GCE Design and Technology:

Food Technology

Unit 3 Design and Manufacture (FOOD3)
Mark Scheme

2540
June 2015

V1 Final Mark Scheme

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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SECTION 1

Question 1

01 'The Government is to roll out new salt reduction targets to the food industry. The aim is to cut the salt content of manufactured and catering food by a further 25% because recent findings have shown that, on average, we are still consuming 8.2g per day. The Department of Health recommendation for adults is less than 6g per day.'

With reference to the article above, explain why the government is concerned about high salt intake in the United Kingdom.

[10 marks]

Any relevant point will be rewarded. Below are expected responses to this question:

- There seems to be a link between excess salt consumption and coronary heart disease, strokes and high blood pressure.
- The average over consumption is 2.2g according to this data
- Recent research has also linked overconsumption of sodium with poor immunity.
- More people are eating fast food / takeaway food / chip-based products and sandwiches, which are notoriously high in salt.
- Salt makes food tasty and can encourage people to buy foods high in salt because they taste nice.
- If salt is used as a method of preservative, such as in brine, levels may go up unknowingly.
- Some restaurants and pubs sell salty food as they encourage people to buy more drinks to quench thirst, thus encouraging them to spend more money and take in more calories.
- There may be a correlation between a diet high in salt and bodily retention of fluids, which can affect heart function and breathing and may increase body weight temporarily.
- Some salty food may actually contain monosodium glutamate, which has addictive properties. It is similar in chemical composition to salt. This can increase heart rate and can cause allergic reactions and hyperactivity in some people.
- Salt can mask the inferiority of ingredients in terms of quality, age and sensory characteristics.
- There are inconsistencies with food labelling so consumers not aware of the high salt content in manufactured foods.
- Allow 1 mark if mention is made of the need for salt to replace that lost by sweating in hot weather.

Reward explanations, justifications or examples which support the points made.

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
A range of points which may or may not be explained or justified.	**1 – 4**
A range of relevant points with explanation. The candidate may be confused in places but demonstrates a good understanding of the issues.	**5 – 7**
A well expressed response covering a full range of points which	**8 – 10**

are explained. There is evidence of thorough understanding and originality.	

02 State three different types of manufactured food products which are high in salt.

For each food product you have chosen, suggest one different way of reducing the salt levels.

[3 x 2 marks]

Expect to see **three different** types of manufactured food products and a **different** way of reducing the salt levels for each. Allow 1 mark for each correct example, whether or not the suggested way of reducing the salt is correct.

Manufactured food products (maximum 3 marks) could include any of the following:

- Pre-salted Fish and Chips (1 mark)
- Ready meals
- Bacon, ham and other cured meats (note that ham is salted as part of the way it is cured / processed)
- Kebabs (1 mark)
- Pizzas (1 mark)
- Curries (1 mark)
- Stir Fries (1 mark)
- Sandwiches, baguettes, wraps, Panini (1 mark)
- Chinese and Thai or other ethnic foods (1 mark)
- Salads (1 mark)
- Dips and / or dunks (1 mark)
- Soups (1 mark)
- Snacks such as crisps, nuts, savouries (1 mark)
- Sushi (1 mark)
- Any other relevant product (1 mark per product)

Possible ways of reducing salt must relate to products student has chosen. (1 suggestion per manufactured product named - Maximum 3 marks). Only reward 'Use less Salt or don't add salt' once.

Replace common salt with reduced sodium salt e.g. with fish and chips.

- Replace salt, or some of the salt with herbs, spices e.g. curry powder in soup instead of stock or added salt.
- Avoid using processed, smoked meat or fish products which are salted as part of the processing e.g. use fresh meat which has been roasted, grilled or fried on top of a pizza instead of sliced salami or tuna in brine.
- Avoid using foods which have been preserved in brine.
- Avoid using salted nuts, crisps or savoury toppings which may contain salt.
- Don't add salt to the recipe.
- Use of 'low salt' products

- Replace salt with pepper.
- Avoid the use of stock cubes or yeast extract.
- Consider adapting recipes to include low salt foods which still have good flavour e.g. vegetables, whole grains, curry powder, various vinegars and oils, pureed or reduced non salted ingredients or sauces.

03 Describe, with examples, the following terms with reference to the working characteristics of eggs:

- **Aeration**
- **Coagulation**
- **Coating**
- **Glazing**

[4 x 3 marks]

Aeration:
This is where egg is whisked mechanically and the albumen forms a matrix which traps and holds bubbles of air. This is generally known as 'partial coagulation' where the protein molecules unravel partially. Examples include meringue, fool, mousse, Genoese sponge.

Coagulation:
This is where the protein in the egg sets solid when heat is applied. Usually this is irreversible and the colour, flavour and texture of the egg changes. The protein denatures (the molecule unravels) and the egg hardens. Examples include any form of cooked egg: e.g. boiled, poached, scrambled or fried. If the egg is incorporated with other ingredients, such as in a Swiss roll or sandwich cake, the coagulation helps form the structure of the product.

