



2009 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 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) 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 outline some of the main issues of the report.

Answers should make reference to the following points:

1. Drive for healthy eating from consumers has led to increase in range of additive free food.
2. 'Additive and preservative free' overtaken 'low fat' as new health message/public concern.
3. Increasing trend for additive free food as consumers take more interest in health/natural products.
4. Concerns over potential link between colourants and hyperactivity in children.
5. FSA has told parents to avoid identified additives if their children are hyperactive.
6. Food campaigners believe that artificial additives should be banned completely.
7. Concern over labelling of additives on food/drinks as they may confuse consumers.
8. Confectionery items, sold loose, have no ingredient information therefore are difficult to avoid.
9. Consumers' Association demanding new rules for clear labelling of all additives used in food/drinks.
10. Consumers find it difficult to identify the additives on lists/labels if names not E numbers used.
11. Confusion of names/E numbers for additives on labels.
12. People who avoid certain additives for health reasons may find it difficult to identify them/ unsure/unwittingly if not clearly marked.
13. Shelf life is important – banning preservatives would affect range available for consumers.
14. Concern over additives could lead to increase in popularity of frozen/canned foods.
15. Loss of preservatives could make life more difficult for consumers.
16. Parent concern over man-made additives – many would prefer removal or replacement with natural additives.
17. Mismatch from consumer – want additive free food but still want convenience.

(b) Discuss the use of additives in the manufacture of food products

Mark allocation: 10 marks

A – 8-10 marks

The candidate is able to develop a full and coherent discussion of the use of additives in the manufacture of food products. 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 use of additives in the manufacture of food products. 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.

Answers should make reference to the following points

1. Food additives carry both benefits and risks to the consumer.
2. Additives are not new – an extension of traditional techniques eg salt to preserve.
3. Additives allow enormous quantities of food to be provided.
4. They extend shelf life thereby reducing cost.
5. They improve product appearance.
6. Food manufacturers should only use additives which have been tested and found to be safe.
7. Manufacturers are legally forbidden to add substances to food that may injure a consumer's health.
8. Some additives may present a health problem to a minority of consumers.
9. Manufacturers are now having to justify the use of additives to consumers and are subsequently redesigning products to reduce or omit additives.
10. The lack of additives in a product is used as a positive advertising feature by manufactures.
11. Products which are promoted as 'free of artificial colourings' are just that and will probably contain natural colourings, preservatives, flavourings etc depending on the actual product.
12. Consumers must read labels carefully as some manufacturers 'play' with words to give a false impression.
13. The food additives approved for use in the UK perform useful functions without harming the vast majority of customers.
14. Increased variety in diet as foods can be imported in to the country and foods out of season can be consumed.
15. Sensory value is improved by addition of colourings/flavourings.
16. Food is safer for longer as micro-organism infection is reduced or impaired.
17. Reduces need for daily shopping – convenience factor.
18. Reduces food wastage at home.
19. Additives may be natural or artificial.
20. Increased range of products on market.
21. Increased range of packaging options – increased flexibility for consumer.
22. Flavourings/colourings can be used to replace those lost during processing.
23. Low fat options available due to additives – health benefits.
24. Improved standards and consistency of products.
25. Allows use of cheaper ingredients to produce more economical products.
26. Some additives can help to minimise nutrient losses during processing and storage or to replace those lost.
27. Regulated and controlled on a European Union (EU) wide basis.
28. Clearer labelling to facilitate consumer choice.

Emulsifiers

1. An emulsifier allows the dispersion of tiny droplets of oil to be made in water to give a stable emulsion eg in mayonnaise, sauces, drinks and soups.
2. Increase appeal of foods – have a pronounced effect on the structure/texture of products eg prevent separation of oil and vinegar in mayonnaise.
3. Aid in processing and preparation of foods – modern high speed food processing techniques often require use of emulsifiers to allow the product to be successfully produced.
4. To maintain product quality and freshness – mould growth in low fat spreads is controlled by creating an emulsion with finely dispersed small droplets of water.
5. To increase choice – functional properties allow a much wider choice of end product for the consumer.
6. Allows a wider choice of raw ingredients for the manufacturer.
7. Many common products would not exist without emulsifiers eg low fat spreads, fatless sponges.
8. Allows the manufacture of quality products with health benefits for the consumer eg reduced fat versions.
9. Costs too can be lowered without reducing nutritional value of foods.
10. Product can remain stable during transport/distribution and shop shelf life.
11. Used to make stable emulsions or creamy suspensions from oils and fats and water/form colloids.
12. Also used in baked foods to slow down the rate of staling eg extends shelf life of cakes etc.
13. Used in a wide variety of products, commonly; biscuits, breakfast cereals/extruded snacks, cakes/bread, margarine/spreads, desserts/mousses, soft drinks, chocolate coatings, sweets, chewing gum, frozen desserts/ice-cream, dried potato, mayonnaise.

