



**2005 Food and Technology GA 3: Written examination**

**GENERAL COMMENTS**

The 2005 Food and Technology 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 examination criteria were drawn from the four areas of study. The paper consisted of seven short-answer questions which were based on the four criteria.

**Areas of strength and weakness**

**Strengths**

- explaining how social factors influence the foods that are eaten
- understanding target and/or niche markets and the foods developed for them
- explaining the role of technology in the development of modified products
- understanding the requirements of labelling
- explaining the function and importance of packaging to the consumer
- demonstrating an understanding of health and safety practices in food production
- demonstrating an understanding of the reasons for modifying food products and the resulting foods

**Weaknesses**

- explaining key food commodities and their role in primary and secondary processing
- understanding and explaining how Modified Atmosphere Packaging or Aseptic Packaging can extend shelf life and why they are appropriate techniques
- explaining the advantages and disadvantages of genetically modified foods
- explaining how methods of food preservation prevent deterioration
- explaining the advantages and disadvantages of irradiation of foods for consumers and/or food producers
- providing definitions of genetic modification and irradiation of foods
- explaining the role of Food Standards Australia and New Zealand (formerly ANZFA) in the food industry
- understanding aspects related to food safety regulated by the Food Standards Code
- recognising natural food components and their functions in food production
- understanding terms used in the study; for example, 'strategies', 'product development' and 'functions'
- an inability to provide answers that were relevant and directly related to the questions asked

**SPECIFIC INFORMATION**

The information below should be read in conjunction with the 2005 Food and Technology examination.

**Question 1**

Students were given a recipe for chocolate cake and were required to nominate three ingredients from the recipe that contain the natural food components fats and oils, alkalis and starch and give a function of the ingredient in the cake. Many students did not match the ingredient with the correct natural food component.

**Question 1a.**

Marks	0	1	2	3	4	5	6	Average
%	6	10	15	15	20	16	17	3.5

Natural food component	Ingredients containing the natural food component	Function of the ingredient in the cake
<b>Fats and oils</b>	<ul style="list-style-type: none"> <li>• butter</li> <li>• egg yolk</li> </ul>	<ul style="list-style-type: none"> <li>• provides smooth mouth feel and flavour</li> <li>• prevents the development of gluten</li> <li>• ensures tenderness</li> <li>• used in the creaming process, allows incorporation of air into mixture</li> </ul>
<b>Alkalis</b>	<ul style="list-style-type: none"> <li>• bicarbonate of soda</li> </ul>	<ul style="list-style-type: none"> <li>• acts as a raising agent, as it produces carbon dioxide</li> </ul>
<b>Starch</b>	<ul style="list-style-type: none"> <li>• flour</li> </ul>	<ul style="list-style-type: none"> <li>• aids the structure of the cake by adding to the volume, height and density/bulk</li> <li>• aids dextrinisation/browning of crust of cake</li> </ul>

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## Question 1b.

Marks	0	1	2	Average
%	59	19	22	<b>0.6</b>

Functions of sugar in the chocolate cake (other than flavouring) include:

- tenderising – lessens the uptake of water by the flour, which reduces gluten development and results in a more tender cake
- aeration – allows air to be incorporated during creaming
- moisture retention – helps retain moisture due to hygroscopic property
- colour – when combined, sugar and protein undergo the Maillard reaction when heat is applied, which results in a brown crust on the cake
- stabiliser – if egg whites are whipped in the recipe the sugar will act to stabilise the egg white foam
- preservative – creates an environment that is unsuitable for bacterial growth.

This question was poorly answered.

## Question 1c.

Marks	0	1	2	3	Average
%	36	12	18	34	<b>1.5</b>

Students were required to select an ingredient from the chocolate cake that could be replaced by a modified food product/ingredient and describe a property (physical, sensory, and/or chemical) that may be different in the cake when compared to the original cake.

