

2006 Health & Food Technology

Advanced Higher

Finalised Marking Instructions

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Instructions to markers.

General Instructions

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

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

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

Section A

(a) Outline the main issues of the report.

Mark allocation: 5 marks

A – 4-5 marks

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

B – 3 marks

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

C – 2 marks

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

Answers should make reference to the following points:

- $\frac{3}{4}$ of parents struggle to motivate their children to eat a healthy diet/stop eating salty/sugary foods
- marketing and advertising of unhealthy food and drinks is at least partly to blame for this problem
- one in three of Scottish children is overweight and less than one in five eats five portions of fruit and veg a day
- many parents are not setting good examples
- although children have strong personal likes and dislikes, parental consumption is the strongest predictor of children's consumption
- other factors are also important – eating together as a family, breast feeding and introducing a variety of fruits and veg early on are also important
- breast feeding is an important factor in future fruit and veg consumption
- 75% of children said they would live a healthier lifestyle if their parents did
- 81% of parents said they would eat a more balanced diet if it encouraged their children to do so
- a new initiative has been set up to encourage parents with children to take on 5 key health challenges a week, it also provides tips and advice
- teaching children at a young age about healthy lifestyles can follow them into adulthood
- celebrities also have a role to play in educating youngsters
- government also has a role to play.
- school also has a role to play

(b) Discuss the ways in which parents could help improve children's food choices.

Mark allocation: 10 marks

A – 8-10 marks

The candidate is able to develop a full and coherent discussion of how parents could help improve children's food choices. 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 how parents could help improve children's food choices. 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:

- buy a range of fruit and vegetables to have at home so the choice is there
- put a fruit bowl at children's height so they can access it easily
- introduce new foods gradually to increase the range of foods eaten
- set a good example themselves
- change cooking methods to provide healthier foods, these will soon become more familiar and hopefully preferred
- breast feeding babies introduces their palate to a broader range of foods at an earlier age and has been shown to increase fruit and vegetable consumption later in life
- provide 'healthy' lunch boxes
- encourage children to eat a good breakfast every day
- make meals at home filling to reduce snacking between meals
- buy lower fat, sugar, salt varieties of convenience foods to help develop a taste for these versions
- encourage children to get involved in cooking and understanding food at home/education
- reward healthy food choices eg sticker scheme
- do not have fatty/sugary snacks readily available at home
- limit TV viewing when adverts for food are shown in large numbers/encourage educational food programmes
- start providing healthy options when they are very young, it can even be too late once they are toddlers to change some eating habits
- encourage children to choose fruit and veg when shopping
- mix variety of fruit and veg into dishes such as pizza, macaroni/pasta
- make fruit/veg a daily addition to lunch boxes.
- limit visits to fast food outlets/take aways
- parents helping children to interpret food labels
- encourage family eating together
- make food look attractive
- do not encourage children to purchase sweets with pocketmoney

(c) Critically discuss the other factors which can influence children's eating habits.

Mark allocation: 10 marks

A – 8-10 marks

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

B – 6-7 marks

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

C – 4-5 marks

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

Answers should make reference to the following points:

Culture

- association of foods with events eg Christmas
- types of foods offered outwith the home eg friends homes may influence the range of foods they are willing to eat
- experiences of foreign holidays may make children confident to try new foods at home
- ethnic background may influence foods prepared at home
- religion may prohibit the consumption of specific foods.

Peers

- very conscious of being part of the 'gang' – can be either positive or negative.

Media/Promotion

- media – advertisers target young children by using TV characters to sell foods
- promotions – children easily attracted to free gifts/toys
- TV – almost half children's adverts on TV are for food
- supermarkets – where foods are placed – shelf height, end of aisle promotions – children notice foods and pester parents to buy them
- introduction of 'healthy eating ranges' such as – Sainsbury's Blue Parrot, may encourage healthier choices (some of the products – not all)
- promotional characters/films used to entice children in to McDonalds
- pop/film/sports stars are all used to promote foods to children – a very powerful medium
- images in magazines and films portray specific body types which may influence eating habits, possibly adversely.
- Brightly coloured packaging

School

- choice available may be poor and adversely affect health
- vending machines in schools provide an instant sweet shop for those with a sweet tooth
- school can teach children positively about food, nutrition and health
- school meals may introduce children to new foods
- home economics lessons may introduce children to new foods and teach them skills to enable them to prepare their own foods
- breakfast clubs may promote a healthier start to the day and help reduce snacking
- free fruit in primary may help encourage a greater consumption of fruit.

Personal Factors

- personal likes and dislikes
- allergies to specific foods/intolerances
- appearance of the food itself, eg attractively presented foods are more likely to be appealing
- amount of money available – in the home will influence the foods the child/family can buy
- amount of money available personally
- comfort eating
- season of the year – hot climate encourages purchase of ice-cream.

