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## GCE Food 3

- 1 01 Describe, with reference to physical structures, the differences in the nutritional composition of the following carbohydrates:

**Monosaccharides**

**Polysaccharides**

**Non-Starch Polysaccharides.**

**(12 marks)**

Candidates are expected to have an understanding of the physical structures and nutritional composition of the saccharides. They may support their answer with diagrams and ring structures, where relevant. Any relevant point and appropriate use of terms, names and technical language will be rewarded. Examples of foods which source the nutrients will be rewarded, to a maximum of three words. Only allow *one* mark for food examples for each of the three types of carbohydrates.

**Monosaccharides:** These sugars contain 2 to 7 carbon atoms (most commonly 6, 'hexoses' and occasionally 5 carbon atoms, 'pentoses'). The formula is  $C_6H_{12}O_6$ . This formula applies to any monosaccharide with 6 carbon atoms, not just to glucose. The monosaccharides are *glucose*, *galactose* and *fructose*.

The nutritional content of monosaccharides is sugar in its simplest form, which is used for quick energy release. It can be converted to glycogen for storage.

**Glucose** (Dextrose) is found in large amounts in grapes and in smaller quantities in vegetables such as peas and carrots.

**Fructose** (Laevulose) is chemically similar to glucose except that the arrangement of the atoms within the molecule is different slightly. Fructose is found in many fruits and in honey.

**Galactose** is also similar to glucose chemically. It is not found naturally in foods, but is produced when milk sugar (lactose – a disaccharide) is broken down.

**Polysaccharides:** Simple polysaccharides are long chains of one type of monosaccharide joined together. They are thus big molecules and are insoluble in water. They usually exist as a long chain. Occasionally there are branches formed by 1-6 glycosidic links. The general formula is  $(C_6H_{10}O_5)_n$  where  $n$  can be many thousands of monosaccharide units. Starch is the energy reserve of plants. It can be recognised under microscope by its shape that is granular. It exists in two forms: amylose (straight chain of alpha glucose units) and amylopectin (many shorter, branched chains of alpha glucose).

The main sources of starch in the diet come from plants such as potatoes, wheat, rice, corn and other cereal crops. Nutritionally starch is important because it provides the body with a slow release form of energy from the carbohydrate which the starch provides. Unlike the monosaccharides however, starchy foods can provide other essential nutrients to the diet, including protein, fat, the B group of vitamins, vitamin C in the case of potatoes, potassium, copper, calcium, selenium, magnesium, manganese, iron and non-starch polysaccharide.

**Non-starch polysaccharide:** Cellulose and pectin are examples of two types of NSP. Cellulose is **insoluble**, found mainly in plants such as grains, rice, vegetables and pulses. The **soluble** sources of NSP are as follows: **pectin**, (found in citrus fruits, soft fruits and apples) **beta-glucans** (found in oats, barley and rye) and **arabinose** (found in pulses). They have the ability to hold water and thus aid peristalsis. Cellulose gives plants structure in the form of long fibres. It is a very large molecule, often made up of several thousands of monosaccharide units: beta glucose (as opposed to alpha glucose in starch). These units are joined together by 1-4 glycosidic links. Heating may soften the cellulose, but it does not gelatinise as starch does, thus remaining undigested in the digestive system, aiding peristalsis. Humans do not have the necessary enzymes to digest NSP.

In terms of nutrients, NSP does not contribute anything to the diet, but it does increase the feeling of fullness, speeds the passage of stools, helps reduce bowel disorders and aids the process of digestion and absorption of minerals generally. Soluble NSP is thought to reduce LDL blood cholesterol levels and control blood sugar levels by slowing the absorption of sugar.

Candidates may be credited for making reference to the presence of Phytates in some foods, such as rhubarb, which inhibit the absorption of minerals.