Stabilisers

1. A stabiliser usually works by absorbing large quantities of water and binding them into a stable form eg in ice cream.
2. Used to improve the stability of emulsions and prevent separation of their components – maintains a good product.
3. Helps maintain the physical characteristics of a product eg gives “body” and improves the melting resistance of ice cream.
4. Improves the stability of a mixture by increasing the viscosity.
5. In ice cream a stabiliser is added to prevent the formation of large crunchy ice crystals during the freezing process – improves texture.
6. The ice cream will thaw gradually with a stabiliser present and not melt so rapidly.
7. Used to prevent the appearance of large, grainy ice crystals/lumps in ice-cream/lollies.
8. Gives ice cream the firm texture, smooth taste and good keeping qualities.
9. Ice creams/lollies made without stabilisers tend to have a grainy feel in the mouth due to formation of large ice crystals.
10. Stabilisers help these products resist melting ensuring the right consistency/texture is experienced by consumer.
11. Used in manufacture of many reduced or low fat products which are high in demand due to consumer awareness of their health benefits.
12. When a quantity of fat/oil is removed from a product it must be replaced, usually with water/gel/stabiliser, if the product is to be comparable with the traditional one.
13. Used in sauces and dressings to prevent separation of oil and the aqueous components. This separation is not unsafe but would be unattractive to consumers.
14. Allows production of products which remain stable during shelf life, transport and distribution.

Preservatives

1. Used in wide variety of food/drink products.
2. Used to control growth of micro organisms.
3. Increases transport & storage times of foods.
4. Not a substitute for good food hygiene practices – can't bring spoiled foods back to acceptable level.
5. Can help to reduce incidence of food poisoning by controlling growth of micro-organisms/toxins.
6. Most are used to prevent growth of fungi/moulds.
7. Currently 36 preservatives permitted in the UK.
8. Enables food to be transported in bulk keeping costs down.
9. Extends shelf life which is convenient for consumer – prevents food wastage.
10. Can prevent discolouration to some fruits.

Antioxidants

1. Added to food in order to slow down the rate of oxidation – none can completely prevent it.
2. Can extend shelf life of product.
3. Can protect fat soluble vitamins from combining with oxygen.
4. Generally used in fat containing products to prevent rancidity.
5. Can be used to prevent browning reactions in fruits & fruit products.

Sweeteners

1. Function to provide a sweet taste.
2. Used in wide variety of foods/drinks.
3. Often used to limit energy provided by food while maintaining sweetness.
4. Used to provide food/drink suitable for diabetics.
5. Intense sweeteners used in very low concentrations reducing ingredients cost for manufacturers.
6. Bulk sweeteners about as sweet as sucrose generally used in equal amounts.

Anti-foaming agents

1. Used to prevent or stabilise any foams produced during manufacture.
2. Used in cooking oils & bottled beers to prevent over foaming.

Colourings

1. Used to improve general appearance.
2. Can replace natural colour lost during manufacture.
3. Makes product more appealing to consumer.
4. Gives wider range of food/drink choices for consumer.
5. Ensures uniformity of colour in food from batch to batch.
6. Possible link with hyperactivity in children.

Flavourings

1. Added to give, enhance or intensify flavour.
2. At present, flavourings may be used without restrictions.
3. Synthetic flavourings are usually copies of natural flavourings.
4. Can give odour to some foods/drinks.
5. Used to produce artificial flavours in foods where 'real' flavours would add to cost eg strawberry yoghurt.
6. Can replace flavour lost during manufacturing process.

Anti-caking agents

1. Improves the flow characteristics of powders improving efficiency of manufacturing process.

Acidulants

1. Used to impart sharp, characteristic taste to foods.
2. Assist in the setting of gels.
3. Can be a form of preservative.

(c) Critically discuss irradiation as an alternative means of food preservation.

Mark allocation: 10 marks

A – 8-10 marks

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

B – 6-7 marks

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

C – 4-5 marks

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

Note: Candidates should link responses to the “role” of the media not focus solely on the methods employed.

For

1. Traditional preservation methods eg drying, smoking, curing, addition of salt all change the way the food looks or tastes – irradiation may overcome this.
2. Increasing demands and pressures on food production systems in recent years have led to large sections of the food chain being contaminated, eg poultry frequently contaminated with salmonella, as much as 75% in Europe. The contamination problems using conventional methods of preservation have led scientists to try to improve these techniques, irradiation may be the answer.
3. International organisations such as the UN International Atomic Energy Agency promote its use surely meaning it is an economic and viable method of preservation.
4. WHO has supported food irradiation as it sees it as a means of reducing food borne disease.
5. Many governments also have concerns about food borne disease and feel irradiation is an easy way to provide safe food.
6. Many governments have concerns about food shortage and irradiation may help with this problem.
7. Some food producing countries such as Ghana and Brazil use decontamination methods which are presently banned on health and safety grounds. Irradiation would help the food export problems they are facing.
8. It also has some specific advantages as a food treatment process in certain countries eg it is the only process that can be used to treat raw food such as the Thai nahm sausage which consists of raw pork. It is also the only way of treating sea foods that are traditionally eaten raw.
9. Food manufacturers support irradiation as it enables them to extend the shelf life and storage periods of foods, this allows them to reduce waste and to deliver foods to the shops when it is economically advantageous to do so.
10. It enables foods such as tropical fruits to be transported all over the world economically.
11. Irradiation can make foods safe by killing harmful micro organisms.
12. Since 1961 exhaustive studies have been carried out regarding the safety of irradiated foods.
13. Modern irradiation plants are completely automated and computer controlled so time and dose levels can be strictly monitored and no people are exposed to radiation at any time.
14. Irradiation plants have to be licensed and are subject to strict inspections.
15. Storage and transport also licensed and subject to strict inspection control.
16. Transportation and storage also subject to close monitoring by government controlled agencies.
17. It can kill many insects and pests that infest foods such as grains, herbs and spices without appearing to affect them.
18. It can delay or stop the ripening/decay process so foods can be stored for longer.
19. It can completely sterilise a food making it suitable for vulnerable patients in hospitals.
20. It can kill/reduce micro organisms such as Salmonella, Listeria and Campylobacter.

