



2004 Food and Technology GA 3: Written examination

GENERAL COMMENTS

The 2004 examination was designed to assess students' knowledge and understanding of Unit 3, Areas of Study 1 and 2 and Unit 4, Areas of Study 1 and 2. The four examination criteria were drawn from the four Areas of Study. The paper consisted of nine short answer questions that were based on the four criteria.

Areas of strength and weakness

Strengths

- explaining how social factors influence the foods that are eaten
- understanding niche markets and the foods developed for them
- explaining methods used to preserve foods
- explaining labelling requirements and the function of packaging
- demonstrating an understanding of health and safety practices in food production
- demonstrating an understanding of modified food ingredients and their suitability for substitution in place of original ingredients.

Weaknesses

- explaining reasons for primary and secondary processing
- explaining environmental issues that result from primary and secondary processing
- explaining factors that influence the marketing of a product
- defining genetic engineering and irradiation of foods
- explaining the advantages and disadvantages of genetically modified foods
- explaining the advantages and disadvantages of irradiation of foods
- identifying and explaining the use of a tool used to prepare a food containing a modified ingredient
- explaining the role of Food Standards Australia and New Zealand (formerly ANZFA) in relation to food production control
- understanding the Food Standards Code and advantages of food safety regulations
- providing answers that were irrelevant or not directly related to the questions asked.

SPECIFIC INFORMATION

The information below should be read in conjunction with the 2004 Food and Technology examination.

Question 1

1a

Marks	0	1	2	3	4	5	6	Average
%	1	1	6	11	18	19	43	4.8

Students were required to identify one important health and safety practice in each of the following aspects of a small restaurant and describe a consequence of **not** following each practice. Many students did not include a consequence of not following the health and safety practice.

Storage Controls

- Store raw and cooked foods separately, otherwise cross contamination of these foods could occur which may result in food spoilage or food poisoning if consumed.
- Use sealed containers to prevent contamination, otherwise foods could be contaminated by vermin, insects, etc.
- Monitor use by, best by or best before date, otherwise food may not be at its best or freshest and could cause food poisoning.

Food Handling

- Sanitise equipment, premises and work surfaces, otherwise food or equipment could be contaminated.
- Use different coloured chopping boards for different foods (for example, red for meats, green for vegetables) or cross contamination from foods could occur and result in food spoilage or food poisoning.
- Maintain correct temperature control throughout the food preparation activities or food spoilage could occur.
- Hands should be washed, gloves worn, cuts covered and long hair tied back when preparing and handling foods, or contamination of foods could occur.

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Design of Work Areas

- Good lighting is necessary or there is a risk of injury to the workers.
- Good ventilation is important as the health of the workers may be affected.
- Hand washing facilities need to be adequate and suitable (for example, a sensor tap) as contamination of foods and equipment could occur, resulting in food spoilage.
- Garbage disposal systems must be suitable, otherwise pests and vermin may be attracted to the premises and contamination could occur.

1b

Marks	0	1	2	Average
%	35	30	35	1.0

Students were required to describe the main features of the batch production system used in the restaurant. Features include:

- smaller quantities of cakes and biscuits are produced
- high labour costs
- less expensive to set up
- labour intensive
- inconsistent final appearance of the cakes and biscuits
- less technology – little automation is involved in the production
- speciality products
- wider product range
- relies on skilled and knowledgeable staff to check HACCP points during production.

Question 2

Students were required to refer to a picture of Uncle Tobys Oat Temptations, answer questions about a possible niche market and give reasons why the product might appeal to the niche market previously identified.

2a

Marks	0	1	2	3	Average
%	7	5	21	66	2.5

2ai.

Possible niche markets include:

- single, busy people who use microwaves
- people who want a healthy breakfast
- people who want a quick/simple/convenient breakfast
- people who lack food preparation skills.

2aii.

Reasons why the product might appeal to this niche market include:

- the oats are low in fat and high in fibre
- the oats can be cooked in the microwave, which is quick and simple.

Both reasons given needed to be different and linked to the target group identified in part i.

