Understanding the functional properties of food...
You should know and be able to describe the following, including examples of products the use them:

- **Gelatinisation**: heated starch granules absorb liquid and swell, then burst to thicken a liquid e.g. white sauce
- **Shortening**: when fat coats the flour particles preventing the absorption of water resulting in a crumbly texture e.g. shortcrust pastry
- **Aeration**: when air is trapped in a mixture e.g. whisking egg whites for meringues
- **Emulsification**: when two liquids are combined that would usually not mix with the aid of an emulsification agent e.g. lecithin in egg yolk holds mayonnaise together
- **Coagulation**: when eggs are heated they change colour and become firm set as the proteins become solid e.g. the filling of a quiche
- **Flavouring**: can be artificial or natural
- **Colouring**: can be artificial or natural
- **Fermentation**: when yeast produces carbon dioxide e.g. bread making process
- **Binding**: sticking ingredients together e.g. adding an egg to raw mince to form burgers
- **Bulking**: adding bulk to a product
- **Enrobing**: coating and surrounding a product with another ingredient e.g. breadcrumbs on fish fingers
- **Enriching**: adding depth to a dish e.g. adding egg yolk to a sauce
- **Finishing techniques**: techniques that allow you to complete the presentation of a food product to a high standard e.g. adding garnishes
- **Glazing**: adding a glaze e.g. egg wash or milk to a baked product to add shine
- **Sealing**: browning the outside of meat to preserve flavour and moisture and add colour e.g. browning meat for a stew
- **Shaping**: forming food products into shapes by hand or by the use of cutters e.g. shaping fishcakes
- **Tenderizing**: break down or soften the connective tissue in meat by marinating in acid e.g. lemon juice or vinegar, mechanically using a mallet or by chopping, or cooking in a slow and moist manner e.g. stewing
Understanding the nutritional properties of food...

- **Protein**: made of small units called amino acids that are linked together in a chain. Needed for growth and repair of the body and are a secondary source of energy. Sources= meat, fish, milk, eggs, cheese, lentils, soya, nuts, wheat, beans and pulses

- **Fats**: needed for protection and insulation in the body, and also give the body some energy. Sources= butter, cheese, oily fish, meat

- **Carbohydrates**: give the body energy, can be starch or sugars. Sources= sugar, honey, jam, potatoes, pasta, rice

- **Vit A**: helps in eyes see in dim light, help healthy skin and tissue. Sources= liver, eggs, butter, soft spreads, orange and yellow vegetables and fruit e.g. carrots and apricots

- **Vit B**: needed for the transfer and release of energy and the formation of red blood cells. Sources= cereals, meat, fish, eggs, dairy products, pulses, yeast products

- **Vit C**: healthy skin, helps the body heal faster and helps resist infection, needed for the absorption of iron. Sources= fruit and vegetables e.g. oranges, lemons and blackcurrants

- **Vit D**: growth and maintenance of strong bones, absorption of calcium. Sources= made by the body when skin is exposed to sunlight, oily fish and eggs

- **Calcium**: keeps bones and teeth strong, healthy muscles and nerves. Sources= dairy foods, white bread, canned fish, green leafy vegetables

- **Iron**: formation of red blood cells that transport oxygen around the body. Sources= red meat, dark leafy vegetables, eggs, chocolate, dried fruit, wholegrain cereals

- **Five a day**: people that eat five a day may have lower risk of ill health e.g. obesity, strokes, high blood pressure, coronary heart disease, cancers, tooth decay, diabetes type 2

- **Eatwell plate**: healthy eating model for the UK. Made up of five different groups and shows the balance and variety of foods we should include in our diet

- **High fibre**: Non starch polysaccharide (NSP) is the part of the food that we can’t digest in the body. Helps the bowels move regularly, which reduces constipation and other digestive problems

- **Deficiency**: having too little of a nutrient

- **Excess**: having too much of a nutrient

- **Vegetarian**: do not eat meat or fish. Obtain protein from dairy, nuts and pulses. Lacto- no meat, fish, poultry, eggs. Lacto-ovo- no meat, fish, poultry. Vegan- no animal products at all.
• **Diabetes**: diabetics need a healthy diet and have to control sugar intake. Develops when the body cannot use glucose properly.