Against

1. Effect of radiation on foods varies, it only works successfully on a small number of foods.
2. In some foods the dosage is critical, a slight overdose can cause foods to have an unpleasant taste and texture.
3. Despite the results from many studies, consumer experts are dissatisfied with some of the conclusions and argue that key experiments have been ignored and that risk assessment methods are suspect.
4. Although there is no hard evidence to show irradiation dosage levels used are dangerous or have harmful effects, very few of the studies have been done for any length of time on humans.
5. Consumer experts fear that changes produced by irradiation may have subtle chemical effects, but that the results may not show up for many years.
6. Studies done have been on selected foods and little is known about the effects on pesticides and other chemical residues on foods.
7. Tests done have been in controlled circumstances, and effects may change when the process is scaled up in a manufacturing environment.
8. Consumer groups protested about the original irradiation label which gave it a positive image, they won and the label in use is less biased.
9. Although all irradiated foods must carry a label intimating the fact, it is difficult to enforce as it is difficult to detect.
10. No cheap and reliable detection test available.
11. If irradiation is to be more widely adopted, a cheap and reliable detection system should be a matter of priority for monitoring organisations to use.
12. It can only be used on a very limited range of foods.
13. It is a relatively expensive method of preservation.
14. Vitamin E levels can be reduced by 25% and vitamin C by 5 – 10%, many consumers are unaware of this.
15. At the dose given about 90% of micro organisms are killed so care still has to be taken with foods.
16. It is ineffective against viruses so food poisoning may still occur.
17. It can create new substances called radiolytic products – there is controversy over whether such products are dangerous.

Section B

1. (a) Discuss the ways in which the Scottish dietary targets could contribute to a reduction in obesity.

Mark allocation: 10 marks

A – 8-10 marks

The candidate is able to develop a full and coherent discussion on the possible reasons for this statement. The discussion shows good analysis and the identification of the majority of the main points with full explanation.

B – 6-7 marks

The candidate is able to develop a discussion on the possible reasons for this statement. Most of the main points will be identified with 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:

Fruit and vegetables – average intake to double to 400g per day

1. A diet which is high in fruit and vegetables will reduce the opportunity to consume foods which are higher in fats and so lessen the risk of obesity.
2. Many ways of consuming fruit and vegetables do not involve large quantities of fat in either preparation or cooking making them lower in K_j.
3. Changing diet to consume more fruit and vegetables may in turn change ones palate and hopefully such changes may result in a reduction in the intake of fats and fatty foods which may help reduce obesity.
4. Satiety/feeling of fullness due to NSP/fibre content/chewing.
5. Reduces snacking on high fat/sugar foods due to feeling of fullness.

Bread – intake to increase by 45% mainly using wholemeal and brown bread

1. Bread is rich in starchy carbohydrate and is very filling thus reducing the need to fill up on fatty foods which may help reduce obesity.
2. Bread will contribute to a reduction in obesity but this is dependent on the topping/sandwich filling used.

Fats – average intake of total fat to reduce from 40% to no more than 35% of total energy intake

1. Following this target would reduce the consumption of fat to satisfactory levels and reduce the energy content of the diet.

Fats – average intake of saturated fatty acids to reduce from 16.6% to no more than 11% of total energy intake energy

1. If this target is met it is likely that alternative sources of energy would be sought, there is an opportunity for this extra energy to come from starchy carbohydrate foods which are less energy dense.

Total complex carbohydrates increase average non-sugar intake by 25%

1. Increasing bulk in the diet by consuming more complex carbohydrate will reduce the need to snack on fatty foods between meals which could help reduce obesity.
2. Increasing the proportion of starchy carbohydrates eaten with meals will reduce the need to serve high fat foods to make meals filling and so help reduce obesity.

Breakfast cereals – average intake to double to 34g

1. Consumption of breakfast reduces the need/desire to snack throughout the rest of the day. Many snack foods are higher in fat & sugar and could contribute to obesity.

Average sodium intake to reduce to 100mmol per day

1. Consumption of salty foods, particularly snacks can make one thirsty. This could result in increased consumption of high sugar drinks which may contribute to obesity.

