2012 Health and Food Technology

Advanced Higher

Finalised Marking Instructions

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 rewarded 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)	**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 – 1-2 marks
The candidate is able to **outline** some of the main issues of the report.

Answers should make reference to the following points:

1. Sales of organic foods have risen, in part due to the ethical concerns of consumers.
2. More awareness of the impact that artificial fertilisers and pesticides are having on the environment.
3. Supermarkets now stock more Fairtrade goods due to consumer demand.
4. Buying Fairtrade/organic makes consumers feel they are helping developing countries/ the environment.
5. Most Fairtrade and some organic produce come from abroad and travel here by air.
6. Food miles refer to the distance the food has travelled to get to your plate.
7. Air transportation of food is growing but it creates the highest level of CO_2 emissions, much more than other methods of transportation.
8. The amount of air freighted foods is concerning environmentalists.
9. Despite the fact labels state where fruit and vegetables have come from, many consumers do not seem to pay attention to this.
10. The positive aspect of organic foods may be negated by the environmental impact of air freight.
11. If air freighting food was reduced this would harm the Fairtrade movement.
12. In the future the Soil Association is considering only awarding their label if food is both organic and environmentally friendly.
13. There is no real need to buy foods out of season as we can produce lots of fruit and vegetables in Britain all year round eg availability 365 days a year.
14. When fresh foods travel distances they can be less tasty and nutritionally valuable.
15. 63% of adults did not know which British fruits and vegetables came into season at which time of year in a recent survey.
16. Eating seasonal, organic produce may provide us with tasty nutritious foods but we may find it difficult to change old habits.
17. Often local produce is sent miles away for packaging/distribution.

(b)	**Mark allocation:** 10 marks

A – 8-10 marks
The candidate is able to develop a full and coherent discussion of the impact of Fairtrade products on food choice. This discussion shows good analysis and the identification of the main points with full explanation.

B – 6-7 marks
The candidate is able to develop a discussion of the impact of Fairtrade products on food choice. Most of the main points will be identified with some explanation.

C – 4-5 marks
The candidate is able to identify some of the main points with limited explanation.

Answers should make reference to the following points; linked to impact of Fairtrade products on food choice:

Fairtrade products

1. The purpose of the Fairtrade movement is to improve the wages and working conditions of workers in third world countries producing goods therefore this may encourage consumers to purchase these goods.
2. By requiring companies to pay above market prices, Fairtrade addresses the injustices of conventional trade, thus consumers may feel positive about purchasing these products.
3. Since Fairtrade organisations work directly with producers, they are able to return a greater percentage of the selling price to the producer so consumers may feel good that more of the profit goes to the producer.
4. The producer has the advantage that they use environmentally friendly practices that manage and use local resources which gives the local community an incentive to preserve their natural environments for future generations this may encourage purchases of Fairtrade products.
5. Because Fairtrade consider the environment when purchasing their products, in some cases consumers believe they purchase a better quality of product.
6. The Fairtrade label is marked on food products, therefore consumers who are concerned with the environment and working conditions, for example child labour, in the third world will purchase these.
7. There is an increasing range of food products for consumers to choose from – bananas, coffee, chocolate, tea, honey, snacks, biscuits, sugar, fruit juice, fresh fruit. These are available from many sources, for example Fairtrade stores, catalogues and websites.
8. Some supermarkets stock a limited range of Fairtrade products.
9. Most Fairtrade products do not cost more than other products so consumers consider them a value-for-money product.
10. Some products, eg coffee, may be higher in price and this may discourage purchase.
11. Due to the popularity of Fairtrade foods, more shops sell a wider range making it easier for the consumer to choose the products they need.
12. Fairtrade fortnight increases consumer awareness of Fairtrade goods and so encourage purchases.
13. Schools which have Fairtrade status increase awareness of the foods available and so pupils may ask parents to buy them.
14. Clear labelling of Fairtrade products makes it easier to choose Fairtrade foods.
15. Many large coffee shop chains eg Costa/Starbucks serve Fairtrade food and drinks which may impact on food/drink choices.

16. The Fairtrade mark on a food product provides the consumer with a guarantee about its production.
17. Fairtrade is the only certification scheme therefore this may limit the choice of consumers who wish to help with such issues.
18. Towns which block purchase Fairtrade goods may impact more significantly on food choice.
19. Transportation/food miles may be harmful to the environment.
20. Trends/image of Fairtrade products.

(c)	**Mark allocation:** 10 marks

A – 8-10 marks
The candidate is able to critically discuss the statement giving full analysis linked to consumer choice of food.

B – 6-7 marks
The candidate is able to critically discuss the statement giving some analysis linked to consumer choice of food.

C – 4-5 marks
The candidate is able to critically discuss the statement giving limited analysis linked to consumer choice of food.

Answers should make reference to the following points linked to consumer choice of organic foods:

General point

1. Organic is a term governed by law, certification is provided by independent inspectors approved by the UK Register of Organic Food Standards (UKROFS).
2. Organic farmers have to prove that agro-chemicals are not used or have been used during a 2 year conversion period so organic credentials are guaranteed.
3. To be called organic the manufactured product must have no less than 95% of its agricultural raw materials produced or grown organically.