Section B

1 (a) Discuss the factors which have affected the implementation of the Scottish dietary targets.

Mark allocation: 10 marks

A – 8-10 marks

Candidates are able to develop a full and coherent discussion of the factors which have affected the implementation of the Scottish Targets. The discussion shows good analysis and the identification of the main points with full explanations.

B – 6-7 marks

Candidates are able to develop a discussion of the factors which have affected the implementation of the Scottish Targets. Most of the main points will be identified with some explanations.

C – 4-5 marks

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

Answers should make reference to the following points:

Access to shops

- large supermarkets, which have a wide range of lower fat/sugar, higher NSP products are usually out of town. The least healthy 10% of the population do not have ready access to supermarkets be it in inner city areas or rural areas where public transport may be limited therefore availability of products which may help reduce risk of obesity are limited
- availability of acceptable healthier products at an appropriate cost often a problem
- shelf life of fresh fruit/veg is limited so bulk buying not an option for many consumers. Access to fresh produce may be a problem so consumption is lower.

Culinary skills/knowledge

- lack of skills/knowledge may result in a reluctance to prepare fresh foods such as fruit and vegetables. If skills are limited and both parents working, less time and ability to pass on skills from one generation to another, thus exacerbating the issue
- changing skills may be difficult particularly if skills/knowledge (poor in quality) is passed down from parents
- media is constantly reporting mixed messages/food scares eg salmon. Many consumers do not know what to believe so continue eating as normal.

Cultural conventions

- poor diet in Scotland is now a historical fact with fried and high fat foods traditional. In the past these foods were required as a source of warmth, but much less now with central heating/less energetic activities etc so excess energy is stored as fat
- pressure on people in rural areas to change to a diet high in convenience foods – and so increasing fat and sugar – and to move away from growing their own produce such as vegetables.

Cooking facilities

- poor housing and limited finances often equal poor housing facilities. Improving them to facilitate “home cooking” often not seen as a priority so high fat/sugar convenience foods eaten in larger quantities
- poor facilities reduce ability and willingness to prepare fresh foods which continues and exacerbates obesity problem.

Awareness of what is/is not healthy/knowledge

- messages often confusing and contradictory – as a result, many stick to what is familiar – which may lead to obesity
- general lack of appropriate education means people do not know how to change their diet to make it lower in Kcalories/fat – real issue in terms of inability to change diet for the better
- unaware of “hidden” fats – difficulty in understanding labels
- promotion of many foods as healthy – only 10% fat – leads to confusion and lack of understanding/consumption of less healthy foods
- increase in publicity of health messages – ‘Sid the Slug’
- healthy living campaign has provided everyone with access to healthy eating information through internet/phone/mail.

Resources

- lack of money discourages experimentation with new foods – so change unlikely
- lower fat/sugar/fruit and vegetables/“diet options” often more expensive
- fresh foods have a limited shelf life therefore more prone to waste
- fatty foods are filling, cheap – important if budget is limited.
- Increased range of fast food outlets/eating out in restaurants – unsure of ingredients.

Advertising

- majority of advertising of food products is for those which are high in fat/sugar which contribute to obesity, very little advertising for healthier options
- although “diet foods” advertised, they tend to be expensive to purchase and portions are often small and may not appeal in particular to men due to “image” problem
- advertising to children may be subject to limitations by the government.

Lifestyle

- increased use of convenience foods high in fat/sugar due to lack of time for food preparation.
- increased acceptance of mothers breastfeeding in public – many restaurants/cafes now allow this.
- Shift patterns

Manufacturers

- slow progress at adapting products to make them healthier. Cost and taste often affected
- some manufacturers have developed ‘healthy eating’ ranges in response to consumer increased awareness
- dietary ‘fads’ can influence products available eg low carb foods in response to Atkins diet – not always ‘healthy’
- problem of sweet weaning foods set tastes for life – many new parents using prepared baby foods with sweet tastes
- labelling can be confusing for customers.

Foods in schools (eg meals, tuck shops, vending machines)

- statutory guidelines/Hungry for Success in Scotland for school meals only just being introduced. Previously the removal of local authority subsidy has often meant poor quality, cheap products frequently used to make profits eg frozen chips require no preparation and little skill to cook so they can have a high profit margin – promoting such foods can only worsen obesity
- free fruit in primary schools has helped increase fruit consumption
- introduction of “healthy” vending machines in some schools
- breakfast clubs in some schools may help towards achieving breakfast cereal target.

Consumer attitudes

- not all changes to products to make them “healthy” in fact do so and as a result may be another health concern eg sweeteners, olestra, so people may continue with varieties which lead to diet related diseases
- motivation to change food eating habits/psychological influences may be lacking.
- Peer pressure.

Taste

- both fat sugar and salt are important in the flavour of foods. Often foods low in these ingredients may lack flavour and therefore are less desirable, so health problems continue.