• **Coeliac disease**: intolerance to the protein gluten, which is found in wheat, barley and rye. Gluten free foods are available.

• **Calorie Controlled diet**: general guidelines are for people to eat more starchy foods and cut down on fat and high sugar foods.

• **Nut allergies**: increasing number of people suffer from this condition.

• **Lactose Intolerance**: people who are lactose intolerant cannot digest the milk sugar, lactose. Cow’s milk must be avoided.

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*The effects of combining different ingredients and the interaction of foods during the preparation and cooking…*

• **Solutions**: when a solid dissolves in a liquid e.g. salt in water

• **Suspensions**: a solid held in a liquid e.g. flour in milk in a white sauce, custard

• **Emulsions**: oily and watery liquids mixed together e.g. oil and vinegar to make mayonnaise

• **Gels**: a liquid held in a solid network e.g. jam or jelly

• **Foams**: bubbles of gas trapped in a liquid e.g. whisked egg whites or cream
The importance of appropriate proportions on the structure, shape and volume of mixtures...

- **Accurate measuring**: essential to ensure the success of products
- **Making and shaping to designated criteria to achieve acceptable outcomes**: in product development criteria will be set to ensure the consistency of a finished product: e.g. weight tolerances, cutters, shapers etc.

<table>
<thead>
<tr>
<th>Product</th>
<th>Fault</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread</td>
<td>Not risen, heavy and closed texture</td>
<td>Wrong flour, too much salt, yeast killed, too little kneading</td>
</tr>
<tr>
<td>Bread</td>
<td>Uneven texture with large holes</td>
<td>Dough not knocked back, uncovered during rising</td>
</tr>
<tr>
<td>Bread</td>
<td>Collapses when put in oven</td>
<td>Over-proving</td>
</tr>
<tr>
<td>Bread</td>
<td>Crust breaks away from loaf</td>
<td>Under proving, oven to hot</td>
</tr>
<tr>
<td>Sauce</td>
<td>Too thick</td>
<td>Inaccurate weighing of thickening agent or liquid</td>
</tr>
<tr>
<td>Sauce</td>
<td>Lumpy</td>
<td>Insufficient agitation, liquid added to quickly to a roux, heated too quickly</td>
</tr>
<tr>
<td>Sauce</td>
<td>Poor colour</td>
<td>Burnt at bottom of pan, metal spoon used in metal pan</td>
</tr>
<tr>
<td>Sauce</td>
<td>Bland/poor flavour</td>
<td>Insufficient flavouring, mild cheese used</td>
</tr>
<tr>
<td>Shortcrust pastry</td>
<td>Hard and tough texture</td>
<td>Over kneading, incorrect proportions, oven temp too low</td>
</tr>
<tr>
<td>Shortcrust pastry</td>
<td>Blistered</td>
<td>Oven too hot, fat not mixed in, uneven water added</td>
</tr>
<tr>
<td>Shortcrust pastry</td>
<td>Fragile and crumbly</td>
<td>Too much fat, too little water</td>
</tr>
<tr>
<td>Shortcrust pastry</td>
<td>Shrunk during cooking</td>
<td>Over working and kneading</td>
</tr>
<tr>
<td>Rough puff/flaky</td>
<td>Not flaked well</td>
<td>Oven temp too cool, insufficient liquid, folded and rolled unevenly</td>
</tr>
<tr>
<td>Rough puff/flaky</td>
<td>Shrinkage</td>
<td>Not relaxed after rolling</td>
</tr>
<tr>
<td>Cake</td>
<td>Peaked and cracked top</td>
<td>Oven to hot, to much mix for tin, over mixing</td>
</tr>
<tr>
<td>Cake</td>
<td>Problem</td>
<td>Cause</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cake</td>
<td>Cake sinks</td>
<td>Too much sugar, too much raising agent, undercooking</td>
</tr>
<tr>
<td>Cake</td>
<td>Sugary, speckled crust</td>
<td>Too much sugar, wrong type of sugar, insufficient creaming</td>
</tr>
<tr>
<td>Cake</td>
<td>Close, heavy texture</td>
<td>Too much liquid, too little raising agent, curdled, over beating when adding flour</td>
</tr>
<tr>
<td>Cake</td>
<td>Coarse and open texture</td>
<td>Too much raising agent, insufficient mixing of flour</td>
</tr>
<tr>
<td>Cake</td>
<td>Fruit has sunk</td>
<td>Too much liquid to carry weight of fruit, too much sugar and raising agent</td>
</tr>
<tr>
<td>Cake</td>
<td>Very dry</td>
<td>Overcooking, too much raising agent, too little liquid</td>
</tr>
</tbody>
</table>