Egg white coagulates at 60 degrees
Egg yolk coagulates at 66 degrees
Full coagulation is at 73 degrees

Coating:
This is where egg is used beaten (either whole egg or as white or yolk) to cover a food prior to rolling or dipping it into another ingredient such as flour or breadcrumbs, usually prior to frying or baking. Examples include potato croquettes, Scotch egg, fish cakes etc. Coagulation binds the coating to the egg. This forms a protective layer and prevents the product drying out and becoming over cooked.

Glazing:
This is where beaten whole egg, or egg white or yolk is brushed over the outside of a food product in order to produce a shine or rich brown coating when the product is cooked. Examples include: sausage rolls brushed with beaten egg to increase the colour of the outer crust; pork pie glazed with egg yolk to produce a rich brown coating or apple pie glazed with egg white and sugar for a crispy clear coating. This is an example of Maillards reaction.
(Don't reward 'appealing' – must be a specific description such as shiny, glossy, rich brown colour).

Examples are **not** to be rewarded a mark on their own, only as part of the explanation. See mark band below for further information.

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
The term is described but is either inaccurate **or** the explanation of the working characteristics is inaccurate. An example may not be given.	**1**
The term is described with an example and an attempt to explain the working characteristics is made. There may be some inaccuracies in the answer and they may be no example.	**2**

Both the term and the reference to the working characteristics are accurately described. Correct example(s) are given to support answer.	**3**

Question 2

04 'Research suggests that in Britain we consume 43% more food than we actually need. This equates to 384 kg excess food and drink each year which is referred to as 'mindless eating'.'

Discuss the issues raised in this article.

[12 marks]

Responses might include any of the following points. Examiners should allow for answers which do not feature in this list but which are nevertheless credible.

- Food is readily available and for many, plentiful and affordable.
- Fast food and snacks are easily purchased in towns, cities, railway stations, airports etc. People often build the purchase of such foods into their daily working routines, whether or not they feel they want the food.
- Many people choose to buy pre prepared food such as sandwiches for their lunch than make it themselves at home. Portion sizes may be larger than they would be if the food were home prepared. The processed food may be more calorific and filling and consumers may be tempted into buying things they would not normally have at home, such as nuts, chocolates, cakes and pastries.
- Eating is a social activity, e.g. going out for meals, having dinner parties and people often over eat as a result, to be sociable…'Oh go on then, I will have a dessert!' etc.
- People often 'comfort eat' when they are stressed.
- Friends and family may 'snack' whilst chatting over a drink, such as coffee and biscuits or cake, wine and crisps or nuts etc. The food is not eaten because they are hungry, but as a sociable activity.
- People often eat 'mindlessly' when they are watching TV or at the cinema, travelling etc. This can be psycho-somatic or out of boredom or simply part of a routine.
- A lot of modern day food is indeed very tasty, well presented and appealing and people enjoy eating it. Manufacturers have developed many products which have excellent flavours and textures.
- Some food and drink products can be 'moreish' and even 'addictive' e.g. Chinese take away food which contains monosodium glutamate.
- Some people eat secretly not realising how many calories they are taking in.
- Drinking is also a social activity, which encourages people to eat too. Many pubs offer a tempting bar menu.
- Many people work long hours and choose to go out for a meal. This may mean eating two or three courses when they may ordinarily only eat one. The portion sizes may also be larger, which lends itself to eating more than needed.
- Special offers in eating places can encourage people to order more food than they actually need.
- People often under-estimate the calorific value of alcohol (second to fat in terms of energy value). Alcohol has the effect of suppressing the feeling of 'fullness', therefore people often eat more, e.g. with second helpings, when they are drinking alcohol.

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
A few points made but the response is unadventurous and little discussion is evident.	**1 – 3**
Several relevant points are made and an attempt is made to discuss them. The answer may lack breadth and depth.	**4 - 6**
A good range of points and the discussion shows understanding of the topic. Relevant examples may be given. Alternatively, a wide range of different points are made with some discussion, which shows understanding but may be brief.	**7 - 9**
A full and inventive response which is well structured and contains a variety of relevant points. The level of discussion shows good understanding and is fluent and perceptive. Examples cited support the argument effectively.	**10 – 12**

05 Explain what is meant by the following terms:

- **Oxidative rancidity**
- **Trans fats**
- **Triglycerides**
- **Melting point of fat**

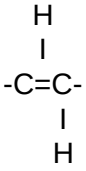
[4 x 3 marks]

Oxidative rancidity:

- This is a chemical change brought about by oxidation.
- The hydrogen in the fat is oxidised. (Allow 1 mark for mention of oxygen and one for mention of fat).
- It occurs as a result of the reaction between unsaturated triglycerides and oxygen from the air.
- Oxygen molecules join across the double bond of the triglyceride molecule and a variety of compounds are formed such as aldehydes and keytones.
- It leads to the deterioration of fat and the production of odours and bitter flavours caused by aldehydes and ketones (reward both terms if used). This is referred to as a 'rancid taste'.
- The reaction is accelerated by heat, light and traces of metals such as copper and iron.

