



GCE MARKING SCHEME

SUMMER 2016

**DESIGN & TECHNOLOGY
DT1 - FOOD TECHNOLOGY
1111/02**

INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

**GCE DESIGN & TECHNOLOGY
DT1 - FOOD TECHNOLOGY**

SUMMER 2016 MARK SCHEME

- 1. Describe and explain how modified starches are used in the development of food products. [8]**

Principle to expand Mark scheme.

- Modified starches – salad dressings / instant desserts / fruit pie fillings / pot snacks / cook –chill meals,
Used to provide consistent results such as extended shelf life. Can be modified by heating or by the use of chemicals.
- Used to improve mouth feel.
- As fat replacement / prevent 'drip' syneresis.
- Starches that have been altered chemically or physically.
- Granular starches (swell in cold water).
- Oxidized starches produce tough clear films that make products e.g. fish coatings & French fries crispier.
- Stabilise an oil – in water emulsion.
- Also added to some breakfast cereals so they stay crisp after.
- Used as 'dust' to stop sweets sticking.

- 2. Food materials such as egg and sugar have different properties.**

Explain how the properties of these two materials affect the physical and aesthetic characteristics of named food products.

2 x [4]

Properties must be clearly stated and examples given:

Eggs

- Coagulation (examples of any of the following could be givensetting – baked meringue or poached eggs / binding – holding dry ingredients together, e.g. burgers coating and or enrobing – holding a coating in place, e.g. breadcrumbs on fish fingers / thickening – setting a liquid, e.g. quiche / enriching – sauces / glazing egg brushed over pastry, egg coagulates and gives shinny finish).
- Protein stretches to hold air in a structure (whisking air into egg white creates foam - sponge cake / egg white foam is used for meringues).
- Emulsifying agent (stabilises emulsions of oil and water in mayonnaise).

Sugar –

- Preservative- inhibits the growth of micro -organisms e.g. tinned fruit or bottled fruit in sugar syrup.
- Preservative – acts with pectin to form a gel in jams.
- Stabilizer – maintains consistency and texture (chilled and frozen desserts).
- Aeration – together with fat and sugar entraps air to aid the raising and aerating of cakes.
- Caramelisation to produce colour – dependent on sugar used.
- To thicken – produces correct texture in sauces and custards.
- To add texture – helps to soften gluten and prevents the over development of gluten in cakes and pastries.
- To retain moisture- delays products from drying out and becoming stale.
- To sweeten - expand – do not award for just sweeten.
- Consider sugar in icing/decoration.

Relevant food products and full explanation must be given, to gain higher marks.

3. Describe the benefits of high volume production within the food industry. [8]

High volume (mass) production.

Used when large numbers of one product are manufactured, e.g. white sliced loaves digestive biscuits, crisps.

- Manufacturing process is split into tasks and sequenced into an assembly line, conveyor belts move the food product from one stage to the next as it is assembled.
- Specialised equipment use / line operators.
- Quick and efficient - MUST be compared to another manufacturing system.
- Raw materials purchased in bulk – reducing costs.
- Low ratio of workers to number of products being produced.
- Production workers do not have to be skilled.
- Large numbers manufactured at a low unit cost.
- After a large run the production line may be adjusted to make another product
- Less waste.
- Identical appearance (no human error).

Maximum of four marks if candidate merely lists some of the features.

4. (a) Describe the benefits of using CAD (Computer Aided Design) to the food technologist. [4]

(b) Describe the benefits of using CAM (Computer Aided Manufacture) to the food manufacturer. [4]

Benefits of CAD

- Accuracy for the designer when investigating nutritional analysis for a product.
- Gives a professional finish, e.g. graphics / art work on food packaging.
- Allows certain tasks to be completed quickly, e.g. drawing process when producing annotated drawings of food products.
- Colours and effects can be modelled / prototyping.
- Designs can be varied easily or promotional ideas used.
- Designs can be quickly emailed from design stage to manufacturer.
- Enables good communication between designer and client / manufacturer.
- Candidates may explain type of software used.
- Reference to costings (if qualified).

Up to 2 marks for each detailed response:

Benefits of CAM to manufactures

- Saves time – repetitive tasks can be carried out quickly, e.g. cutting several pastry tops at same time / could affect costing.
- Standardises production – accuracy / precision / reduces human error.
- Increases productivity.
- Increases the reliability of finished products – all stages controlled / rejection of products can be automatic.
- Monitors the production system - sensors / Critical control points / colour / pH, etc.
- Reduces storage – just in time system may be used.
- Increases safety – workers do not carry out hazardous tasks.
- High standard of packaging is maintained by cutting packaging nets / printing information on package.
- Data handling using large amounts of information - monitoring of complex production schedules, e.g. stock control / HACCP.

