



**2007 Food and Technology GA 3: Written examination**

**GENERAL COMMENTS**

The 2007 examination was designed to assess students' knowledge and understanding of Unit 3, Areas of Study 1, 2 and 3 and Unit 4, Areas of Study 1, 2 and 3. All key knowledge and skills that underpin the outcomes were examinable.

The seven examination assessment criteria listed on page 23 of the *Food and Technology Assessment Handbook* were drawn from the six Areas of Study. The paper consisted of nine short answer questions that were based on the criteria.

**Areas of strengths and weakness**

**Strengths**

- understanding wet and dry methods of cooking foods
- developing criteria for evaluation
- understanding the requirements of labelling
- understanding the impact of packaging on the environment
- explaining the difference between primary and secondary processing
- demonstrating an understanding of health and safety practices in food storage and preparation
- demonstrating an understanding of the reasons and methods used to preserve foods
- considerations involved in the marketing of a new food product

**Weaknesses**

- providing answers that were irrelevant or not directly related to the questions asked
- not reading the information provided in the question and relating the answer to this information
- understanding new technological developments in the food industry and what constitutes 'health claims' and 'functional foods'
- understanding and describing how to minimise the impact of farming practices on the environment while maintaining economic advantage
- understanding the impact of wet and dry methods of cooking on the properties of key foods
- explaining the advantages and disadvantages of genetically modified foods for consumers and/or food producers
- explaining the advantages of plant breeding for food producers
- defining genetic modification and the process of plant breeding
- explaining the responsibilities of Food Standards Australia New Zealand (FSANZ) and associated consumer benefits and explaining the HACCP system
- understanding the levels of authority in Australia (national, state and local) and their responsibilities, roles and interrelationship in ensuring a safe food supply
- understanding and explaining the difference between food spoilage and food poisoning
- understanding the role of sensory testing and the methods used to record results
- explaining complex processes used in food production
- understanding of terms used in the study design; for example, strategies, sensory properties, plant breeding, product development, functions and genetic modification
- understanding the meaning of ethical marketing
- understanding the stages involved in the development of new food products

This report should be read in conjunction with the 2007 Food and Technology examination paper.

**SPECIFIC INFORMATION**

**Note: Student responses reproduced herein have not been corrected for grammar, spelling or factual information.**

For each question, an outline answer (or answers) is provided. In some cases the answer given is not the only answer that could have been awarded marks.

**Question 1a.**

Marks	0	1	2	3	4	Average
%	6	2	14	9	69	3.4

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Acceptable labelling requirements and reasons included any two of:

- 'use by' date or 'best before' date – to inform best quality of the product
- nutritional panel – to inform consumers of nutrient content and to be able to compare products
- net weight – to determine the minimum expected weight of the product
- name and address of manufacturer – so the consumer can go directly to the manufacturer for redress
- identification of packaging premises and job lot – to assist with recall
- list of ingredients – to show ingredients to allow consumers to meet their lifestyle needs
- food additives – to enable consumers to identify any additives that may cause allergic reactions
- declaration of the presence of potential allergens in food – to provide information to consumers with food allergies/sensitivities
- declaration of the presence of any genetically modified material added to the food – to enable consumers to make an informed choice
- health and safety advice for consumers – to promote correct storage and maintenance of optimal quality
- percentage of the characterising ingredient of the food – to enable consumers to make appropriate health choices
- country of origin – to enable consumers to make an informed choice.

One mark was available for each requirement and one mark for each reason. The reasons given had to relate to the requirement identified. Students should note that the bar code, storage suggestions and serving suggestions do not have to appear on the label.

### Question 1b.

Marks	0	1	2	3	4	Average
%	10	7	28	16	39	2.7

Acceptable factors and explanations included any two of:

- biodegradability – non-biodegradable products cause a build up of waste and produce litter that is unsightly and unhygienic. They can also cause blockages of water runoff and create more landfill
- recycling – packaging needs to be recyclable to allow less use of raw materials and greater reuse of packaging material
- decreasing the weight of containers – this will reduce raw product in manufacturing and reduce the use of fuel in transportation of products
- minimise energy used to create packaging – this will reduce the use of fossil fuels
- use of recycled material in outer packaging – encourages recycling and minimises the use of raw materials.