2b

Marks	0	1	2	Average
%	18	27	55	1.4

Using the same product, Oat Temptations, students were asked to suggest considerations or constraints that may have existed in the design brief that the company established. Responses included:

- type of fruit
- portion size/quantity
- cost
- packaging
- ingredients
- methods/equipment used in production
- product suitable to microwave.

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2c

Marks	0	1	2	3	Average
%	8	17	31	44	2.1

2ci.

Students were asked to write two criteria questions that the manufacturer could use to evaluate Oat Temptations. Criteria could have been formulated as follows:

- cost effectiveness – is the product cost effective?
- size – is the portion size suitable for a single serve?
- packaging – is the packaging suitable?
- physical and sensory properties – do the physical and sensory properties (flavour, taste, consistency, mouth feel, fruit content and aroma) appeal to consumers?
- suitability for niche market – does the product meet the needs of and appeal to the niche market?

2cii.

It is important for the manufacturer to undertake this evaluation to ensure that:

- a good quality, marketable product has been produced
- the product meets the needs of the target market
- the product meets the needs of the consumer.

2d

Marks	0	1	Average
%	55	45	0.5

Factors that may influence the marketing of Oat Temptations include:

- cost
- other products on the market
- type of target market
- location of possible sales
- whether the product can be microwaved.

2e

Marks	0	1	2	Average
%	15	20	65	1.5

Marketing strategies that could be used to promote Oat Temptations could include:

- advertise in food magazines
- advertise in other forms of media during optimum times
- billboards at bus stops
- point of sale demonstrations
- sample tastings at supermarkets
- free sample giveaways (for example, in letterboxes)
- competitions offered on packaging or with proof of purchase.

2f

Marks	0	1	2	Average
%	11	26	63	1.5

Factors that may influence the price of the Oat Temptations could include:

- cost of raw ingredients
- cost of production
- set up costs
- cost of packaging
- cost of similar products/competition
- cost of suitable packaging for use in microwaves
- market position – target group.

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2g

Marks	0	1	2	3	4	Average
%	3	7	22	35	33	2.9

2gi.

Social factors that have led to the increased use of microwaves include:

- lifestyle changes
- time available for food preparation
- more women working
- more disposable income
- fewer cooking skills
- independent living
- minimum facilities
- family members eating at different times.

2gii.

Students had to name two health and safety practices to follow when using a microwave. Responses could have included:

- use correct/microwavable cookware
- do not use metal
- the microwave should be in good repair
- follow the manufacturer's instructions
- food should be thoroughly cooked
- use caution when removing food from oven because of possible steam
- cover food correctly
- the oven should be clean
- observe correct safety precautions when using electricity.
- follow the instructions provided on the packet.

Question 3

Students needed to select an ingredient from those listed (eggs, milk, butter or margarine).

3a

Marks	0	1	Average
%	21	79	0.8

Students had to identify a **modified food ingredient** that could be used in place of the selected food.

Suitable answers included:

Original Ingredient	Modified Ingredient
Eggs	Ready eggs, Ready egg whites, Newstart eggs.
Milk	Low fat, no fat, skim milk, etc. Fat removed or adjusted, lactose removed, vitamins and minerals or protein added, UHT milk.
Butter	Low salt, lower animal fat. For example, blends, unsalted, spreadable butter.
Margarine	Low salt, lower levels of saturated fats (for example, Logicol, Flora or Proactive), blends which use canola or olive oils, spreadable.

3b

Marks	0	1	2	Average
%	23	19	58	1.4

The answer needed to refer to **differences** between the two ingredients selected in the previous responses and could have included the following information relevant to the ingredients selected.