Policy

- despite strong recommendations in documents such as Eating for Health few schools have compulsory nutrition beyond S2 or effective SNAG's. This contributes to poor and misinformed education and a lack of commitment from schools. Very difficult to reverse this situation so many people remain ill informed of the consequences of poor diets.

Increased interest in food/health

- increasingly wide range of “healthy options” available to consumer
- impact of community food initiatives
- development of Farmers Markets/local food markets offering competitively priced foods.

(b) Critically discuss the role which different sectors of society can play in meeting the challenge of improving Scotland's diet.

Mark allocation: 15 marks

A – 12-15 marks

The candidate is able to critically discuss the role which different sectors of society can play in meeting the challenge of improving Scotland's diet. The discussion shows good analysis and the identification of the main points with full explanations.

B – 9-11 marks

Candidates are able to develop a discussion of the role which different sectors of society can play in meeting the challenge of improving Scotland's diet. Most of the main points will be identified with some explanations.

C – 7-8 marks

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

Answers should make reference to the following points:

Primary producers

- stimulate demand for fruit and vegetables by means of innovative, developmental initiatives and imaginative marketing campaigns
- press forward the breeding of still leaner livestock for human consumption
- meat producers should develop a coordinated strategy to develop new low fat meat products which can be promoted collectively by retailers etc
- the dairy industry should explore alternative non-food markets for butter fat
- consumer demand for oil rich fish should be stimulated.

Manufacturers and Processors

- weaning and infant food manufacturers should work towards producing products free of, or low in, non-milk extrinsic sugars
- catering and retailing organisations can help manufacturers by making joint decisions on nutritional specifications to provide commercially viable outlets for new products of high nutritional quality
- nutritional training should be available for the food manufacturing, processing and bakery industries
- new technologies should be investigated to facilitate the production of food products which are low in fat, salt and sugar
- small but progressive reductions of fat, salt and sugar content of products should be undertaken by this sector
- a wider range of products containing those commodities of which an increase in consumption is required should be developed
- information on the composition and nutritional values of food products should be presented in such a way as to facilitate the public's understanding of them.

The Retail Sector

- supermarkets should further develop innovative ways, including in-store initiatives, of marketing healthy products to consumers
- ensure that “own brand” products sold in stores provide easily understood information on product composition and nutritional value to enable consumers to make healthy choices
- examine the feasibility of measures, such as free, low cost, transport, to facilitate access to their stores by low income consumers within the community
- consider, with low income communities, alternative ways in which healthy food products available in supermarkets could be more readily available to those communities
- explore the scope for access to electronic point of sale (EPOS) information/loyalty card data, for Scottish Executive, to monitor and evaluate the various initiatives being undertaken to improve the Scottish diet.

Community Action

- Health Boards should have designated, nutritionally trained staff with specific responsibility for action to improve the diet of low income communities in their areas
- research should be undertaken into the diet of rural communities to provide a basis from which to develop a specific strategy to support these communities
- a national project officer should be appointed to promote and focus dietary initiatives within low income communities
- consideration of the dietary needs of local populations should be undertaken by local authorities when developing strategies for regenerating their deprived areas.

Pregnancy, Pre-school, Children, School Students, Education

- Health Boards should ensure that their health promotion activity includes regular campaigns to alert potential parents of the need for good nutrition prior to, as well as during pregnancy
- GPs, obstetricians, midwives and health visitors should provide dietary information to expectant mothers about their own nutritional needs as well as those of their babies. Health Boards should monitor the quality of the information so provided
- education sector should examine the potential to include material on the benefits of breastfeeding in order to inform pupils
- Health Boards should continue to encourage the achievement of local breast-feeding targets and to promote with hospitals the breast-feeding criteria specified by the WHO and UNICEF
- cultural and societal issues which influence women’s willingness to breast feed should be addressed
- Chief pharmacist should identify action necessary to accelerate the introduction of low or sugar free paediatric medicines
- health professionals, residential and day care staff with care responsibilities for children under five should have a working knowledge of the dietary and nutritional needs of young children
- special initiatives to encourage children under five to eat healthily should be explored by local authorities, including the value of employing home economists and/or dieticians to provide advice and support to families with young children
- work should be continued to raise the profile of health education within the curriculum. The development of policies on health education, including nutrition and diet, and the progression of these through school development planning should be vigorously encouraged
- School Boards should be utilised as a vehicle for developing dietary awareness within schools
- available advisory material should be distributed to educational establishments to assist production of consistent diet and nutrition related materials
- a national short course on practical food preparation for healthy eating for all pupils post S2 should be introduced
- all trainee teachers should receive adequate training in health education, including diet and nutrition, appropriate to their course

- schools should take steps to ensure that tuck shops and school vending machines re-enforce the healthy eating message
- The Model Nutritional Guidelines for Catering Specifications for the Public Sector in Scotland should be issued and taken into account when determining contract specifications for school meal provision
- a limited range of menus with vegetables and fruit included in the price of the meal should be available at all times in Primary schools
- schools should be encouraged to set up School Nutritional Action Groups which offer a multi-agency approach to tackle food-related education and health issues
- Health Boards should explore the potential for partnership arrangements to facilitate the introduction of healthy eating initiatives tailored specifically to the dietary needs of children in schools in low income areas.