### Question 1c.

Marks	0	1	2	3	Average
%	31	25	22	22	1.4

#### 1ci.

A health claim (any one of):

- is an 'express or implied claim made on the label of a food or in an advertisement for food that describes a relationship between the food or a component(s) in the food and a disease or a health-related condition, including a claim that would be likely to be understood to identify such a relationship'
- is a message that makes a direct link between eating certain foods as part of your diet and reducing the risk of a specific disease
- describes a relationship between consumption of a food and a reduced risk of a particular disease
- describes the direct relationship between a nutrient and a disease or a related condition.

To be awarded full marks students needed to mention both the consumption of food/nutrients and its relationship to disease.

Following is an example of a high-scoring student response to this question.

*A health claim describes the direct link between the consumption of a food/ingredient and the reduction of a certain disease or condition.*

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## 1cii.

Acceptable reasons why health claims are monitored included:

- to prevent under- or over-consumption of a particular food/nutrient
- because people may think they only need to eat these products to be healthy
- to prevent people from thinking they will be healthier if they eat these products
- to provide accurate information to the consumer
- to avoid fraudulent/incorrect claims that science has not yet proven
- to prevent the use of the 'fear factor'; for example, there is a danger that consumers will sacrifice a balanced diet for a 'quick fix'
- to discourage the over-consumption of processed foods that are promoted as having health claims in preference to unprocessed fresh foods.

Following is an example of a high-scoring student response to this question.

*Health claims are monitored as they can falsely promote a particular food for preventing a disease when a number of factors contribute to preventing diseases, not just that particular ingredient. They are therefore misleading to consumers.*

## Question 2a.

Marks	0	1	2	Average
%	43	27	29	<b>0.9</b>

Suitable responses could have included any one of:

- genetic modification involves the application of genetic engineering to directly manipulate the genetic makeup of organisms. It involves a gene from one plant or animal being spliced onto another to improve its characteristics
- gene technology is used to introduce a desired trait into another plant or animal to improve its characteristics.

Following is an example of a high-scoring student response to this question.

*The process of genetic modification involves the splicing of a particular gene from a plant/animal into another to improve its qualities.*

## Question 2b.

Marks	0	1	2	Average
%	22	48	30	<b>1.1</b>

Suitable reasons included any two of:

- long-term health and biodiversity effects have not been studied sufficiently to ensure there are no adverse affects
- consumers may be concerned that GM foods may reduce the effectiveness of antibiotics
- consumers may be concerned that GM foods may lead to the development of new food allergies
- consumers may be concerned about the environmental impact of GM foods, for example:
  - increased resistance to herbicides, creating weeds that are hard to kill and thus affecting the environment
  - some species could be wiped out if they feed on larvae that feed on GM crops that contain pesticides
  - growing GM crops on a large scale may reduce the balance of wildlife and lead to a reduction in biodiversity
- GM foods may cost more because of the increased costs of development which are passed on to consumers
- many consumers fear the use of science in food production because they do not understand the process.

To be awarded marks students needed to use consumers as the focus of their responses, not producers or farmers.

## Question 2c.

Marks	0	1	2	Average
%	26	34	40	<b>1.2</b>

Suitable benefits of genetic modification for farmers included any two of:

- increased yields in crop production
- crops that are resistant to pests and disease, resulting in less wastage and greater yields
- less need for fertilisers and pesticides

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- less damage to the environment and wildlife from runoff into soil, waterways, etc.
- the shelf life of products can be extended by delaying ripening, resulting in less wastage and longer transportation times
- farmers can produce a higher quality product which has increased nutritional value and/or improved sensory properties, which are more appealing to consumers.

### Question 3a.

Marks	0	1	Average
%	36	64	0.7

Either of:

- FSANZ
- Food Standards Australia New Zealand.

The acronym and/or the full name were accepted, but unfortunately some students gave the incorrect meaning of the acronym when they expanded it into words. Many students gave Food Safety Australia and New Zealand, which was incorrect.