Original ingredient	i. Modified ingredient	ii. Difference in cake properties
eggs	<ul style="list-style-type: none"> <li>• ready eggs</li> <li>• newstart eggs</li> </ul>	<ul style="list-style-type: none"> <li>• lower saturated fat</li> <li>• increased omega-3 and vitamin E</li> </ul>
milk	<ul style="list-style-type: none"> <li>• low-fat milk</li> <li>• skim milk</li> <li>• no-fat milk</li> <li>• added vitamins</li> <li>• UHT milk</li> </ul>	<ul style="list-style-type: none"> <li>• lower in fat</li> <li>• lower in saturated fat</li> <li>• higher levels of vitamins and minerals; for example, calcium, vitamin D and vitamin A</li> <li>• slight change in flavour</li> </ul>
butter	<ul style="list-style-type: none"> <li>• low salt</li> <li>• lower levels saturated fat</li> </ul>	<ul style="list-style-type: none"> <li>• lower in salt content</li> <li>• lower fat content – more crumbly, lighter in colour, less tender, not as smooth in mouth</li> </ul>

## Question 1d.

Marks	0	1	2	3	Average
%	28	15	28	29	<b>1.6</b>

### 1di.

The food production system that the Delights coffee shop uses to produce the chocolate cakes is the batch system.

### 1dii.

Two differences that could be expected of cakes made using this system and cakes made by a large commercial manufacturer include:

- high quality finish
- variation in characteristics – inconsistent appearance/each one is unique
- smaller quantity
- higher cost
- fresher product as cakes may be made every day.

No marks were awarded for part ii. if the answer for part i. was incorrect.

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The following is an example of a good response.

*Commercially produced cakes would have a uniform quality and appearance, whereas cakes produced using batch production would vary in quality and appearance. Commercially produced cakes would be made in larger quantities than those produced by batch production.*

### Question 2a.

Marks	0	1	2	Average
%	16	26	57	1.4

Students were required to select one factor from the range of factors named (social pressures, changes in technology, consumer demands and industry economics) and discuss how it may have influenced the development of the omega-3 muffin.

Suitable responses could have included the following.

Social pressures	Changes in technology	Consumer demands	Industry economics
<ul style="list-style-type: none"> <li>convenience of enriched products</li> <li>parents' desire to provide children with healthier foods</li> <li>greater nutrient intake for those with fussy tastes</li> <li>desire for food with health benefits</li> </ul>	<ul style="list-style-type: none"> <li>ability to enrich foods</li> <li>ability to copy natural food components with synthetic ones</li> </ul>	<ul style="list-style-type: none"> <li>brand loyalty</li> <li>customers' desire for more variety and choice</li> </ul>	<ul style="list-style-type: none"> <li>to make more profit</li> <li>to meet the needs of niche/target markets</li> <li>to gain a larger share of the market</li> <li>developing new products to keep up with competitors</li> </ul>

The following is an example of a good response on consumer demands.

*Consumers are becoming more and more health conscious and more aware of the foods they are eating and what they contain. They want a healthier alternative and more variety. The manufacturer would want a piece of the market share for healthier foods.*

### Question 2b.

Marks	0	1	2	3	Average
%	30	18	25	27	1.5

Students were asked to name a product analysis test and briefly describe how it could be used to evaluate the properties (physical, chemical and/or sensory) of the omega-3 muffin.

Suitable answers could include:

- sensory tests, such as paired comparison tests, triangle tests, two out of five tests, ranking tests and rating tests – to measure taste, colour, aroma, mouth feel, etc.
- taste-testing panels and questionnaires
- chemical tests – to test nutrient quantity or whether ingredients meet the standards
- physical tests – to measure height, volume, texture, shelf life and gel.

The following is an example of a good response.

*Taste testing and questionnaires: this would analyse the physical and sensory properties of the muffin and provide the company with information on the consumers' likes and dislikes and their opinions on other things that the manufacturer would like to know.*

### Question 2c.

Marks	0	1	2	3	Average
%	18	10	22	51	2.1

2ci.

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

2cii.