Trans Fats:

- These are fatty acids where the two hydrogen atoms are on geometrically opposite sides of the double bond:



- Trans fats are formed as a result of *hydrogenation*, where hydrogen is added across a double bond (by heating the oil, stirring with a small amount of nickel which acts as a catalyst, enabling hydrogen atoms to be taken up by the unsaturated fatty acids.
- This process turns an unsaturated fatty acid into a saturated fatty acid (hardening the fat).

- This process is used in the manufacture of margarine and other spreadable cooking fats. Only used by manufacturers as a rule.

NB: A diagram is not obligatory, but if an accurate diagram is given it should be rewarded.

Triglycerides:

- These are made from *glycerol* and three *fatty acids.*
- *Can be saturated or unsaturated.*
- Mixed triglycerides contain three different fatty acids – they are the basic constituents of natural fats.
- Simple triglycerides contain the same fatty acid (not normally found in fats in food).
- Any differences between natural fats will be due to their different combinations of acids with glycerol.

Melting point of fat:

- When heat is applied, fats melt.
- Fats have a variety of melting points depending upon their triglyceride composition.
- The more double bonds, the lower the melting point.
- The temperature at which melting starts is called the 'slip point'.
- Most fats melt between 30°C and 40°C.
- The melting point for oils is below normal air temperature.

Criteria for marks awarded	**Mark range**
No response worthy of credit	**0**
The response includes one or two significant points which are described sufficiently well to show good understanding.	**1 – 2**
A good range of points are made which are well described and accurate. Good use of terminology.	**3**

06 What is the difference between a sol and a gel?

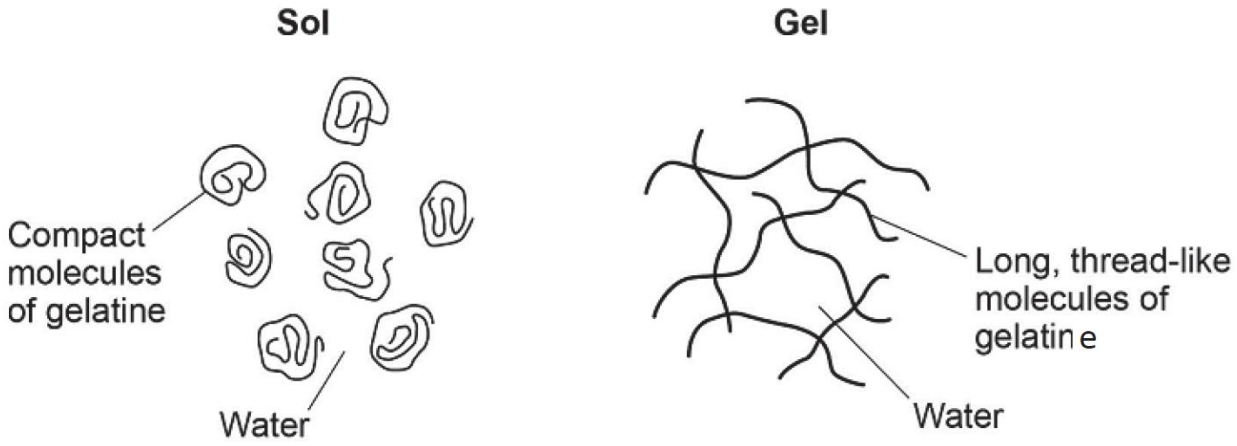
[4 marks]

Sol:

- A sol is a protein or a starch dispersed in water and heated to form a 'sol', for example when jelly is made, gelatine (a protein) is dispersed in water and forms a sol once heated.
- There is little attraction between the protein molecules and the sol behaves like a liquid, i.e. it is runny and can be poured.
- e.g. Disperse phase is gelatine / starch // Continuous phase is water)

Gel:

- A gel is a sol which has cooled.
- On cooling, the molecules which are compact and coiled in a sol, begin to unwind and cross-links are formed between adjacent molecules and a network (mesh) is formed.
- A gel can sometimes reform into a sol, e.g. if jelly is heated it becomes liquid and forms a sol.
- e.g. Disperse phase is water / Continuous Phase is gelatine / starch



NB: A diagram is not obligatory, but if an accurate diagram is given it should be rewarded.

Summary: A sol behaves like a liquid, i.e. it is runny and can be poured. A gel is solid and cannot be poured. A gel can sometimes revert to the state of a sol when it is heated.

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
Some understanding is evident but only one significant point is made.	**1**
A reasonable understanding of the difference. There may be a little confusion.	**2 - 3**
Full understanding of the terms – accurately described - and a clear explanation of the differences. Good use of terminology. Annotated diagrams may be used to support answer but are not essential.	**4**

Question 3

07 Many secondary school children do not eat at lunch time.

Give reasons why this may be the case and explain why it is important for school children to eat at lunch time.

