.
3. This tendency to improve raw food materials by traditional breeding, by genetic modification, or by changing the feeding of animals is often seen: health improved meat by improving the fatty acid profile of animal feed; health improved eggs by adding fish oils to the chicken feed.
4. Beef is a source of conjugated linoleic acid (CLA) which has been shown to modulate tumour development.
5. More recently CLA has been investigated for its ability to change body composition suggesting a role as a weight-reduction agent.
6. Eggs with added Omega 3 – reduce cholesterol levels lowering risk of CHD.

### **Cereals and Grains**

1. This is area where calcium and mineral fortification is strong – added to both breakfast cereals and fortified cereal bars.
2. Calcium-enrichment of foods, (and beverages) can allow up to 30 times the amount of calcium present in an equivalent volume of milk to be incorporated – could address issues such as osteoporosis and other calcium related diseases.
3. Oats are source of cholesterol-lowering soluble fibre b-glucan which can reduce LDL cholesterol thereby reducing the risk of CHD.
4. Soy is thought to play preventative and therapeutic roles in cardiovascular disease (CVD), cancer, osteoporosis and the alleviation of menopausal symptoms.
5. Flaxseed consumption has been shown to reduce total and LDL cholesterol as well as platelet aggregation.
6. Burgen is a bread containing soya flour and linseeds which provide phytoestrogens, natural substance which mimic the structure of the hormone oestrogen. Phytoestrogens have been said to enhance oestrogen levels when hormonal levels are low (ie at the menopause) or to weaken the effects of oestrogen when levels are high. This action may protect against both hot flushes and breast cancer.
7. However quite a lot of this type of bread would have to be eaten – at least 6 slices daily on a long term basis for any health benefit to be noticed.
8. In USA ‘men’s bread’ is on sale containing soya isoflavones and Omega 3 and 6.

9. Breads with the prebiotic inulin added to it are on sale in Germany and Australia.
10. In Japan bread which offers cosmetic benefits is proving popular.
11. In Germany, bread enriched with L-Carnitine claims to boost energy particularly among active people/sports enthusiasts.
12. Development of bread fortified with soya isoflavones and trehalose to increase calcium absorption is under way.
13. In UK Allied Bakers have launched a soy-enriched bread said to lower cholesterol and improve heart health.

4. Discuss the factors which may influence the food choices of secondary school children.

**Mark allocation:** 25 marks

**A – 18-25 marks**

The candidate is able to develop a full and coherent discussion of the factors which may influence the food choices of secondary school aged children. The discussion shows good analysis and the identification of the majority of the main points with full explanation.

**B – 15-17 marks**

The candidate is able to develop a discussion of the factors which may influence the food choices of secondary school aged children. Most of the main points will be covered with explanation.

**C – 12-14 marks**

The candidate is able to identify some of the main points with limited explanation.

**Answers should make reference to the following points:**

**Parents**

1. their eating habits are passed on to their children and the children learn to like the foods made by the parents
2. mothers most involved with provision of food so very influential on children
3. food at home – children eat what is available – if fruit is available they may choose it but if it is not they cannot
4. meals served at home – if filling less likely to snack
5. parents may want their children to be healthy so buy products high in vitamins, low in sugar etc
6. financial situation of the family will heavily influence the eating experience at home
7. frequency of eating out in restaurants will provide children with a wide range of foods to choose from
8. money – children may be given money to spend on snacks, the amount given may influence their choice
9. teenagers may be left to make their own meals and as skills and knowledge may be limited poor choices may be made
10. rewards should not focus on unhealthy foods eg trips to fast food outlets, chocolate.

**Culture**

1. association of foods with events eg Christmas, Easter
2. types of food offered to children outwith the home eg friends homes may increase the range of foods they eat
3. experience of foreign holidays may make children more confident to try new foods at home
4. ethnic background may influence foods prepared at home.

**Peers**

1. very conscious of being part of the gang so copy cat behaviour is very common – can be either positive or negative.

### **Media/promotion**

1. advertisers target teenage children by using celebrities to sell products eg sports people, pop stars etc
2. promotions – children easily attracted to free gifts eg Walkers crisps ipod promotion
3. TV – almost ½ of children’s adverts on TV are for food, children are attracted by this powerful medium
4. promotional characters used to encourage children to buy products eg Harry Potter
5. use of messages in adverts/labels to encourage choice eg Lucozade sport, low fat products
6. attractive, bright packaging can influence choice
7. image created round a food to make it appear ‘cool’ – eg Coke
8. children susceptible to brand name adverts so companies take advantage of this
9. use of popular music to promote a food may make it appeal to teenagers
10. adverts in cinemas can be targeted directly at teen audiences when shown with films they enjoy
11. constant pressure from media to look very slim may encourage under eating/poor nutrition
12. product placement can encourage purchase.