5. Minerals are essential for good health.

Select two different minerals and for each explain:

- (a) **Why it is essential for good health.** **2x[2]**
- (b) **The effect of a deficiency in the diet.** **2x[2]**

Marks awarded for x 2 developed points for (a)
and x 2 developed points for (b)

Candidates should choose two different minerals, e.g. Calcium / Iron / phosphorous / sodium / fluoride.

Calcium

Why it is essential

- Combines with phosphorous to harden bones and teeth (to make calcium phosphate).
- Blood clotting.
- Nerve and muscle function.
- Heart regulation.

Absorption of calcium can be prevented by phytic acid (found in whole grains), by oxalic acid (found in spinach) and by tannins found in tea and coffee.

Absorption of calcium can be helped by a good supply of vitamin C, lactose, and by foods containing protein.

Deficiency

- Stunted growth.
- Can in extreme cases cause rickets (leg bones bend with body weight).
- Osteoporosis / osteomalacia / dental decay.
- Calcium absorption is affected by vitamin D (calcium rich foods need to be consumed with a vitamin D supply).

Iron

Why it is essential

- Production of hemoglobin in red blood cells.
- carries oxygen in the blood.
- Gives blood its red colour.

Deficiency

Anaemia – women and children most at risk

Iron absorption is reduced by the presence of tannins found in tea and coffee and phytates found in unrefined cereals such as bran.

Iron absorption is increased by eating iron rich foods with foods and drinks containing vitamin C.

Sodium

Why is it essential

- Maintains water balance in the body.
- Nerve transmission.

Deficiency

Unlikely in UK (health concerns re; too much salt).

Phosphorous

Why it is essential

- Helps from bones and teeth (with calcium).
- Needed for good muscle function.

Deficiency

- Rare in UK.
- Deficiency increases tiredness and depression.

6. Disassembly is an important aspect of product analysis in food technology.

Discuss the benefits that a food technologist would get from taking an existing food product apart. [8]

Award up to 2 marks for each of 4 developed points.

Product analysis is where food technologists analyse food products in order to understand them and to give them ideas for new products.

By carrying out a disassembly the food designer would benefit by being able to:-

- Read and understand the food label.
- Evaluate attributes such as, its ingredients, its specification – tasting a product / weighing specific component parts.
- Find out how the product is made.
- Look at product quality.
- The environmental impact could be discussed if the candidate states packaging is looked at as part of the disassembly (e.g. biodegradable packaging / packaging material used).
- Investigate the Special claims that are made.
- Look into legal / health and safety issues.
- Ultimately disassembly will enable new products to be designed and for effective production processes to be put in place / ensures products are safe to eat / helps products to be designed that will sell – for designers to design what is needed.
- Main function – does it meet target group requirements.
- Above and below the line criteria when defined and explained.

7. (a) Explain, giving examples, what you understand by standardised food components. [4]
- (b) State two reasons why food manufacturers would use standardised food components. 2 x [2]

- (a) Must define the term 'standard food components' and give detailed examples.

Manufacturers often find it quicker/ cheaper or simpler to 'buy in' ready – prepared ingredients or parts to make their food product rather than to make the product 'from scratch'.

If terms like cheaper/ quicker/ simpler are used they must be qualified.

A standard component is a pre-manufactured or ready-made ingredient, e.g.

- A manufacturer of novelty cakes may buy in marzipan, ready to roll icing and cake decorations from a different supplier.
- A cook chill manufacturer making spaghetti bolognese may purchase 'ready to use grated parmesan cheese' and 'ready chopped' herbs from other suppliers.
- Other examples include – pizza base / meringue nest / sponge flan case / crumble mix / dried cheese sauce / pre-washed and prepared vegetables / ready to serve custard/ tinned tomatoes / thickeners such as cornflour / raising agents, e.g. baking powder / stock e.g. cubes / concentrates, e.g. tomato puree.

- (b) Award 2 x 2 marks for fully developed answers based on the following:

- Saves time - reduces the number of manufacturing processes.
- Saves staff skill, costs and equipment – keeps assembly simple / reduces production costs.
- Consistent results.
- Quality is guaranteed.
- Components from experts who know how to make them.
- May have relatively long shelf life – maintains stock control.
- Saves on relying on several suppliers to provide the separate ingredients.
- Can make food preparation safer because the high risk processes are carried out elsewhere.
- If egg products are cooked elsewhere removes the risk of contamination from raw egg.
- Trialing new product.

