A-LEVEL

Design and Technology: Food Technology

Unit 1: Materials, Components and Application - FOOD1
Mark scheme

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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 A

1 **State two functions of protein in the diet.** **[2 marks]**

Functions could include:

- General growth and repair of body tissue, as protein is an essential component of all cells.
- A secondary source of energy, when there is either a lack of carbohydrate or an excess of protein.
- Prevention of extreme conditions such as kwashiorkor/marasmus, generally only seen in LEDCs (less economically developed countries).

1 correct function = 1 mark
2 correct functions = 2 marks

2 **Name two water soluble vitamins.** **[2 marks]**

Answers should include any two of the following:
Vitamin B group - Thiamin, Riboflavin, Niacin, Vitamin $B_{6,}$ Vitamin $B_{12,}$ Folate and Vitamin C.

1 correct vitamin = 1 mark
2 correct vitamins = 2 marks

3 **Name one deficiency disease caused by a lack of iron and give one symptom of this disease.** **[2 marks]**

Deficiency disease: Anaemia (This will probably be the most popular answer but other relevant responses should be credited)

Symptoms could include:
Fatigue, pale skin, inability to concentrate, listlessness, breathlessness, heart palpitations.

Deficiency disease = 1 mark maximum
One symptom of the disease named = 1 mark maximum

4 **Describe two health issues caused by a lack of vitamin A in the diet.** **[2 marks]**

Health issues described could include:

- Poor vision in dim light
- Lack of immunity to infection
- Poor skin quality
- Dry mucus linings in nose

1 correct issue = 1 mark
2 correct issues = 2 marks

5 **State two food sources of zinc in the diet.** **[2 marks]**

Sources could include:

- Beef
- Lamb
- Pork
- Liver
- Salmon
- Chicken
- Turkey
- Shellfish
- Milk
- Eggs
- Cheese
- Bread
- Cereal products e.g. wheat germ

1 correct source = 1 mark
2 correct sources = 2 marks

6 **Which vitamin helps the body to absorb:**

(a) **calcium** **[1 mark]**
(b) **iron** **[1 mark]**

Answers should be:

a) Vitamin D (Student may include the scientific terminology – Cholecalciferol) = 1 mark

b) Vitamin C (Student may include the scientific terminology - Ascorbic

Acid) = 1 mark

7 **Explain the term Body Mass Index (BMI) and give two factors that affect it.** **[4 marks]**

Definition of BMI:
A simple weight to height calculation (weight in kilometres divided by height in metres squared), that is commonly used to classify underweight, overweight and obesity in adults and children over 5.

Factors that affect it could include age, gender, weight, health, activity level.

Mark breakdown:

Explanation of BMI:
A basic understanding of the term BMI showing limited knowledge and possibly confused grasp of BMI = 1 mark

A more detailed and knowledgeable answer showing a more thorough understanding of BMI = 2 marks (maximum)

1 mark for each factor given = 2 x 1 marks (maximum)

8 **Explain, with two examples, the role of antioxidants in food production.** **[4 marks]**

Role of antioxidants:

- Antioxidants prevent fat and fat soluble vitamins from going rancid.
- They also prevent them from changing colour, as the fat combines with oxygen and oxidizes.
- Antioxidants such as ascorbic acid prevent enzymic browning.
- This therefore extends the shelf life of products.
- Marketing device to attract health conscious consumers

Examples could include:
Vitamin C (ascorbic acid/E300) is one of the most widely used antioxidants, Butylated Hydoxyanisole or BHA (E320), Butylated Hydroxytoluene or BHT (E321).

Mark breakdown:

Explanation of role:
A basic understanding of the role of antioxidants showing limited understanding of the role of antioxidants in food production = 1 mark

A more detailed and knowledgeable answer showing a more thorough understanding = 2 marks (maximum)

1 mark for each example given = 2 marks (maximum)

Section B

9 (a) The number of people over 65 years of age in the United Kingdom is growing. **[10 marks]**

Explain the impact this could have on the design of new food products. Give examples to illustrate your answer.