### Question 3b.

Marks	0	1	2	3	4	Average
%	28	11	26	10	25	1.9

Responsibilities	Benefit to consumers
Developing standards for foods available in Australia and New Zealand <b>or</b> the food standards code, which includes food safety, maximum residue limits, manufacturing and labelling	<ul style="list-style-type: none"> <li>• enables consumers to make informed choices</li> </ul>
Coordinating national food surveillance (AQIS)	<ul style="list-style-type: none"> <li>• ensures that food which is imported or exported is safe for consumption</li> <li>• border protection and quarantine to prevent banned foods from entering the country</li> </ul>
Overseeing food recall	<ul style="list-style-type: none"> <li>• consumers can read about recalls in newspapers and at the point of sale</li> <li>• ensures only food which is safe to eat is sold in Australia and New Zealand</li> </ul>
Conducting consumer and industry research	<ul style="list-style-type: none"> <li>• testing ensures that foods available to the consumers are safe; for example, genetically modified foods</li> </ul>
Undertaking research and scientific risk assessment	<ul style="list-style-type: none"> <li>• research into a wide variety of food and health related food issues ensures the consumer of safe food</li> </ul>
Dietary exposure assessment	<ul style="list-style-type: none"> <li>• potential risks associated with chemicals and additives in food are analysed for safety</li> </ul>
Developing food safety standards involved in processing and primary production	<ul style="list-style-type: none"> <li>• enables consumers to purchase safe food</li> </ul>

This question was very poorly done.

Following is an example of a high-scoring student response to this question.

*Responsibility: Coordinate food recalls*

*Benefit to Consumers: In the event of a food recall, consumers will be alerted to not consume the product, thus protecting their health and safety.*

*Responsibility: Food Standards Code – labelling requirements on products*

*Benefit to Consumers: Consumers understand what the product is, what ingredients it contains, its nutritional value, when to throw it out and who made the product.*

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## Question 3c.

Marks	0	1	2	3	4	5	Average
%	49	7	11	11	7	15	1.7

### 3ci.

Suitable examples included any of:

- food recall
- food labelling
- dietary exposure assessment
- *Food Act 1984*
- ensuring a safe food supply.

### 3cii.

Suitable explanations included the following.

#### Food recall

- National – coordinating recall nationally by actions such as informing state health authorities of potential food related health issues; providing advice regarding communications and recall strategies; liaising with quarantine services when imported goods are involved; maintaining detailed records of recalls
- State – monitoring the efficiency and effectiveness of food recalls by actions such as providing details of recalls to relevant organisations such as councils, food businesses and other government and community agencies that may be affected; ensuring recovery of affected goods and destruction of goods; liaising with FSANZ about recall action
- Local – no legislative powers to order recalls, but may be delegated functions by the state health authority; for example, ensuring information about the recall at point of sale; overseeing the collection and destruction of recalled food

#### Labelling

- National – developing standards for labelling, including content of food; producing guides on reading labels for consumers
- State – ensuring that the labelling requirements specified in the Food Standards Code are followed by all food manufacturers in their state
- Local – monitoring food sold at local markets, including labelling, according to the requirements for markets

#### Dietary exposure assessment

- National – undertaking dietary exposure assessment to estimate the likely intake by consumers of food chemicals, nutrients and residues
- State – overseeing the collection of food samples for a bi-annual dietary exposure survey
- Local – collecting the samples for a bi-annual dietary exposure survey

#### A safe food supply and/or *Food Act 1984*

- National – developing the Food Standards Code, from which the states develop their relevant food Acts
- State – the Victorian Government developed the *Food Act 1984* and the *Food (Amendment) Act 1997*, which outline the legal responsibilities of all food manufacturers and retailers in Victoria to ensure a safe food supply
- Local – employing environmental health officers who inspect food premises on behalf of the local council; registering food businesses which have an approved food safety plan; inspecting all food premises on an annual basis

This question was answered very poorly.

Following is an example of a high-scoring student response to this question.

*Example. Food Safety Programs – HACCP*

*State: The Food Act (amendment) 1997 states all food premises have to have a specific HACCP Plan, identifying the critical control points involved in their particular food manufacture and how these points are to be monitored.*

*Local: Health officers inspect the food premises to ensure they are following the correct health and safety practices.*

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## Question 4a.