Criteria for marks awarded	Mark range
Little or no understanding of the physical and nutritional composition of the saccharides. Few accurate examples given.	0 – 4
A basic answer. Some attempt is made to describe the physical and nutritional characteristics, but the answer may be inaccurate and lacks detail. Some accurate examples given. Candidates may focus on structure without discussing nutrition.	5 – 8
A sound answer that reflects a good knowledge and understanding. Good use of terms. Effective explanations. May include diagrams accurately drawn. Accurate examples. Candidates must discuss all three for top marks.	9 – 12

(12 marks)

**02 Explain the value of the following in relation to a diabetic's diet:**

- **sugar substitutes (replacers)**
- **sweeteners.**

**Sugar Substitutes** (sometimes referred to as 'bulk sweeteners') such as Slim Sweet, which is a natural sugar derived from a fruit which is a relative of the kiwi fruit is a low glycemic sugar but 15 times sweeter than refined sugar. Many bulk sweeteners are designed to have the equivalent level of sweetness to sucrose. These products are suitable for baking as they come in granular form and are useful for home baking and as a table sweetener.

**Sweeteners** are substances which give food products an 'artificial' sweetness. Foods such as confectionary or soft drinks are often sweetened using sweeteners such as *saccharin* or *aspartame*. The 'diet' products are usually 'sugar free' and thus diabetics can eat or drink them without fear of their blood sugar levels being affected. In large quantities the sweeteners can have laxative effects.

Candidates should be rewarded **no more than** two marks for naming sugar replacers and/or sweeteners. No marks should be awarded for a description of diabetes, as the question does not ask for this.

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<b>Criteria for marks awarded</b>	<b>Mark range</b>
Little or no understanding of the terms or of the implications for the diabetic diet.	<b>0 – 2</b>
Some attempt is made to describe the terms but the answer may be inaccurate and lack detail. A reasonable understanding of the value to the diabetic's diet.	<b>3 – 4</b>
A sound answer that reflects a good knowledge and understanding of the diabetic's diet in relation to sugar intake and the value of sugar replacers and sweeteners. Effective explanations.	<b>5 – 6</b>

**(6 marks)**

**03 It is believed by some that keeping a food diary can aid dietary planning. Consider the extent to which this is good advice.**

Any relevant point will be rewarded. Candidates will be expected to justify and substantiate their answer fully if they are to gain marks in the top band. Allow for reference to Government guidelines or initiatives (COMA, NACNE findings, Eatwell plate, five-a-day etc).

Answers may include any of the following points:

**Positive points:**

- Being aware of the amount of food you are taking in is one step towards modifying intake.
- It could be used as a form of forward planning, e.g. for planning meals for the week.
- If someone is making the effort to record their food consumption, they are more likely to want to calculate the number of calories they are taking in. IN other words, they are keeping a diary for a reason.
- It will make people think twice before they eat something because they know that they will have to write it down.

**Negative points:**

- You cannot trust people to be honest.
- They may not accurately weigh or measure food.
- The problem is possibly more deep routed than just over eating. The person may have psychological difficulties and entering data into a diary is not going to help the situation.
- People may be eating food without remembering or realising it, therefore do not enter it into the diary because they don't recognise they have eaten it.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
A limited response. The answer contains only the most obvious and basic points, with little reasoning.	<b>0 – 3</b>
A reasonable attempt. The answer contains a range of significant points with justification. Some of the points may lack originality and there may be a tendency to argue from a single perspective.	<b>4 – 7</b>
A full and thought-provoking response. The answer is well balanced, taking account of several different angles. Argument is justified and fluently written.	<b>8 – 10</b>

**(10 marks)**

**2 04 The diet of young people in the United Kingdom has become of great concern. Discuss in detail the issues raised in the article above.**

Any well expressed point will be rewarded. To achieve marks in the top band, candidates should demonstrate the ability to argue from more than one perspective and to support their argument with examples or evidence. Do not reward candidates who quote from the article without supporting their points.

Answers may include any of the following points:

- Is the statement actually true? Where is the evidence?
- Do school children have too much money at their disposal to spend on take away food?
- Where are the Parents in all this? Why are they not teaching their children about healthy eating? Do they know better or not? Is it their encouragement or support of this that is to blame?
- Are school meals too expensive? Can the cooks cook? Are they offering the right sort of food?
- Are school meals actually healthy?
- What is the environment like in schools at lunchtime? Do pupils try to get out for a break?
- Should the take-away shops be invited into the schools to set up a little outlet within the school premises?
- Has anyone looked at school meal provision abroad? Do they do any better? What ideas could we get from other countries?
- Are we a country of ignorant eaters? Should every child learn about Food Technology? Should it be a core subject with higher academic status?
- Are we a nation with low expectations where food for children is concerned? Think of children's menus in restaurants...etc.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
A basic answer which makes few points other than the most obvious ones. Little attempt to be creative or to draw on own knowledge or to use the article.	<b>0 – 4</b>
A good response generally. The answer covers several different aspects and most of the points made are justified or explained. Some original thinking is evident. Answer may refer to the article or the issues in it.	<b>5 – 8</b>
An excellent response. The answer includes many different arguments which are taken from a variety of perspectives. Use of language is fluent and articulate. Sophisticated and original thought evident. Answer should use the article.	<b>9 – 12</b>