Answers could include the design of:

- Single or small portion sizes.
- Products with softer texture for those with dental problems or false teeth.
- Products that appeal to older adults, that claim to offer incentives such as:
  - lower calorie content
  - lower salt/sugar/fat contents
  - increased non-starch polysaccharide (NSP) content
- Foods that offer a functional element e.g. cholesterol lowering.
- Products that can be frozen and appropriate for later use if regular visits to the shops are problematic.
- Products that are individually wrapped or in resealable packaging.
- 'Long life products' ultra-heat treated (UHT) products, e.g. milk or orange juice for those who may be housebound.
- Processed/economy range food products that are affordable for those on lower incomes, i.e. pensions.
- Products that can be stored effectively if space is a premium.
- Products available online specifically targeting older adults.

Any other justified points and examples will be credited

For the highest marks candidates will link design ideas to examples throughout.

Mark Range 8 - 10	Responses will include a **wide range** of points with full and accurate explanation of each. There are relevant examples to support the knowledge shown.
Mark Range 4 -7	Responses will include a **range** of points with explanations, but perhaps justified superficially. Some food product examples may be given to illustrate points made. Not all may be accurate or relevant.
Mark Range 1 -3	Responses will be superficial with little or no justified points made. Information may be inaccurate. Few or no correct examples given.
Mark Range 0	No points worthy of credit.

9 (b) Describe the different methods of market research that could be used when designing and developing new food products. [10 marks]

Answers are likely to include the following:

- A **review of secondary sources**, background information such as data, media articles
- Lead on to **primary research** which could include:
  - **Shop visits/online analysis** to analyse products currently on the market and consider potential for future products.
  - **Product analysis** - specific products purchased to disassemble and analyse for development
  - **Focus groups, interviews, questionnaires and surveys** used with different consumer groups to identify areas of interest that could show areas for development.
  - **Sensory evaluation/tasting panels** used to trial the organoleptic qualities of different prototypes being designed and developed by food technologist

Any other suitable points will be credited.

For the highest marks candidates will link theory to practice throughout.

Mark Range 8 - 10	Responses will list a **wide range** of methods, with a full description of each.
Mark Range 4 -7	Responses will include **a number** of methods with descriptions, but these may be superficial.
Mark Range 1 -3	Responses will be superficial with few methods mentioned. May not necessarily describe the main issue raised in the question.
Mark Range 0	No points worthy of credit.

10 (a) Explain why cheese could be considered to be a suitable ingredient when producing food products for packed lunches. **[10 marks]**

Answers could include the fact that cheese is a versatile food product and can offer a wide range of opportunities for food product development.

The following may also be referenced:

- Easy to store, prepare and cook with little waste.
- Flavoursome product with wide public appeal.
- Strong versions such as mature Cheddar and Parmesan mean that less can be used so therefore cheaper and lower in saturated fat.
- Can be cut and shaped to the required dimensions; can also be grated.
- Combines well with a range of other foods to offer a range of textures and tastes.
- Suitable for use in a wide range of products designed for lunchboxes e.g. pizza, sandwiches, Paninis, hand held snacks e.g. cheese straws, cubed cheese in salads.
- Safer to use in lunchbox sandwiches than other protein sources such as ham or chicken.
- Suitable for those with different food preferences e.g. lacto vegetarians, vegan versions also available.
- A good source of high biological value (HBV) protein, calcium and fat soluble Vitamins A and D.
- Can be locally sourced.
- Low environmental impact.

Any other justified points will be credited.

For the highest marks candidates will link theory to practice throughout.

Mark Range 8 - 10	A **wide range** of responses will include full and accurate explanations, with specific points raised and fully justified, and reference will be made to packed lunches.
Mark Range 4 -7	A **range** of points will be raised and perhaps justified superficially, with packed lunches referenced in some way.
Mark Range 1 -3	Responses will be limited and superficial with **little or no** justified points raised. May not necessarily explain the main issue raised in the question.
Mark Range 0	No points worthy of credit.

10 (b) Discuss the use of additives when producing food products. Give examples to illustrate your answer. **[10 marks]**

Marks to be given for discussion of the use of additives. Therefore, there are no marks for just listing additives.