Caterers

- should work progressively towards providing a variety of vegetables and/or side salad as part of the main course of every meal. The cost should be included in the price of the meal
- nutrition and dietary education should be included in the curriculum of all hotel and catering management courses
- fast food sector should broaden range of nutritionally beneficial foods on offer and urgently examine the feasibility of an incremental reduction in the fat content of standard products
- all catering staff should have basic level of training in nutrition and diet
- nutritional guidelines should be issued to all catering staff
- a low cost (or free) nutritional advisory service, which caterers could approach for advice and nutritional analysis of food recipes, should be piloted
- The Scottish Office should ensure that public service catering sector should reflect the model guidelines
- the introduction of a national Healthy Eating Award Scheme/Healthy Choices could be explored by HEBS and SCC
- The Scottish Tourist Board should consider ways of incorporating nutritional advice within its campaign to raise catering standards throughout Scotland.

The National Health Service

- should ensure that the catering service meets the model guidelines
- should ensure that greater priority is given to providing adequate dietary education and counselling skills to enable health professionals to place greater emphasis on giving dietary advice
- public health nutritionists or suitably experienced state registered dieticians should be appointed by health boards
- HEBS should ensure access to expert nutritional advice
- annual reports should include a summary of the health boards' diet-related activities
- medical courses should give appropriate emphasis to nutritional training.

Local Authorities

- the potential for local authorities to maximise the promotion of healthy eating should be explored
- Health Boards should seek to develop the health alliance partnerships they have established to maximise local authority involvement
- they should examine, develop and utilise all opportunities available to them to facilitate dietary improvement across the wide range of those of their responsibilities where they can influence the diet of the Scottish population.

2 Discuss how the properties of carbohydrates can be used in the manufacture of food products.

Mark allocation: 25 marks

A – 18-25 marks

The candidate is able to develop a full and coherent discussion of the properties of carbohydrates and how they can be used in manufacture of food products. The discussion shows good analysis and the identification of the majority of the main points with full explanation.

B – 15-17 marks

The candidate is able to develop a discussion of the properties of carbohydrates and how they can be used in manufacture of 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:

Solubility and retrogradation of starch

- carbohydrate consists of starches and sugars, properties will vary according to type
- starches are of plant origin
- starches are generally not sweet
- they are not readily soluble in water
- they form pastes and gels in hot water
- provides a reserve energy source in plants and supply energy in nutrition
- occur in seeds and tubers as characteristic starch granules
- heating in a suspension of starch granules in water will cause the granules to swell due to water uptake and to gelatinise
- viscosity of the suspension will increase and form a paste, on cooling it will form a gel
- starch pastes are used to thicken foods, they can be modified by sugar of acid and are used in puddings
- both pastes and gels can revert or retro grade back to the insoluble form on freezing or ageing causing changes in food texture
- Dextrin is formed on partial breakdown of starches
- recent developments have allowed an increased range of uses for starch as a food ingredient with respect to controlling the texture of food systems and permitting the manufacture of items which require minimum heating to achieve the desired viscosity eg instant puddings.

Inversion and crystallisation

- sucrose can be hydrolysed by acids or enzymes into two monosaccharides glucose and fructose – invert sugars
- invert sugar can prevent or help control the degree of sucrose crystallisation
- a mixture of sucrose and invert sugar has greater solubility in water than sucrose alone; increased solubility is equivalent to less crystallisation
- invert sugar may be obtained commercially and substituted for part of the sucrose in candy formula or may be formed directly during production by the addition of a food acid such as cream of tartar early on in the formula
- invert sugar encourages the formation of small crystals essential to the smoothness in fondant creams, soft mints and fudges.

Caramelisation

- this occurs when sugar is heated to the above boiling point
- when heated at a high temperature it turns brown and has a pleasant toffee like flavour. If heated for too long it becomes black in appearance and bitter in flavour
- sugar toppings on cakes and pastries can be caramelised to give an attractive appearance and flavour
- caramel made in this way is added to custards and ice creams.

