



**2006 Food and Technology GA 3: Written examination**

**GENERAL COMMENTS**

The 2006 Food and Technology examination assesses students' knowledge and understanding of all outcomes in Unit 3 and Unit 4. All key knowledge and key skills that underpin the outcomes are examinable. Students are examined against the seven examination criteria listed on page 23 of the Food and Technology Assessment Handbook.

**Areas of strengths and weakness**

**Strengths**

- explaining the stages of food product development
- understanding wet and dry methods of cooking foods
- understanding target and/or niche markets and the foods developed for them
- understanding the development of evaluation criteria
- explaining the difference between primary and secondary processing
- demonstrating an understanding of health and safety practices in food production

**Weaknesses**

- understanding why a specific food manufacturing system is suitable for making a particular food
- understanding new technological developments in the food industry and what are 'health claims' and 'functional foods'
- describing two functions of milk packaging
- understanding and explaining recent developments in packaging and their role in food production; for example, aseptic packaging and UHT
- explaining methods used to preserve foods; how preservation affects spoilage and impacts on the properties of food
- explaining the process of genetic modification and its benefits and risks
- explaining how plant breeding has affected physical, chemical or sensory properties of food
- explaining the role of Food Standards Australia and New Zealand (FSANZ) in relation to food safety
- understanding the levels of government in Australia and their roles and responsibilities in ensuring the safe production of food
- recognising natural food components and their functions in food production
- understanding and explaining causes of food spoilage and contamination
- explaining complex processes used in food production
- understanding and explaining terms used in the study design; for example, 'strategies', 'sensory properties', 'product development', 'functions' and 'aeration'
- 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 2006 Food and Technology examination paper.

**Question 1a.**

Marks	0	1	2	3	4	5	6	Average
%	7	5	9	13	19	18	29	4.0

Stage of product development	Explanation of stage (What is it? How is it done?)	Purpose of stage (Why is it done?)
Research	<ul style="list-style-type: none"> <li>• can involve surveying customers</li> <li>• survey trends and patterns of the market</li> <li>• identify gaps in the market/a potential market by using company surveys, etc.</li> <li>• business research data</li> <li>• magazines, journals – available technology for packaging, ingredients, equipment, tools, etc.</li> <li>• analyse data for the development of a competitor's product (Me-too)</li> </ul>	To find out if the product will be: <ul style="list-style-type: none"> <li>• cost effective</li> <li>• viable</li> <li>• able to be made</li> <li>• profitable for company</li> <li>• able to meet market needs.</li> </ul>

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Prototype	<ul style="list-style-type: none"> <li>• sample of finished proposed product/small quantity of proposed product</li> <li>• sample of proposed packaging</li> <li>• trial run for manufacturing process</li> <li>• test run for machinery</li> <li>• opportunity to test sensory properties</li> <li>• test shelf life</li> </ul>	To test the: <ul style="list-style-type: none"> <li>• effectiveness of ingredients</li> <li>• manufacturing equipment</li> <li>• cost effectiveness of the process</li> <li>• suitability of proposed packaging</li> <li>• cost of production</li> <li>• product's appeal.</li> </ul>
Product analysis	To analyse the: <ul style="list-style-type: none"> <li>• product against previously established design brief requirements/criteria for evaluation</li> <li>• sales figures</li> <li>• profit margin</li> <li>• consumer acceptance.</li> </ul>	<ul style="list-style-type: none"> <li>• to make sure it meets the requirements of the design brief</li> <li>• to see if it will be a successful product</li> <li>• to check consumer satisfaction as reflected in sales</li> <li>• to analyse the success of the market campaign</li> </ul>

### Question 1b.

Marks	0	1	2	Average
%	35	14	51	1.2

#### 1bi.

Line extension

#### 1bii.

Advantages included any of:

- increased profits
- extended target market
- brand loyalty.

### Question 1c.

Marks	0	1	2	Average
%	14	58	29	1.2

Consumer demand influenced the development through:

- increased demands for health benefits from food
- increased knowledge about links between food and health (better supply of a range of nutrients)
- increased demands for low fat products
- convenient product – rescrewable lid
- the plastic being safe for young children.