### **School**

1. school meals – foods on offer influence choice and whether children eat it or go elsewhere
2. vending machines in schools can offer healthier choices
3. school and what it teaches about nutrition and health
4. practical skills taught in schools may influence if children make their own food or use ready meals
5. school may offer new different foods not on offer at home
6. breakfast clubs may offer a healthy/unhealthy start to the day and may reduce snacking
7. health promoting schools may make the issue of healthy eating a feature
8. conflicting messages may confuse and distort food choices
9. location of school, if near chip shops and cafes temptation to buy foods from there may prove irresistible
10. Hungry for Success – implementation will influence foods available in school, ambience in dining halls etc.

### **Personal Factors**

1. personal likes and dislikes or perceived personal likes and dislikes
2. allergies to particular foods or additives may limit food choice
3. appearance of food itself
4. boredom leading to snacking leading to poor eating at mealtimes
5. money available – if part time job teenager will have their own money to spend as they wish
6. little thought for future health implications as they seem a long way off
7. may make very positive food choices due to sporting interests, desire to look good.

5. Discuss the function of fats in the manufacture of food products.

**Mark allocation:** 25 marks

**A – 18-25 marks**

The candidate is able to develop a full and coherent discussion of the function of fats in the manufacture of food products. The discussion shows good analysis and the identification of the majority of the main points with full explanation

**B – 15-17 marks**

The candidate is able to develop a discussion of the function of fats in the manufacture of food products. Most of the main points will be identified with explanation

**C – 12-14 marks**

The candidate is able to identify some of the main points with limited explanation

**Answers should make reference to the following points and the function should link to the manufacture of food products:**

**Melting**

1. fat – lipid which is solid at room temperature
2. the longer the fatty acid chain, the more solid the fat is at room temperature
3. the more saturated the chains, the more solid the fat is at room temperature
4. the higher the melting point, the more saturated the fat
5. fats melt when heated. Since fats are a mixture of triglycerides they do not have a distinct melting point but melt over a range of temperatures – most fats melt at a temperature of between 30 – 40°C.

**Plasticity related to creaming and shortening properties**

1. fats do not melt immediately but over a range of temperatures – known as plasticity
2. plasticity is due to the mix of tri-glycerides each of which has its own melting point
3. fats are plastic at certain temperatures ie they are soft and can be spread
4. substances which have the property of plasticity will change their shape when pressure is applied to them but will remain in their final shape when the pressure is removed
5. some fats have been formulated to have low melting points so that the product can be spread straight from the fridge ie soft margarine
6. the range of temperatures over which a fat shows plastic behaviour is known as the plastic range of the fat. A mixture of tri-glycerides with a large range of melting points will form a fat with a wide plastic range. This type of fat is better for certain purposes eg creaming and spreading
7. most animal fats have a narrow plastic range and are hard and difficult to spread eg butter
8. shortenings used in bakery products should have a wide range of plasticity so that the melting behaviour remains constant over a specified temperature range allowing the fat to be easily manipulated without melting at room temperature (24 – 42°C)
9. shortenings (semi solid fats) impart a “short” or tender quality to baked products, as well as enhancing the aeration of leavened products such as bread, cakes and give a good flavour and texture to the product

10. uses of shortenings in food production:
- toughness is prevented by coating the gluten protein of flour
  - fat also prevents contact between the protein in the flour and water in the dough and so restricts the formation of gluten so that the gluten formed is in short lengths and not long elastic strands eg bread
  - pure fats are the best shortening agents as plastic fats are best as they coat the flour particles readily
  - in products such as doughnuts, it modifies the gluten to add richness to the product
  - in baked products it is used to leaven, cream and lubricate
  - in icings and fillings, the fats help to form very small air bubbles when creamed or beaten and thus creates a light, fluffy structure
  - when making rich cakes, fat and sugar are beaten or creamed together. This process incorporates small air bubbles into the mixture, forming a foam and so lightening a product.

### **Hydrogenation**

1. hydrogenation – addition of hydrogen to unsaturated fatty acids which changes oil to fat
2. hydrogenation creates stability to fats and oils allowing use of otherwise unstable fats/oils in manufacturing
3. allows manufacturers to produce products which use unsaturated fats/oils but hydrogenated fats more likely to be linked to CHD
4. fish oils used far less in manufacturing – difficult to selectively hydrogenate fish oils.