[12 marks]

Responses might include any of the following points. Examiners should allow for answers which do not feature in this list but which are nevertheless credible. The marks do not have to be evenly distributed between the two sections of the question, but in order to achieve marks in the top two bands, reference must be made to both parts.

Possible Reasons for not eating school meals at lunch time:

- The lunches may not be affordable, especially if the family have more than one child and do not qualify for free school meals.
- The child may feel that the food is overpriced.
- The child may not have enough time to eat (rehearsals, moving from one site to another, catching up with homework, playing with friends etc.
- The child may want to eat at break instead.
- The child may not like the food / not appeal to them.
- The child might not like the dinner ladies.
- Media and celebrity influences.
- Self image
- The child may not like queuing and eating in the atmosphere of a school dining hall and thus may be put off school meals for social rather than nutritional reasons.
- The child's friends may not have school meals and so the child opts to do what they do in order to be together at lunch times.
- The child may have had a bad experience with school meals in the past and have been put off.
- The child may have specific dietary requirements and prefers to have a packed lunch which meets those needs.
- The canteen may not cater for specific needs adequately, e.g. Muslims, Jews if the meat is not Halal or Kosher
- The quality of the food and the nutritional value may actually not be very good.
- The preference for packed lunches containing high fat, sugar and salt levels.

Why it is important for school children to eat at lunch time:

- To function more effectively in the afternoon
- To restore energy levels
- To obtain key nutrients for growth, repair and maintenance of the body
- To consume a meal which is nutritionally balanced
- To maintain a healthy digestive system with good routines
- To sit and relax half way through the school day
- To learn how to socialise with others
- To become accustomed to eating food not cooked by Parents and family members – learning to be more independent

- To learn how to hold cutlery and develop table manners
- To be introduced to new foods which may not be eaten at home
- For some children, this may be the best quality and most nutritious food they will eat in a day
- The quality of cooking may actually be better than the quality of cooking the child experiences at home
- To keep warm in winter
- To build resistance to illness and to prevent blood sugar levels dropping and feeling faint.
- The 'Jamie Oliver' influence on improving school meals.

Criteria for marks awarded	**Mark range**
No response worthy of credit	**0**
Some points are made which are relevant but the explanation is weak. It is possible that the candidate has only touched upon one part of the question. May not mention nutrition.	**1 – 3**
A range of points are made with some explanation which shows a reasonable understanding. Both aspects of the question are covered, though the coverage may not be equal. Some reference to nutrition.	**4 – 6**
A varied range of relevant reasons which are well explained. A good level of understanding is evident and the answer is well constructed generally. Good reference to nutrition.	**7 - 9**
The candidate has a very good grasp of the question and the topic is very well covered. The explanation is based upon excellent levels of knowledge and understanding and elements of the response are topical and / or original. Excellent reference to nutrition.	**10 – 12**

08 Explain why emulsifiers are used in the food industry and give examples to show how they work.

[8 marks]

Why emulsifiers are used in the food industry:

- Emulsifiers are used to stabilise oil in water or water in oil mixes to prevent separation.
- They play a vital role in the manufacture of many food products because without them food becomes unstable and separates out into water and fatty layers.
- They improve and / or maintain texture, which enhances sensory characteristics such as mouth feel, appearance, and colour.

Examples of how they work:

- They allow the dispersion of tiny droplets of oil to be made in water to give a stable emulsion, e.g. in mayonnaise, sauces, drinks and soups.
- In general, part of the structure of a substance used as an emulsifier must be able to dissolve in water and part in fat or oil. This aids the hydrophilic and hydrophobic action of emulsification to occur, where the droplets are held in suspension.

Examples of emulsifiers:

- Lecithin (egg and synthetic)
- Allow for egg yolk containing lecithin
- GMS (glyceryl monostearate)
- Sorbitan tristearate (E492)(used in chocolate to stop a bloom forming)
- Monoglycerides of fatty acids (E471) – found in frozen desserts
- Sucrose esters of fatty acids (E473) – used as a wetting agent

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
Some understanding is evident. One or two accurate points given. May include an example of either how emulsifiers work or a named emulsifier. There may be confusion.	**1 - 3**
A reasonable understanding of why emulsifiers are used, which is supported with some examples of food products. Emulsifiers may be named. Examples are given to show how they work.	**4 - 6**
A full and technically accurate answer which is clear and focused, responding well to the question. Good use of terminology. The response includes relevant examples showing how they work within various food products, with named emulsifiers.	**7 - 8**

09 With reference to specific foods, explain the following terms:

- **enzymic browning**
- **Maillard reaction.**

[2 x 4 marks]

Enzymic browning:

- This occurs when oxygen from the air reacts with substances in food (see below), in the presence of enzymes, forming brown compounds (*pigments)*, e.g. the browning of freshly cut fruit and vegetables, particularly apples.
- When fresh foods such as apples, bananas, avocados, pears and salad vegetables are peeled or have the cellular structure physically damaged in some way, through bruising, cutting, eating or through disease; they rapidly start to develop a brown colouration.
- The enzymes which cause this are called *polyphenolases* or *polyphenol oxidases.*
- The substrates for the enzymes are *phenolic compounds.* Some are faster in their reaction than others – apples contain *catechol* which is highly reactive.
- Some fruit and vegetables contain the enzyme but not the substrate e.g. citrus fruits and thus don't brown.
- Cider and tea are examples of this reaction, hence the golden brown colour.