Answers are likely to include some of the following:

- **Preservatives** - used to help keep food safe for longer. Any processed food with a long shelf-life is likely to include preservatives, unless another way of keeping it has been used, such as freezing, canning, and drying To stop mould or bacteria growing: dried fruit is often treated with sulphur dioxide (E220) bacon, ham, corned beef and other 'cured' meats are often treated with nitrite and nitrate (E249 to E252) during the curing process. More traditional preservatives such as sugar, salt and vinegar are also still used to preserve some foods.

- **Sweeteners** -Intense sweeteners such as acesulfame-K (E950), aspartame (E951) and saccharin (E954) are very low in calories and are safer for teeth. Bulk sweeteners, such as sorbitol (E420), can be used to replace sugar in products.

- **Flavourings/flavour enhancers** - used to bring out the flavour in a wide range of foods without adding a flavour of their own e.g. monosodium glutamate (E621), known as MSG, is added to processed foods, especially soups, sauces and sausages. Flavour enhancers are also used in a wide range of other foods including savoury snacks, prepared meals and condiments. Salt, although not classed as a food additive, is the most widely used flavour enhancer.

- **Anti-oxidants** - Any food prepared with fats or oils - from meat pies to salad creams - is likely to contain antioxidants. They reduce the chance of oils, fats and fat-soluble vitamins from combining with oxygen and changing colour or going rancid. Antioxidants are also used in a wide range of other foods including bakery products, soup mixes and sauces
  - Vitamin C (ascorbic acid) is one of the most widely used antioxidants
  - Others include butylated hydoxyanisole or BHA (E320) and butylated hydroxytoluene of BHT (E321). In high doses, BHA and BHT may cause cancer in rats; but in low doses, such as those permitted in foods, they appear to protect against cancer

- **Colourings** - enhance and/or replace colour lost during the production process e.g. Tartrazine (E102) used in fruit drinks, mushy peas.

- **Emulsifiers** - help mix ingredients together that would normally separate e.g. oil and water. Natural – lecithin in egg yolk

mayonnaise. Soya lecithin/modified starch – some instant deserts.

- **Stabilizers** - prevent them from separating again. Particularly useful in making low-fat spreads, but they have many other uses in both sweet and savoury foods e.g. locust bean gum (E410) made from carob beans.

- **Fortifiers** - white flour with calcium, iron, vitamins B1 – thiamine and B3, niacin B1, B2 margarines with vitamins A and D. These measures have helped to reduce the burden of many previously common deficiencies such as rickets. Other commonly fortified foods include:
  - Breakfast cereals (B group vitamins and iron), Soya milk (calcium, vitamin D and some also have vitamins A, B2 – riboflavin and iodine added), Infant formula milks and many baby foods.

For the highest marks candidates will link theory to practice throughout.

Mark Range 8 - 10	Responses will discuss a wide range of additives, giving a full explanation of their use in the food industry, and involving a detailed discussion of the points made. Relevant examples are provided to support the knowledge shown.
Mark Range 4 -7	Responses will identify some additives but may not give a full explanation of the reason for the use of each, and may lack discussion of issues raised. Some correct examples may be given to illustrate points made. Not all may be accurate or relevant.
Mark Range 1 -3	Responses will be superficial. A few additives may be mentioned but little or no justified points made. Few or no correct examples may be given to illustrate points made.
Mark Range 0	No points worthy of credit.

Section C

11 (a) Describe how one or more savoury food products based on eggs could be developed to:

- **reduce the salt content** **[5 marks]**
- **improve the texture** **[5 marks]**
- **increase the soluble non-starch polysaccharide (NSP) content** **[5 marks]**
- **improve the folic acid content.** **[5 marks]**

You may use annotated sketches to illustrate your answer.

Suggestions will vary based on the dish (dishes) chosen.

Some candidates may choose to describe one savoury food product, others may describe more than one in their answer.