Product	Differences in sensory/physical properties from the original ingredient selected	Differences in nutritional/chemical properties from the original ingredient selected
Ready eggs	White and yolk combined, no shell, frozen, slightly thinner when thawed.	Yolk fat removed and replaced with vegetable oil. Skim milk powder added.
Ready egg whites	White only, no shell, frozen.	Vegetable gum and whipping aid added.
Newstart eggs	Similar to regular eggs, have shell and regular structure.	Increased omega-3, five times the amount of fat, and 2.7 times the amount of vitamin E.
Milk: fat reduced	Thinner, different colour (blue grey), less rich, less flavour, feels less oily in mouth, extra ability to foam.	Less fat.
Milk: added vitamins and minerals		Increased amounts of vitamins A and D and minerals.
Milk: added fat	Richer, creamier, yellower in colour.	Extra fat.
Low salt/no salt butters	Not as salty (or no salt), less flavour (bland).	Reduced salt or no salt.
Blends/spreadables	Softer, easier to spread, less butter flavour.	Lower saturated fat, added vegetable oil or water.
Margarine: low salt/low fat/spreadables	Less salty, softer, paler colour, feel smooth in mouth, lighter in texture.	Lower levels of saturated fats. Contain omega-3 fatty acids or added water.

3c

Marks	0	1	2	Average
%	61	14	26	0.7

This question was poorly answered. The answer needed to refer to the modified food selected and identify and explain why the tool is used.

- Ready eggs: an electric beater needs to be used to obtain full volume.
- Milk (low fat): lower fat content in the milk means a non-stick pan needs to be used to prevent sticking and burning.
- Low fat margarine: a non-stick pan prevents sticking and burning, and a pan with high sides will prevent spitting.
- Butter blends and margarines: a wooden spoon can be used for creaming, as the texture is softer.

3d

Marks	0	1	2	3	Average
%	14	11	27	48	2.1

3di.

Students had to define the term 'niche market'. Answers included:

- a specific group of consumers or people who have specific or common needs or wants
- a specific group with a special need within the target market.

3dii.

Students were asked to identify a niche market for their modified food ingredient. This could include:

- health conscious people
- people with high cholesterol
- people who are not very mobile.

3diii.

Students had to explain how the modified food meets the needs of the niche market. Answers could include:

- people may wish to consume less fat or salt in their diet
- Logicol margarine contains plant sterols which help lower a person's absorption of cholesterol
- UHT milks have an extended shelf life until they are opened and can be stored for a long time.

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3e

Marks	0	1	2	3	Average
%	17	15	31	37	1.9

3ei.

The food chosen must have been appropriate and possible to produce using the identified modified food ingredient. For example, cakes, batters, biscuits, pastries, quiches and ice creams.

3eii.

Explanations as to why the modified food ingredient is a suitable substitute should have related/linked to information given in the table above (Question 3b) and could have included that there is no change to the overall sensory properties of the food product.

Question 4

Marks	0	1	2	3	4	Average
%	11	16	30	19	24	2.3

Responses needed to explain the **role** of the food component in food preparation and include an example. The following could have been included.

Acids

- tenderise and marinate connective tissue in meats and poultry
- assist in the setting of jams
- prevent browning of fruits
- inhibit growth of moulds; for example, in cheese making
- acids such as vinegar are used as preservatives (for example, pickled onions)
- food acids added to processed foods act as a stabiliser or firming agent; for example, jellies.

Alkalis

- bicarbonate of soda – a chemical raising agent that releases carbon dioxide on heating. Used in cakes and muffins.

Sugars

- crystallisation – confectionary
- sweetening – drinks and desserts
- cratersation – toffee
- preservative – jams and butters
- stabiliser – meringues
- activator – yeast products
- colour – Milliard reaction (brown crust on breads and cakes)
- aeration – creaming method (cakes)
- tenderising – cakes
- hygroscopic – moisture retention (soft biscuits)
- flavour – sugar in coffee.

Starches

- thickening agent – gelatinisation in sauces, fillings for meat and fruit pies
- colour – dextrinisation, toast
- texture – gravies and sauces
- volume and structure – breads, desserts, biscuits, cakes, extruded snacks, pasta
- binding qualities – meat loaves, smoked meats.

Fats and oils

- emulsification – dispersion of fats or oils in a liquid (mayonnaise)
- hydrogenation – the hardening of oils to produce a spreadable margarine
- shortening effect – gives tenderness or short texture to biscuits
- flavour and density – layer around steaks.

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Question 5

Students needed to refer to the pictured biscuit wrapper for all parts of this question.