Marks	0	1	2	3	4	5	6	Average
%	20	9	12	13	15	13	18	3.0

Ingredient	Identify the natural food component in the ingredient.	Explain one main function for each natural food component in the preparation of the cupcakes.
Butter	Fat	<ul style="list-style-type: none"> <li>Improved keeping qualities: butter helps to delay the staling process and increase the keeping qualities of the cupcakes.</li> <li>Aeration: fat in the butter traps tiny air cells around the sugar during creaming, assisting with aeration.</li> <li>Butter improves the sensory properties of the cupcakes, giving a moister texture, smoother mouth feel and greater richness.</li> </ul>
Egg	Protein	<ul style="list-style-type: none"> <li>Structure: during baking, the heat of the oven coagulates the protein in the egg and helps give the cakes a firm structure.</li> <li>Colour: the protein in the eggs can contribute to the Maillard reaction, causing the cakes to brown.</li> </ul>
Plain flour	Starch	<ul style="list-style-type: none"> <li>Structure: starch allows the cakes to hold their shape when baked.</li> <li>Moisture absorption: flour absorbs liquid from milk and helps to bind the ingredients in the cupcakes.</li> <li>Dextrinisation: starch in flour changes to dextrin when the cakes are baked in the oven, causing them to brown.</li> </ul>

## Question 4b.

Marks	0	1	2	Average
%	33	36	31	1.0

Suitable answers could have included the following.

Creaming the butter and sugar

- weigh and measure ingredients accurately
- make sure butter and sugar are at room temperature
- beat butter and sugar thoroughly with a wooden spoon or beater

Baking the cupcakes

- arrange the oven bars before lighting the oven and preheat the oven to 200°C
- place the cupcakes in the oven for 12 to 15 minutes
- test cakes by visual observation and 'touch' test or with a fine skewer

Answers needed to reflect that a judgment was needed. No marks are awarded for the name of the process.

Students and teachers should refer to the 'Table of complex processes' available on the VCAA website for further information on this area.

## Question 4c.

Marks	0	1	2	Average
%	42	23	35	0.9

4ci.

Appropriate processes included either of:

- dextrinisation
- Maillard reaction.

Caramelisation was not acceptable due to the proportion of sugar in the recipe.

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4cii.

- Dextrinisation – The dry heat of the oven causes the starch in the flour mixture to brown.
- Maillard reaction – The Maillard reaction occurs when baking the cakes, as the cake mixture contains sugar and starch (found in the flour) as well as a protein (in the egg and milk). When they are baked by the dry heat of the oven, the cake mixture will brown.

**Question 4d.**

Marks	0	1	2	3	Average
%	32	7	21	40	1.7

4di.

Batch system

One-off and craft production were not accepted.

4dii.

Suitable features of the batch system included any two of:

- small quantities of cupcakes can be produced
- the sensory properties of the cupcakes would be superior because of the skill of the cake stall owner
- the setup costs would be lower because there is less machinery involved, resulting in lower costs for the stall holder
- the cupcakes could be designed for a niche market
- the system has greater flexibility and can change quickly to satisfy consumer demands if a new trend is noted; for example, gluten-free cupcakes.

**Question 5a.**

Marks	0	1	2	3	4	Average
%	8	3	5	16	68	3.4

Criteria needed to be based on the following information in the design brief:

- delicious lunches and dinners for casual or more traditional dining
- healthy, with an emphasis on fresh, high-quality, well-presented food
- vegetarian choices
- preserved foods to enable variation in texture and flavours.

Criteria could be written as statements or questions.

**Question 5b.**

Marks	0	1	2	3	4	Average
%	13	4	22	8	52	2.9

Suitable answers could have included any two of:

- frozen berries – used in a cake, muffins or coulis
- mango chutney – as an accompaniment to cold meats or a curry
- tomato relish/sauce – used on sandwiches or to accompany a meat pie or pasty
- lemon curd – used in muffins, lemon meringue tarts or in a torte
- apricot jam – used in tarts, on scones for a Devonshire tea or as a glaze
- dehydrated tomatoes – used in a salad, on a pizza or in a quiche.