NB: Candidates are not being asked to say how to prevent enzymic browning from occurring, but if they do so, reward may be given e.g. they may mention destroying the enzymes with heat, removal of oxygen by immersing in water or destroying them with the use of sulphites or acids such as lemon juice. Reward such points as they demonstrate understanding and may usefully aid the explanation of the term.

Maillard reaction:

- This occurs during the roasting, baking, grilling and frying of many foods.
- A chemical reaction between an amino acid and glucose takes place, in the presence of heat, which causes browning.
- Reward if 'non enzymic browning' is cited
- The reaction between the amino group (NH_2) of a protein or amino acid and the *aldehyde group* of a reducing sugar is called the *Maillard reaction*, discovered by Maillard in 1912.
- Brown coloured compounds are formed (*melanoidins)*. These provide an attractive colour of products such as cake or bread crust, roasted meat, biscuits, fried potatoes – accept with an explanation which is not referring to caramelisation or dextrinisation.
- The browning compounds also give an appetizing flavour to the foods.
- This reaction is often referred to as the 'Maillard reaction'.
- The reaction can also cause undesirable effects in foods, showing deterioration over a period of time e.g. in browning of dried milk pwder.

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
One accurate point is made but there is little significant understanding. An example of a specific food may be given.	**1**
A reasonable understanding of the term. Key words and reference to specific foods indicate this.	**2 – 3**
A full understanding. The use of terminology and key words is accurate and detail is given in the explanation, supported by	**4**

correct specific food references.	

SECTION B

Question 4

10 Market research has shown that the amount of pasta consumed in the UK between 1987 and 2009 increased by 200%. Explain in detail the reasons for this increase.

[12 marks]

Responses might include any of the following points. Examiners should allow for answers which do not feature in this list but which are nevertheless credible.

Possible Reasons and explanations

Reason	Explanation
• Wider availability of pasta and pasta products in the supermarkets	Now seen as a household product. Many varieties for sale in a wide range of products, from dried to ready meals.
• More consumer travel to Italy and other countries, thus wider opportunities to try pasta.	People who travelled in the 1980's may not have had much pasta in the UK and they may have bought it as a result since the holiday, hence the sales increasing.
• The production of fresh pasta for sale in supermarkets	A new innovation which may have appealed to the more discerning chef.
• Celebrity chefs making pasta more trendy	Recipe ideas and ideas for dinner parties or children's meals. May have seen something on TV and want to try it out.
• Cook – in pasta sauces being sold to encourage the less confident chef to produce a pasta dish	Easy to put together a tasty meal without having to buy all the individual ingredients to make an Italian sauce.
• Pasta being included in one pot salads as a lunch product	Widening the appeal of pasta, enabling people to have a change from sandwiches. Seen as a healthier lunch product. Can easily be eaten with a fork.
• The 'slow release' energy qualities of pasta and GI ratings - Pasta seen as a healthy food product	More sports minded people who are aware if the importance of health and slow release carbohydrates.
• Easy to store	No need to refrigerate dry pasta. Can last for several months at room temperature.
• Quick to cook	Only needs about 15 minutes to cook. Easy to put together a hot meal when someone is working late and comes home hungry.
• Inexpensive to buy	Goes a long way. You only need to use the amount you actually need. Most shops sell it.
• Popular amongst all age groups	Easy to eat, digest, flavour and design a meal to suit all tastes. Can adapt it to suit dietary needs, religious needs and portion size.

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
A few points made but with little or no explanation.	**1 – 3**
Several relevant points are made and an attempt is made to explain them. The answer may lack breadth and depth.	**4 - 6**
A good range of points and the explanations show understanding of the question.	**7 - 9**
A full and inventive response which is well structured and contains a variety of relevant points. A wide range of reasons with detailed explanations.	**10 – 12**

11 Describe what HACCP is and explain its importance in the food industry.

[10 marks]

Responses might include any of the following points. Examiners should allow for answers which do not feature in this list but which are nevertheless credible.