8. (a) Describe one experiment or test which could be carried out to investigate how food materials behave and interact. [5]

(b) Explain how this investigation could help you in developing a new food product. [3]

(a) Candidate should provide details of an appropriate experiment showing the ways in which food materials interact. Sketches could be used.

Examples

- Investigating the most suitable ingredients for pastry making / cake making
- Investigating most suitable methods of cooking a particular food material, e.g. to prevent shrinkage of meat.
- Gluten tests / yeast / raising agent comparisons.
- Testing for ingredients used in food preservation, e.g. sugar type in jam making – is there a difference.

(b) 1 x explanation as to how the named experiment could assist in the candidate's knowledge of developing a new product. Example must be realistic and relevant.

Examples will depend on experiment discussed but could include

- Keeping quality of a product (fats).
- Raising agents in bread making or cake making.
- Storage / keeping quality of jams / chutney (dependent on fruit type / vinegar type).
- Most suitable flour type in cake making.
- Carrying out sensory testing.

SECTION B

Section B involves extended written answers in which the mark awarded must take into account the quality of written communication – as indicated to candidates in the rubric on the front of the question paper. This should form an integral part of the judgement on the question, the following criteria being applied in deciding whether the points outlined in the marking scheme are communicated sufficiently clearly to award the full credit:

- Legibility; accuracy of spelling, punctuation and grammar.
- Organisation of information clearly and coherently (appropriate to purpose and to complexity of subject matter); use of specialist terms.

At the same time it should be noted that over-rigidity in interpretation of the mark scheme is not intended, and it is accepted that points may be made in a variety of different ways. Thus, except where terms are specifically requested, correct responses using different words are acceptable providing that points are clearly communicated.

The following levels of achievement grid should be used in conjunction with question specific guidance listed below. In each case you are asked to check the mark you have arrived at against the grid before finalising it.

SECTION B

Answer **one** question from this section.

Your answer should be substantial and show the **depth** of your knowledge in Food Technology.

Each question carries 30 marks.

ESSAY LEVELS:

Level 1 0-10 marks	<ul style="list-style-type: none">• Candidate has a simplistic knowledge of the issues associated with the question.• The use of terminology and technical language is basic.• The candidate has little understanding of the general elements of industrial and commercial practices. Little knowledge of ICT in manufacturing systems.• The candidate has limited knowledge of the form and function of products.• The candidate will express ideas clearly, if not always fluently. Answers may deviate from the question or not be relevant.• Grammar, punctuation and spelling may be weak impacting on effective communication.
Level 2 11-16 marks	<ul style="list-style-type: none">• The candidate has a basic understanding of the issues associated with the question.• The use terminology and technical language is variable.• The candidate understands the general elements of industrial and commercial practices related to manufacturing systems and some aspects of ICT in production.• The candidate has some general knowledge of the form and function of a product, trends and styles of products. Environmental, cultural and/or ethical /moral issues not always considered.• The candidate will express straightforward ideas clearly, if not always fluently. Answers may deviate from the question or be weakly presented.• There may be some errors of grammar, punctuation and spelling but is still able to communicate the issues.
Level 3 17-23 marks	<ul style="list-style-type: none">• The candidate demonstrates a clear understanding of the issues associated with the question.• The use terminology and technical language is reasonably accurate.• The candidate understands the general elements of industrial and commercial practices related to manufacturing systems and is aware of aspects of ICT in production.• The candidate has developed a common knowledge of the form and function of a product, trends and styles of products. Environmental, cultural and/or ethical /moral issues are also considered.• The candidate will express moderately complex ideas clearly and fluently, through well linked sentences and paragraphs. Answers will be generally relevant and structured.• There may be occasional errors of grammar, punctuation and spelling.
Level 4 24-30 marks	<ul style="list-style-type: none">• The candidate demonstrates a specific ability to analyse questions, takes into account of a wide range of factors and has a clear understanding of the issues associated with the question.• Uses correct terminology and technical language.• The candidate understands the main feature of industrial and commercial practices related to manufacturing systems including the use of ICT and stages of production.• Candidate has developed a detailed knowledge of the form and function of a product, trends and styles of products. Environmental, cultural and/or ethical /moral issues are also considered where appropriate.• The candidate will express complex ideas extremely fluently. Sentences and paragraphs will follow on from each other smoothly and logically. Answers will be consistently relevant and structured.• There will be few, if any, errors of grammar, punctuation and spelling.