**Question 5c.**

Marks	0	1	2	Average
%	32	30	37	1.1

Suitable answers included any of:

- frozen berries – the berries are frozen in an airtight container at temperatures below  $-18^{\circ}\text{C}$ , which will either kill any food-spoiling bacteria or inhibit their growth/activity
- mango chutney or tomato chutney/relish/sauce – the chutney is made using vinegar, which alters the pH level. The high acid levels prevent the growth of microorganisms
- lemon curd – the curd is made using a strong concentration of sugar, which inhibits the growth of microorganisms by changing their environment

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- dehydrated tomatoes – the removal of moisture from the food means that bacteria cannot survive – the water content is reduced to 5–25 percent.

### Question 5d.

Marks	0	1	2	3	4	Average
%	19	11	24	17	29	2.3

Suitable answers included the following.

#### Apples

- Dry method – baked in the oven; retains shape; cell structure breaks down so apple pulp becomes soft; fruit may change in flavour as natural sugars caramelize
- Wet method – stewing; preserves (chutney and sauce); cell structure breaks down so apple does not retain its shape

#### Plums

- Dry method – baked in a pie; retains shape; cell structure breaks down so the plums' pulp becomes soft
- Wet method – stewing; poaching; cell structure breaks down so plums do not retain their shape

#### Berries

- Dry method – in cakes or muffin making; berries retain their shape and become soft
- Wet method – preserves (jams and jellies); fruit softens and forms a gel when pectin and sugar are present

Appropriate dry methods of cooking included frying, baking, roasting and grilling. Appropriate wet methods included boiling, poaching, stewing and steaming. Microwaving was not an acceptable answer to this question.

### Question 5e.

Marks	0	1	2	3	Average
%	18	27	33	23	1.6

The HACCP system is a food safety plan that will identify any potential food hazards in the production of food items at the café.

This question was poorly done.

Following is an example of a high-scoring student response to this question.

*It identifies any risks involved in the production of food and prevents them from occurring. If problems do arise, information is provided on what to do. HACCP protects the health and safety of both consumers and manufacturers.*

### 5eii.

Appropriate responses included any two of:

- analyse the hazard and assess risks – to identify hygiene and food production safety hazards (for example, check the freshness of raw ingredients by sight or by the 'best by date'); storage of raw ingredients at correct temperatures or in correct containers; rotate the stock and use the oldest product first
- identify the critical control points – indicate where a hazard poses a high risk so that these can be avoided (for example, to prevent cross-contamination from raw and cooked foods by using separate or different coloured chopping boards)
- set the 'critical limits' for each critical control point – this will enable the café to take steps to prevent, reduce or remove the hazard (for example, cooking temperatures and chilling temperatures)
- monitor the critical control points – the café will be able to prevent any food spoilage or food poisoning by checking that safety control procedures are being carried out (for example, recording the temperature of chilled/frozen ingredients on delivery to the café)
- establish corrective actions – the café must demonstrate it has solutions to overcome any potential problems (for example, discarding foods or retraining staff)
- set up records – this will enable the café to keep records showing improvements and/or solutions to problems identified
- verify that the HACCP system is working correctly – allows the café to show that they have reviewed the system on a regular basis and made improvements.



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Following is an example of a high-scoring student response to this question.

**Analyse the hazards and assess risks**

*Risks are identified and preventative measures are brainstormed and then put in place.*

**Identify the critical control points**

*Involves deciding upon whether each risk is likely to cause a health problem (deciding whether each point is critical). Essential to ensure high risk points are identified and care is taken.*

**Question 6a.**

Marks	0	1	2	3	4	Average
%	8	9	24	23	37	2.7

Suitable answers could have included any two of:

- market research – enables companies to collect information about their consumers, market trends and consumer needs and to use this information in the development of new products
- the design brief – the design brief clearly states the aims and intentions of the new product and includes all considerations and constraints required to produce the product
- criteria for evaluation – these will be used to enable the company to evaluate the product and determine whether it meets the needs outlined in the design brief before the product is launched into the marketplace
- development of a prototype – this helps the company to:
  - determine the best combination of ingredients
  - evaluate the sensory properties of the product
  - evaluate the suitability of existing equipment
  - determine the packaging requirements for the product
  - evaluate the expertise of current staff
  - estimate the manufacturing costs to determine whether it is likely to make a profit
- production – production trials help the company to determine whether they can reproduce the prototype in full-scale production. Before full-scale production commences, they will determine the exact ingredients and processes to be used
- marketing – a marketing campaign is designed to encourage consumers to try the product and then to become repeat purchasers
- evaluation – the company will evaluate all aspects of the product and the stages of development, including the physical and sensory properties of the product, the production processes and an economic evaluation of the product.