Gelatinisation

- undamaged starch granules are insoluble in cold water but can imbibe water reversibly ie they can swell slightly and return to their normal size on drying
- when heated in water starch granules undergo a process called gelatinisation
- this is the disruption of molecular order within granules. Evidence for this disruption includes irreversible granule swelling, loss of birefringence and loss of crystallinity
- leaching of amylose occurs during gelatinisation although some can occur prior to the process
- total gelatinisation usually occurs over a temperature range with larger granules gelatinising first
- a starch paste results from heating starch slurry producing a viscous mass consisting of continuous phase of solubilised amylose and/or amylopectin and a discontinuous phase of granule remains
- under normal food processing conditions starch granules quickly swell beyond the reversible point
- water molecules quickly enter between chains, break interchain bonds and establish hydration layers around separated molecules lubricating the chains so they become more fully separated
- starches are used in food production principally to take up water and produce viscous pastes and gels to give desired textural qualities
- the extent of starch gelatinisation in baked goods strongly affects product properties such as storage behaviour and rate of digestion
- potato starch is used in extruded cereal and snack food products and in dry mixes for soups and cakes
- rice starch produces opaque gels useful in baby foods
- waxy rice starches gels are clear and cohesive while wheat starch gels are weak
- potato and tapioca starches have weak intermolecular bonding and swell greatly to give high viscosity pastes
- starches are often modified before use in foods.

Pectin gel formation

- pectin and carbohydrate gums are sugar derivatives usually present in plants and in lesser amounts than carbohydrates
- in colloidal solution they contribute viscosity to tomato paste and stabilise fine particles in orange juice for separating out
- in solution they form gels when sugar and acid are added and this is the basis of jelly manufacture
- also added to foods as thickeners and stabilisers
- pectin is a polysaccharide
- during jam making its molecules form a 3 dimensional network which is the framework of the gel
- pectin will not form a satisfactory gel until the pH is about 3.5
- unripe fruit contains more acid and pectin than over ripe fruit whose pectin has been converted into a form unable to produce a gel.

3	“Micronutrients are essential for good health.” Discuss this statement with reference to the elderly.
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	Mark allocation: 25 marks
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A – 18-25 marks

The candidate is able to develop a full and coherent discussion of the part played by micronutrients in the diet of the elderly. 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 the elderly. 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 and include reference to the elderly:

Vitamin A

- necessary for good eyesight especially night vision – important for elderly with failing eyesight
- has anti-oxidant properties – important for elderly who may be at risk from cancers/disease
- required to keep the mucous membranes in the throat, digestive and bronchial and excretory systems moist and free from infection
- required for the maintenance and health of the skin.

Vitamin B complex

- allows the chemical reaction to occur which releases energy from CHO
- elderly must ensure adequate supplies to obtain energy from their food otherwise they will be lethargic
- important for healthy skin, tongue, digestive and nervous system
- all active people must ensure adequate supplies to ensure energy release from food.

Folic Acid

- essential for the formation of red blood cells and the prevention of megaloblastic anaemia
- required for the release of energy from food
- important for the production of the nucleic acids RNA and DNA.

Vitamin B12

- important to vegans to prevent pernicious anaemia
- important for the production of red blood cells
- important for the normal functioning of the nervous system
- involved in the metabolism of protein, carbohydrates and fats.

Vitamin C

- necessary for healing wound/sores – vital for old and for preventing scurvy
- antioxidant properties beneficial to elderly at risk from cancers/disease
- assists with the absorption of iron – essential that women have adequate amounts
- required to make connective tissue which binds body cells together
- required for the building and maintenance of skin and linings of the digestive system.

Vitamin D

- required to promote the absorption of calcium and phosphorus to build strong bones and teeth – vital for the elderly
- readily available by the action of sunlight on the skin – elderly who go out less may not take full advantage of this factor – may affect onset of osteomalacia/osteoporosis
- 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 kidneys and can result in death.

Vitamin E

- antioxidant properties – it protects polyunsaturated fatty acids from damage by free radicals, especially cell membranes in the body – beneficial to elderly at risk from cancers/disease.

Vitamin K

- 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.

Calcium

- required for blood clotting, very important in case of falls etc
- required to be present in the blood for normal excitability in nerves and muscles
- required for the normal action of hormones
- essential for the prevention of osteomalacia/osteoporosis.

Phosphorus

- an essential component of all bones along with calcium
- an essential component of all tissues
- a vital metabolic compound
- vital in the repair of bones eg after a fall.

Sodium

- is one of the main elements of blood
- is one of the main elements of tissue fluid which allows nutrients to flow into body cells and waste products to flow out
- low intake may result in muscle cramps eg if the elderly get dehydrated
- essential for the transmission of nerve and muscle impulses
- excess can cause high blood pressure as the result of the expansion of extra cellular fluid volume – particularly dangerous in the elderly.

Potassium

- deficiency may result in mental apathy, muscular weakness
- potassium levels also linked with hypertension important in the elderly
- very old people whose muscles waste away may become short of potassium.

Magnesium

- needed in the body for the functioning of some enzymes
- necessary for the maintenance of the excitability of nerve and muscle membranes.