SECTION B

Answer **one** question from this section.

Your answer should be substantial and show the **depth** of your knowledge in Food Technology.

Each question carries 30 marks.

9. **Food production lines require sufficient materials and components to be available at the right time and place.**

Explain how this can be achieved and discuss the advantages to the food manufacturer.

[30]

Candidates are required to explain how the materials and components are available at the right time and place by developing and discussing the following points:-

Achieved:

Key features of Just in Time (JIT) manufacture - manufacturing according to an agreed plan that is governed by material and resource availability. Features may be descriptions of aspects of production e.g. the prompt delivery of one component determines the success of the production line, and meeting the needs of customers (production schedules / manufacturing time scales and customer deadlines). The relevance and importance of control of stock, and the arrival of materials and components *just in time* need to be fully explored by candidates.

Advantages to the manufacturer:

Food products are not made in advance and put into store when working as part of the just in time system. Food products are made as the order is received. This saves floor space in ambient, chilled or frozen storage facilities. It is used for example in batch production of specialist breads, certain types of potato crisps etc.

Other advantages of this system are

- Less storage space will be needed
- Efficient and faster manufacturing system thereby getting products to the customer / consumer quickly. (Efficiency of manufacturing, production lines and cells)
- Releases capital for use elsewhere,
- No depreciation in material costs,
- Increased profit margins.
- Used for a product or range of products.

Candidates could also discuss

- the ordering systems and how it can benefit the manufacturer by enabling the stock to be available when needed.

Note: responses may not necessarily state the JIT process (or any other related process) in order to access the higher band of marks

10. **A significant percentage of the UK population ignores the health warnings issued regarding the effects of poor diet.**

Discuss, giving clear examples, how food manufacturers have designed their food products to encourage consumers to make healthier choices. [30]

Discussion points could include developed explanations of the use and application of the following points:-

Packaging

- Nutritional labelling using examples (eg Traffic light system).
- Ingredients listed on products.
- Specialist labelling – e.g. made with 100% chicken breast.
- Supermarket healthy options ranges in wide range of products
- Health claims –
e.g. low fat,
high fibre
low sugar
- Specialist foods – weight watchers / energy drinks.
- Special offers.
- Promotional / advertising campaigns –
e.g. logos
5 a day
- Target group information highlighted e.g. suitable for vegetarians.
- Details about storage conditions and shelf life may be considered regarding shopping time.
- Cooking methods e.g. baked crisps rather than fried.
- Serving tips / hints.
- Endorsement by celebrities.

Products

- New 'healthy' products – smoothies
- Use of Smart materials to feign tastes deemed as unhealthy
- Use of stabilizers and emulsifiers (lengthening shelf life of baked products)
- Use of flavour enhancers.
 - Use of sweeteners – (i) intense sweeteners 300x sweeter than sugar used in low-calorie drinks / reduced sugar products / sweetener tablets
(ii) bulk sweeteners used in sugar free confectionary
- Colours – used to make foods more attractive to the consumer.
- Super foods.

11. Understanding and applying food safety practices is vital to the food manufacturer.

Discuss how food manufacturers and food handlers apply safe working practices at all stages of production. [30]

Developed discussion points could include the following:-

- Food safety practice should be explained / the law and expectations.
- Hazard Analysis – definition / explanation of terms.
- Use of HACCP – procedures.
- Use of HACCP – application.
- CCP's – target limits set / tolerances set.
- TQM (total quality management).
- Equipment e.g. use of coloured chopping boards etc.
- Risk assessments.
- Training – understanding e.g. correct personal hygiene practices.
Knowledge e.g. food hygiene certificate.
- Staff involvement – quality assurance staff / engineers/microbiologist / production staff / external HACCP specialist all involved in setting up systems to ensure safe practices are followed and adhered to.
- Monitoring systems that are in place (explanation of how it is implemented).
- Corrective action procedures in place (examples given where relevant).
- Records kept – cleaning schedules / training / temperature logs / maintenance records. Explanation of its relevance and application.
- Role of environmental health officer's in ensuring hygienic practices are carried out / that the food safety act is followed (procedures that are followed, principles that are involved within the role of the EHO).

Examples should be used within the response to exemplify points made.

Some candidates may also use diagrams to support their answers.