Industry economics influenced the development through:

- increased product range, leading to increased profit
- responding to competitor's new product
- fostering brand loyalty
- adding another niche market potential.

The answers for industry economics were poorly done.

### Question 1d.

Marks	0	1	2	3	Average
%	50	5	19	27	1.3

#### 1di.

Continuous processing

#### 1dii.

Appropriate features included any two of:

- suits larger quantities of the product being made
- produces a consistent product
- is economical/cost effective

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- is run 24/7 to produce the large quantities needed.

An example of a good answer could be:

- the set-up costs for the continuous system are very high and the cost of each unit is low
- the system can produce large quantities of milk that are of a consistent quality.

This question was poorly answered. No marks were awarded for part ii. if part i. was incorrect.

### Question 1e.

Marks	0	1	2	3	4	Average
%	30	17	20	8	25	1.8

Suitable functions included any two of:

- containment – contains the product for easy transportation and prevents spillage
- protection – packaging protects the product from bacteria, light and insects
- preservation – reduces the rate of spoilage by assisting in preservation
- communication – the label communicates messages to the consumer regarding nutrient content. May be used as a marketing tool
- convenience – provides food containers in portion sizes, with appropriate materials and easy to use to satisfy consumer demands.

This question was poorly answered.

### Question 1f.

Marks	0	1	2	3	Average
%	38	26	22	14	1.1

Suitable descriptions included either:

- aseptic – milk is sterilised using ultra heat treatment; the carton is multilayered to prevent bacteria absorption and sterilised before milk is added; the carton is fully sealed in a sterile environment (sterilised liquid, sterilised container, sterilised environment)
- UHT– milk is heated to a high temperature (135–140°C) and held for two to three seconds and then packaged as for aseptic.

This question was poorly answered.

### Question 1g.

Marks	0	1	2	3	4	5	Average
%	5	8	5	11	23	48	3.8

#### 1gi.

Suitable target markets included:

- people who are weight conscious and wish to reduce their fat intake
- adolescent students (for lunch or a snack) who are conscious of their weight
- consumers who want a low fat milk product in a convenient package.

#### 1gii.

Suitable marketing strategies included:

- advertise and give free samples in gyms, TAFE colleges, school canteens and/or universities
- advertise on television during viewing times that are popular with the target groups
- advertise in magazines read by these target groups
- place posters and promotional material in doctors' surgeries, health centres and/or other places that the target group may attend.

The marketing strategies needed to relate back to the target market given in part i.

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## 1giii.

Suitable answers included:

- Free sample given out in the gym – this gives consumers an opportunity to taste the product, which in turn will encourage them to purchase it
- Promotional material – people often pick up free literature and read it when they are waiting for an appointment. This may result in them purchasing the product.

When responding to this question, students needed to refer to their chosen target market. No marks were awarded for selecting the marketing strategy.

## Question 2a.

Marks	0	1	2	Average
%	20	30	50	1.3

**Primary processing** refers to making food ready after slaughter or harvest for consumption or for use in other food products and **secondary processing** turns primary processed foods into other usable products.

## Question 2b.

Marks	0	1	2	3	4	Average
%	19	15	21	26	19	2.1

Primary processing	Secondary processing
<ul style="list-style-type: none"> <li>• washing</li> <li>• sorting</li> <li>• grading</li> <li>• packaging</li> </ul>	<ul style="list-style-type: none"> <li>• cutting</li> <li>• stoning</li> <li>• juicing</li> <li>• cooking</li> <li>• canning</li> <li>• drying</li> <li>• dehydrating</li> <li>• stewing</li> <li>• bottling</li> <li>• jam making</li> </ul>

No marks were given if the examples given named products rather than the process used.