Advantages of this type of product development include:

- companies can expand into a growing market
- risks are less than those with new products
- increases market share and profit.

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## Question 2di.

Marks	0	1	2	Average
%	7	12	81	1.8

Suitable bread or muffin products that the manufacturer could add to their range include:

- high fibre muffins or multigrain breads
- bite-size muffins
- individually wrapped muffins or bread portions
- gluten-free muffins or bread.

## Question 2dii.

Marks	0	1	Average
%	12	88	0.9

Possible target/niche markets for the product described in the previous question include:

- high fibre muffins or breads – health conscious people
- bite-size muffins – children
- individually wrapped muffins – busy people who want convenient foods.

## Question 2diii.

Marks	0	1	2	Average
%	14	23	63	1.5

Suitable justifications for why the product named in part i would appeal to this niche/target market could include:

- added fibre helps to prevent constipation and bowel cancer, and helps lower cholesterol
- smaller muffins will be easier for a child to hold and eat
- muffins that are individually wrapped will stay fresh for longer and can be easily taken to work for lunch without the need to wrap them.

No marks were awarded if the answer did not link to the previous responses.

## Question 2ei.

Marks	0	1	2	3	4	Average
%	7	3	16	17	56	3.2

Suitable strategies for marketing the product identified in part di. could include advertising the product through:

- print media – newspapers, magazines
- electronic media – radio, television, the Internet
- billboards
- promotional leaflets
- point of sale display
- in-store tasting
- competitions, special offers and giveaways
- attractive pricing.

No marks were awarded if the response did not relate to the product previously identified.

## Question 2eii.

Marks	0	1	2	Average
%	14	18	69	1.6

Students were required to evaluate the strategy which they believed would be the most effective method to promote the new bread or muffin product. Criteria by which the strategies could be evaluated could include: location of advertising, time of advertising, age of target market, appeal of giveaways, cost of product, etc.

The following is an example of a good response.

*In-store sampling would be the most effective as the consumer is already in the store/supermarket. Having samples then and there would encourage the consumer to buy the product after trying it.*

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## Question 3a.

Marks	0	1	2	3	Average
%	2	3	17	78	2.7

Students were required to identify a possible target/niche market for the salad and then discuss one reason why the salad may appeal to the target/niche market identified in part i. Suitable responses included the following examples.

i. Target/niche market	ii. Reason for appeal
health conscious people	low in fat (as indicated on the label)
working/busy people	no preparation, keeps in cupboard, easy for after work or good to take to work for lunch
single people	they are single serves
students	easy to take to school as they don't require heating
vegetarians	no meat is included in the salad
people who travel or camp	convenient, no cold storage needed and no cooking required

No marks were awarded for part ii. if the discussion did not relate to the answer given in part i.

## Question 3b.

Marks	0	1	2	Average
%	24	20	55	1.3

Two possible questions that could be used as criteria for evaluating the new light lunch range could include the following.

- Is the product low in fat?
- Is the product ready to eat, requiring no preparation?
- Is the product free from animal products?
- Can the product be stored and/or transported without refrigeration?
- Is the product free from artificial colours and preservatives?
- Does each single serve product contain a full serving of vegetables?

Answers needed to relate back to the design brief.

## Question 3c.

Marks	0	1	2	Average
%	21	31	48	1.3

Suitable reasons why it is important to evaluate the light lunch range during all stages of product development could include:

- to produce a good quality product with desirable sensory properties
- to produce a product that meets the needs of the market
- to produce a product that meets the design brief's considerations and constraints
- to ensure expected company costs to develop the product are not exceeded.

## Question 3d.

Marks	0	1	2	Average
%	20	35	45	1.3

Two reasons why the development of a prototype is an important stage in product development could include:

- allows modifications to be made to the product
- allows packaging and labelling to be refined
- allows process systems, machines and ingredients to be tested
- allows sensory testing and evaluation of product to take place
- establishes the viability of continuing with the manufacture of the product.

The following is an example of a good response.