### **Smoke point related to uses as a cooking medium**

1. frying – cooking oils must be stable under high temperatures and to moisture during frying
2. when a fat or oil is heated to a certain temperature it starts to decompose producing a blue haze or smoke. In general vegetable oils have a higher smoke point than animal fats
3. smoke point is a useful measure when assessing the suitability of a fat or oil for frying purposes. Fats with a high smoke point are best for frying – safety
4. repeated heating of an oil will reduce the smoke point
5. repeated heating will also produce oxidative and hydrolytic changes in the fat and give undesirable flavours to the food cooked in fat
6. temperature of oil should be maintained at 180°C during frying – important for manufacturers to maintain correct temperature to produce an acceptable product
7. water in food will contribute to the breakdown of fatty acids which occur on heating. Hydrolysis results in an oil of poor quality which has a lower smoking point, darker colour and changed flavour
8. heating oil will polymerise it which will result in the production of a viscous oil that is readily absorbed by foods, resulting in a greasy product
9. the more saturated the oil (solid) the more stable it is to breakdown by oxidation and hydrolysis. In addition it is less likely to polymerise
10. sunflower and safflower have been genetically developed to be used as frying oils
11. snacks which are fried and stored prior to eating require a stable oil
12. if oil is used continually, as in a chip shop, a frying fat must be used which can withstand heavy use. Solid shortenings are preferred as they are more stable for many hours of frying
13. stability of fats and oils are an important consideration in catering where they may be used for long periods of time.

**Colloidal systems**

1. colloid – suspension of particles in a solution. Mixing of oil and water in a product require an emulsifying agent eg mayonnaise – egg yolk is used as an emulsifying agent holding the oil and vinegar together ie forming a colloidal solution and improves the appearance.

**Emulsifying agents and stabilisers**

1. egg yolk is used as an emulsifying agent in mayonnaise
2. food manufacturers have to ensure that the choice of fats and oils used in food production can remain stable for the maximum length of time
3. in low fat products, water is often added to replace the fat which has been removed along with a commercial additive stabiliser to ensure the texture is acceptable and the fat/water do not separate.

**Hydrolytic and oxidative rancidity**

1. rancidity is the term used to describe the spoilage of fats and oils – off flavours develop
2. oxidative rancidity occurs as a result of the reaction between unsaturated fats and oxygen from the air, giving rise to an unpleasant rancid taste. Storage of fats important
3. anti oxidants may be added to foods which contain fats. They work by reacting with “free radicals” which are produced in the first stages of oxidative rancidity – this reaction stops the onset of rancidity. Manufacturers must ensure that the correct amount of an anti oxidant is used as too high a concentration can actually speed up rancidity
4. manufacturers have to make sure that the choice of fats and oils used in production of a food item can remain stable for a long time – anti oxidants may help
5. hydrolytic rancidity is caused by enzyme activity and is a factor considered in the dairy and meat industries
6. the more unsaturated the fat the more likely the rancidity is to occur.

**ADVANCED HIGHER HOME ECONOMICS  
RESOURCE MANAGEMENT**

**Context: Health and Food Technology**

Question	Context	Elaboration	Skills		Totals
			Knowledge	Evaluation	
<b>Section A</b> <b>(a)</b> <b>(b)</b> <b>(c)</b>	Nutrients and their effect on the health and development of individuals	Study of nutrients and the effect on the health and development of individuals at different life stages – pregnancy Health and dietary diseases – obesity	5 10	10	25
<b>Section B</b> <b>1(a)</b>	Food Politics Nutrients and their effect on the health and development of individuals Food commodities	Food, nutrition and health issues/policies in Scotland Micronutrients – functions and effect on health Anti oxidants – role in health Fruit and vegetables – relationship to health	10		
<b>(b)</b>	Food Politics	The impact of nutritional/health, social, economic and environmental factors on food availability, selection and consumption patterns		15	25
<b>2</b>	The food chain	Product design and quality	25		25
<b>3</b>	Biochemistry, preservation and processing	Functional foods (health promoting foods)	25		25
<b>4</b>	Psychology of food	Influence on consumers Role/influence of the media Consumer behaviour	25		25

Question	Context	Elaboration	Skills		Totals
			Knowledge	Evaluation	
5	Food Science	The properties and uses of fats	25		25

[END OF MARKING INSTRUCTIONS]