## Question 2c.

Marks	0	1	2	3	4	Average
%	8	10	21	29	32	2.7

Preservation technique	i. How it prevents the spoilage of apricots	ii. Impact on the properties of apricots
freezing	Stores food at very low temperatures ( $-18^{\circ}\text{C}$ ), which stops the growth of micro-organisms.	<ul style="list-style-type: none"> <li>• loss of shape as cell wall breaks down</li> <li>• softer texture and loss of moisture when thawed</li> </ul>
dehydration	Removes/reduces the moisture/water content of apricots to a level that prevents the growth of micro-organisms.	<ul style="list-style-type: none"> <li>• smaller and flatter shape</li> <li>• wrinkly and dry texture</li> <li>• more intense flavour</li> <li>• concentrated nutrient properties</li> </ul>
use of sugars (jam making)	Due to the dehydrating effect, high levels of sugar prevent the growth of micro-organisms.	<ul style="list-style-type: none"> <li>• softer texture</li> <li>• sweeter flavour</li> <li>• less defined form</li> <li>• deeper colour</li> </ul>
use of acids (apricot chutney)	The pH is lowered (changed) due to the addition of acids to the food. The level is lowered to a level that inhibits the growth of micro-organisms.	<ul style="list-style-type: none"> <li>• may have a deeper colour</li> <li>• softer texture</li> <li>• smaller in size (may be cut)</li> </ul>

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heat processing – sterilisation (bottling)	Cooking apricots at a high temperature (above 100°C) kills harmful bacteria and seals the glass jar, creating a sterile environment.	<ul style="list-style-type: none"> <li>• soft, tender texture</li> <li>• shape retained</li> <li>• lighter in colour</li> </ul>
canning	Apricots are sealed in a metal can and then heated to very high temperatures to seal the can and sterilise the contents. This inhibits the growth of, or destroys, harmful micro-organisms.	<ul style="list-style-type: none"> <li>• soft and tender</li> <li>• syrup or natural juice may provide sweetness</li> <li>• may be in halves with stones removed</li> </ul>

## Question 2d.

Marks	0	1	2	3	4	Average
%	4	6	16	25	49	3.1

Method of cooking potatoes	Example of technique	The suitability of this technique for cooking potatoes (Why is this technique used?)
Wet method	<ul style="list-style-type: none"> <li>• boiling</li> <li>• steaming</li> </ul>	<ul style="list-style-type: none"> <li>• softens cellulose and the potatoes become tender; cooked potatoes lose their raw taste</li> <li>• steaming assists in retaining shape; boiling often results in the potatoes breaking up</li> </ul>
Dry method	<ul style="list-style-type: none"> <li>• baking</li> <li>• roasting</li> <li>• shallow or deep frying</li> </ul>	<ul style="list-style-type: none"> <li>• crisp exterior/golden colour</li> <li>• smooth mouth feel</li> <li>• delicious aroma</li> <li>• retains shape</li> </ul>

## Question 3a.

Marks	0	1	2	Average
%	45	31	23	0.8

A **gene** from a **plant or animal** is spliced onto the gene of another plant to improve its characteristics. Examples include Flavr Savr tomatoes, which have delayed ripening and are resistant to bruising; non-browning potatoes; canola and soya; longer lasting raspberries; and tomatoes suitable to grow in cold climates.

This question was poorly answered. One mark was awarded for the definition and one mark for the example.

## Question 3b.

Marks	0	1	2	3	4	Average
%	17	15	22	22	23	2.2

Benefits include:

- could help increase the nutritional value of foods; for example, increasing the protein content of cereals
- food has improved sensory properties (taste, aroma and appearance)
- can delay the ripening of foods to extend their shelf life
- crops can be modified to become pest resistant and therefore produce increased yields
- can reduce the amount of herbicidal sprays used on crops
- plants can be modified to become drought resistant
- foods could be modified to provide edible vaccines.

Risks include:

- the effectiveness of antibiotics may be reduced if genes coded for antibiotic resistance cross from the genetically modified crop to animals used for meat consumption
- crops coded for herbicidal resistance could cross with weeds, producing weeds that are resistant to herbicides
- biodiversity may be affected if genetically modified crops are grown on a large scale
- people who are allergic to some foods, such as nuts, may not know if their food has been altered with the protein they are allergic to
- pollen drift may contaminate non-genetically modified crops.

This question was poorly answered. Answers needed to relate to consumers and/or producers.

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## Question 3c.

Marks	0	1	2	Average
%	55	26	18	0.7

Plant breeding involves transferring one or several genes that carry the desirable traits or characteristics to another plant within the **same species**. This is usually carried out in a laboratory and allows desired traits to be developed in a shorter period of time.