**(12 marks)**



**Explain why the following might be used by manufacturers in the mass production of food products:**

- 05 Emulsifiers and stabilisers (4 marks)**
- 06 Preservatives (4 marks)**
- 07 Antioxidants (4 marks)**
- 08 Nutritional Supplementation (fortification) (4 marks)**

**05 Emulsifiers and stabilisers**

**Emulsifiers:** These are substances, which allow water and oil to mix (immiscible liquids). They enable the production of a stable dispersion of oil in water or vice versa. Examples include glycerol monostearate (GMS), lecithin, egg yolk and whey protein. All of these prevent droplets of oil from coalescing and separating. They reduce the rate of staling in baked goods.

**Stabilisers:** These are substances that have the ability to absorb considerable quantities of water. This property makes them good thickening agents, many being able to produce gels. Most can act as *emulsifiers* and prevent fat separation. Examples are *gums*, *cellulose* derivatives and gelatine.

- If candidates only refer to emulsifiers or to stabilisers, they should gain no more than 3 marks.
- Only allow one mark for examples of foods
- Only allow one mark for commercial names of additives.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
Little or no understanding of the additive or of the implications for the manufacturer.	<b>0 – 1</b>
Some attempt is made to describe the function of the additive but the answer may be inaccurate and lack detail.	<b>2 – 3</b>
A sound answer that reflects a good knowledge and understanding of the function and its relevance to mass production. Effective explanations. Good use of terms.	<b>4</b>

**06 Preservatives**

These are used to help keep food fresh or safer for longer than they would normally last. They are added to foods to extend their shelf life and to prevent the growth of micro-organisms which can cause food spoilage and lead to food poisoning. The main two on the permitted list are *sulphur dioxide* and *benzoic acid*.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
Little or no understanding of the additive or of the implications for the manufacturer.	<b>0 – 1</b>
Some attempt is made to describe the function of the additive but the answer may be inaccurate and lack detail.	<b>2 – 3</b>
A sound answer that reflects a good knowledge and understanding of the function and its relevance to mass production. Effective explanations. Good use of terms. Candidates mention prevention of food poisoning.	<b>4</b>

**07 Antioxidants**

- These prevent rancidity developing in fats by either absorbing oxygen or preventing chemical changes involved in rancidity. Vitamin C (ascorbic acid) is an antioxidant that absorbs oxygen, as does vitamin E (tocopherols). Hydrolytic rancidity cannot be prevented by antioxidants. Chemical reactions involved in rancidity are prevented by using butylated hydroxyanisole (BHA) or butylated hydroxytoluene (BHT). Do not allow for the health related anti-oxidants (preventing cancer etc.): this is not why *manufacturers* use them.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
Little or no understanding of the additive or of the implications for the manufacturer.	<b>0 – 1</b>
Some attempt is made to describe the function of the additive but the answer may be inaccurate and lack detail.	<b>2 – 3</b>
A sound answer that reflects a good knowledge and understanding of the function and its relevance to mass production. Effective explanations. Good use of terms.	<b>4</b>

**08 Nutritional Supplementation**

This group include the vitamins and minerals and protein supplements. They are only considered additives when they fulfil a technological purpose, e.g. Ascorbic acid used as an antioxidant. Some nutrients must be added to foods by law, e.g. Vitamins A and D must be added to margarine. The purpose is to improve the nutritive value of mass produced foods to improve the health of the nation. Some micro-nutrients are lost in food processing and thus may be replaced as a form of supplementation. Nutrients may be added to certain foods, such as iron in pasta; folic acid in breakfast cereals; calcium in bread, to aid certain dietary groups such as children, the elderly, vegetarians and pregnant women. Candidates must be specific about the nutrients used