5a

Marks	0	1	2	3	4	5	6	Average
%	1	2	4	10	18	24	41	4.8

5ai.

Responses had to identify four of the following labelling requirements:

- name of food
- name and address of manufacturer
- country of origin
- weight and measurement of contents
- ingredient list
- additives
- allergy warning statements regarding certain ingredients; for example, traces of nuts
- use by or best before date
- packaging premises
- job lot/bar code
- nutritional panel
- nutrition information if certain nutrition claims are made for the food
- percentage of ingredients.

5aii.

Functions of the packaging of the biscuits include:

- containment – holds food in packet so that food can be moved from place to place
- communication – informs consumers about packet contents; for example, nutrient content, portion size, serving suggestions, advertising
- convenience – for transporting, stacking, ease of opening, portion size to suit need of consumers
- preservation – reduces the rate of spoilage
- protection – from breakage, dust, dirt, etc.

5b

Marks	0	1	2	Average
%	23	29	49	1.3

Students needed to summarise the main features of continuous processing and could have included the following points in their responses:

- processes 24 hours a day, seven days a week
- quick and efficient
- high level of technology/use of computers/highly automated
- large quantity of product
- expensive to set up
- low running costs
- less labour intensive
- uniform quality of product
- quick and efficient
- automated checking of critical control points.

5c

Marks	0	1	2	Average
%	11	26	63	1.5

5ci.

The type of product development is 'me too' or 'direct copy'.

5cii.

Reasons for developing the product include:

- to gain a share of the market and increase company profits

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- cost of making is less; for example, no research is required as a similar product is already successful
- the target market is already established.

5d

Marks	0	1	2	Average
%	8	23	69	1.6

This question asked students to name and explain the reason for another type of product development.

5di.

The type of product development is 'line extension'.

5dii.

Reasons for developing the product include:

- to increase market share
- to keep current market share by offering variety
- to keep up to date with competition.

Question 6a

Marks	0	1	2	3	4	5	6	Average
%	20	10	14	15	15	13	13	2.9

This question, which asked students to define genetic engineering and describe two advantages and two disadvantages, was poorly answered. Students needed to **explain** the advantages and disadvantages, not just give key words. The answers given were often not relevant to genetically modified foods.

6ai.

Genetic engineering involves splicing the gene from one plant or animal onto a gene from another in order to improve its characteristics.

6aii.

Students provided a variety of responses, some of which related to a consumer or producer's point of view, of the advantages and disadvantages of genetic engineering.

	Advantages of genetically modified foods	Disadvantages of genetically modified foods
consumers	<ul style="list-style-type: none"> • increased nutritional value • longer shelf life • improved sensory properties (looks and tastes better). 	<ul style="list-style-type: none"> • may reduce effectiveness of antibiotics • may cause new allergies • possible unknown effects of use.
producers	<ul style="list-style-type: none"> • less wastage • increased yield • designed for a specific environment (for example, drought conditions) • specialised pesticides. 	<ul style="list-style-type: none"> • farmers pay more for seed • seed is sterile, there is no germination, 'terminator technology' prevents traditional use of seed • cross contamination of crops is no assurance of 'clean and green'.

6b

Marks	0	1	2	3	4	5	6	Average
%	37	9	9	11	11	11	12	2.3

This question was very poorly answered, and responses were often not related to food irradiation. Students needed to define irradiation and describe two advantages and two disadvantages.

6bi.

Irradiated food has been exposed to radiation (ionising energy) that penetrates food and can kill bacteria, moulds and insects.

6bii.

Students provided a variety of responses, some of which related to a consumer or producer's point of view, of the advantages and disadvantages of food irradiation.

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	Advantages of irradiation	Disadvantages of irradiation
Consumers	<ul style="list-style-type: none"> less wastage longer shelf life more choice of foods for remote communities food poisoning is unlikely wider food choice. 	<ul style="list-style-type: none"> some vitamins are destroyed. can affect flavour and texture long-term effects of consumption are unknown.
Producers	<ul style="list-style-type: none"> less waste because of spoilage increased profit can be done after packaging, so less chance of recontamination fewer chemicals are needed during production. 	<ul style="list-style-type: none"> safety hazards expensive process not all consumers will purchase these foods producers may have a false sense of security about food hygiene standards.