## Question 3d.

Marks	0	1	2	3	Average
%	60	9	12	20	0.9

### 3di.

Suitable food products included:

- seedless watermelon
- bread containing Hi-maize
- margarine containing plant sterols
- baby cos lettuce/baby bok choy
- sweet gem lettuce
- cosmopolitan lettuce.

### 3dii.

Suitable explanations included:

- bread made using Hi-maize has a much higher amylase content and therefore higher levels of resistant starch and dietary fibre than traditional breads
- sweet gems: plant breeding has produced a new variety of small cos lettuce hearts – they have elongated leaves, are paler in colour and have a more delicate flavour
- cosmopolitan lettuce is a cross between two lettuces, iceberg and romaine, which makes the leaves sturdier, crisper and sweet, and strong enough to hold hot and cold fillings for wraps
- margarine (Pro-activ or Logical) containing plant sterol esters assists in lowering cholesterol.

This question was very poorly answered.

## Question 3e.

Marks	0	1	2	3	Average
%	31	16	24	29	1.5

Suitable answers included:

- irrigation/water management – about 40 per cent of the water harvested for irrigation is lost through seepage and evaporation. Poor management of irrigation can lead to rising water tables, which increases salinity. Herbicides and pesticides can be washed into water courses
- growing crops without rotation – lack of crop rotation can result in nutrient levels in the soil decreasing and soil degradation
- soil degradation – caused by land clearing (removal of trees) and over tilling of soil. This results in top soil and nutrient loss
- use of chemicals – poor management of fertilisers can increase the acidity of the soil. If herbicides and pesticides are not applied carefully they can cause spray drift which can contaminate nearby pastures, crops and population centres. Overuse and poor management of pesticides and herbicides can lead to run-off into waterways, causing contamination.

One mark was awarded for identifying the practice and up to two marks for explaining the negative impact on the environment.

## Question 4a.

Marks	0	1	2	3	4	5	6	Average
%	32	12	15	12	13	6	9	2.2

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Level of government and authority	Role of government and authority	Explanation
National	<ul style="list-style-type: none"> <li>developing and reviewing standards for the Food Standards Code</li> <li>the Food Standards Code includes regulations on food labelling</li> <li>research conducted into new ingredients such as novel foods and genetically modified foods</li> </ul>	<ul style="list-style-type: none"> <li>The standards prescribe exactly what the dips must and may not contain.</li> <li>This provides information on what Harvest Fine Foods must include on their label, such as a list of ingredients.</li> <li>This allows Harvest Foods to have confidence about safely including these foods in their dips</li> </ul>
State	<ul style="list-style-type: none"> <li>development of the Food Safety Program based on HACCP</li> <li>approval of food safety auditors</li> <li>the Food Premises Code</li> </ul>	<ul style="list-style-type: none"> <li>This will require Harvest Fine Foods to establish a Food Safety Program that will include the appointment of a food safety supervisor.</li> <li>This ensures that the environmental health officers who will check the premises of Harvest Fine Foods are fully qualified to carry out their role</li> <li>This explains procedures and precautions that are needed when the dips are produced; for example, safe food handling and registration of food premises.</li> </ul>
Local	<ul style="list-style-type: none"> <li>responsibility to register the food business</li> <li>inspect all food premises on an annual basis</li> <li>check that HACCP plan is being implemented</li> </ul>	<ul style="list-style-type: none"> <li>Before they can begin to manufacture their dips, a local environmental health officer will check the premises of Harvest Fine Foods to make sure they comply with their Food Safety Program.</li> <li>The local environmental health officers will check the premises annually to make sure they still comply with the Food Safety Program and that the dips can be produced safely.</li> <li>This ensures that the dips are safe to eat.</li> </ul>

This question was very poorly answered.

### Question 4b.

Marks	0	1	2	Average
%	27	41	31	<b>1.1</b>

Suitable reasons included:

- the HACCP is a food safety system which will enable Harvest Fine Foods to identify potential food hazards and their control points at all stages in the production of the dips
- HACCP enables the company to identify and monitor the critical points where things can go wrong when producing the dips, such as an incorrect refrigeration temperature or poor food handling or sanitation.