Positive

4. It is considered that it produces crops and livestock without damage to the environment.
5. It avoids the use of artificial chemicals – approved fertilisers only.
6. The use of genetically modified organisms is prohibited
7. Animals are reared without routine use of drugs/antibiotics/wormers, which may appeal to consumers.
8. Consumer concern for animal welfare – organic is better for them
9. Concerns over pollution, non organic agriculture uses artificial fertilisers/pesticides which can add to water pollution.
10. Consumer can be sure the food does not contain GM ingredients
11. Food is thought to be safer – no incidents of BSE in organic foods in the last 20 years/less likely to harbour e-coli.
12. It is considered to taste better/be better quality by some consumers.
13. It is considered to be better for health – less allergies/side effects.
14. Several studies have shown higher levels of protein, vitamin C, calcium, iron and potassium in organic vegetables.
15. Fewer additives are permitted in organic foods so will appeal to consumers who are concerned about additives in food.
16. Vastly increased ranges in supermarkets means there is a much wider range of goods to choose from.
17. Increased demands are bringing cost of organic foods down.
18. Increased popularity of delivered organic ‘box’ schemes/pick your own.
19. People concerned with ‘food miles’ may choose to buy from farmers markets which sell organic foods
20. It has become more fashionable to choose organic food as it is now seen as a mainstream choice as opposed to something unusual to purchase.

21. Some councils use local organic produce to support local communities.
22. Increased promotion of organic products may encourage consumers to buy them.
23. Green' image may appeal to some consumers.
24. Organic foods come from 'trusted' sources which reassures the consumer.
25. If consumers are concerned about the use of antibiotics getting into the food chain, purchasing organic foods will help appease this worry.
26. Influence of celebrity chefs/cookery programmes.

Negative

27. Pesticides can drift over from conventional farms so food may not be completely organic.
28. Higher price for organic food makes it too expensive for those on a lower income.
29. Appearance of foods, especially vegetables may not be as good.
30. Fresh vegetables products may not have such a long shelf life.
31. No guarantee that the product is completely residue free.
32. Some scientists believe there are no nutritional benefits.
33. An equal number of studies shown no difference in nutritional content between organic non-organic foods, than have shown a difference.
34. Natural pesticides produced by plants can be more harmful than synthetic ones.
35. Concern over the occurrence of E-coli bacteria in the manure used as fertilizer and the safety of organic crops.
36. High levels of toxins in organic foods could be hazardous to health eg green potatoes.
37. Foods may be contaminated by copper and sulphur containing fungicides.
38. Recent studies have shown that organic chicken is less nutritious, contains more fat and tastes worse than free range or battery meat (plus cost considerations).
39. Organic chicken contains lower levels of the anti oxidant Vitamin E which preserves the flavour of the meat.
40. Organic chicken also had lower level of Omega 3 fatty acids and some had higher cholesterol levels.
41. There is now concern that the increasing industrialisation of organic farming to meet demands has led to a dilution of its "green" credentials and quality.
42. May have an adverse effect on the sustainability of farming particular crops.
43. Some organic foodstuff eg milk, tomatoes, chicken cause more damage to the environment than their non organic counterparts.
44. May be some concern over foreign organic foods standards and authenticity which could put consumers off buying it.
45. Range of organic foods may be limited in some supermarkets.

Section B

Question 1

(a)	**Mark allocation:** 10 marks

A – 8-10 marks
Candidates will be able to list and discuss almost all of the reasons how the Scottish dietary targets can contribute to a reduction in coronary heart disease. The discussion shows good analysis and the identification of the majority of the main points with full explanation.

B – 6-7 marks
The candidate will be able to list and discuss some of the reasons how the Scottish dietary targets can contribute to a reduction in coronary heart disease. Most of the main points will be identified with explanation.

C – 4-5 marks
The candidates will be able to list and discuss a few of the reasons how the Scottish dietary targets can contribute to a reduction in coronary heart disease. The discussion will show limited or no explanation.

Answers should make reference to the Scottish dietary targets linked to coronary heart disease:

Fruit and vegetables – Average intake to double to 400 grams per day
Implications for health

1. Many ways of consuming fruit and vegetables involve no or very little quantities of fat in either preparation or cooking therefore helping to reduce the incidence of Coronary Heart Disease (CHD).
2. Changing diet to include more fruit and vegetables may change ones palate and may result in a reduction in consumption of fatty, sugary foods which reduces the risk of CHD.
3. Fruit and vegetables are high in non-starch polysaccharides (NSP) which are filling and so prevent us snacking on high-fat and sugar foods between meals – this will lessen the risk of obesity and high blood pressure (HPB), which may result in CHD or strokes.
4. Fruit and vegetables are low in fat or contain no fat so assist the overall reduction in fat in the diet and do not greatly increase calorie intake, reducing the risk of CHD.
5. Some fruit and vegetables are low in sugar so are useful as they do not greatly increase calorie intake which may lead to obesity and CHD.
6. Fruit and vegetables are good source of antioxidant vitamins and these have an important role to play in preventing CHD.
7. Specific antioxidants may also be identified and their role in preventing CHD.
8. Fruit and vegetables are high in NSP, this helps ferry cholesterol out of the body so reducing the risk of CHD

Target – bread – increase by 45% mainly using wholemeal and brown bread.
Implications for health

9. Breads, especially those high in NSP, are filling and so reduce the need to snack on high-fat and sugar foods, reducing the possible risk of obesity, HBP and CHD.
10. NSP combine with cholesterol and bile salts, so preventing the cholesterol from being absorbed, reducing the risk of CHD.