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% of total energy**

1. Snacking on high sugar foods can add significant amounts of energy to the diet so reducing this could help reduce obesity.
2. Consumption of large quantities of highly sugared fizzy drinks could contribute to obesity, so reducing this level could lessen the risk of obesity.

White fish consumption to remain the same

1. White fish is low in fat and therefore can contribute to a reduction in obesity.

Proportion of mothers breastfeeding their babies for the first 6 weeks of life to increase to 50%

1. Evidence suggests that babies which are breast fed are less likely to suffer from obesity in later life.
2. May contribute to mothers weight loss.

General

1. An interest in healthy eating may be generated by knowledge of the Scottish Dietary Targets. This interest may result in a change of eating habits eg a reduction of fat.

1. (b) Critically discuss the factors which have contributed to the increased levels of obesity in Scotland.

Mark allocation: 15 marks

A – 12-15 marks

The candidate is able to critically discuss the factors which have contributed to the increase in obesity levels in Scotland, giving full analysis.

B – 9-11 marks

The candidate is able to critically discuss the factors which have contributed to the increase in obesity levels in Scotland, giving some analysis.

C – 7-8 marks

The candidate is able to critically discuss the factors which have contributed to the increase in obesity levels in Scotland, giving limited analysis.

Candidates should make reference to the following points:

Culture

1. Poor diet in Scotland is now a historical fact, fried and high fat foods are traditional. In the past they were required for warmth but much less so now so they contribute to obesity.

Skills/Knowledge

1. Lack of preparation and cooking skills means a reluctance to prepare fresh foods such as fruit and vegetables, so convenience/take away foods which can be higher in calories are consumed.
2. Children learn poor eating habits from parents so problem continues down the generations.

Cooking facilities

1. Poor housing and limited finances often equal poor cooking facilities. Improving them to facilitate 'home cooking' not always seen as a priority so higher fat convenience foods/takeaways may be consumed more regularly.
2. Poor facilities reduces the ability and willingness to prepare fresh foods which exacerbates obesity problem.

Resources

1. Lack of money discourages experimentation with new foods so poor diet continues.
2. Lower fat/sugar foods often more expensive.
3. Fresh foods have a limited shelf life and are more prone to waste.
4. Fatty foods are filling and cheap – important if on a budget.
5. Fresh fruit and vegetables are expensive.
6. Economic climate may result in cutbacks in activities eg gym memberships.

Access to shops

1. Larger supermarkets which have a better range of lower fat/sugar, higher NSP foods usually out of town, not all people have access to transport.
2. Rural nature of Scotland means that access to larger supermarkets which have a better range of lower fat/sugar, higher NSP not always easy, therefore availability of products which may help reduce obesity are limited.

Advertising promotion

1. Majority of advertising of food products is for those which can contribute to obesity, very little for healthier options.
2. Heavy advertising during children's programmes in the past of high fat/sugar foods encouraged poor eating habits from an early age, these are then hard to change.
3. Special offers – buy one get one free – can encourage over purchasing of foods which if unhealthy can promote overeating.
4. Use of cartoon/TV characters on foods can encourage pester power to prevail and foods may well be high in fat/sugar.

Lifestyle

1. Sedentary lifestyle, particularly of young people due to TV, computer games etc contributes to obesity.
2. Increased use of convenience foods due to lack of time for food preparation, often these can be high in fat.
3. Erosion of family mealtimes means 'grazing' more common, often on high fat/sugar foods.
4. Increased use of fast food/take away outlets/eating out.

Manufacturers

1. Slow progress at adapting foods to make them lower in fat/sugar.
2. Use of sweet weaning foods can set tastes for life.
3. New labelling schemes not always helpful/understood fully by consumers so may be ignored.

Consumer Attitudes

1. Some consumers anxious about adaptations made to food products to make them healthier eg fat replacers, sugar substitutes, so they continue to buy higher fat/sugar varieties.
2. Not all consumers want to change.

Education

1. Messages often confusing and contradictory – as a result people stick to what is familiar – which leads to obesity.
2. General lack of nutrition education may mean people don't actually know what to do to reduce their risk of obesity.

Taste

1. Both fat and sugar add flavour to food so by reducing them foods become less appealing so consumers revert to varieties which are higher in fat and sugar.

Peer Pressure

1. Peer Pressure may encourage consumption of foods high in fat/sugar.

Climate

1. Poor weather in Scotland is not always conducive to outdoor exercise so population generally may be less active.
2. Poor weather also encourages use of cars.
3. Cold climate encourages consumption of foods high in fat.

2. Discuss the role of micro nutrients in the diet of teenagers.

Mark allocation: 25 marks

A – 18-25 marks

The candidate is able to develop a full and coherent discussion of the part played by micro nutrient in the diet of teenagers. 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 part played by micronutrients in the diet of teenagers. 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 with reference to teenagers

Vitamin A

1. Necessary for good eyesight especially night vision – important for teenagers to make visual purple.
2. Has anti-oxidant properties – important for teenagers to reduce the risk of cancers/disease in the future.
3. Required to keep the mucous membrane in the throat, digestive and bronchial and excretory systems moist and free from infection.
4. Required for the maintenance and health of the skin – important for people of this age to look good.