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
Little or no understanding of the additive or of the implications for the manufacturer.	<b>0 – 1</b>
Some attempt is made to describe the function of the additive but the answer may be inaccurate and lack detail.	<b>2 – 3</b>
A sound answer that reflects a good knowledge and understanding of the function and its relevance to mass production. Effective explanations. Good use of terms.	<b>4</b>

3

**09 Red meat taken from the neck of the animal - best suited for braising or stewing (2 marks)**

**10 Mackerel or Herring - best suited for grilling or barbequing (2 marks)**

**11 Cod or Haddock - best suited for frying or microwaving (2 marks)**

- 09** Meat is the flesh of animals and is composed of fibres which are held together by connective tissue to form bundles. The tenderness of meat depends upon the size of the muscle fibres. Meat composed of small, narrow fibres is more tender than meat made up of larger fibres. Tough meat contains more connective tissue than tender meat. The older the animal the greater will be the amount of activity in its life, the greater will be the amount of connective tissue. Parts of the animal's body that undergo a great deal of movement, such as the leg and neck, will have a developed amount of connective tissue. Connective tissue consists of the proteins: collagen (which is found in skin and tendons and around muscle fibres), elastin (which is found in blood vessel walls and ligaments and is a tough, insoluble protein) and reticulin (which is fibrous and found between muscle fibres). Neither elastin nor reticulin are affected by cooking, but collagen is gradually converted into gelatin with slow, moist methods of cooking such as braising or stewing.

Credit candidates who make reference to the fact that some tougher cuts can be chemically or mechanically tenderised prior to cooking. Reward the key terms connective tissue, collagen, elastin, gelatine, slow moist cooking, in the correct context.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
The answer contains no points worthy of reward.	<b>0</b>
A limited attempt to answer the question.	<b>1</b>
A good answer which covers the most important aspects of the question, including explaining why this cut is tough and the method softens it.	<b>2</b>

- 10** Fish has a typically flaky texture that is due to the fact that fish muscle contains short fibres called *myotomes*, rather than the long fibres of animals. The myotomes are separated by thin sheets of connective tissue. Fish has much less connective tissue than meat and no elastin, and is therefore much more tender. The fish lives a different lifestyle to animals and its body does not have to work in the same way. The life of a fish, particularly a sardine, is relatively short. Fish portions tend to be smaller and often thinner than meat and because there is little connective tissue and a light, flaky flesh, the heat can penetrate the fish more efficiently, hence the shorter cooking time.

Mackerel and herring are known as 'oily' fish, with oil distributed amongst the fleshy fibres. During cooking this oil is released and hence the suitability for grilling or barbequing. Oily fish remain moist during cooking and do not need too much protection from direct heat sources as a result of this.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
The answer contains no points worthy of reward.	<b>0</b>
A limited attempt to answer the question.	<b>1</b>
A good answer which covers the most important aspects of the question.	<b>2</b>

- 11** Cod and haddock are white fish. They do contain oil but this is to be found in the liver. Consequently when these fishes are cooked, they need to be protected from the heat source as they are likely to stick to the cooking container as they cook. Thus methods of cooking such as frying, where fat is added to prevent sticking, or microwaving which cooks using water already in the product, are suitable methods. (Credit candidates if they refer to poaching as a suitable cooking method as this is also a moist method, at a lower temperature).

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
The answer contains no points worthy of reward.	<b>0</b>
A limited attempt to answer the question.	<b>1</b>
A good answer which covers the most important aspects of the question.	<b>2</b>

**12 Compare and contrast the differences in nutritional composition of the following:**

- **chicken**
- **beef**
- **red kidney beans**
- **Quorn**

FOOD	NUTRITIONAL COMPOSITION (Key Points)
Chicken	High in animal protein (HBV) Fat under skin (credit 'low fat' if thus clarified by candidates) Not much iron Good source of B group vitamins Good source of potassium, phosphorus, zinc, selenium
Beef	High in animal protein (HBV) Contains fat, including cholesterol Good source of iron, phosphorus, potassium, zinc Good source of B group vitamins
Red Kidney Beans	Contains a good source of protein (LBV) Contains starch Contains NSP Low fat content Good supply of folate Good supply of potassium, iron, manganese, copper
Quorn	Reasonable source of LBV protein Contains NSP Low in fat Good source of phosphorus, zinc, copper, manganese Good source of vitamin B12

Any well reasoned answer, with accurate information will be credited.