Target – fats – Total fat to reduce to no more than 35% of total energy intake
Average intake of saturated fats reduce to no more than 11% of total energy intake.

Implications for health

11. Fat is a concentration source of calories which, if not used up through activities, will contribute to obesity, with a possible link to HBP, which then may lead to CHD.
12. A diet high in saturated fats will raise the level of cholesterol in the blood – this cholesterol is then deposited on the walls of the arteries and narrows them. This restricts the blood flow, which can lead to HBP, which may lead to CHD and heart attacks.
13. Trans fatty acids are as harmful as saturated fats. This type of fat is found in processed foods, eg margarine and biscuits, and causes an increase in cholesterol in the blood and an increased risk of heart disease.
14. Excess weight gained through eating too many fats can cause complications during operations, eg blood pressure can rise, increasing the risk of heart attack.
15. Choice of foods lower in fat, such as fat-reduced products, and choice of cookery methods could help lower the fat content of the diet.

Target – sugar – Average intake of NME sugars in adults not to increase
Average intake of NME sugars in children to reduce by half to no more than 10% total energy.

Implications for health

16. Sugar provides calories which, if not used through activities, may contribute to obesity and this in turn may result in HBP and CHD.
17. High intakes of sugar may result in the development of type 2 diabetes – diabetics are at more risk of CHD.
18. Overweight children often become overweight adults which in turn increases the risk of CHD

Target – salt – average intake to reduce to 100mmol per day

Implications for health

19. High salt intakes are liked to HBP, with increased risk of CHD.

Target – total complex carbohydrates – increase average non sugar intake by 25%.

Implications for health

20. Complex carbohydrates, especially those high in NSP, will provide bulk in the diet and prevent snacking on high-fat and sugar foods.
21. Complex carbohydrates provide a steady supply of energy, helping blood sugar levels to remain stable and thus preventing snacking on high-fat foods.
22. Increasing the proportion of starchy carbohydrates eaten with meals will reduce the need to serve high-fat foods to make meals more filling.

Target – breakfast cereals – average intake to double to 34 grams

Implications for health

23. Consumption of breakfast cereals reduces the need to snack on high-fat or sugar foods during the morning. Breakfast ensures energy is provided during the morning.
24. Some breakfast cereals are high in NSP, this helps ferry cholesterol out of the body, so reducing the risk of CHD.

Target – fish – Intake of oily fish to double to 88 grams
Intake of white fish to be maintained at current levels

Implications for health

25. Omega 3 in oily fish reduces risk of blood clots/reduces cholesterol level so helping prevent CHD.
26 White fish is low in fat so assists the overall reduction in fat, helps prevent obesity which may lead to CHD

(b)	**Mark allocation:** 15 marks

A – 12-15 marks
The candidate is able to discuss the factors other than diet which may contribute to coronary heart disease. They demonstrate a clear understanding of the issues involved, giving a full analysis.

B – 9-11 marks
The candidate is able to critically discuss the factors other than diet which may contribute to coronary heart disease. They demonstrate an understanding of the issues involved, giving some analysis.

C – 7-8 marks
The candidate is able to critically discuss the factors other than diet which may contribute to coronary heart disease. They demonstrate a limited understanding of the issues involved, giving limited analysis.

Answers should make reference to the following points linked to coronary heart disease:

Cigarette smoking

1. This is the largest known contributory factor to CHD and increases the chance of blood clots forming.
2. Smoking causes the blood to thicken, increasing the tendency to clot.
3. Smoking constricts (narrows) the arteries, reducing the blood flow to the heart.
4. The nicotine in tobacco smoke increases the pulse rate and raises blood pressure. The carbon monoxide content of cigarette smoke cuts down the oxygen in the blood so the heart has to work harder.
5. Smokers need a high intake of ACE vitamins as smoking increases the number of free radicals in the body. Free radicals damage cells and tissues, increasing the risk of heart disease.
6. Smoking introduces harmful free radicals into the body and destroys antioxidants vitamins, which could then lead to a build up of cholesterol in the arteries.

Heredity/Genetic factors

7. Some families may inherit high risk factors such as a liking for fatty foods and this increases the risk of heart disease. Poor eating habits develop in childhood are often carried into adulthood.
8. Genetic conditions may produce high blood cholesterol levels.

High alcohol intake

9. Alcohol contains a high number of calories, which will cause weight gain, and possibly high blood pressure and so increase the risk of CHD.

Physical exercise

10. Lack of regular exercise can have an impact on the heart by decreasing stamina and weakening the heart muscle, making it less efficient
11. Lack of exercise can increase stress and higher blood cholesterol levels – both of which can contribute to heart disease.
12. Exercise helps weight loss and maintenance.
13. Exercise strengthens the vessels leading to heart muscle and so reduces the likelihood of developing CHD.
14. Lack of physical exercise may cause energy intake to exceed output, thus increasing the risk of obesity and CHD.
15. Regular exercise has a beneficial effect on blood cholesterol levels.
16. A sedentary lifestyle from an early age contributes to weight gain.