Vitamin B complex

1. Allows the chemical reaction to occur which releases energy from nutrients – important for teenagers especially those who are very active (B₁ B₂ B₃).
2. Teenagers must ensure adequate supplies to obtain energy from their food otherwise they will be lethargic, which is common behaviour at this age anyway and lack of B vitamins could make it worse (B₁ B₂ B₃).
3. Important for healthy skin, tongue (B₂).
4. Important for the nervous system (B₁).

Folic Acid

1. Essential for the formation of red blood cells and the prevention of megaloblastic anaemia – vital for teenagers who require increased iron at this stage of development as it can act as a ‘back up’ if iron is lacking.
2. Required for the release of energy from food.
3. Important for the production of the nucleic acids RNA and DNA.
4. Required for normal growth in children, particularly important during the teenage growth spurt.
5. Maintains muscle tone – important for active, sporty teenagers.

Vitamin B12

1. Important to prevent pernicious anaemia, teenagers may be susceptible to anaemia due to muscle development (boys) and menstruation (girls).
2. Important for the production of red blood cells to help prevent anaemia.
3. Important for the normal functioning of the nervous system.
4. Involved in the metabolism of protein, carbohydrates and fats.

Vitamin C

1. Necessary for healing wounds/sores – teenagers with active lifestyles may be more at risk of injury.
2. Antioxidant properties beneficial to teenagers to help prevent cancers/heart disease in the future.
3. Assists with the absorption of iron – essential that teenagers have adequate amounts.
4. Required to make connective tissue which binds body cells together.
5. Required for the building and maintenance of skin and linings of the digestive system.
6. Teenagers may be at risk of low vitamin C intake if their diet is very low in fruit and vegetables.
7. Lack of vitamin C may result in anaemia due to poor iron absorption.

Vitamin D

1. Required to promote the absorption of calcium and phosphorus to build strong bones and teeth – vital for developing teenage bones and teeth/reaching peak bone mass.
2. Too much vitamin D can be dangerous as it results in excess absorption of calcium in the blood, this is deposited on the lungs and can result in death.
3. Promotes quicker healing of fractures which active teenagers may be more prone to.
4. Lack of vitamin D may lead to osteoporosis in later life due to calcium absorption.

Vitamin E

1. Antioxidant properties – it protects polyunsaturated fatty acids from damage by free radicals, especially cell membranes in the body – beneficial to teenagers to help prevent cancers/heart disease in the future.

Vitamin K

1. Assists in the production of coagulation factors in the blood to enable it to clot properly after an accident – vital at all stages of life.
2. Manufactured in the gut.

Calcium

1. Required for blood clotting, very important in case of accidents etc.
2. Required to be present in the blood for normal excitability in nerves and muscles.
3. Required for the normal action of hormones.
4. Essential so teenager can reach peak bone mass/development and maintenance of strong bones during period of growth.
5. Essential for the prevention of osteomalacia/osteoporosis in the future.

Phosphorus

1. An essential component for bone formation.
2. An essential component of all tissues.
3. Works with calcium to prevent osteoporosis in later life.
4. Vital in the repair of bones eg after an injury.
5. Plays an essential part in basic biomechanical mechanisms by which energy is obtained for life – important for energetic teenagers.

Sodium

1. Is one of the main elements of blood.
2. Is one of the main elements of tissue fluid which allows nutrients to flow into body cells and waste products to flow out.
3. Low intake may result in muscle cramps eg if the teenager becomes dehydrated.
4. Essential for the transmission of nerve and muscle impulses.
5. Excess can cause high blood pressure as the result of the expansion of extra cellular fluid volume – particularly dangerous in later life, important not to start bad habits at this age which could lead to HBP in later life.

Potassium

1. Deficiency may result in mental apathy, muscular weakness.
2. Potassium levels also linked with hypertension important in the long term health of the teenager.
3. Encourage the consumption of potassium rich foods during teenage years as potassium is linked with sodium and so may prevent HBP in later life.

Magnesium

1. Needed in the body for the functioning of some enzymes.
2. Necessary for the maintenance of the excitability of nerve and muscle membranes.
3. Works with calcium and phosphorous to assist normal skeletal development so important in teenager's diet.
4. Magnesium plays a role in the production of energy and maintaining good muscle health. Having a good supply of magnesium can assist oxygen and energy being delivered to working muscle tissue – important if teenagers are active.

Iron

1. Required as oxygen carrying pigment ie haemoglobin in the red blood cells.
2. Vital for the transportation of adequate supplies of oxygen to the tissue.
3. Teenagers may be susceptible to anaemia if diet is poor.
4. Teenagers' blood volume is increasing during period of rapid growth.
5. Teenage girls may require more iron due to blood loss during menstruation.

Copper

1. Components part of several enzymes – one of the most important one being the enzyme that catalyses the oxidation of ferrous to ferric iron so copper helps the absorption of iron and prevents anaemia in teenagers.