- *to establish the costs associated with producing the product*
- *to establish the type of skills and equipment needed in the production process*

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## Question 3e.

Marks	0	1	2	3	4	Average
%	16	10	30	14	30	2.3

Students were required to name and discuss two environmental factors that needed to be considered when selecting the packaging of the light lunch range. Suitable answers could include the following.

Factor	Discussion
Can package be recycled?	Edgell would need to consider whether all layers of the packaging are recyclable, to reduce landfill.
How much packaging is used?	Edgell would need to consider how many layers of packaging would be used and try to keep these to a minimum to reduce landfill.
How much energy will be used to produce packaging?	Edgell would need to determine if energy used to produce packaging can be reduced to decrease the impact of climate change.
How much waste will be created when producing the packaging?	Reduction of waste created when producing the packaging reduces landfill.
Is the package biodegradable?	Edgell would need to consider if the package is biodegradable to reduce the amount of waste that does not break down.

## Question 3f.

Marks	0	1	2	3	4	Average
%	13	8	23	13	43	2.7

Students were required to identify two functions of the packaging and explain why each is important to the consumer. Suitable answers included:

- protection – to protect against structural damage during transportation or tampering on shelves
- preservation – to increase shelf life and protect from spoiling
- containment – to enclose the food during transport and storage
- convenience – to allow individual serves and to allow the product to be eaten from the container
- marketing – for the manufacturer to convey information about the food and its features
- information – for consumers, such as use-by dates, nutrition information and ingredient list (this could also come under communication).

## Question 4a.

Marks	0	1	Average
%	14	86	0.9

Students were given a graph showing consumer acceptance of genetically modified food and were required to describe the main trend shown by the graph.

The following is an example of a good response.

*Consumer appeal of genetically modified (GM) food has increased over time, with more people accepting GM food and more people prepared to consume GM food.*

## Question 4b.

Marks	0	1	2	Average
%	17	21	62	1.5

Explanations for how the trend may influence product development could include:

- more GM products are available
- more profit for producers, with more people prepared to consume GM foods
- improved nutritional values of GM foods
- longer shelf life of GM foods will encourage production
- better sensory properties for GM foods.

## Question 4c.

Marks	0	1	2	3	4	Average
%	23	14	31	10	23	2.0

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Two reasons why some people may have concerns about the use of genetically modified foods could include:

- may cause new allergies
- unknown side effects
- may reduce effectiveness of antibiotics.

This question was poorly answered.

The following is an example of a good response.

- *The long term effects are still unknown so consumers may be concerned about consuming these products.*
- *New allergies could develop from consuming GM foods so consumers are also concerned about the risks they may be taking.*

#### Question 4di.

Marks	0	1	2	Average
%	48	20	32	<b>0.9</b>

Irradiation: food is exposed to radiation, which penetrates the food and can kill bacteria and moulds.

This question was poorly answered.

#### Question 4dii.

Marks	0	1	2	Average
%	45	18	37	<b>0.9</b>

Reasons why people may have concerns about irradiated food could include:

- vitamins may be destroyed when the food is irradiated
- may affect the flavour of the food
- unknown long-term effects of consuming foods that have been irradiated.

This question was also poorly answered.

#### Question 4e.

Marks	0	1	2	Average
%	46	33	22	<b>0.8</b>

Two roles of Food Standards Australia and New Zealand (FSANZ), other than the development of the Food Standards Code, could be to:

- promote fair trading
- conduct research
- develop codes of practice for industry on matters included in food standards
- develop national food hygiene standards for Australia
- coordinate food recalls
- provide information to consumers to enable informed choices
- protect public health and safety.

This question was poorly answered.

#### Question 4f.

Marks	0	1	2	Average
%	78	8	14	<b>0.4</b>

One aspect of food safety that is regulated by the Food Standards Code, other than assisting consumers to make informed choices by the use of labelling, could include:

- permitted ingredients in foods
- standard of identity (description of products)
- microbial standard of foods
- standard of composition (permitted ingredients/additives)
- nutritive value of foods.