Emotional stress

17. People who are tense, impatient and anxious may be more likely to suffer from CHD.

18. Emotional stress – stress can increase blood pressure, which increases the risk of CHD.
19. Blood pressure also tends to rise under stress and this could damage the artery walls, particularly if they are clogged with cholesterol. The heart then has to pump harder to force blood round the body.

Gender

20. More men than women tend to have heart disease but it is affecting an increasing number of women.
21. Women under 40 years may be protected from heart disease by the hormone oestrogen. After the menopause, when oestrogen levels are reduced, cholesterol levels rise and risk of heart disease increases.

Food choices linked to lifestyle

22. Less food eaten within household environment therefore less control and responsibility for its nutritional content. People tend to eat out and purchase more fast foods.
23. High consumption of convenience foods and takeaways due to inability or unwillingness to cook and lack of time. Many of these foods have a high fat content, which contributes to CHD
24. Children have much more choice in relation to food and often make inappropriate choices that may lead to obesity and so increase risk of CHD in later life.
25. Children may experience peer pressure which can encourage them to want to eat in fast food restaurants like their friends. These foods can contain a high fat content therefore an increased risk of CHD in later life.
26. Financial considerations may affect lifestyle/food choices

Question 2

	Mark allocation: 25 marks

A – 18-25 marks
The candidate is able to discuss the health implications of a vegetarian diet. They demonstrated a clear understanding of the issues involved, giving a full analysis.

B – 15-17 marks
The candidate is able to discuss the health implications of a vegetarian diet. They demonstrate an understanding of the issues involved, giving some analysis.

C – 12-14 marks
The candidate is able to discuss the health implications of a vegetarian diet. They demonstrate a limited understanding of the issues involved, giving limited analysis.

Answers should make reference to the following points linked to health implications of a vegetarian diet:

General points

1. People follow a vegetarian diet for a variety of personal, philosophical, moral, ecological or cultural reasons.
2. Provided a vegetarian diet is well balanced, it should provide all of the nutrients needed by the body throughout life.
3. Nutrient intake for vegetarian children compare favourably with dietary recommendations providing that total fat intakes are not excessive and iron intakes are adequate.
4. A vegetarian diet can confer a wide range of health benefits and may protect against disease including coronary heart disease and diet related cancer.
5. A healthy vegetarian diet for adults may not be appropriate for infants or children below the age of 5 years. Diets low in fat and high in fibre can fill up infants before they have received adequate energy and nutrients.
6. Studies have shown that vegetarians and vegans are more likely to adopt other healthier lifestyle habits, such as being more physically active and not smoking. Together, these various factors help to explain why a vegan or vegetarian lifestyle is often linked to improve health.
7. In some studies, vegetarians have been shown to be more healthy than meat-eaters, to suffer less from disease such as heart disease, some cancers, hypertension and Type 2 diabetes, and to live longer.
8. Vegetarianism is becoming more common among teenagers. Following a vegetarian diet requires some forward planning to ensure that all of the nutrients needed for rapid growth and development at this time are adequately supplied. It is certainly not true that a vegetarian diet is automatically ‘healthier’ or ‘slimming’.

Protein

9. Protein from animal-derived food contains all of the amino acids (protein building-blocks) that the body needs, and so a vegetarian diet that includes animal products is likely to contain enough high-quality protein.
10. Most plant food proteins (with the exception of soya) have a low content of one or more of the amino acids needed by the body (essential amino acids).
11. If vegetarians and vegans eat a variety of vegetable proteins there is no reason why their intake of protein cannot be as good as that of a person who eats meat or other foods that contain animal protein.

Carbohydrates

12. Vegetarians need to use complex carbohydrates as a source of energy. The high intake of NSP in vegetarians may have a positive effect on health, as more pulses, nuts, fruits and vegetables are consumed there will be less risk of developing bowel disorders.
13. Soluble forms of fibre eaten in large amounts can help reduce blood cholesterol levels.

Fats

14. Lacto-ovo vegetarians should limit their consumption of dairy foods such as cheese, butter and whole milk to avoid a large intake of saturated fats. Reduced-fat variations of these foods should be used.
15. With vegans, the saturated fat content of the diet will be lower as more polyunsaturated fats are consumed.

Calcium

16. Vegetarians who consume milk and milk products are likely to have adequate intakes of calcium.
17. Vegans can obtain adequate calcium from plant food. Good sources include tofu, green leafy vegetables, watercress, dried fruit, seeds and nuts. White bread is fortified with calcium, as are soya milk. The presence of phytic acid in wholegrain cereals and NSP may make calcium less available to the body.
18. Where requirements for calcium are high, supplements containing calcium and calcium-fortified foods (such as fortified soya products) may be useful.

Iodine

19. Lacto-ovo vegetarian diets usually contain adequate amounts of iodine, but vegans are at risk of low intake.
20. Consumption of small amounts of iodised salt or seaweed is advisable for those following a vegan diet to ensure sufficient intake.