Iron

- required as oxygen carrying pigment ie haemoglobin in the red blood cells
- vital for the transportation of adequate supplies of oxygen to the tissue
- elderly may be susceptible to anaemia if desire to cook wanes
- some elderly may have poor absorption and so may become anaemic.

Iodine

- Required to make thyroxine, which helps to control the rate of metabolism in elderly

Copper

- Is a component in several antioxidant enzymes so plays a role as antioxidant in protecting cells in the elderly
- Involved in the formation of blood cells

Selenium

- An antioxidant which plays a part preventing cell damage/cancers/heart disease in the elderly
- Is part of the antioxidant enzyme glutathione peroxidase which reduces peroxides before they can damage cell membranes
- Also enhances immune response

Zinc

- An antioxidant which plays a part in preventing cell damage/cancers/heart disease in the elderly
- Is part of the antioxidant enzyme superoxide dismutase which prevents free radicals from forming peroxides and damaging cell membranes

4 Discuss the main issues of the debate surrounding the genetic modification of foods.

Mark allocation: 25 marks

A – 18-25 marks

The candidate is able to develop a full and coherent discussion on the debate surrounding GM foods. 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 on the debate surrounding GM foods. Most of the main points will be identified with explanation.

C – 12-14 marks

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

Answers should make reference to the following points:

- genetic modification means making changes to the genes of a product and the way they are combined – may be unacceptable to some
- genetic engineering allows genes from almost any form of life to be introduced into almost any other form of life
- recombinant DNA technology – “gene splicing” used to give desired effect in products eg leanness in a farm animal or pest resistance in a crop
- other types of biotechnology include cloning and cell fusion
- reduces losses in the supply of certain foods/less wastage of crops – results in a constant supply of foods and stable pricing for the consumer
- can produce foods in greater quantities, ensuring supply – could also lower prices for the consumer
- can assist in the preservation of food by preventing the ripening of fruits and vegetables, enabling a longer shelf life – value to consumer
- can increase the shelf life of fresh foods without the use of preservatives or additives. This is advantageous for individuals with a food intolerance
- combined with clear labelling, could allow consumers to make choices concerning the purchase of such products
- can increase the variety, texture and appearance of food and so increase consumer choice
- improved flavour of foods eg fruit and vegetables could encourage consumption and help to achieve Scottish dietary targets
- vegetarian cheeses can be produced thereby enhancing their diet and increasing choice
- can help to modify foodstuffs to meet consumer demands eg leaner meat to help meet dietary targets
- food can be modified to improve nutritional value and help fight disease eg increasing Vit C and E in fruit and vegetables
- protein content could be increased – value for third world countries eg protein enhanced rice/reduce malnutrition
- modified fat products can be produced to alter saturated fat content so helping consumers to meet CDA
- could provide raw materials for pharmaceutical industries
- vaccines are more readily available for farm animals – less deaths/higher profits
- allows better and quicker disease diagnosis of sick animals – contributes to animal welfare
- genetically modified vaccines and medicines are being developed to protect animals from a variety of serious diseases
- genetic make up of animals with most desirable genetic traits could be introduced to herds

- growth hormones make animals grow more quickly and with leaner meat allowing higher production rates and more profit
- pest resistant crops created – less waste/higher production rates benefits both consumer and manufacturer
- drought resistance in plants enables farmers to extend the growing season and number of places where crops could grow – increased yield could benefit all
- allows easier control of weeds – a major threat to the success of crops.
- use of selective herbicides combat weeds without damaging the crop – leads to better crop management leading to higher yields and improved crop quality
- using fewer chemicals in weed control is better for the environment
- reduces need to use pesticides in crops without risking poor harvests which can result from disease
- increased development of new crops allowing cheaper and more environmentally friendly crops to be produced
- enables plant breeders to develop crops much more rapidly and with desirable characteristics
- GM makes it possible to transfer genes between plants that do not usually breed with each other – helps breeder make useful changes to crop plants that are difficult to make at present – increased levels nutrients eg vitamins, better taste and texture, improved keeping qualities
- consumers have concern about unforeseen problems/effect of GM food on future health – concern that food should be natural and not tampered with
- fear that manufactures are “playing god”
- fear of the unknown in terms of ensuring that such developments will not affect the safety and quality of food
- concerns over the environmental aspect of genetic modification and consumers may therefore not buy the food. Genetically engineered plants and animals could affect wildlife
- poor labelling means consumers are unable to tell if a food has been genetically modified – concern over use in manufacturing
- strict vegetarians would object to using copy gene of animal origin in a plant
- Muslims, Sikhs and Hindus have a moral, ethical, religious and/or cultural objections to consuming organisms which contain copy genes from animals that are included in dietary restrictions for their religion
- legalisation is needed to require genetically modified food to be clearly labelled
- greater control from regulatory bodies over the production and control of crops
- huge profits by manufacturers/monopoly concerns
- concern over animal welfare with GM technology/distress of animals due to increasing yields or making them adapt to different environments
- unwanted consequence of genes escaping and transferring to another breed
- possible loss of beneficial insects because GM technology will travel through the food chain
- scientist input/development/career-limitations on use of GM may hinder progress.