### Question 4c.

Marks	0	1	2	3	4	Average
%	10	8	32	17	33	<b>2.6</b>

Suitable answers included:

- personal hygiene – follow appropriate personal hygiene practices such as washing hands thoroughly before handling food
- design of food premises – work areas must be used as designed; that is, enable raw and cooked foods to be prepared separately

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- cleanliness of premises – cleaning must cover all areas of the food premises including walls, floors and benches
- garbage – garbage must be removed regularly to avoid contamination by rodents and pests
- purchasing food supplies – check the use by or best before date to make sure food is safe to eat
- storage – check that food is stored correctly according to whether it is perishable, semi-perishable or shelf stable
- avoid cross-contamination – separate raw and cooked food during preparation and storage.

### Question 4di.

Marks	0	1	2	Average
%	24	35	42	1.2

**Food spoilage** refers to the loss of quality by deterioration in the properties of food whereas **food poisoning** is illness caused by bacterial, chemical or biological contamination of food.

### Question 4dii.

Marks	0	1	2	Average
%	74	8	17	0.5

Suitable responses included answers such as:

- yeast – produces bubbles on the surface of the liquid and gives off a strong ‘yeasty’ smell, causing food to spoil
- moulds – form spores which form as a dark fuzzy mass on the surface of the food, causing food to spoil
- enzymes – the natural chemicals in the food cause food to over ripen and eventually spoil.

This question was poorly answered.

### Question 4diii.

Marks	0	1	2	3	4	Average
%	20	16	23	11	30	2.2

Suitable answers included any two of:

- moisture – bacteria need moisture to divide and multiply
- temperature control – bacteria can grow if the temperature is between 5° and 60° C
- danger zone – food must be kept at a temperature that is either too cold or too hot for bacteria to grow
- time – given the best conditions of moisture and temperature, bacteria can reproduce by binary fusion
- food type – bacteria can grow more quickly in foods that are high in protein
- low-acid environment – bacteria need a low acid environment, such as protein-based foods
- oxygen supply – many bacteria need oxygen to reproduce.

One mark was awarded for identifying each condition and one mark for the related explanation.

### Question 5a.

Marks	0	1	2	3	Average
%	80	3	4	13	0.5

Suitable answers included:

- innovations in plant breeding – by using plant breeding techniques, maize with high levels of resistant starch has been produced
- microencapsulation: minute droplets of fish oil are enclosed in a capsule, which masks the unpleasant sensory properties during eating, and added to a food product during its manufacture; for example, omega 3 fish oil added to bread.

This question was very poorly answered. One mark was awarded for identifying a technological development and the second mark for the description.

### Question 5b.

Marks	0	1	Average
%	54	46	0.5

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Functional foods are foods or ingredients that provide a health benefit to individuals beyond that of the traditional nutrients they contain.

## Question 5c.

Marks	0	1	2	Average
%	42	15	43	<b>1.0</b>

Suitable foods and advantages included:

- Hi-maize muffins or breads – increase fibre content and bowel function
- Logical margarine – contains plant sterol esters which assist in lowering the cholesterol level in people who suffer from high cholesterol.

## Question 5d.

Marks	0	1	Average
%	72	28	<b>0.3</b>

A health claim made by manufacturers of food describes the direct relationship between a specific nutrient and a particular disease, such as food reducing the risk of a heart disease or condition.

This question was poorly answered.

## Question 5e.

Marks	0	1	2	3	Average
%	25	20	18	38	<b>1.7</b>

### 5ei.

Food sensitivity is an unpleasant reaction to a certain food which can lead to varying symptoms, for example headaches or hives, but is not life threatening.

### 5eii.

Correct examples included:

- gluten free products such as gluten free flour
- lactose free milk
- sugar free products.

### 5eiii.

Correct examples included:

- coeliac sufferers
- lactose intolerant people
- those with fructose sensitivity.

## Question 6a.

Marks	0	1	2	3	Average
%	16	6	13	66	<b>2.3</b>

Suitable evaluation criteria included:

- are the picnic packages a convenient snack option for those visitors?
- are the products of high quality?
- are the products able to be pre-prepared requiring little or no final preparation?
- can the products be stored for a short time without refrigeration?
- are the products suitable for a variety of meals throughout the day?
- does the range of products include some local ingredients?