- Award 1 mark for the definition.
- Award up to 1 mark for a description of each of physical, chemical and biological contamination.
- The Food Safety Act of 1990 states that all owners and workers involved in the production of food must devise and operate a safety system called Hazard Analysis and Critical Control Point. This requires that a risk assessment is carried out on all tasks in the manufacture of food and actions devised in advance to remedy identified problems.
- The onus for controlling the safety and quality of food products lies with the owner. HACCP is a key part of this process.
- The management system should assess, check, predict and minimise the risk that occur during food manufacture.
- This is a continuous process during production and the development of new products.
- Some candidates may make reference to the 7 stages of the HACCP process: (1) Putting the details into a flow diagram with risks identified at each stage of the process (2) Identifying Critical Control Points (3) Setting tolerance levels or limits for each CCP (4) Regular testing and checking of CCPs, including monitoring and measuring (5)Devising a system for corrective action to put things right when faults occur (6) Keeping records or logs of all processes, tests and corrective action for a third party to see (7) Review and audits of the logs to ensure the system is working well.
- HACCP is important to protect consumers from food poisoning (biological contamination) and to minimise risks of contamination from physical and chemical sources.
- It is important to maintain high standards in production, to maintain good reputations in the food industry and to protect manufacturers from possible litigation and fines or even imprisonment.
- Shows due diligence and evidence in case of complaint.

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
A basic understanding of HACCP which outlines what it is. The answer lacks detail.	**1 – 3**
A reasonable understanding of HACCP with reference to its importance in the food industry. There are some omissions.	**4 – 7**
A full and detailed understanding of the process of HACCP (which may include all seven stages) and the industrial reasons for its use. Good use of terminology.	**8 – 10**

12 Explain why drying is a popular method of food preservation. Give examples of different drying methods to support your answer.

[6 marks]

Responses might include any of the following points. Examiners should allow for answers which do not feature in this list but which are nevertheless credible.

- Drying is a traditional method of preservation which has developed through the centuries.
- **Do not** reward food examples unless a specific point about popularity is being explained
- The underlying principle of drying food is to remove moisture which is required by micro-organisms for growth. It thus minimises food poisoning and food spoilage.
- Many foods can be dried by a variety of methods (such as accelerated freeze drying, spray drying, fluidised bed drying, tunnel drying, roller drying and sun drying).
- **Do not** reward explanations of the methods
- Dried foods are easily stored at ambient temperatures. They do not need to be chilled usually.
- Other than water soluble vitamins, there is little loss of nutrients.
- They can be packaged using smaller quantities of packaging materials than food which are hydrated, thus taking up less space.
- They are often reasonably cheap to buy.
- They can be used as a convenience or emergency food.
- They can be very versatile.
- Long shelf life.
- Dried foods are light and easily carried, useful when travelling, camping or walking.

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
A few basic points made with little explanation or justification. Examples may be given but may be incorrect or irrelevant.	**1 – 2**
A reasonable attempt which includes a range of points. There is some explanation but the answer lacks originality or detail. Examples are given but these may not all be correct.	**3 – 4**
A full and well supported answer which is detailed, showing excellent knowledge and understanding. Correct examples are given to support answer.	**5 – 6**

Question 5

13 A product development team are designing a new food product. They have carried out market research and have concluded that the consumer demand is for low calorie, self-assembly main meals which are colourful, tasty and appear like a homemade dish.

Describe how the product development team would use the information above to create the new food product.

[12 marks]

Responses might include any of the following specification points, which should be fully justified. Examiners should allow for answers which do not feature in this list but which are nevertheless credible.

Low Calorie:

- Selection of suitable ingredients such as lean meat, Quorn, vegetables.
- Choice of cooking methods to reduce fat content, e.g. steaming rather than frying
- Portion control to ensure consumers are not eating more that they need in a portion
- Use of nutritional analysis programmes
- Reference to DRVs
- Consider reduced use of saturated fats

Self-Assembly:

- Creating the dish in parts so that it can be assembled easily by the consumer
- Clear instructions on the packaging
- Simple processes for the unskilled cook to carry out
- Pre-preparation of component parts to maintain organoleptic qualities, e.g. preventing enzymic browning if vegetables are cut etc.

Main Meal:

- Reference to DRVs
- Portion size
- Satiety value
- Popular ingredients
- Suit a wide range of consumer preferences e.g curries, pasta, potato or rice based dishes
- Vegetarian options
- Options suitable for special dietary requirements such as coeliacs, lactose intolerance, religious groups
- Unique selling points

Colourful:

- Careful selection of ingredients to ensure that they do not deteriorate whilst being stored or cooked.
- Contrasting colours e.g. sauces and accompaniments
- Addition of natural (or artificial) food colours e.g. beetroot, carotene etc.