Question 7a

Marks	0	1	2	3	4	5	6	7	8	9	Average
%	11	1	2	3	3	5	9	13	20	31	6.5

This question required information about key food commodities. Responses could have included the following information, but students needed to carry the selected examples consistently through the answer.

Key Food Commodity	Fruit and Vegetables	Milk	Meat
Origin of the key food commodity	Plant, seed, trees	Animal, cow, goat	Animal, poultry, game, fish
Example of a food that results from the primary processing of the key food commodity	Any fresh fruit or vegetable; for example, apples or tomatoes	Pasteurised or homogenised milks, reduced fat, fat modified	Any cut of fresh meat, fish or poultry
Example of a food that results from the secondary processing of the key food commodity	Canned apples, tomato sauce, apple pie	Milk changed to milk products: cheese, yoghurt, cream, butter, UHT, flavoured milks	Bacon, meat pies, smoked chicken, smoked kangaroo

Question 7b

Marks	0	1	2	Average
%	22	31	48	1.3

7bi.

Reasons for the primary processing of food include:

- cleaning, so that food is safe and hygienic
- sorting
- grading
- packaging, to assist transport
- distribution.

7bii.

Reasons for the secondary processing of food include:

- convenience
- increased variety of foods
- may increase appeal to consumers
- reduces meal preparation time – home meal replacements
- food spoilage is reduced or prevented.

7c

Marks	0	1	2	3	4	Average
%	34	13	19	13	21	1.8

7ci.

Environmental issues that result from the primary processing of food include:

- use of water and energy to clean foods

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- use of energy in refrigeration
- disposal of by-products
- use of packaging for sorting, storing and transporting
- use of energy for transporting
- water pollution from run offs when washing.

7cii.

Environmental issues that result from the secondary processing of food include:

- use of energy in refrigeration of foods
- use of energy from processing foods; for example, when cooking
- use of energy from packaging, labelling and transporting
- air emissions during processing
- excess packaging, non-biodegradable packaging, non-recyclable packaging
- creation of landfill and disposal of waste products.

7d

Marks	0	1	2	3	4	Average
%	31	14	23	11	21	1.8

Health and safety issues associated with primary and/or secondary processing of foods include:

- hygiene of handler
- hygiene of workplace
- removal of waste
- recognition and implementation of HACCP principles
- cross contamination
- safe storage of foods
- safe use of equipment
- adequate ventilation
- adequate lighting
- worker health and safety
- safe work habits.

Question 8

8a

Marks	0	1	Average
%	11	89	0.9

Students were required to select a processing technique used commercially to preserve food, either from the list provided or one they nominated themselves. They then had to identify a food that is commercially preserved using the technique selected.

8b

Marks	0	1	2	Average
%	30	35	35	1.1

The following are examples of some acceptable responses.

Technique/food	Explanation
Heating: meat, poultry, UHT milks	Food is cooked and made safe by destroying harmful microorganisms, which extends the shelf life of the food.
Freezing: vegetables, bread	Food is stored at temperatures below -18°C, which inhibits the growth of microorganisms. Food should be frozen quickly to ensure minimal damage from crystal formation.
Dehydration: fruit, herbs	Warm air or the sun is used to remove moisture from the food. Water content is reduced to between five and 25 per cent so that bacteria cannot survive.