Iron

21. Much of the easily-absorbed iron (haem iron) in non-vegetarian diets comes from red meat and offal.
22. Plant foods contain no haem iron at all. Iron from non-haem sources such as eggs, cereal products, green vegetables, nuts and pulses is less well absorbed.
23. The presence of vitamin C from fruit, fruit juices and vegetables will enhance the absorption of non-haem iron.
24. Tea (because of tannins) and the plant substances phytate and NSP may reduce iron absorption.
25. Iron may be unavailable to the body from certain plant foods due to the presence of phytic acid.
26. Provided sufficient iron is included in the diet, iron deficiency anaemia is not common amongst vegetarians and vegans.
27. Iron deficiency anaemia has been reported in macrobiotic vegetarians who followed a very restrictive diet and consume brown rice, which is rich in phytates, as their staple food.

Zinc

28. Foods considered to be the best sources of this mineral include meat, poultry, dairy products, bread and other cereal products, and seafood. If many of these foods are not included, dietary intake may be low.
29. It is thought that adaptation to the diet might occur with time, resulting in an increase in the proportion of zinc absorbed from the intestine.
30. Good plant sources of zinc include bread and cereal products, pulses, nuts and seeds, but many of these are also high in phytate, which inhibits the rate of zinc absorption.
31. Although unrefined foods (eg wholemeal bread and brown rice) do contain more phytate, they are still preferable to refined sources, which contain less zinc and other micronutrients.

Vitamins

32. Most vitamins can be provided by foods of plant origin. However, vitamin B12 is found only in foods of animal origin, and there are few plant sources of vitamin D.

Vitamin B12

33. The body's requirement for vitamin B12 is only a few micrograms per day, it is essential that vegans, and other people who avoid all animal foods, include a source of vitamin B12 in their diet.
34. Vegans may be at risk of developing megaloblastic anaemia.

Vitamin D

35. Low vitamin D intake has been found among the Asian population, particularly among children, adolescents women and the elderly, many of whom are vegetarians.
36. Prolonged deficiency of vitamin D results in rickets in children and osteomalacia in adults. A combination of factors may be associated with low vitamin D intake.
37. Vitamin D is found naturally in only a few foods, all of which are of animal origin, for example meat, oily fish such as mackerel and sardines, eggs, whole milk and its products. Vegetarians may be more at risk of a deficiency of vitamin D.
38. Fortified foods can help to contribute to the amount of Vitamin D in the diet some breakfast cereals, soya milk, yoghurts and all margarines (required by law in the UK to contain vitamin D) and reduced-fat spreads are fortified with vitamin D.

ACE Vitamins

39. ACE will help boost and maintain the immune system therefore allowing a higher resistance to illness and infection if intake of fruit and vegetables is high.
40. Function of Vitamins A, C and E as appropriate to the question.

Question 3

		Mark allocation:	25 marks

A – 18-25 marks
The candidate is able to develop a full and coherent discussion of the properties of protein and their use of food manufacture. 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 properties of protein and their use in food manufacture. 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 linked to food manufacture:

Maillard Reaction

1. Non-enzymatic browning ie Maillard Reaction important in the food industry – wide variety of baked goods with browned surfaces – known as Carbonyl-amine browning.
2. Occurs when protein and CHO occur together in foods and it is a reaction between free amino groups, or free amino groups and carbonyl group of a reducing sugar eg glucose.
3. The following may affect Maillard browning so are important in food manufacturing – pH, temperature, moisture content, sugars and amino acids available.
4. Carbonyl browning occurs at high temperatures and at a pH value of 7 and above.
5. It produces desirable chances in flavour, colour and aroma during dry cooking methods eg roasting, baking and grilling.
6. Important for baking goods such as bread, biscuits and cakes, nuts and coffee beans (roasting), flavour in biscuits and breakfast cereals and meat extracts and roasted or grilled meat or poultry.

Coagulation and denaturation

7. Denaturation may be brought about by controlling pH and occurs most readily at the isoelectric point when proteins are least stable.
8. Isoelectric point varies from each protein – it occurs when the pH is neutral.
9. Many proteins are denatured by heat ie they coagulate.
10. Coagulation results in the loss of solubility or change from fluid (sol) to more solid state to formation of gel eg egg white (ovalbumin) begins to coagulate at 60ºC, egg yolk begins coagulation at 65ºC.
11. As temperature rises, coagulation continues until whole mass is solid.
12. Different proteins coagulate at different rates.
13. If cooking temperature is kept below 100ºC coagulation is slow and coagulated protein is not too firm, ie is more digestible, important when cooking meat and products containing eggs.
14. If cooking temperature is above 100ºC coagulation is rapid and denatured protein forms a hard solid mass.
15. Particularly important when stewing/casseroling meat – if cooked at too high a temperature for too long, can be tough.
16. Coagulation of proteins is responsible for the thickening effect eggs give in products eg custards, quiche, lemon curd.
17. Coagulation of egg custard produces a gel.
18. Overheating would result in syneresis where protein becomes hard and separates from liquid.
19. Product producing ‘holey’ open textured product.