Criteria for Marks Awarded	Mark Range
Only some of the nutrients mentioned, with little comparison or contrast. There may be inaccuracies.	<b>0 – 4</b>
A reasonable grasp of the nutrients, though the response may be incomplete. Comparisons and contrasts are made, but there may be inaccuracies.	<b>5 – 8</b>
A full response. The answer is well written. Reference is made to almost all the relevant nutrients and comparisons and contrasts are accurate and well considered. Good use of technical language	<b>9 – 12</b>

**(12 Marks)**

**13 'The media has the power to influence the food choices consumers make'. Consider the extent to which you believe this statement to be true.**

Any well reasoned response will be credited. Answers may include any of the following points:

- The media enters nearly every home in the form of TV, magazines, newspapers, radio, internet, DVDs, videos etc. It is hard to avoid it.
- Children are particularly influenced by the media and they in turn can put pressure on their parents.
- Peer group pressure can influence people, which may have been initiated through the media.
- Celebrities, who are ever present on the media can say and do things which influence people.
- Supermarkets through advertising can strongly influence, either in store or on TV
- Foods can go in and out of fashion within days as a result of media pressure, e.g. breakfast cereals, chocolates, Brand names (e.g. M&S)
- Special offers encourage people to buy food they may not normally eat. Some candidates will confuse 'media' with supermarket offers, such as BOGOF. Only reward if they clarify this with media promotion such as TV adverts, newspaper adverts, internet promotions etc.
- Foods with special claims such as pro-biotic yoghurts, cholesterol-reducing fat spreads can be purchased directly as a result of media hype.

Candidates may also argue against the proposition with justified points

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
A limited response. The answer contains only the most obvious and basic points, with little reasoning.	<b>0 – 3</b>
A reasonable attempt. The answer contains a range of significant points with justification. Some of the points may lack originality and there may be a tendency to argue from a single perspective.	<b>4 – 7</b>
A full and thought-provoking response. The answer is well balanced, taking account of several different angles. Argument is justified and fluently written.	<b>8 – 10</b>

**(10 marks)**

<b>4</b>	<b>14</b>	<b>Ultra-High Temperature (UHT)</b>	<b>(4 marks)</b>
	<b>15</b>	<b>Drying</b>	<b>(4 marks)</b>
	<b>16</b>	<b>Canning</b>	<b>(4 marks)</b>
	<b>17</b>	<b>Vacuum Packing</b>	<b>(4 marks)</b>

**14 Ultra-High Temperature (UHT)**

This is effective because very high temperatures are used to destroy all bacteria e.g. 130 - 140°C for 1 -5 seconds in the case of milk. The food is sealed in an airtight container to prevent micro-organisms from entering and is suitable to be stored at ambient temperatures until opened, when it needs to be refrigerated and used within a few days. Food is easy to store using this method, e.g. milk, fruit juices.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
The answer contains only the most obvious and basic points, with little understanding of methods and principles.	<b>0 – 1</b>
The answer shows a good understanding with some explanation.	<b>2 – 3</b>
Excellent knowledge and understanding of the methods and the underlying principles, well explained and making use of technical terminology.	<b>4</b>

To gain 4 marks the candidates need to mention one or all of: the correct details about the UHT process (no mark for defining UHT); the fact that a sealed airtight container prevents re-entry of bacteria; the fact that it has a long shelf life and can be stored at ambient temperature until opened; and an example of, say milk.



**15 Drying**

This is the removal of moisture by warmth or high temperature. As micro-organisms need moisture to grow and reproduce, this makes it an effective method of preservation. Foods can be dried using commercial methods such as spray drying, freeze drying, roller drying, accelerated freeze drying (AFD), tunnel drying, fluidised bed drying, and sunlight e.g. tomatoes and fruits such as raisins, (not always an effective long term method however as it is very slow) or by oven drying, e.g. herbs, coffee, tea, vegetables.

Dried foods have a long shelf life and can be stored at ambient temperatures.