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Control of gaseous environment: stone fruit, tomatoes, salad mix, cheeses	Bottling. Food is heated in a container, which kills microorganisms and creates a vacuum that seals the bottle. Food is in a sterile, controlled environment. MAP packaging (modified atmosphere packaging) changes or modifies the atmosphere or gas inside the package and reduces microbial activity, preserves the colour, stops browning, retains moisture and extends shelf life.
Refrigeration: milk, raw foods	Foods stored between 4°C and 8°C, which retards the deterioration of food and slows down the growth of microorganisms.
Addition of salt: bacon, olives	Salt dissolves in the moisture that it draws from the food and raises the salinity level, making it unsuitable for microorganisms to grow.
Addition of sugar: jams, glace fruits	High concentrations of sugar inhibit the growth of microorganisms. Similar effect to salt.
Addition of acidic ingredients: pickled onions, chutneys	High levels of acid prevent the growth of microorganisms. Natural liquids are replaced with acetic acids; for example, vinegar.
Preservatives: meats, apples	Food additives are chemicals that are safe and added to food to inhibit the growth of microorganisms.
Smoking: fish, meat	Foods are dried to prevent bacteria from growing, some chemicals in the smoke act as a preservative.

8c

Marks	0	1	2	Average
%	27	28	45	1.2

Students had to compare the differences in physical, chemical or sensory properties of the processed food compared to the food before it was processed.

Food	Preservation Method	Physical Before	Physical After	Chemical Before	Chemical After	Sensory Before	Sensory After
Meat, poultry	Heating	Tough	Tenderised – easier to chew, smaller in size	Protein, carbohydrates, fat, vitamins and minerals	Protein coagulated, connective tissue converted to gelatine	Colour – red	Colour – brown
Vegetables: tomatoes	Dehydration	Firm to touch, juicy, round shape	Smaller in size, shrivelled up		Less water	Bright red colour	Deeper red colour
Pasta	MAP packaging	Shaped, soft, raw, ready to cook	same	Carbohydrates, fats, protein, salt	same	same	same
Fruits	Bottling	Shape, firm to touch, colour	Shape similar, softened texture	Cellulose, vitamins	Cellulose softened, water soluble vitamins lost	Colour, fresh fruit smell	Colour may deepen, aroma gone
Yeast bread	Freezing	Crust, soft centre, shape	Hard, shape same, could be drier	Carbohydrates, fat, gluten	same	Brown, yeast smell	Brown, smell gone

8d

Marks	0	1	2	3	4	Average
%	12	14	28	15	31	2.4

Students' responses needed to both identify and explain two advantages to the consumer and/or manufacturer of using the processing technique identified in part a to preserve the fresh food. Responses could include:

- choice of foods all year around
- easier to transport
- increased shelf life
- save on preparation time

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- wider variety
- enhanced flavour
- broader market.

Question 9

Students' responses to this question required an understanding of the role of Food Standards Australia New Zealand (FSANZ) and the Food Standards Code. Overall the responses were very poor, and students did not seem to realise that FSANZ does not police the Code.

9a

Marks	0	1	2	Average
%	62	26	13	0.5

The Food Standards Code regulates:

- correct labelling for specific food products; for example, types of fats and sugars
- nutritive value
- ways to measure quantitative qualities of food; for example, fibre level and vitamin content
- labelling of genetically modified foods
- permitted ingredients/additives – standard of composition
- permitted and required microorganism levels
- correct information on food label.

9b

Marks	0	1	2	3	4	Average
%	19	24	29	17	11	1.8

9bi.

Advantages of food safety regulations for consumers include:

- they allow consumers to make informed choices
- the use by date ensures consumption when food is safe/best
- they inform consumers of additives/ingredients that may endanger their health
- removal from shelves, through recalls, of foods that may be unsafe/contaminated.

9bii.

Advantages of food safety regulations for manufacturers include:

- imported foods are consistent with requirements in Australia
- all foods are required to undergo the same food safety regulations
- specific guidelines for manufacturers ensure correct food specifications as prescribed within the Food Standards Code; for example, the required percentage of milk fat in ice cream.

9c

Marks	0	1	2	Average
%	58	18	24	0.7

Other roles of FSANZ in food production control could include:

- promoting fair trading in food
- promoting trade and commerce
- conducting research in matters that may be included in a food standard
- developing codes of practice for industry on any matter that may be included in a standard; for example, safe procedures in food manufacturing plants
- developing national food hygiene standards for Australia
- coordinating food surveillance
- coordinating food recalls
- assessing policies about imported and exported foods
- protecting public health and safety
- providing information for consumers to enable informed choice.