20. Firmness of custard/final product depends on the proportions of ingredients eg eggs to milk for example and addition of other ingredients.
21. Addition of sugar raises the temperature for coagulation and produces a softer texture.
22. Salts are necessary for the gelling of egg custard mixtures – present in milk or by addition of salt (NaCl)

Partial Coagulation

23. Partial coagulation occurs when eggs are whisked into a foam eg egg whites for meringues, whole eggs and/or yolks for sponge cakes.
24. Heating results in further coagulation and the formation of rigid structure due to the denaturation of protein.
25. Foaming occurs most readily at the isoelectric point.
26. When whisking eg egg whites, foaming may be promoted by the addition of acidic substances (vinegar, cream of tartar) which lowers the pH value nearer to the isoelectric point, this makes the foam more stable.
27. Over beating – too much air incorporated – protein is denatured too much, protein film round bubbles or air becomes too thin and less elastic, foam collapses resulting in loss of volume.
28. Addition of salt reduces stability of foam – decreased volume.
29. Addition of sugar retards denaturation of egg white forms, better to add sugar after egg whites beaten.
30. Addition of sugar to egg white foam will result in a more stable, stiffer foam.

Enzymatic Coagulation

31. This is typified by the clotting of milk in cheese making.
32. The protein casein is coagulated by the addition of rennin (or other enzyme) – forms a continuous mass initially, breaks into cured when agitated ie gel structure is broken down.

Gels

33. Proteins can be used to produce gels in cold desserts eg mousse, jellies and savoury pies/aspic jelly.
34. Gelatin gels have qualities which make them preferable to other gelling agents – thermo reversibility, elastic texture, melt in the mouth characteristic and good flavour.
35. Gelatin' s ability to form thermo-reversible gel makes it useful in the food industry as eg gelling agent, thickener, protective colloid, adhesive agent, stabiliser, emulsifier, foaming/whipping agent, etc.
36. Gelatin is a useful nutritive component as it is protein and free from cholesterol.
37. Viscosity of gelatin important in some food systems eg starch moulded confectionery where the working speeds demanded by modern processing techniques require gelatin with a low viscosity.
38. Gelatin produced from the protein collagen (commercial gelatine) is used as a stabilising agent for emulsions eg ice cream.
39. On cooling, gelatin sol (ie protein in water) will set to form a gel - this is semi rigid but is not coagulated by heat.
40. Unlike egg custard gel this type of gel is reversibly ie on heating it will liquefy.
41. If gelatin sol is cooled until viscous but not set it can be beaten into a foam to incorporate air – gelatin would have a degree of elasticity at this stage and would be able to stretch and surround air bubbles and is used in whipped cream and gelatin desserts.

Meat

42. The cells of the muscle fibres contain two soluble proteins: myosin, which is thicker filaments, and actin, which is thinner. These proteins are responsible for the contraction of muscle and for rigor mortis.
43. The connective tissue surrounding the muscle fibres is mainly collagen, whilst the walls of the muscle fibre are mainly elastin.

44. Collagen gradually converted into gelatin during cooking. Elastin is a tough, insoluble protein and is not affected by cooking. It is commonly known as ‘gristle’.
45. Muscle fibre proteins coagulate. The texture becomes firmer as the proteins myosin and actin, in the muscle fibres, coagulate above 50ºC
46. Meat juices are squeezed out as the collagen and elastin contract at 60ºC. This causes the meat to shrink and reduce in weight.
47. Collagen in the connective tissue is converted into gelatin, which makes the meat tenderer.

Milk

48. Milk is composed of a variety of nutrients either dissolved in water or dispersed in a colloid. The colloidal system is complex but in simple terms is a fat-in-water emulsion.
49. The most important proteins in milk are caseinogens and the whey proteins lactalbumin and lactoglobulin.
50. When milk is heated, the whey proteins coagulate and a skin forms on the surface

Question 4

	Mark allocation: 25 marks
A – 18-25 marks	
The candidate is able to develop a full and coherent discussion of the debate surrounding the use of additives in 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 debate surrounding the use of additives in food products. 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 linked to the use of additives in food products:

Positive – General Points

1. Foods have a longer shelf life and so the consumer can store the products for a longer period of time – convenience factor. This prevents the consumer having to do a lot of shopping daily as foods can be safely bought and stored for an extended period of time.
2. There is increased variety in the diet as foods can be safely bought and stored for an extended period of time.
3. The sensory value of food is improved by the addition of additives. If additives are not used, many foods which are processed would lose flavour, colour and texture.
4. Food is safer for longer periods of time as micro-organism infections are reduced or impaired. This reduces wastage of food in the home.
5. Food additives have allowed the development of a wide variety of new foods that would previously have been unable to be developed.
6. They have opened up an area of packaging of foods and so aid the consumer in terms of choice and storage.
7. Many new lower fat products would not be available without the use of additives – related to health improvement.
8. Foods are more consistent with additives so that the consumer can buy standard products.
9. Additives allow the use of cheaper ingredients, although these economies are not always passed on to the consumer.
10. Some additives help to minimise nutrient losses during processing and storage.
11. Additives allow enormous quantities of food to be provided.
12. They extend shelf life thereby reducing cost.
13. They improve product appearance.
14. Food manufacturers should only use additives which have been tested and found to be safe.
15. Manufacturers are legally forbidden to add substances to food that may injure a consumer's health.
16. Reduces need for daily shopping –convenience factor.
17. Some additives can help to minimise nutrient losses during processing and storage or to replace those lost.
18. Regulated and controlled on a European Union (EU) wide basis.
19. Humectants absorb water and therefore help to prevent food from drying out so improving the product for the consumer.
20. Anti-caking agents can be added to foods during manufacture and help their process be more efficient.
21. Acidulants are used to impart a sharp, characteristic taste to foods without which some foods would appear tasteless.
22. Acidulants also assist in the setting of gels, eg jams, and so make the product more appealing.