5	Discuss the beneficial effects of micro-organisms in the production of foods.
Mark allocation: 25 marks	
<p>A – 18-25 marks Candidates are able to develop a full and coherent discussion of the beneficial effects of micro-organisms in the production of foods. The discussion shows good analysis and the identification of the majority of the main points with full explanation.</p> <p>B – 15-17 marks Candidates are able to develop a discussion of the beneficial effects of micro-organisms in the production of foods. Most of the main points will be identified with explanations.</p> <p>C – 12-14 marks (to include a minimum of 4 marks per product) Candidates are able to identify some of the main points with limited explanations.</p>	
<p>Answers should make reference to the following points:</p> <p>Cheese</p> <ul style="list-style-type: none"> • micro-organisms added as “starter” culture • cheese is produced by coagulating the milk protein casein to form a curd from which whey is extracted and the resultant curd is allowed to mature depending on the type of cheese being produced • starter culture is added to assist the process of coagulation • choice of starter culture will determine the flavour and textural properties of the curd • direct vat inoculation cultures are concentrated cultures in freeze dried or frozen form – now widely used as starter cultures • lactic acid bacteria are used as starter cultures • key role of lactic acid bacteria is to convert the milk sugar lactose into lactic acid • acid production during cheese making is essential in the formation of a gel ie curd from the milk casein • on heating the curds the acid encourages the expulsion of moisture from the cheese by syneresis • enzymes in the “starter” culture also promote the formation of volatile flavour compounds such as diacetyl and aldehydes • and the synthesis of proteolytic and lipolytic enzymes involved in the ripening of cheeses • micro-organisms may be added at the ripening stage to produce cheeses with distinctive flavour, texture and other specific characteristics • eg varying types of micro-organisms are used to produce low levels of carbon dioxide, allowing the desired textural characteristics to be achieved in some mould ripened cheeses such as Camembert, Brie • eg Stilton, Roquefort in internally ripened and ripening mould added to produce blue/green veining • eg Blue Cheshire has secondary surface ripening by mould • eg propionic bacteria brings about the production of propionic acid and carbon dioxide which contributes a distinct flavour and the development of “eyes” in certain types of cheese eg Emmental, Gruyere • ripened cheese has a lower pH level and this suppresses the growth of spoilage and pathogenic bacteria • lactic acid produces fresh acidic flavour of unripened cheese. 	

Yogurt

- micro-organisms added as “starter” culture
- is milk which has been fermented by micro-organisms
- the milk used to make yogurt must be free from antibiotics used to treat udder infections as these antibiotics affect the bacteria used during yogurt production
- taste and texture of yogurt are determined by the carefully controlled addition of a special harmless bacteria culture
- bacteria used belong to the lactic acid bacteria group
- two types of bacteria used – *lactobacillus bulgaricus* and *streptococcus thermophilus*
- these two types of bacteria are added to the milk in equal proportions usually as 0.5-2% of the finished product
- these bacteria ferment the disaccharide sugar lactose in the milk
- under the right conditions of temperature, moisture and food they produce lactic acid
- when the “starter” culture/bacteria have been added to the milk the mixture is incubated at 34°C-44°C for 4-6 hours
- during this time fermentation takes place, the product becomes acidic, the flavours develop and the proteins coagulate and the yogurt sets
- acetaldehyde is produced which gives yogurt its characteristic flavour
- diacetyl is produced until the acidity increases to pH 5.5
- once the level of acid reaches 0.8-1.8% the bacterial growth stops although the bacteria remain alive
- yogurt should be stored at 4.5°C as bacteria are still live they may grow very slowly
- after approx 10 days the acid content in the yogurt may have increased making it unpalatable and causing separation or syneresis to occur
- yeast cells from the fruit in fruit yogurts ferment the sucrose and produce carbon dioxide gas and alcohol
- this can be seen by the raising of the container lid ie “blown”.