Iodine

1. Iodine is required to make the hormone thyroxine, which is produced by the thyroid gland in the neck.
2. Normal body growth and development of the central nervous system.
3. Energy production and oxygen consumption in cells, thereby maintaining the metabolic rate of the teenager.
4. If the thyroid hormone is insufficient, the basal metabolic rate is reduced as is body activity. Normal growth development is also impaired.

Zinc

1. Zinc is vital for a quick reacting immune system and is essential to the proper development and maintenance of the immune system. Without zinc the body could not fight off viruses, bacteria and fungi. A mild deficiency of zinc may increase the risk of infection.
2. Zinc is a key component of the enzyme that activates vitamin A in the retina. Zinc deficient people may show signs of night blindness.
3. In severe zinc deficiency, cells fail to replicate. Zinc is important for sexual maturation of adolescents. Deficiency causes delayed sexual maturing.
4. Some evidence that zinc is concerned with some of the processes involved with foetal development.
5. Studies have shown that zinc plays a role in taste perception and appetite regulation.

Selenium

1. As an antioxidant, selenium is thought to be important in protecting healthy cells against the damaging effects of metabolism, which may contribute to cancer or other chronic conditions in later life.
2. Selenium interacts with iodine in thyroid hormone metabolism.
3. It is also important in the immune system and its response to infection.

3. Discuss the composition and properties of meat and fish which should be considered by a food manufacturer when developing a new product.

Mark allocation: 25 marks

A – 18-25 marks

The candidate is able to develop a full and coherent discussion of the composition and properties of meat and fish which should be considered by a food manufacturer when developing a new product. The discussion shows food 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 composition and properties of meat and fish which should be considered by a food manufacturer when developing a new product. 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:

Meat

Cooking

1. Appropriate method of cooking for the cut of meat – will depend on structure.
2. Meat which is not tender once cooked will be unacceptable to the consumer – food manufacturer must select a suitable cooking method to ensure tenderness.
3. Meat shrinks on cooking and loses weight – manufacturers will have to consider the final weight of the product – product may be too small (unacceptable to consumer).
4. This is a result of the juices being squeezed out as the collagen and elastin contract at 60°C. In most methods of cooking these extracts will pass into the cooking liquid and be eaten as gravy.
5. The meat extracts which are soluble in water contribute to the flavour.
6. During cooking colour changes from red to brown. This is due to changes in the pigment myoglobin which occurs at 63°C.
7. The texture becomes firmer as the proteins myosin and actin in the muscle fibre coagulate above 50°C.
8. If cooked properly, meat becomes more tender as collagen is softened at 80°C - 100°C and dissolves in the presence of water to form gelatine – manufacturers may have to develop a sauce to encourage tenderness.
9. Meat meal becomes more digestible due to softening of collagen.
10. If not cooked properly ie overcooked coagulation is rapid and denatured protein forms a hard solid mass.
11. Particularly important when stewing/casseroles meat – if cooked at too high a temperature and/or for too long meat will become tough.
12. Non-enzymic browning of meat ie Maillard Reaction occurs when protein and CHO exist together in foods.
13. It produces desirable changes in flavour, colour and aroma during dry cooking methods eg roasting and grilling.

Tenderness is affected by

1. Size of muscle fibres – meat composed of small, narrow fibres is more tender.
2. Amount of connective tissue – tough meat contains more than tender.
3. Older the animal and greater the activity, the more connective tissue.
4. If the animal is not rested before slaughter, supply of glycogen to the muscle tissue is reduced and less lactic acid is produced during hanging.
5. Meat hung for several days after slaughter is more tender – glycogen converted to lactic acid.
6. This reduces the pH from about 7.4 to 5.5 which in turn brings about the partial denaturation of the fibre proteins which increase tenderness.
7. Pounding meat with a hammer, cutting or mincing also makes it more tender.
8. Acid marinades eg lemon juice, vinegar or wine tenderises the meat by helping to coagulate the protein.

Colour

1. Consumers recognise fresh meat as being red, so this is desirable.
2. When meat is less fresh, discoloration occurs.
3. Oxygen in the air is absorbed by the purple-red myoglobin which turns it bright pink. After prolonged exposure, this turns to brown metmyoglobin.
4. At this stage consumers find the product unacceptable.

Fish

1. Fish is the flesh or muscle of the animal.
2. Main difference between meat and fish is that fish deteriorates rapidly.
3. Other variables can affect the quality & freshness of fish – differences in tissue composition of species/influences of season/differences between salt and freshwater fish/differences in procurement & holding practices on board fishing vessels.
4. 3 main reasons for rapid spoilage of fish
microbiological/physiological/chemical
5. When fish is killed bacteria attacks the fish tissue causing it to deteriorate.
6. These bacteria are resistant to low temperatures so continue to grow even when the fish is refrigerated.
7. Glycogen in the fish muscles is used up as the fish struggles when caught.
8. If no glycogen left after death then lactic acid can be produced.
9. Lactic acid acts as a preservative by slowing bacteria growth.
10. Different methods of preserving fish have been developed over the years – smoking/salting/drying/canning/freezing.
11. Manufacturers must consider the appearance/taste/texture of the end product when choosing a preservation method.