23. Acidulants can act as preservatives so help to make food last longer.

SPECIFIC BENEFITS

Specific benefits to the consumer of antioxidants

1. Antioxidants prolong the shelf life of foods by protecting against deterioration caused by exposure to air.
2. They prevent fats becoming rancid so extending the shelf life, preventing waste and unpleasant flavours.
3. They prevent colour changes in certain products so maintaining their aesthetic appeal.

Specific benefits to the consumer of preservatives

4. They help to keep food safer for longer.
5. They lengthen the shelf life of foods.
6. They enable manufacturers to transport food in bulk, which is cheaper and keeps costs down for the consumer.
7. They protect food from contamination by micro-organisms.
8. They prevent wastage of foods for retailers/consumers as shelf life is extended.
9. They can be added to some fruits, eg apples, to prevent browning – unpleasant discolouration.

Specific benefits to the consumer of emulsifiers and stabilisers

10. They prevent the ingredients separating again so maintaining a good product.
11. They allow the manufacturer to produce a consistent product that can remain stable on the shop shelf and during transport and distribution.
12. They improve the consistency of food.
13. They produce special characteristics required in certain products, ie viscosity (thickness or thinness), smoothness and stability.
14. They help produce 'healthy' products, eg low-fat spreads, and so contribute to consumer health.

Specific benefits to the consumer of sweeteners

15. Sweeteners can reduce the sugar content of the diet, help weight reduction and help meet the dietary target for reducing sugar consumption.
16. Sweeteners have little or no energy value and can therefore aid weight reduction as they have a lower energy value.
17. Sugar substitutes especially intense sweeteners can be used in the 'lite' market for foods and can therefore help reduce the energy value of these products, assisting in weight reduction.
18. Sweeteners can be used in confectionery, bakery goods and many other foods, increasing the range of 'healthy' options available and giving the consumer a wider choice of products.
19. Bulk sweeteners are used in sugar-free confectionery and can help reduce the risk of tooth decay and obesity.
20. Sorbitol does not require insulin to be metabolised and is therefore used in products suitable for diabetics, eg jam/jellies, increasing their food choice.

Specific benefits to the consumer of colourings

21. Colouring restores the colour lost due to processing so improving appearance.
22. It enhances the colour of certain foods to make them more attractive

Specific benefits to the consumer of flavourings and flavour enhancers

23. Makes flavour in some foods stronger.
24. Added to foods in small amounts to improve taste.
25. Added to foods in small amounts to give odour.
26. Used to produce artificial flavours in foods where 'real' flavours may add to cost (eg yoghurt)
27. Used to add flavours to foods which, when processed, cannot replicate natural flavour.

Specific benefits to the consumer of nutritional additives

28. Fortification allows for the nutritional value of foods to be improved.
29. The enrichment of margarine with vitamins A and D to make its vitamin content equivalent to that of summer butter is obligatory and helps provide the consumer with additional vital nutrients.
30. The addition of nutrients, eg calcium, to flour helps reduce the risk of osteoporosis in the population.
31. The fortification of breakfast cereals with a range of vitamins and minerals eg folic acid can benefit all groups/especially pregnant women and help reduce the risk of spina bifida in unborn babies.
32. The addition of vitamin C to soft drinks and juices can help increase the antioxidant properties of the drink.
33. By adding nutrients to basic, low-cost foods, people on low incomes are able to purchase these foods and so ensure these nutrients are in their diet.

Negative – General Points

1. Some additives may present a health problem to a minority of consumers.
2. The lack of additives in a product is used as a positive advertising feature by manufacturers.
3. Consumers must read labels carefully as some manufacturers 'play' with words to give a false impression.
4. The use of synthetic colours is particularly difficult to justify. The risks, though small, are thought by many people to outweigh substantially the dubious cosmetic benefits of the additives.
5. Additives are sometimes used to give manufactured foods properties associated with the presence of traditional ingredients. Emulsifying agents used to decrease the amount of fat needed in the manufacture of cakes and bread come into this category. Although these reduce the amount of fat required to produce familiar physical properties in cake, they do not, of course, fulfil its nutritional functions.
6. Synthetic cream and meringues are often made from cellulose derivatives, which have absolutely no nutritive value.
7. The use of colouring matter in cakes to give an impression of richness may be seen as being deceitful.
8. The use of nitrates in meat products to prevent food poisoning by *Clostridium botulinum* is well established. There is the risk, however, that the nitrites in food are partly converted into a substance that is known to produce cancer in animals.
9. Concerns over potential link between colourants and hyperactivity in children.
10. FSA has told parents to avoid identified additives if their children are hyperactive.
11. Food campaigners believe that artificial additives should be banned completely.
12. Concern over labelling of additives on food/drinks as they may confuse consumers.
13. Confectionery items, sold loose, have no ingredient information therefore additives are difficult to avoid.
14. Consumers' Association demanding new rules for clear labelling of all additives used in food/drinks.
15. Consumers find it difficult to identify the additives on lists/labels if names not E numbers used.
16. Confusion of names/E numbers for additives on labels.
17. People who avoid certain additives for health reasons may find it difficult to identify them/unsure/unwittingly if not clearly marked.