Beverages/Alcoholic drinks

- used in many ways from relatively uncontrolled activities in production of tea/coffee to highly controlled action of adding commercial enzymes in the brewing and fruit juice industries
- important industrial use of yeast-production of alcohol (and bread)
- economic importance lies in the ability of yeast to break down carbohydrate foods into alcohol and carbon dioxide – alcoholic fermentation
- yeast contains a collection of enzymes known as zymase which are responsible for the fermentation of sugars such as glucose, into ethanol and carbon dioxide
- rice, corn or other unmalted grains are added in beer manufacture as sources of additional or ‘adjunct’ carbohydrate for fermentation by *saccharomyces* yeast into ethyl alcohol and carbon dioxide.
- without adjunct cereals the limiting nutritional factor for yeast fermentation would be protein.
- this means that carbohydrate would remain after fermentation and produce a heavier type of beer.
- malt is barley grain that has been germinated to point of roots and stems just beginning to appear. It is then dried to halt growth but leave the enzyme activity intact
- germination results in enzyme activity which converts starches in the malted barley and other grains into sugars which can easily be fermented by yeast during the fermentation step.
- this is necessary because yeast cannot utilise the starch in the cereal grains for conversion to ethanol and carbon dioxide.
- hops are plants, the flowers of which contain resins and essential oils that contribute a characteristic bitter flavour and pleasant aroma to beer. They also contain tannins which add to colour

- hops are added during brewing and after the enzymes of malt have converted the starch to sugar maltose.
- hops have a mild preservative property and add to the foam holding capacity of the beer. These are secondary functions to the role of hops in flavour and aroma
- wine has been made by the fermenting of grapes for thousands of years
- the sweetness and alcohol content of wines are interrelated because fermentation converts the grape sugars to ethanol
- as more alcohol is produced, sweetness decreases when virtually all the sugar is fermented the wine is without sweetness and is said to be 'dry'
- dry wines contain all of the alcohol that the specific grape is capable of yielding under the conditions of fermentation – generally 12-14% alcohol by volume
- natural fermentation generally yields an alcohol concentration of less than 16% by volume even if more sugar is added because this amount of alcohol is toxic to yeast and stops fermentation
- as grapes mature, the wine yeast *Saccharomyces euisoideus* naturally accumulates on the skin
- when crushed grapes or filtered juice is placed at a temperature of 27°C, the juice continues to ferment, yielding equal molar quantities of ethyl alcohol and carbon dioxide and traces of flavour compounds
- wine yeast is relatively resistant to sulphur dioxide and so this is added to help control undesirable micro-organisms, particularly bacteria
- sulphur dioxide is also effective in inhibiting browning enzymes of the grapes and providing reducing conditions by reacting with oxygen
- fermentation causes a rise in temperature so cooling is required to prevent yeast inactivation
- fermentation under conditions of limited exposure to air may continue until the sugar is entirely consumed, when it stops naturally, or fermentation may be interrupted prior to this point
- at around 27°C, fermentation may last for some 10 days depending on wine type.

Bread

- two main forms of yeast used in bread making – fresh yeast and dried yeast
- water requires to be blood temperature of 32°C approx to encourage yeast to ferment
- at temperature of 43°C yeast cells are inactivated and at 54°C they are killed
- yeast uses small amount of sugar as a starter ferment
- the gas produced by the yeast stretches the gluten in the dough producing little bubbles which become trapped forming the characteristic framework of bread
- when the dough is baked the increase in temperature causes the carbon dioxide bubbles to expand within the dough, thereby causing a further rise in the volume of bread
- during baking the expansion of the carbon dioxide causes the bread to rise rapidly and the alcohol is driven off
- the amount of salt added to the dough is a delicate balance because too much salt can inhibit the yeast while too little can cause the dough to be sticky and unmanageable.

**ADVANCED HIGHER HOME ECONOMICS
RESOURCE MANAGEMENT**

Context: Health and Food Technology

Question	Context	Elaboration	Skills		Totals
			Knowledge	Evaluation	
Section A					
(a)	Food politics	<ul style="list-style-type: none"> • Food and nutrition health policies – Scotland and abroad 			
	Psychology of food	<ul style="list-style-type: none"> • Influence on consumers • Role/impact of the media 	5		
(b)	Psychology of food	<ul style="list-style-type: none"> • Influence on consumers 	10		
(c)	Psychology of food	<ul style="list-style-type: none"> • Influence on consumers • Role/impact of the media 		10	25
Section B					
1(a)	Food politics	<ul style="list-style-type: none"> • Food and nutrition health policies – Scotland and abroad 			
(b)		<ul style="list-style-type: none"> • Issues related to health in Scotland 	10	15	25
2	Food Science	<ul style="list-style-type: none"> • The properties and uses of carbohydrates – solubility, inversion, crystallisation, caramelisation, gelatinisation, retrogradation of starch 	25		25
3	Food Science	<ul style="list-style-type: none"> • Micronutrients and optimal nutrition 	25		25
4	Biochemistry, preservation and processing	<ul style="list-style-type: none"> • Genetic modification of foods 	25		25

Question	Context	Elaboration	Skills		Totals
			Knowledge	Evaluation	
5	Biochemistry, preservation and processing	<ul style="list-style-type: none"> The role of micro organisms and enzymes in the development of flavours and textures in food Beneficial effects of micro-organisms and enzymes related to specific foodstuffs: cheese, yogurt, alcoholic drinks, bread 	25		25

[END OF MARKING INSTRUCTIONS]