Structure and texture

1. Has a flaky texture due to fish muscle consisting of blocks of short fibres called myotomes.
2. The myotomes are separated by thin sheets of connective tissue making the texture very different from meat.
3. Fish has less connective tissue than meat & no elastin.
4. Fish is more tender than meat due to the fact that there is less connective tissue and no elastin.
5. Manufacturers should consider the amount of fish bones and select an appropriate species for use in products.

Cooking

1. When cooked the muscle fibres alter their structure and coagulate.
2. This forms the characteristic firm flakes of fish.
3. The small amount of connective tissue is easily denatured and converted to gelatine.
4. This conversion takes place at a lower temperature than meat & takes less time than meat – reduced production costs for manufacturers.
5. This makes fish an easily digestible product.
6. Overcooking of fish will result in a tough, dry texture due to hardening of muscle fibres.

Colour

1. When fresh white fish has a white translucent colour.
2. Oily fish has a pinkish tinge to the flesh.
3. Neither types has a strong colour so manufacturers must consider ways of ensuring dishes/products appeal to the consumer.

4. Discuss the techniques used by food manufactures to persuade consumers to buy their products.

Mark allocation: 25 marks

A – 18-25 marks

The candidate is able to develop a full and coherent discussion of the techniques used by food manufacturers to persuade consumers to buy their 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 techniques used by food manufacturers to persuade consumers to buy their 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:

1. By apparently providing reliable relevant information about products so consumers can decide for themselves.
2. Information from a variety of media – television, radio, magazine, poster advertising, food labelling and advertising.
3. Use of simple messages in adverts/food labels which reassure consumers that they have made the correct choice eg shredded wheat for a healthy heart/Special K image of a slim woman.
4. Revamping package design of foods eg milk is now available in plastic bags to fit into fridge jugs.
5. Changing the image of foods eg Heinz tomato soup is now being promoted as part of the 5 portions of fruit/veg a day.
6. Changing the name of an existing product – Marathon became Snickers - to enhance/revamp the appeal of a product.
7. Appealing to brand loyalty – consumers will stay with an existing brand name they recognise and will choose new products based on brand loyalty.
8. Adverts which appeal to snobbery – eg after dinner mints.
9. Adverts which appeal to sentimentality eg Werthers Original Toffees.
10. Sex appeal in adverts eg Special K/Muller mousse, yoghurts, rice.
11. Concerns over public concerns eg additives will encourage manufacturers to jump on the band wagon for additive free food promotion on packages.
12. Emphasising the health and environment benefits of organic foods.
13. Ensuring adverts are aimed at the correct target group for example timing of television adverts.
14. Manufacturers of high fat/sugar products screen their products during programmes which both adults and children watch.
15. Promoting the product as contributing to “health eating” given consumers’ concern over diet as a whole.
16. Promoting the convenience of food products to adults in today’s lifestyles eg microwave pasta/sauces.
17. Young children are a vulnerable group and some manufacturers target their advertising and labelling deliberately at this group or their parents.
18. Food adverts and labelling will make use of familiar cartoon characters, Heinz tinned products eg beans & sausages often have latest characters on labels.
19. Use of celebrities to promote product eg sports people, celebrity chefs, soap stars etc.
20. Children’s loyalty to these characters and the accompanying songs and jingles will help to sell the products.
21. Use of humour/slogans within promotions.
22. Children susceptible to brand name adverts so manufacturers take advantage of this.

23. Manufacturers rely on the “pester power” of children to persuade their parents to buy their food products/free toys/free gifts.
24. Parents will know that the purchase will not be wasted as the children want the products – this will motivate parents to buy and is important to those on a limited income who can not afford to purchase products the children will not like/eat.
25. Special offers and special introductory offers by manufacturers eg buy one get one free/buy two get third free.
26. Sampling in supermarkets to persuade purchase.
27. Location in supermarket/store/product placement to encourage sales eg sweets placed near checkouts at child height often leads to additional purchases by parents.
28. Use of competitions to encourage purchase/re-purchase.
29. Collect labels/tokens for promotional gifts.
30. Use of text messages to promote products.
31. Use of internet to promote products.
32. Postal leaflet promotion.
33. Food manufacturers websites.
34. Sponsorship/advertising at an event.

5. Control and prevention of food contamination is a key concern throughout the food chain. Discuss this statement with reference to specific bacteria.

Mark allocation: 25 marks

A – 18-25 marks

The candidate is able to develop a full and coherent discussion of the control and prevention of food contamination throughout the food chain with reference to specific bacteria. This 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 control and prevention of food contamination throughout the food chain with reference to specific bacteria. 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:

Candidates should be given credit for correct identification and application to the steps in the food chain.