Question 5

	Mark allocation: 25 marks

A – 18-25 marks
The candidate is able to develop a full and coherent discussion of the factors that may influence the food choices of primary school 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 that may influence the food choices of primary school 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 linked to the food choices of primary school children:

Parents

1. Their eating habits are passed on to their children and the children learn to like the foods made by the parents.
2. Mother may be the most involved in the 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 put 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/may limit food choice.
8. Money – children may be given money to spend on snacks, the amount given may influence their choice.
9. Parents may teach food skills to their children.

Culture

10. Association of foods with events eg Christmas, Easter.
11. Types of food offered to children out with the home eg friends' homes may increase the range of foods they eat.
12. Experience of foreign holidays may make children more confident to try new foods at home.
13. Ethnic background may influence foods prepared at home.
14. Ethical beliefs may influence food choice.

Peers

15. Older primary aged children can be conscious of being part of the gang so copy-cat behaviour is very common – can be either positive or negative.

Media/promotion

16. Advertisers target primary children by using characters to sell products e.g. Scooby Doo, Ben 10 etc.
17. Promotions – children easily attract to free gifts eg Simpsons stickers.
18. TV – almost ½ of children's adverts on TV are for food, children are attracted by this powerful medium.
19. Promotional characters used to encourage children to buy products eg Harry Potter.
20. Use of messages in adverts/labels/packaging to encourage choice.
21. Promotional characters, films and free gifts are used to entice children into fast-food outlets to encourage consumption of these products.
22. Image created around a food to make it appear 'cool' – eg Coke may appeal particularly to older primary children.
23. Children susceptible to brand name adverts so companies take advantage of this.
24. Use of popular music to promote a food may make it appeal to older primary children.
25. Adverts in cinemas can be targeted directly at primary school aged children when shown with films they enjoy.
26. Text messages could be used to persuade children to buy food products.
27. Advertising and sponsorship at events such as football matches allows manufacturers to advertise their products eg posters round the pitch.
28. Children's magazines/comics are particularly used to target children.
29. Product placement within the supermarket to encourage primary children to pester parents to buy food, eg sweets places near the checkout at child height often lead to additional purchase, popular products placed at eye level.
30. Promotion of free schools equipment through purchase of foods can encourage children to buy or to persuade parents to buy particular foods.
31. Campaigns such as 'text2win' competitions can be found printed on food packaging and this may encourage the product to be bought.
32. Junk food can also be placed in the background of many popular computer games this encouraging young player to purchase food.
33. 'Pop ups' on websites may encourage primary children to buy particular food products.
34. Internet games linked to food could have a positive/negative impact on food choice.
35. Cookery programmes on television may encourage children to try new foods.
36. Celebrity endorsement.

School

37. School meals – foods on offer influence choice particularly with primary children where there is often less choice.
38. School and what it teaches about healthy eating.
39. Curriculum for Excellence now ensures Health and Wellbeing is taught so primary pupils may make healthier/wiser/more informed choices about food.
40. School may offer new different foods not on offer at home.
41. Breakfast clubs may offer a healthy start to the day and may reduce snacking.
42. Health promoting schools may make the issue of healthy eating a feature.
43. School initiative such as free school meals for infants/free fruit may encourage healthier choices.
44. Schools (Health Promotion and Nutrition) Act may limit choices in schools/make them healthier.

Personal Factors

45. Personal likes and dislikes or perceived personal likes and dislikes.
46. Allergies to particular foods or additives may limit food choice.
47. Appearance of food itself.
48. Boredom leading to snacking leading to poor eating at mealtimes.
49. Money available, maybe pocket money to spend as they wish.
50. Little thought for future health implications as they seem a long way off.
51. Health considerations.

ADVANCED HIGHER HOME ECONOMICS 2012 **Context: Health and Food Technology**
RESOURCE MANAGEMENT

Question	Content	Elaboration	Skills		Totals
			Knowledge	Evaluation	
Section A (a) (b) (c)	 Food Politics Psychology of Food	 • The impact of nutritional/health, cultural, social, economic and environmental factors (eg Fairtrade) on food availability, selection and consumption patterns • Consumer attitude to food issues • Organic Foods	 5 10	 10	**25**
Section B 1 (a) (b)	 Food Politics Nutrients and their effect on health and development of individuals	 • Food nutrition and health issues/policies in Scotland and in the UK • Health and dietary diseases – Coronary Heart Disease	 10	 15	**25**
2	Nutrients and their effect on health and development individuals	• In depth study of nutrients, their function and the effect on the health and development of individuals at different life stages/special circumstances - vegetarians	25		**25**
3	Food science Food Commodities	• Proteins – colloidal systems, denaturation and factors affecting it, gels and gelatine, maillard reaction • Composition and properties of food in their raw and cooked state – eggs, milk	25		**25**
4	Biochemistry, preservation and processing	• Food additives	25		**25**
5	Psychology of food	• Influence on consumers	25		**25**

[END OF MARKING INSTRUCTIONS]