**The effects of acids and alkalis…**

- **Acids:**
  - Uses of citric acid (lemon juice): prevent enzymic browning when cut fruit is oxidised, set chilled desserts, set jam
  - Uses of acetic acid (vinegar): tenderising meat through marinades giving tough meat a softer texture, added to meringues to give a soft texture to the centre, adds flavour, preserve foods
  - Uses of ascorbic acid (vitamin C): added during commercial bread making process to speed up fermentation process, cheese production to coagulate the milk

- **Alkalis:** used less in food production. Main use is as a raising agent. Bicarbonate of soda produced carbon dioxide when heated e.g. parkin and gingerbread
Understand the use of standard components in food processing...

- **Advantages:** ensure consistency of flavour, texture, weight, shape and colour. Saves preparation time, guaranteed quality, can speed up manufacturing process, less effort and skill required by staff, less machinery and specialised equipment needed, less risk of cross contamination, can be brought in bulk, can save money.

- **Disadvantages:** can be less reliable to be dependant on another manufacturer, can be more expensive than manufacturing yourself, sensory qualities may not be as good, more storage space may be required, time is required for ordering and supplying, quality may not be as you wish.

- **Examples:** pizza bases, ready to roll icing, stock cubes, sauces for pasta, ready made pastry, fruit fillings for pies, marzipan, cake decorations, grated cheese, dried herbs.

Demonstrate competence in a range of practical food skills/methods/processes to produce quality outcomes...

Over the last two years you have completed a wide variety of practical lessons, and have demonstrated a wide and varied number of skills. Make sure that you know how to safely and successfully produce the following:

- Fruit and vegetable preparation: peeling, slicing, grating, chopping
- Meat: how should it be prepared and cooked?
- Fish: what is the most appropriate way to cook fish?
- Dairy: how can different dairy products be used in dishes?
- Cake and biscuit making: whisking, rubbing-in, melting, creaming
- Sauce making: roux, all-in-one, blended
- Pastry making: shortcrust, rough puff
- Bread making: what is the process?
- Finishing techniques: glazing, icings, coatings, garnishes, piping, caramelisation
Identify and use stages in the development of a food product prototype...

You have all followed this process in the production of your final dish for your coursework. You must be aware of all of the stages of producing a new dish.

- Design briefs
- Research
- Design criteria and specification
- Design Ideas
- Nutritional analysis
- Evaluate, test and refine
- Product specification
- Modification and development
- Investigation into storage methods, cooking methods and ingredients
- Sensory testing
- Manufacturing specification
- Production plan

Labelling, packaging, product information and codes of practice...

- **Legislation that governs the layout and content of food labels**: The Food Labelling Regulations 1996 state the type of information that must be displayed on a product label
- **Labels must include**: the food product name, list of ingredients, weight or volume, instructions for use, storage instructions, use by or best before date, name and address of manufacturer, place of origin, allergy information. Can also include: nutritional information, specialised product information
• Packaging materials:

<table>
<thead>
<tr>
<th>Type</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal</td>
<td>Strong, used in different thicknesses, can be moulded, lightweight, impermeable to contamination, recyclable, preserves food, can be heat treated</td>
<td>Can react to some foods so some cans need non-metallic lining</td>
</tr>
<tr>
<td>Glass</td>
<td>Mouldable, rigid, transparent, recyclable, resistant to high temperatures, impermeable to contamination</td>
<td>Fragile and easily broken, heavy</td>
</tr>
<tr>
<td>Card and paperboard</td>
<td>Can be printed on easily, various thicknesses, moulded and folded, laminated or coated, lightweight, cheap, recyclable</td>
<td>Can be squashed and the contents damaged, not water resistant</td>
</tr>
<tr>
<td>Plastics</td>
<td>Can be moulded into a range of shapes, lightweight, impermeable to contamination, cheap, can be easily printed on, water resistant, can be rigid or flexible</td>
<td>Some can’t be recycled</td>
</tr>
</tbody>
</table>