- Food Safety Act 1990
- Food Hygiene (Scotland) Regulations 2006

Primary Producers

1. Strategies must be put in place to prevent the risk of salmonella in eggs prior to hatching.
2. All cases of BTB brucellosis, salmonella and bovine spongiform encephalopathy (BSE) should be reported.
3. Hens must be kept in conditions which keep the risk of E Coli or campylobacter to a minimum.

Initial/Primary Processing

1. Slaughter houses must comply with Poultry, Meat, Farmed Game Bird and Rabbit (Hygiene and Inspection Regulations 1995. This puts controls in place to minimise risk of salmonella and E Coli.
2. Pasteurisation is used to reduce the risk of salmonella in milk.

Final/Secondary Processing

1. HACCP used in manufacture to reduce risk of contamination.
2. International Standards Association also sets quality management standards to be followed to assure the quality of the product at all stages.
3. The Food Hygiene (Scotland) Regulations 2006 require all foodstuffs which could support harmful levels of pathogenic bacteria or the formation of toxins require maximum temperature of 8°C.
4. Also covers cooked food which is to be sold hot, food which is to be reheated, chill temperatures and foods where pathogenic bacteria grows at lower temperatures.
5. Environmental Health Officers enforce regulations and so help prevent contamination of foods.
6. The Quick Frozen Foodstuffs Regulations 1990 require frozen foods to be stored at -18°C or below and -15°C or below during transportation.
7. The Food Hygiene (Scotland) Regulations 2006 set out basic food hygiene principles to minimise food safety risks.
8. Manufacturer must ensure storage, preparation and cooking of, for example meat – a proper HACCP system is set up to minimise the risk of micro-biological contamination.
9. Chickens are high risk products in relation to salmonella so written records of HACCP systems must be available.
10. All controls must be rigorously monitored to ensure food is safe.
11. Salmonella and E Coli along with clostridium are the most dangerous during ‘bulk cooking’, meat probes should be used to ensure core temperature of 75°C is reached.
12. Staff training in general and personal hygiene to minimise risk of staphylococcus aureus is vital.

Distribution

1. Operating procedures during transportation must be monitored rigorously to minimise the risk of contamination eg refrigerated lorries must be below 5°C.
2. Products must be kept free of external pollutants eg dust, moisture.
3. Packaging must not be physically damaged, the product should be delivered in perfect condition.
4. Transportation vehicles should be clean and free of damp, mould and odour to help prevent contamination from insects and clostridium perfringens.
5. Cramped conditions eg of chickens can spread infections such as salmonella.

Retailer

1. Must ensure all foods are received with use by dates and that all packaging is intact.
2. The Food Hygiene (Scotland) Regulations 2006 vital in controlling the temperature at which food arrives at retailer.
3. Raw meats are a risk of E Coli and must be kept away from cooked foods.
4. Hot food must be kept above 63°C to minimise risk of listeria/staphylococcus.
5. Cold food should be kept below 5°C to reduce risk.
6. Food Hygiene (Scotland) Regulations 2006 should be followed in relation to general hygiene.
7. All efforts should be made to avoid cross contamination.
8. Food which may need to be unheated before serving must reach a temperature of not less than 82°C

Consumer

1. Has the responsibility to purchase foods with in sell by dates, in good condition and properly packaged to avoid contamination between shop and home.
2. Food should be transported home as quickly as possible and ideally cool bags should be used for chilled or frozen foods.
3. Foods should be stored correctly and fridges should be 0-5°C and freezers at -18°C.
4. All foods should be rotated to avoid out of date foods.
5. All foods should be cooked/reheated carefully according to instructions given.
Food should only be reheated once.
6. Consumers have a responsibility to know about food hygiene to reduce the risk of contamination.

**ADVANCED HIGHER HOME ECONOMICS 2009
RESOURCE MANAGEMENT**

Context : Health and Food Technology

Question	Content	Elaboration	Skills		Totals
			Knowledge	Evaluation	
Section A (a)	Food politics	<ul style="list-style-type: none"> • Food and nutrition health policies – Scotland and abroad • Influences on consumers • Role/impact of the media • Food additives 	5		25
	Psychology of food		10		
(b)	Biochemistry, preservation and processing				
(c)	Biochemistry, preservation and processing	<ul style="list-style-type: none"> • Food irradiation 		10	
Section B 1 (a) (b)	Food Politics	<ul style="list-style-type: none"> • Food and nutrition health policies – Scotland and abroad • Issues relating to health in Scotland 	10	15	25
2	Nutrients and their effect on the health and development of individuals	<ul style="list-style-type: none"> • Micro-nutrients – functions and effect on health and development 	25		25
3	Food Commodities and the Food Chain	<ul style="list-style-type: none"> • Meat and fish • Product design and quality to include – stages in product development 	25		25
4	Psychology of Food	<ul style="list-style-type: none"> • Influence on consumers • Role/influence of the media • Consumer behaviour 	25		25
5	The Food Chain	<ul style="list-style-type: none"> • Food hygiene and safety issues at each stage of the food chain • Types of bacteria and possible sources which may increase the risk of food poisoning within the food chain 	25		25

[END OF MARKING INSTRUCTIONS]