Do not allow the candidates more than one mark for the types of process. The answer must focus upon the question.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
The answer contains only the most obvious and basic points, with little understanding of methods and principles.	<b>0 – 1</b>
The answer shows a good understanding with some explanation.	<b>2 – 3</b>
Excellent knowledge and understanding of the methods and the underlying principles, well explained and making use of technical terminology.	<b>4</b>

**16 Canning**

This is a method which uses high temperatures (heat sterilisation) that destroys the micro-organisms that cause food spoilage. The cans are heated which drives out any air before it is sealed with a double seam to prevent leakage or the re-entry of bacteria. Foods preserved by this method have a long shelf life and can be stored at ambient temperatures.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
The answer contains only the most obvious and basic points, with little understanding of methods and principles.	<b>0 – 1</b>
The answer shows a good understanding with some explanation.	<b>2 – 3</b>
Excellent knowledge and understanding of the methods and the underlying principles, well explained and making use of technical terminology.	<b>4</b>

**17 Vacuum Packing**

This is where foods are prepared and then packed into a pouch or foil wrapper and the air is sucked out, forming a vacuum inside the pack. Removing air takes away oxygen and moisture which bacteria require in order to survive and to multiply. Some vacuum packs can be stored at ambient temperatures, such as coffee and have a medium shelf life. Others have to be stored at chill temperatures, such as smoked fish, cheese and cured meats. These have a short shelf life. Organoleptic qualities are often well maintained using this method.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
The answer contains only the most obvious and basic points, with little understanding of methods and principles.	<b>0 – 1</b>
The answer shows a good understanding with some explanation.	<b>2 – 3</b>
Excellent knowledge and understanding of the methods and the underlying principles, well explained and making use of technical terminology.	<b>4</b>

**18 Discuss the advantages and disadvantages to the environment of preserving fresh foods by the methods named above.**

Any well explained and relevant point will be rewarded. Answers may include any of the following:

**NEGATIVES**

- Litter from packaging causing an eyesore, pollution and physical hazards.
- Tins rusting and posing risks from sharp edges
- Pollution caused by factories who make the packaging
- Use of natural resources to make packaging
- The possibility that the packaging cannot be recycled, e.g. tetra-packs
- The creation of a society that expects packaged food rather than being willing to buy food at source, e.g. milk from the milk man, using recyclable glass bottles.
- The costs added to these products as a results of the methods used and the materials consumed
- Vacuum packs may require refrigeration and will thus have a shorter shelf life.

**POSITIVES**

- None of these methods require refrigeration, so all of them are environmentally friendly in terms of fuel consumption
- They can all be kept at ambient temperatures
- They are easy to stack and to store
- They can be kept for a long time, meaning fewer shopping trips required
- They are easy to prepare, some being ready to eat on opening
- Canning, Drying and UHT are safe methods of preservation, with low risks attached

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
The answer contains only the most obvious and basic points, with little understanding of the environmental effects.	<b>0 – 4</b>
The answer shows a good understanding of environmental issues with some explanation of the advantages and disadvantages.	<b>5 – 8</b>
Excellent knowledge and understanding of the environmental issues, well explained and making use of technical terminology.	<b>9 – 12</b>

**(12 marks)**

**5 19 Explain the meaning of the terms gelatinisation and retrogradation.**

**Gelatinisation**

This is the process by which a gel is formed. It is usually associated with the thickening process of starchy foods in conjunction with a liquid and heat, in processes such as sauce making, cooking potatoes, pasta, rice. Starches absorb a large quantity of water and the starch eventually cross-links to form a three dimensional network. The temperature at which the starch gelatinises depends upon the starch used.

Credit candidates who make reference to amylase or amylopectin and strength of the gel

**Retrogradation**

This is the reverse of gelatinisation and is usually seen in relation to the seepage of water from a thickened sauce. Water is expelled from the gel and the starch gradually changes its characteristics. In the case of bread, when it stales, it loses water and this can be considered a retrogradation. Some retrogradation can be reversed, e.g. the bread can be reheated to regain some of the original texture.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
Very little understanding of the terms	<b>0 – 2</b>
Some understanding. There may be omissions or inaccuracies	<b>3 – 5</b>
Excellent understanding. Good use of technical language	<b>6 – 8</b>

**(8 marks)**

**20 With reference to specific food products, explain why manufacturers use modified starch.**

Modified starch is used in manufacture to prevent the process of retrogradation taking place and thus spoiling processed food products. Food products that contain starches for thickening purposes are at risk from this. Some starches are thus cross-linked to reduce retrogradation in processed foods such as fruit pie fillings and lemon meringue pie fillings.