Students also had to provide an explanation of the aspect identified. This question was poorly answered.

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## Question 5a.

Marks	0	1	2	3	Average
%	11	22	37	30	1.9

Students were required to identify a preserved food that would be suitable to sell at a local market and identify and explain the processing technique used to preserve the food named in part i. Suitable answers could include the following.

i. Product	ii. Processing technique and explanation
semi-dried tomatoes	Dehydration: reducing the moisture content inhibits microbial growth and immersion in oil means there is no oxygen, which micro-organisms need to grow.
jam	Add sugar: high levels of sugar inhibit microbial growth.
dried fruit	Dehydration: reducing the moisture content to 5–25 per cent inhibits microbial growth.
chutney	Add acid: natural liquids are replaced by acids such as vinegar to prevent microbial growth.
dried pasta	Dehydration: reducing the moisture content to 5–25 per cent inhibits microbial growth.

Students could discuss products that use freezing as a preservation method if the product would generally be sold frozen; for example, ice-cream.

## Question 5b.

Marks	0	1	2	3	4	Average
%	31	4	16	10	39	2.3

Students were required to compare two properties (physical, chemical and/or sensory) of the food before preservation and after it has been preserved. Suitable answers could include the following.

Food	Before preservation	After preservation
tomatoes	round, firm, juicy, bright red, mild flavour	flattened, shrivelled, darker red, concentrated flavour
strawberries	bright red, juicy, firm	soft, mushy, deeper red, sweeter flavour
apricots	firm, round, mild flavour, soft flesh	concentrated flavour, flattened, shrivelled, tougher flesh
pasta	yellow, soft, flexible	brittle, hard, lighter in colour

## Question 6a.

Marks	0	1	2	3	4	5	6	Average
%	4	2	7	9	22	15	42	4.6

Students were asked to identify one health and safety practice in each of the given areas and justify why the practice is important for consumers of the Youth Week lunch.

	Health and safety practice	Justification
Storage controls	<ul style="list-style-type: none"> <li>temperature control of cooked foods</li> <li>temperature control of raw ingredients</li> <li>store raw and cooked ingredients separately</li> <li>rotate stock (use oldest stock first)</li> </ul>	<ul style="list-style-type: none"> <li>to ensure hot foods are kept hot, to keep foods out of temperature danger zones and inhibit microbial growth</li> <li>to ensure cold foods are kept cold, to keep foods out of temperature danger zones and inhibit microbial growth</li> <li>to avoid cross contamination</li> <li>reduce the chance of using out of date foods</li> </ul>



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<b>Food handling practices</b>	<ul style="list-style-type: none"> <li>wash hands regularly</li> <li>wear gloves for preparing and serving</li> <li>tie hair back</li> <li>maintain food temperature</li> <li>cover cuts</li> <li>regularly dispose of rubbish</li> <li>sanitise all equipment and surfaces</li> <li>use different equipment for cooked and raw foods</li> </ul>	<ul style="list-style-type: none"> <li>to avoid microbial contamination of food</li> <li>to avoid physical contamination</li> <li>to inhibit microbial growth</li> <li>to avoid cross contamination of foods</li> </ul>
<b>Design of work areas</b>	<ul style="list-style-type: none"> <li>use separate areas for preparing raw and cooked ingredients</li> <li>use benches of an appropriate height</li> <li>appropriate ventilation</li> <li>enough space for workers</li> <li>appropriate lighting</li> <li>suitable hand-washing facilities</li> <li>suitable garbage disposal</li> </ul>	<ul style="list-style-type: none"> <li>to avoid cross contamination of food</li> <li>to ensure a safer work environment with fewer accidents</li> <li>to help with efficient work flow</li> <li>reduce contamination of food</li> <li>reduce chance of vermin near food areas</li> </ul>

### Question 6b.

<b>Marks</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Average</b>
%	31	14	18	17	10	11	<b>2.0</b>

Students were required to select and discuss how either Modified Atmosphere Packaging or Aseptic Packaging can extend the shelf life of products, and explain another reason that would make the technique appropriate to package food. Suitable answers could include the following.