Thermoplastics:
• **PP**= **Polypropylene**: used for plastic wrap and containers for ready meals
• **PS**= **expanded polystyrene**: used for trays and containers. The polystyrene is expanded and shaped. It is a poor conductor of heat and often used for takeaway products
• **PET**= **polyester**: used as a film to cover the top of moulded plastic trays that reheat food in the microwave as well as plastic drinks bottles

Vacuum Packaging:
• Has been used for many years
• Food is placed in a plastic packaging and the air around it is then sucked out and the plastic bag is sealed
• Food is now in anaerobic conditions
• Bacon, fish and coffee are most commonly packaged like this

Modified Atmosphere Packaging (MAP):
• Used to extend life of products
• Air in the packaging is replaced with a mixture of oxygen, nitrogen, and carbon dioxide
• Plastic bag or lids is hermetically sealed and then stored in chilled conditions
• Meat, fish, salads, fruit and fresh pasta are packed like this
Social, Economic, cultural and environmental considerations...

- **Multi-cultural factors:** the food culture of the UK has been heavily influenced by immigration into the UK, and an increase in foreign travel.
- **Religious and Cultural preferences:** different religions avoid certain foods e.g. pork.
- **Genetically Modified foods:** scientists have altered the genes within the food to give it other characteristics. This can be done by adding or combining genes from one food to another. Can be used to make crops resistant to disease, increase the nutritional quality of a food, increase the quantity of the food grown from the same amount of land and seeds. Needs more research into the long term effects on health.
- **Organic:** foods grown without the use of chemicals, fertilisers or pesticides, contain no artificial additives, can be expensive.
- **Fairtrade:** make sure the workers that produce the foods get a fair price for their goods and have a reasonable standard of living in the developing world.
- **Farm Assured:** produced to meet specific standards for homegrown foods. Must be farmed and packed in the UK and meet strict hygiene, safety and welfare standards at all stages.

The use, need and effect of additives...

- **Preservatives:** a substance that extends the shelf life of a food product. They stop the growth of bacteria, yeasts and moulds by changing the environment inside the food so that the conditions that microorganisms need to grow are not available.
- **Colourings:** added to make foods more attractive and appealing to consumers, can be natural or synthetic.
- **Flavourings:** added to improve the flavour so the foods appeal to the consumers.
- **Emulsifiers:** a substance that stops oil and water from separating.
The impact and effect of using a range of different equipment to produce food items of quality and consistency...

- **Electrical equipment can be used for the following**: weighing, mixing, chopping, slicing, kneading, whisking, liquidising, shredding, beating, freezing
- **Safety**: before plugging in check assembled properly, use away from water source, don’t use with wet hands, ensure correct attachments are being used, make sure lid is closed, make sure product is fully finished before removing the foods
- **Hygiene**: high level of personal hygiene, dismantle each piece and properly clean to avoid cross contamination, store in clean area
- **Types of equipment**:
  - **Electronic scales**: measure accurately to as little as 0.1g, accuracy is vital in product development
  - **Food processors**: range of attachments that enable them to carry out a range of different tasks, allows for a consistent product
  - **Liquidisers and hand held blenders**: allow for a variety of texture to be produced
  - **Bread makers and Ice cream makers**: machine is able to produce a complete product
  - **Tunnel ovens**: a conveyor belt passes through a heated tunnel to cook the product
  - **Depositors**: huge tubes which fill containers such a pastry cases with the exact same amount each time
  - **Mandolin**: used to slice and cut foods evenly every time
  - **Floor standing mixers**: works like a huge food processor and mix large quantities of ingredients consistently
  - **Enrober**: coats a product with another ingredient to give it an outer layer
  - **Microwave ovens, electric griddles and steamers**: can all be used to improve the nutrition and health benefits of a product
Storage of food and food products...

- **Chilling:** does not preserve food but extends the shelf life, little change to taste, texture, flavour and nutritional value, stored between 0-5°C as it prevents the growth of common food poisoning bacteria.