Manufacturers need processed products to remain in good condition on the shelves for several days. If sauces, pie fillings or pizza toppings start to 'weep' liquid they become less desirable to the consumer. Examples of retrogradation that can be observed at home are custard, gravy and white sauces kept in a fridge, which within days start to produce a watery residue around the edges which is not very appealing.

There are two forms of starch: *amylose* and *amylopectin*. Amylose is a straight chain in the form of a coil and amylopectin is a highly branched form. Amylose has better gelling properties than amylopectin, but retrogrades easily. Amylopectin's branched structure helps to retain water, thus reducing retrogradation. Phosphates cross bonded starches are starch treated with phosphoric acid to give amylose the appearance and properties of amylopectin. The result is a stable starch that does not retrograde.

Modified starch can be pre-gelatinised and is used in products such as 'Angel Delight', where the thickening is instant on addition of cold liquid (cold-water swelling). In products such as 'Pot-Noodle', instant custards and gravies the thickening is instant upon the addition of boiling water.

Some starches are acid-modified, which results in a clearer paste with a lower viscosity

Criteria for Marks Awarded	Mark Range
Very little understanding of modified starch or its function	0 – 2
A reasonable understanding of modified starch, but the answer lacks detailed explanation.	3 – 5
Excellent understanding and explanation of both modified starch and its function in manufacture. Good use of technical terms	6 – 8

**(8 marks)**

**21 Describe how new product development in the food industry has been enhanced by scientific and technological innovation in recent years.**

Any significant point, well described and justified will be credited.

Answers may include any of the following:

- Packaging developments have meant that new products can be developed, e.g. packaging in relation to food preservation, food production, presentation, storage, reheating and cooking.
- New methods of manufacture e.g. 'cook-chill'
- New ingredients, e.g. modified starch, pro-biotics, cholesterol-reducing fats
- Food additives such as anti-caking, anti-foaming agents which make mass production easier
- Developed understanding of Food Hygiene, HACCP and Risk Assessment systems, which have made mass production safer for the consumer
- Effective QA systems in place with the aid of CAD and CAM
- Better research, use of ICT and nutritional understanding
- Consumer access to fridges, freezers and microwaves, which has enabled the ready meal industry to boom
- In-store bakeries which have benefitted from the Chorley Wood method of bread dough production
- Development of air travel and sourcing ingredients from abroad
- The use of nanotechnology

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
A limited understanding of innovation and its benefits to the food industry.	<b>0 – 4</b>
Some good points made. A sound understanding of the topic.	<b>5 – 8</b>
Excellent understanding with full description. Some originality.	<b>9 – 12</b>

**(12 marks)**

6

**22 Plate**

In this method the food is prepared in the ordinary way and is packed into a flat container, usually a cardboard-based container, often with polythene or wax lining (e.g. beef burgers). The container is placed between flat, hollow refrigerated metal plates, which are adjusted to press tightly to the pack. This method is slowed down if there are any air gaps between the food and the metal plates. It too has been superseded by other more efficient methods.

Credit will be given for diagrammatic representation of the methods.

Criteria for Marks Awarded	Mark Range
Very little understanding of the method.	0 – 1
A reasonable understanding of the method. There may be omissions or some confusion however.	2 – 3
Excellent understanding of the methods. The processes are clearly explained, giving examples. Good use of technical language	4

23

**Blast**

This is an ideal method for freezing foods which have an irregular shape, such as chickens. A blast-freezer is a large cabinet in which a fan has been introduced to move the air over the product. Moving air readily takes up heat and loses it again. The air reaches a temperature of -25°C or lower and should move with a velocity of 400m/minute. The blast freezer is generally a batch system. Continuous systems which have been developed have more throughputs.

Credit will be given for diagrammatic representation of the methods.

Criteria for Marks Awarded	Mark Range
Very little understanding of the method.	0 – 1
A reasonable understanding of the method. There may be omissions or some confusion however.	2 – 3
Excellent understanding of the methods. The processes are clearly explained, giving examples. Good use of technical language	4

24

**Cryogenic**

This is where use is made of very cold liquified gases such as nitrogen and carbon dioxide. It is a rapid method of freezing which can cause thermal shock to some foods because of the sudden contraction. Liquid nitrogen is sprayed onto food on a conveyor belt in a tunnel. This is a good method for soft fruit and prawns (small items).