**Question 6b.**

Marks	0	1	Average
%	30	70	0.7

Suitable answers could have included any of:

- consumer demand (health) – consumers have become increasingly aware of the link between food consumption and health concerns such as obesity or heart disease and are therefore demanding foods which are low in fat to optimise their health
- social issues (change in population mix; an aging population) – Lite pies will meet the need of older consumers who have an emphasis on increasing longevity and maintaining their well-being by selecting foods which are dense in nutrients yet low in energy. Therefore they will select products which they see as ‘healthier’ yet will still enable them to enjoy some of their favourite foods
- knowledge and education – information on the Internet, on television and in lifestyle magazines has enabled consumers to be far more informed about the risks of an unhealthy diet. This increased knowledge and education has led consumers to seek products, such as the Lite pies, which will enhance their health
- industry economics – by producing the Lite pies, Four’n Twenty has increased its product range. This is likely to enable the company to increase their sales and market share within the pie sector and so increase their profits.

**Question 6c.**

Marks	0	1	2	3	Average
%	35	23	25	17	1.3

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Suitable answers could have included any of:

- sensory test – a panel of people would be selected to undertake a taste test of the pies to evaluate the sensory properties of flavour, texture, aroma and appearance. Each of the members of the panel would rate each of these properties on a scale of one to nine, or they may rate them on a scale using terms such as ‘liked very much’ to ‘disliked very much’, or used facial hedonic descriptors
- difference tests – in a ‘triangle’ test, two of the three samples are the same and the third is different. In a ‘two-out-of-five’ test, three of the five samples are the same; the other two samples are slightly different from each other and the other three
- profiling test – a star diagram is used to rate the sensory properties of the product and then compared with a competitor’s product
- quantitative test – a quantitative test of the physical features of the Lite pies, such as measuring the colour, weight, size, viscosity of the filling and volume of the pies against one of the original Four’n Twenty pies to determine whether they are similar to the original product.

### Question 6d.

Marks	0	1	2	3	4	Average
%	12	19	42	14	13	2.0

### 6di.

Suitable answers could have included any two of:

- product – the Lite pies must be low in fat, but still be similar in flavour, texture, aroma and appearance to the traditional pies that consumers have always enjoyed
- price – the price of the Lite pies must be similar to traditional pies so that consumers will be encouraged to buy them
- place – the Lite pies should be available in places where consumers might stop during their lunch break or on their way home from work, such as a convenience store or supermarket
- promotion – the Lite pies would need to be advertised in places where consumers would easily see ads, such as on television, billboards, or as a part of a sporting promotion such as at the football or a golf tournament.

### 6dii.

Appropriate responses could have included any of:

- health claims – Four’n Twenty must not make any claim that there is a link between the consumption of their Lite pies and a nutritional benefit; for example, that eating the Lite pies will help people to lose weight or reduce the risk of cardiovascular disease
- nutrition content – Four’n Twenty must not mislead the public by claiming that their pies are lower in fat or kilojoules than traditional pies if they are not. The nutrition panel should clearly and accurately state the energy and fat content of the pies so that consumers can compare them with other products
- marketing to children – Four’n Twenty should not advertise the pies during children’s television viewing times as children may be persuaded to think that these pies are a ‘healthy’ food when they are still higher in energy than many unprocessed foods.

This section was poorly answered. Many students misread ‘ethical’ as ‘ethnic’.

Following is an example of a high-scoring student response to this question.

*The marketing must not be misleading or deceptive. The description of the product must be accurate and photographs must be realistic.*

### Question 7a.

Marks	0	1	2	3	4	Average
%	50	17	13	12	8	1.1

### 7ai.

The process used was plant breeding, where the chosen characteristics are selected from one plant and bred into another plant of the same species in a laboratory environment. This process prevents any undesirable traits being transferred and is quicker and more accurate than traditional plant breeding.

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## 7a.ii.