	<b>Modified Atmosphere Packaging</b>	<b>Aseptic Packaging</b>
<b>i. Description of process and how it extends shelf life</b>	The atmosphere around the food is altered by vacuum packaging or gas flushing. The removal of oxygen inhibits microbial growth.	The food and packaging are sterilised separately before filling and sealing. High temperatures are used to kill microorganisms.
<b>ii. Other reason why appropriate</b>	<ul style="list-style-type: none"> <li>slows deterioration of food</li> <li>maintains the quality of the food</li> <li>light weight</li> </ul>	<ul style="list-style-type: none"> <li>product doesn't require refrigeration</li> <li>quick</li> </ul>

This question was poorly answered.

### Questions 6c.

<b>Marks</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>Average</b>
%	3	0	2	1	14	7	73	<b>5.4</b>

Students were required to identify three labelling requirements and explain how this information would benefit the consumer.

<b>Labelling requirement</b>	<b>Benefit to the consumer</b>
<ul style="list-style-type: none"> <li>common name of the food</li> <li>name and address of manufacturer, packer or importer</li> <li>weight or measure of contents</li> <li>date marking (use by or best before)</li> <li>country of origin</li> <li>list of ingredients</li> <li>nutrition information panel</li> </ul>	<ul style="list-style-type: none"> <li>identifies the product</li> <li>allows easier contact if needed</li> <li>allows comparison between products or sizes</li> <li>ensures food is safe or in best condition</li> <li>identifies ingredient source in case of allergies</li> <li>provides information on proportion of ingredients</li> <li>provides information of percentages of particular nutrients</li> </ul>

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## Question 7a.

Marks	0	1	2	3	4	Average
%	36	10	20	12	22	1.8

The students were required to identify and explain two environmental issues associated with the primary production of key food commodities. Suitable answers could include the following.

- removal of animal manure from large-scale farms – to protect waterways
- excess land clearance for growing crops – can lead to deforestation, soil erosion, etc.
- soil damage from overuse – leads to unproductive land and degradation
- excess water use in growth and production – can contribute to water shortage and salination
- cleaning foods – can use valuable water and energy sources
- waste contamination of waterways – due to chemicals used in growing and washing crops
- use of packaging – may lead to landfill and harm animals
- transportation – uses energy, contributes to air pollution
- poor farming techniques – may lead to salinity of soil
- pesticides, herbicides and other chemical residues – can pollute waterways.

The following is an example of a good response.

- *The use of pesticides and chemicals to keep plants insect free can damage the environment, as rain can cause these chemicals to run into nearby streams and rivers and contaminate the water. This could affect animals that live in the streams or drink the water.*
- *The emissions from the transport trucks that take the food to be washed and sorted go out into the air and cause pollution.*

## Question 7b.

Marks	0	1	2	3	4	Average
%	16	8	22	19	34	2.5

Primary processing applied to apples

- washing
- sorting
- grading
- transporting
- packing
- mini labels on apples (for example, type of apple)
- waxing

Secondary processing applied to apples

- peeling
- coring
- canning
- baking

Students were asked to provide two examples of each.

## Question 7c.

Marks	0	1	Average
%	11	89	0.9

Products that could result from secondary processing of apples in industry and in commercial settings could include:

- apple pie
- apple juice
- apple chutney
- dried apples
- canned apples.

## Question 7d.

Marks	0	1	2	Average
%	17	35	48	1.3

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Two reasons for the secondary processing of food could include:

- convenience for consumer and producer
- prevents or reduces spoilage of the raw food
- can destroy microorganisms, making food safer for consumption
- may increase consumer appeal
- allows for storage
- makes food available all year
- increase the range/variety of food available
- allows for easy preparation – less time needed
- allows nutrients to be added that may have been lost in processing.