All criteria needed to come from the information in the brief and relate to the food items to be prepared.

## Question 6b.

Marks	0	1	2	3	4	Average
%	23	23	21	20	13	<b>1.8</b>



Food category	i. Example of a suitable food item	ii. Complex process and key step
yeast items	<ul style="list-style-type: none"> <li>bread</li> <li>focaccia</li> <li>rolls</li> </ul>	Yeast baking <ul style="list-style-type: none"> <li>kneading – gluten development</li> <li>proving</li> </ul>
cakes, biscuits or desserts	<ul style="list-style-type: none"> <li>sponge cakes</li> <li>sweet biscuits</li> </ul>	Creaming <ul style="list-style-type: none"> <li>creaming of sugar and shortening, addition of eggs, addition of dry ingredients</li> </ul> Sponge making <ul style="list-style-type: none"> <li>beating of eggs, addition of sugar/dry ingredients</li> </ul>
pastry items	<ul style="list-style-type: none"> <li>shortcrust pastry products</li> <li>puff pastry products</li> <li>choux pastry products</li> </ul>	Pastry making <ul style="list-style-type: none"> <li>rubbing in, kneading and resting</li> <li>folding, rolling and resting</li> </ul>
sweet and savoury preserves	<ul style="list-style-type: none"> <li>chutney</li> <li>pickles</li> <li>sauces (tomato/fruit)</li> <li>jam</li> <li>jelly</li> <li>marmalade</li> </ul>	Jam making <ul style="list-style-type: none"> <li>sterilisation of jars</li> <li>pectin tests</li> <li>calculation of the amount of sugar needed</li> <li>gel test</li> </ul>
confectionery products	<ul style="list-style-type: none"> <li>nougat</li> <li>handmade chocolates</li> <li>toffee</li> <li>fudge</li> </ul>	Confectionery making <ul style="list-style-type: none"> <li>dissolving sugar</li> <li>caramelisation</li> <li>judging soft ball stage</li> </ul>

This question was poorly answered.

**Question 6c.**

Marks	0	1	2	3	Average
%	25	29	28	18	1.4

Suitable tests included:

- quantitative tests – volume, size, weight, colour
- qualitative tests – sensory evaluation
- difference tests – triangle or two out of five
- preference tests – hedonic descriptors
- profiling tests – to develop a sensory profile and quantify differences between food items.

Food category	Product	Properties that could be measured
yeast items	rolls	<ul style="list-style-type: none"> <li>golden crust</li> </ul>
cakes, biscuits or desserts	biscuits	<ul style="list-style-type: none"> <li>even size</li> <li>even colour</li> </ul>
pastry items	pies	<ul style="list-style-type: none"> <li>texture</li> <li>mouth feel</li> <li>crispness</li> </ul>
sweet and savoury preserves	jams and chutneys	<ul style="list-style-type: none"> <li>sweet – spreadable consistency</li> <li>savoury – evenly sized pieces of fruit/vegetable</li> </ul>
confectionery products	chocolates or jellies	<ul style="list-style-type: none"> <li>mouth feel</li> <li>creaminess</li> <li>sweetness</li> </ul>

An appropriate response could be: a panel of consumers carries out the test to analyse the sensory properties of the food and uses various methods to record the findings. They rank the food item.

One mark was awarded for the name of an appropriate test and two marks for a description of the test, including how it is done and what it measures.

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## Question 7a.

Marks	0	1	2	3	Average
%	44	20	22	14	1.1

### 7ai.

Protein or albumen

This question was poorly answered.

### 7aii.

Aeration

- Egg whites are whisked and beaten, which stretches the protein in the egg white. The white is denatured to form an elastic framework around the air bubbles and increase the volume of the egg white.
- The whites are beaten to form foam that entraps the air and increases the volume of the egg white.

One mark was awarded for naming aeration and one mark for describing the function.

## Question 7b.

Marks	0	1	2	3	4	Average
%	47	14	12	13	15	1.4

### 7bi.

- Ingredient: cornflour
- Natural food component: starch

### 7bii.

Gelatinisation occurs when starch granules absorb liquid, swell and thicken when heated.

For full marks the description needed to mention both heating and thickening. This question was poorly answered.