Appropriate advantages included any two of:

- it is not genetically modified, therefore there may be an economic advantage for the producer due to consumer perceptions about health concerns
- higher crop yields may be produced
- crops may be more climate tolerant; for example, drought resistant
- the product has improved physical and sensory properties and so will have a greater market potential
- there is less risk to the environment, as there is less chance of polluting other crops.

Question 7a. was very poorly answered, with many students unable to identify and explain the process, while others confused plant breeding with genetic modification. Many students did not focus their advantages on the **farmers** who grow the wheat. Information provided in the introduction to the question could have assisted students in answering the question.

Following is an example of a high-scoring student response to this question.

*Farmers may have increased sales to manufacturers because of the improved sensory properties.*

*Unlike traditional plant breeding the process does not rely on chance as much. This means that the production of a successful crop is more likely.*

## Question 7b.

Marks	0	1	2	Average
%	55	20	24	0.7

Appropriate definitions for 'novel foods' included either of:

- non-traditional food for which there is insufficient knowledge in the broad community to enable safe use in the form or context in which it is presented
- those new foods or ingredients that have not normally been used in Australia or New Zealand for human consumption and have no previous safety evaluation.

Following is an example of a high-scoring student response to this question.

*New foods or food ingredients for which there is insufficient knowledge in the community to ensure safe use.*

## Question 7ci-ii.

Marks	0	1	2	3	Average
%	50	10	15	25	1.2

Suitable answers could have included any of:

- ultrafiltration – this occurs when pressure separates and removes dissolved or suspended solids or such from a liquid. For example, skim milk, lite-start, etc.
- microencapsulation – a substance such as fat is surrounded by a thin biodegradable shield to protect it. For example, omega-3 in Tip Top Up bread, breakfast cereal, milk and margarine
- high pressure processing (HPP) – high pressure is used to deactivate spoilage microbes without damaging the food; the food looks, feels and tastes fresh but has a much longer shelf life
- genetic engineering – genetic modification involves directly manipulating the genetic makeup of organisms. A gene from one plant or animal is spliced onto another to improve its characteristics. For example, Flavr savr tomatoes, miximiser corn, faster growth rates in cattle, climate tolerant strawberries and non-browning/non-sprouting potatoes
- plant breeding – this is where the chosen characteristics are selected from one plant and bred into another plant of the same species in a laboratory environment. This process prevents the undesirable traits being transferred and is quicker and more accurate than traditional plant breeding. For example, hi-Maize, clever rice and pineapples.

This question was poorly done. No marks were awarded for naming the type of technology.

Following is an example of a high-scoring student response to this question.

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## Microencapsulation

i.

This involves enclosing fish oil droplets within a minute capsule, which masks the fish oil's unpleasant sensory properties when eaten. These are added to food to provide additional omega 3.

ii.

Tip Top Up Bread.

### Question 7d.

Marks	0	1	2	Average
%	59	23	17	<b>0.6</b>

A suitable answer could have included any of:

- organic farming – uses no chemicals at all in primary production, therefore there is no damaging runoff into dams, channels or lakes that may kill fish or encourage unhealthy algae to grow
- green farming – uses sustainable practices such as water recycling, planting trees or not chopping them down to retain the water table levels
- increased tree-planting – maintains healthy water table levels to minimise the likelihood of increased salination
- crop rotation – allows soil and grasses a chance to renew and avoids draining all natural nutrients from the soil and therefore damaging it for future use
- not overstocking – animal activity can compact the soil, preventing grasses from growing and damaging it for future use
- drip irrigation – maximises water available, is less damaging to the soil and results in less wastage of water
- low or minimal chemical use of herbicides and pesticides – prevents damaging runoff into dams, channels or lakes that may kill fish or encourage unhealthy algae to grow
- minimise food miles – reduces greenhouse gases caused by food transportation.

### Question 7e.

Marks	0	1	2	3	4	Average
%	23	11	23	20	22	<b>2.1</b>

Primary processing takes place after the wheat is harvested to make the food fit for human consumption or for further processing. Examples for wheat include transportation, sorting, cleaning, blending and milling.

Secondary processing is when the primary product is changed into other food products. Examples for wheat include flour, bread, cakes, pasta, dry spaghetti, pastry and canned spaghetti.