Credit will be given for diagrammatic representation of the methods.

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<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
Very little understanding of the method.	<b>0 – 1</b>
A reasonable understanding of the method. There may be omissions or some confusion however.	<b>2 – 3</b>
Excellent understanding of the methods. The processes are clearly explained, giving examples. Good use of technical language	<b>4</b>



**25 Frozen ready meals are very popular, in spite of being associated with several health risks. Explain what these risks are and why frozen meals continue to be popular.**

Any well reasoned point will be credited. Answers may include any of the following:

**FOOD HYGIENE and SAFETY**

- People often forget to defrost food properly before cooking and therefore it does not reach 'piping hot' at the core, meaning that bacterial growth could be significant. If pathogenic bacteria are present, this could lead to food poisoning.
- Use of the microwave could be poor, e.g. estimating the time instead of timing the cooking properly, placing on the wrong setting, failing to follow the manufacturer's instructions
- Lack of knowledge of cooking and a general lack of understanding about food hygiene and safety
- Forgetting to read or follow the 'Use by' dates.
- Allowing food purchased to go out of the cold chain, storing it at above safe refrigeration or freezer temperatures (5 degrees or below in a domestic fridge, -18 degrees in a freezer) or failing to refrigerate or freeze it at all.
- Re-freezing a defrosted frozen product, allowing bacteria to multiply

**NUTRITION and HEALTHY EATING**

- Consumption of high levels of salt and sugar through eating too many ready meals.
- Consumption of too much fat
- Consumption of too little NSP
- Consumption of too many food additives
- Forgetting what 'real' fresh food tastes like
- Becoming too lazy to cook from scratch and therefore becoming too reliant upon manufactured food which is unlikely to offer a balanced diet

**CONTINUE to be POPULAR**

- Suit peoples' lifestyle
- Easy to store
- A wide range available
- Cater for special diets
- Portion sizes suitable for one person or more

Credit any relevant point

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
A basic answer which covers only the most obvious points	<b>0 – 2</b>
A good answer which covers several points, which are described well and justified	<b>3 – 5</b>
An excellent answer which is well considered and original, making very good use of language and reasoning	<b>6 – 8</b>

**(10 marks)**

**26 How does current food labelling legislation protect the consumer?**

- The primary aims are to protect the health of consumers and to prevent food fraud.
- The Food Labelling Regulations 1996 require all food to be labelled with the name of the food; a list of ingredients; the approximate durability indication (life); any special storage conditions or conditions of use; the name and address of the manufacturer; places of origin and instructions for use.

-where the labelling of a food places special emphasis on the presence or low content of an ingredient in a food, an indication of the minimum or maximum percentage of that ingredient in the food.

-make special provision for foods that are not pre-packaged, or sold in tiny packages.

- additional labelling requirements for food sold from vending machines and an indication of the strength of alcoholic drinks (% vol.).

- cautionary statements to be given with raw milk, skimmed milk and full fat products.

- additional labelling for food packaged in gas (durability), food containing sweeteners, added sugar.

- prohibit claims that food has tonic or medical properties.

- specific labelling requirements in the giving of nutritional information for a food, whether or not a nutrition claim is also being made.

Candidates may refer to these Acts – credit if relevance to question made clear.

- The Food Safety Act 1990: This is the most significant Act which intends to ensure that food should be in as wholesome condition as possible when it is eaten. The Act prescribes legally enforceable standards of composition and treatment and renders infringement a criminal offence. The Act prevents the addition to food of any substance that would make it '*injurious to health*'.
- The Food Safety (General Food Hygiene) Regulations 1995 aim to ensure that the same food hygiene rules are enforced in all European countries.
- The Weights and Measures Act 1985 relates to short weight.

<b>Criteria for Marks Awarded</b>	<b>Mark Range</b>
Little understanding of how legislation protects the consumer.	<b>0 – 2</b>
A reasonable attempt to describe how legislation protects the consumer.	<b>3 – 4</b>
An excellent explanation with accurate details, written fluently.	<b>5 – 6</b>

**(6 marks)**