Tasty:

- Selection of suitable ingredients to compensate for reduced fat levels such as salty foods, herbs, spices, fruits and vegetables.
- Themed flavours such a s flavours from around the world
- Do more research to see what consumers like in terms of 'taste' and select foods appropriately

Appear like a homemade dish:

- Design of containers to give the illusion of the dish being made at home, such as re-useable glass or ceramic dishes.
- Clever design of manufacturing processes to simulate the 'home-made' textures, aromas and finishes.
- Garnishes to add to improve the finish and make the dish look home cooked.
- Selection of recipes that are commonly cooked in the home.
- Traditional recipes and ingredients which are locally sourced

Any relevant points related to manufacturing and processing:

- Look at products already on the market to inform designs
- Carry out extensive sensory testing in the test kitchen and amongst potential consumers
- Look at packaging and processing techniques, including modern materials and methods
- Design of labels to emphasise the unique selling points
- Increase shelf life if all items packaged separately

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
Some points are made which are relevant but the description is weak. It is possible that the candidate has only touched upon one part of the question. May not describe how the information can be used to develop a new food product adequately.	**1 – 3**
A range of points are made and the description shows a reasonable understanding of the topic. Some aspects of the question are covered in more detail than others and there are likely to be omissions in terms of the use of the information in developing a new food product.	**4 – 6**
A varied range of relevant points which are well described. A good level of understanding is evident and the answer is well constructed generally. Good reference to the uses of the information in creating a new food product.	**7 - 9**
The candidate has a very good grasp of the question and the topic is very well covered. The description is based upon excellent levels of knowledge and understanding and elements of the response are topical and / or original. Ideas about how the information might be used in creation of a new food product are well considered and credible.	**10 – 12**

14 What are the advantages and disadvantages of packaging liquid food products in refillable bottles or containers?

[10 marks]

Responses might include any of the following points. Examiners should allow for answers which do not feature in this list but which are nevertheless credible:

Advantages:

- It reduces waste.
- Better for the environment as it re-uses materials and cuts down on resources being required.
- It discourages litter.
- It encourages consumers to take more responsibility for the world's resources.
- It may reduce the cost of buying the product as the packaging is being re-used.
- It gives product designers the opportunity to come up with new and innovative ideas for environmentally friendly packaging materials and designs.
- Milk bottles and beer bottles that have been re-used through the decades prove how successful this idea has been and could continue to be in the future.

Disadvantages:

- It could be difficult to collect and clean the used containers.
- Sterilizing and preparing the containers for re-use could be more costly than making new ones.
- Consumers may not enter into the spirit of this and may not send the container for recycling.
- There could be cross-contamination and problems with bacteria breeding if the containers are not properly cleaned.

Criteria for marks awarded	Mark range
No response worthy of credit	**0**
A few points are made. The level of explanation and argument is likely to be weak.	**1 – 3**
A reasonable attempt. A range of points are made which are relevant and both sides of the argument are discussed. The response may lack depth and detail and originality.	**4 – 7**
A full response which covers a wide range of points. The argument is well considered and both advantages and disadvantages are covered in some detail. There is likely to be an element of originality in the response.	**8 – 10**

15 Describe two food sources and one symptom of food poisoning for each of the following:

- **Bacillus cereus**
- **Campylobacter**

[2 x 3 marks]

	Source	**Symptom**
Bacillus Cereus	Cereals, especially cooked rice dishes, soil and dust.	1-5 hours Abdominal pain, some diarrhoea, vomiting
Campylobacter	Raw poultry, meat and milk. Animals, sewage and untreated water – foods grown or coming into contact with these.	2-5 hours Diarrhoea, often bloody, abdominal pain, nausea, fever.

Mark guidance

For each bacteria (maximum 3 marks):

Correct food source – 1 mark per food source (maximum 2 marks)
Correct symptom – 1 mark maximum

Question 6

16 'It has been suggested that between 30% and 50% (almost 7 million tonnes) of food produced gets wasted in the United Kingdom. Food is not just wasted in homes; it is wasted at each stage of the distribution chain. A lot of the food that is wasted is often still edible and of high nutritional value.'

Discuss the moral and economic issues raised in this statement.

[12 marks]

Responses might include any of the following points. Examiners should allow for answers which do not feature in this list but which are nevertheless credible.

Moral Issues:

- Some people do not realise how much food they throw away.
- Some people do not have a conscience about throwing food away.
- Many people in the UK do not know what it is to be hungry and do not recognise the moral value of food, when so many in the world go to bed hungry each night
- Use by dates and the possible risk of food poisoning can make people throw away food that is perfectly edible.
- People may over buy and then throw away the excess rather than refrigerate it and eat it later.
- It is seemingly socially accepted to throw food away if it reaches the use by date. Keeping leftovers and re-using food in another meal is sometimes looked upon as being 'mean' or

'cheapskate'. This can put pressure upon people to waste food that they may have liked to save and re-use.

- Many people work long hours and choose to go out for a meal. This may mean eating two or three courses when they may ordinarily only eat one. The portion sizes may also be larger, which lends itself to wastage if people are over faced.
- Special offers in eating places can encourage people to order more food than they actually need.
- Supermarkets do not distribute out of date but perfectly edible food to the poor when they could do this.