Other cereal products, such as rice, barley and maize, were also acceptable. The examples given needed to be appropriate to the cereal selected. Examples that were not related to cereals were not accepted.

### Question 7f.

Marks	0	1	2	Average
%	25	30	45	<b>1.2</b>

Suitable reasons for secondary processing included any two of:

- makes some food palatable
- is convenient, can be preserved (such as canning or frozen), and is therefore easier to transport and keep
- prevents food spoilage and can also prevent food poisoning by killing harmful microorganisms
- food is at its best just after harvesting, so it can be processed at its best quality and therefore reach consumers when it is at its best
- if preserved, foods that are out of season can be available
- increases choice for consumers, different processes can produce different food items from the one primary product
- reduces preparation time.

### Question 8a.

Marks	0	1	Average
%	35	65	<b>0.7</b>

Food poisoning is the contamination of foods by harmful bacteria that may cause illness or even death.

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## Question 8b.

Marks	0	1	2	3	4	Average
%	14	9	21	17	39	2.6

Suitable answers included any two of:

- temperature – bacteria need warmth to grow. This can occur between 5°C and 60°C (or above 4°C and below 60°C), which is called the 'danger zone'
- food – bacteria grow more quickly in foods that are high in protein or are high-risk, such as dairy foods, cooked rice, pasta, chicken and fish
- moisture – bacteria need moisture to be able to divide and multiply/grow
- time – in ideal conditions, bacteria can grow and multiply in 20 minutes
- low acid environment – bacteria will grow/flourish in a low acid environment, whereas they are less likely to grow in high acid environments
- oxygen – many bacteria need oxygen to survive and reproduce.

## Question 8c.

Marks	0	1	2	Average
%	8	19	73	1.7

Suitable responses could have included any two of:

- food should be stored at the correct temperature before and after preparation to prevent bacteria from growing
- cross contamination should be avoided by washing equipment and hands
- cross contamination should be avoided by preparing raw foods separately from cooked foods
- good personal hygiene, including washing hands, not wearing jewellery, covering cuts, always wearing clean clothes and tying hair back. People who are ill should not work with food
- always use clean equipment and benches and wash well after each use
- store cooked foods above raw foods in the fridge
- check the 'use by' dates of foods when buying them
- dispose of rubbish regularly
- keep foods out of the 'danger zone'
- keep and serve hot foods above 65°C.

## Question 8d.

Marks	0	1	Average
%	41	59	0.6

Food spoilage is when the chemical and physical properties of the food deteriorate and the food loses quality. The food is not usually harmful. It can be caused by yeasts, enzymes or moulds.

## Question 9a.

Marks	0	1	Average
%	59	41	0.4

Suitable answers could have included either of:

- MAP is a system of packaging that changes or modifies the atmosphere of gas inside a package to extend the shelf life of the food
- MAP packaging alters the atmosphere inside the packing in which the foods are stored by controlling the mixture of gases to slow down the food's deterioration.

## Question 9b.

Marks	0	1	2	Average
%	24	45	31	1.1

Suitable reasons included any two of:

- protects food from microbial and chemical contamination, therefore maintaining the quality of the product
- extends the shelf life of the product
- maintains a fresh colour and other sensory properties of the food
- inhibits the growth of anaerobic microorganisms within the package.

Following is an example of a high-scoring student response to this question.

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*Reason 1. Increases the shelf life of products as it doesn't allow micro-organisms to enter or multiply within the package.*

*Reason 2. Delays ripening or browning of foods by allowing a mixture of gases to be included in the package.*

## Question 9c.

Marks	0	1	2	3	Average
%	29	9	24	39	1.7

### 9ci.

Either of:

- me too
- direct copy.

### 9cii.

Acceptable reasons included any two of:

- allows the manufacturer to enter an established market for the first time
- companies can maintain brand loyalty
- allows the manufacturer to gain a share of the market and therefore increase their profit
- decreases the risk taken by competitors
- enables companies to bypass the product research stage as this has already been done for the original product.

Following is an example of a high-scoring student response to this question.

*i.*

*Me Too*

*ii.*

*The research has already been done to show that there is an opportunity for profit.*

*The competitor is able to bypass the market research stage as a market has already been ensured, therefore less chance of failure.*