Reduce the salt content by using:

- products such LoSalt or equivalent low sodium products, instead of cooking salt and stock cubes
- dried or fresh herbs such basil, coriander, rosemary, thyme
- spices such as cayenne pepper, paprika, mixed curry powder
- highly flavoured foods such as spinach, beetroot, fennel

Improve the texture by using:

- a range of different flours e.g. wholemeal, granary, soya, chick pea, potato
- different fats e.g. olive oil, butter
- modifying fillings e.g. with herbs, spices, cheese, fennel, peppers etc. with different fillings relevant to product chosen
- different cooking methods e.g. grilling, frying, roasting, steaming dependent on the chosen range of products

Increase the soluble non-starch polysaccharide (NSP) content by using:

- oats, barley and rye
- lentils, flaxseeds, beans, dried peas, chick peas, golden linseeds
- root vegetables, such as carrots and potatoes
- nuts
- fruit, such as bananas and apples where appropriate

Improve the folic acid content by using:

- green vegetables such as broccoli, spinach, broccoli, asparagus, peas
- pulses such as chickpeas
- cereals such as brown rice

All correct and relevant responses will be credited, depending on the individual / range of products chosen.

Mark range 4-5	4 or 5 **relevant** points made. Alternatively, several points given with good and accurate description showing full understanding.
Mark range 2-3	2 or 3 **relevant** points made. Alternatively, 1 point made with good and accurate description showing full understanding. Not all points may be relevant or accurate.
Mark range 1	1 or more **relevant** points made but may be superficial and lack accuracy and complete understanding.
Mark range 0	No relevant response

11 (b) Explain how Information and Communication Technology (ICT) is used in the development of new food products. **[10 marks]**

Answers will make reference to the essential role of ICT in food production, such as:

Computer Aided Design - access to research from the internet, word processing, spread sheets, nutritional analysis packages, modelling costs, risk assessment, HACCP/QCC charts (not essential for AS but will be credited if given), modelling to alter recipes including scaling up, sensory evaluations, digital photography including Skype links, data logging.

Computer Aided Manufacture – weighing and measuring ingredients, components, prototypes etc. light refractor to identify foreign objects, light detector and viscosity or products, temperature tolerances, control of equipment, packaging.

Reference can be made to the importance of both systems in food product development. Candidates will be credited for identifying the different stages involved in the two systems but also linking to examples in the development of new food products.

Other ICT – Computer modelling – nutrition, costing
Word processing / DTP, spreadsheets, digital photography. Online surveys.

Any justified points will be credited.

For the highest marks candidates will link theory to practice throughout.

Mark Range 8 - 10	Responses will reflect a full explanation of the use of ICT with a wide range of points fully justified.
Mark Range 4 -7	Responses will include an explanation of the use of ICT with a range of justified points some of which may not be fully explained.
Mark Range 1 -3	Responses will be superficial with few or no justified points raised. And the use of ICT not necessarily explained.
Mark Range 0	No points worthy of credit.

11 (c) With reference to a consumer group of your choice, discuss the social and economic factors that influence their food choices. [10 marks]

Answers may include reference to a range of factors which could include the following, but any other correct points will be credited:

Social:

- **Change in family groups** – lone parent, divorced/reconstituted/both parents working and the potential link to an increased consumption of ready meals.
- **Importance of peer groups**/eating out and the influence that brings to food choices and the potential link to fast/takeaway foods
- **The impact of media** and advertising targeting 16-19 year olds perceived as a 'grazing' generation, and the choice of snack/takeaway products as result.
- **The appeal/convenience** of vending machines in schools and colleges.
- **Greater awareness** of the environmental impact/ethics of food production and the potential choice of Fairtrade.
- **Increased interest** in growing own foods and options such as vegetarianism could influence choices.

Economic:

- The impact of the Recession and potential lack of student/parental employment may result in a limited income and the subsequent choice of budget- brand/fast foods and the appeal of an increasing range of 'dining out – staying in' products e.g. dine for 2 for 10 pounds.
- Growing number of people over retirement age, coping on a limited income may also opt for cheaper processed options
- Those with greater disposable income who may choose to eat out more

Mark Range 8 - 10	Responses will include a wide range of social and economic factors which influence the food choices of the chosen group, giving examples as appropriate. Answers will be detailed with no inaccuracies.
Mark Range 4 -7	Responses may include an explanation of some of the social and economic factors that influence the food choices of the chosen group. Information may be superficial in places with occasional inaccuracies
Mark Range 1 -3	Responses will be superficial, with only a few factors explained and may not necessarily explain the main issue raised in the question
Mark Range 0	No points worthy of credit