Economic Issues:

- Many people have a good income and can afford to be wasteful.
- Supermarkets cannot afford to be sued so they err on the side of caution in disposing of food when it is out of date.
- Use by / Best before dates are often too cautious with several days leeway, thus food is removed from the shelves and disposed of not because it is bad, but to protect the reputation of the retailer.
- It is frequently more expensive to find ways of utilising waste food products than it is to throw it away, so food manufacturers and producers tend to take the most cost effective option, which often results in waste.
- If consumers are encouraged to observe the sell by and use by dates strictly, they will clear food off their shelves at home into the bin and buy more, which is good for the retailer.
- Many consumers do not recognise the economic cost of over producing food to be wasted, as well as the cost of disposing of wasted food.
- Allow for disposing of waste food.

Criteria for marks awarded	**Mark range**
No response worthy of credit	**0**
A few points are discussed but the response lacks depth and detail. The candidate may not consider both parts of the question.	**1 – 3**
A variety of good points are made and discussion takes place. There may be a lack of depth and detail in places.	**4 – 6**
A range of points, some of which may be original. The discussion is clear and focused.	**7 - 9**
A full and detailed answer which covers a wide range of possibilities. The discussion is original and well argued.	**10 – 12**

17 Describe the process of microbial risk assessment and explain how it can be effective in controlling outbreaks of food poisoning.

[8 marks]

Responses might include any of the following points. Examiners should allow for answers which do not feature in this list but which are nevertheless credible:

- A sample is taken from one batch. This sample is then made into a liquid solution in a laboratory using a machine called a 'stomacher', which pulverises the food with distilled water to produce an opaque liquid.
- This is then smeared onto an agar medium and the plates containing the substance are left to incubate for several days. This procedure is carried out in a clean laboratory, using sterile techniques.
- When the incubation period is reached, the dishes are placed under a strong microscope and colonies of micro-organisms are identified and counted. A grid is placed over the plates to aid counting. The colonies are counted using a 'clicker' pen. This is a laborious process, which needs to be carried out by a specially trained technician. Microbiologists are employed by many large food manufacturers for this purpose.
- If any large quantities of pathogenic bacteria are found, the product may be deemed to be unsafe for human consumption and the contaminated batches will have been removed from circulation. Use by and Sell by dates are calculated in this way by the micro-biologists, who plot the rate of microbial growth of certain foods, in certain conditions and mathematically predict the point at which a product becomes unfit for human consumption.
- Set levels for safe numbers.
- They will always be cautious in this estimation, allowing a certain amount of 'safe time' to compensate for situations such as transportation time from shop to home refrigerator in temperatures within the danger zone, allowing for accelerated rates of microbial growth to occur.
- The findings done in the lab are recorded and dated. This, together with food product batch numbers, will be essential if products have to be recalled or traced back to source in the event of a food poisoning outbreak.

Criteria for marks awarded	**Mark range**
No response worthy of credit	**0**
A few correct points are made but the response lacks breadth and depth. Understanding of the topic is limited.	**1 – 3**
A reasonable attempt. The candidate is able to describe the process and can explain the effectiveness.	**4 – 6**
A full response which covers all aspects of the question. The answer is detailed and thorough. Good reasoning and explanation given.	**7 – 8**

18 Drying is one way of preserving fresh milk. Describe two other preservation methods suitable for extending the shelf life of fresh milk.

(2 x 4 marks)

Candidates may describe any of the following preservation methods:

- **Pasteurisation**
  This method is often known as 'High Temperature Short Time' where the ilk is heated for 15 seconds to 71 or 72°C. The milk is then bottled and sealed and chilled.

- **Ultra Heat Treatment**
- The milk is heated for 1 second (allow up to 3 seconds) to 131°C (allow a range from 130 to 135°C) It is packaged under aseptic conditions in either a carton or plastic bottle.

- **Sterilisation**
  This is where heat is applied to milk in sealed bottles to a temperature of 104 or 107 to 113°C for 15 to 40 minutes. The bottles are left to cool by passing through water cooling tanks.

- **Canning.** Milk which is canned is either condensed or evaporated:
  - **Condensed milk** is homogenized and heated. Sugar is added and then the milk is boiled under vacuum in an evaporator until it is concentrated to approximately two and a half times that of the original milk. It is cooled and sealed into sterilized cans.
  - **Evaporated milk** is processed in a similar way to condensed milk but does not have sugar added. It is also sterilized in the can and is concentrated to twice the density of the original milk.

- **Freezing:** Milk in plastic cartons can be placed in a domestic freezer and successfully frozen. Skimmed and semi skimmed milk are best for this as the fat in whole milk tends to defrost with a 'bitty' texture.

Answers need to be specific. Note that the question is referring to the suitability of the method for preserving milk.

Applied to each method given:

Criteria for marks awarded	Mark range
No response worthy of credit.	**0**
The method selected is correct but the description may be inaccurate.	**1**
A correct method is selected but the description may be lacking in detail.	**2**
A correct method is selected and supported by a clear description.	**3**
A correct method is selected and supported by an accurate, detailed description.	**4**