- **Freezing:** preserves food for between one week and one year, most foods can be frozen easily, foods with high water content or colloid structures don’t freeze well, commercial fast freezing (blast, plate or cryogenic) ensures only small ice crystals form that cause no damage to the food structure, involves reducing core temperature from 0 to -18°C in 12 minutes, stops microorganisms from growing- they are dormant not destroyed, domestic freezers= -18°C, commercial freezers= -29°C.

- **Reheating:** ensure foods are fully defrosted, follow instructions, need to be heated above 72°C.

- **Ambient conditions:** room temperature.

- **Monitoring temperatures:** temperature probes= plug in, ensure is clean using antibacterial wipe, check digital reading is set to zero, place into centre, hold in place for 2 minutes, ensure reading is static, remove from food, clean with antibacterial wipe.

- **Hygiene and safety procedures:** wear protective clothing, tie hair back or wear a hairnet, clean hands, cover cuts with blue plasters, finger nails short and scrubbed, remove jewellery, wear disposable gloves, do not chew or smoke near food, do not touch ears, nose or mouth, report any illness, coloured chopping boards, separate storage areas for different ingredients, good facilities for cleaning and waste disposal, equipment and work areas kept in good condition, use methods to prevent insect contamination e.g. fly screens.

- **Physical contamination:** foreign materials can cause injury to the consumer. These could come from metal or plastic from factory machinery, or natural hazards like bones in fish.

- **Chemical contamination:** potentially dangerous chemicals like cleaning fluids or pesticides contaminate food. These could cause severe illness.

- **Biological contamination:** foods become dangerously infected by bacteria which might lead to food poisoning. Symptoms of food poisoning can include diarrhoea, vomiting, headaches and fever.

- **Food poisoning:** occurs if harmful microorganisms contaminate food and are then allowed to grow, bacteria that cause food poisoning are known as pathogenic bacteria, harmful and can cause death, main types are salmonella, campylobacter, staphylococcus aureus.
Manufacturing and large scale production requirements…

- **One-off production:** when one food product is made for the specific needs of a consumer e.g. wedding or celebration cake, requires specialist skills from experienced workers

- **Batch production:** small scale production system making a specific number of the same food product e.g. bread rolls in a bakery, only a small number of people are involved in the food production and they each carry out a specific process

- **Mass production:** used when large numbers of the same food product are required e.g. white sliced loaf, split into single tasks that are linked together on a production line, all or some of the line is automated

- **Continuous flow:** works on the same principle as mass production but always produces the same product all the time usually 24 hours a day, 7 days a week, automated process and computers control the process

- **CAD:** Computer Aided Design, use of computer design programs to produces images or drawings that can be used in the development of food products, can help with product profiles, nutritional modelling, mathematical calculations for scaling up

- **CAM:** Computer Aided Manufacture, used to control and monitor processes during the mass production of food products, used to program the machines to do specific tasks, prevent food spoilage hazards occurring during the production run, monitor the quality of the food product

- **Quality Control checks:** these checks cover a wide range of variables that can happen when a food product is being produced e.g. undercooking, some checks have to be within a tolerance but some need to be exact
Technological Developments...

- **Modified starches**: starch that has been altered to perform additional functions to react to different processes. Used to thicken food when boiling water is added e.g. cup-a-soup, pre-gelatinised starch is used to thicken instant desserts without heat e.g. angel delight
- **Functional foods**: foods where additional ingredients have been added so that the food contributes additional nutrition e.g. multi vitamins added to breakfast cereals
- **Nano foods**: all products are made from atoms which are measured in nanometers, properties of foods depend on how the atoms are arranged, very new technology, great concerns about the side effects on our health from processing foods

Don’t forget that this is only SECTION B of the exam-
SECTION A will be related to the prep sheet you receive from your teacher

For extra revision use the following websites:

- [www.bbc.co.uk/schools/gcsebitesize/design/foodtech](http://www.bbc.co.uk/schools/gcsebitesize/design/foodtech) This website allows you to revise the main topics, complete activities and test yourself

- [www.getrevising.co.uk](http://www.getrevising.co.uk) This is a website that allows you to create your revision notes online. You can make revision cards, tests and wordsearches of key words, and can view those resources made by other people. If you are an i-pod addict, you can also download your notes to mp3 files and listen to them on your i-pod!

- [www.s-cool.co.uk/gcse/food-technology](http://www.s-cool.co.uk/gcse/food-technology) Another revision website that you may find useful