

## 2014 HSC Food Technology Marking Guidelines

### Section I

#### Multiple-choice Answer Key

Question	Answer
1	B
2	A
3	C
4	D
5	C
6	B
7	B
8	A
9	D
10	B
11	C
12	C
13	A
14	D
15	A
16	B
17	D
18	C
19	D
20	C

**Section II****Question 21 (a)**

<b>Criteria</b>	<b>Marks</b>
• Provides characteristics and features of level of operation and the type of mechanisation that exists in the identified organisation	4
• Sketches in general terms level of operation and the type of mechanisation that exist in the identified organisation	2–3
• Provides general information on level of operation and/or the type of mechanisation	1

***Sample answer:***

Nestlé is a multinational organisation operating in a number of countries and employing 1000s of people. It uses a number of technologies to produce a vast range of products from frozen meals through to chocolate bars. Automation and computerisation are essential to produce the required volume and maintain quality of these products. Large-scale production operations are used with 24/7 production lines.

**Question 21 (b)**

Criteria	Marks
• Makes a judgement based on how the organisation has an impact on individuals, society and the environment	7–8
• Provides characteristics and features of how the organisation has an impact on individuals and/or society and/or the environment	5–6
• Sketches in general terms ways in which the organisation has an impact on individuals and/or society and/or the environment	3–4
• Provides general information on the organisation	1–2

**Sample answer:**

Nestlé has both a positive and negative impact on individuals, society and the environment. It provides employment, therefore income, for a large number of people in a variety of areas. Some of these include production plant workers, food technologists and senior management roles.

Nestlé provides a wide range of food options for consumers including breakfast cereals, confectionery and milk products. These products provide convenience and nutrition for individuals, although there can be negative health consequences associated with some of their high sugar/carbohydrate foods such as confectionery and muesli bars.

Nestlé provides societal benefits such as sponsorship of community events, recipe ideas on their website, allergy information and promotion of healthy lifestyle ideas through online educational resources. This is a positive impact as the information assists consumers in making informed choices. Nestlé spends a large amount of money on research and development to provide nutritionally enhanced products such as functional food breakfast cereals.

Nestlé is committed to minimising their environmental footprint. An example of this is the implementation of energy management strategies such as reducing water consumption and eliminating unnecessary resource use and waste generation. Nestlé has signed up to the National Packaging Covenant to minimise the negative impact packaging has on the environment. This is a positive outcome for Australia.

**Question 22 (a)**

Criteria	Marks
• Provides reason/s why the product falls into the nominated category	2
• Provides general information on a type of food product development	1

**Sample answer:**

Name of food product – Cherry Berry Muffins  
 Type of food product development – Line Extension

The Cherry Berry Muffins are an example of a line extension. Line extensions involve relatively minor changes to extend the range of a company's existing products by incorporating features such as new flavours, colours and/or diet-related variations.

**Question 22 (b) (i)**

Criteria	Marks
• Makes the relationship evident between idea generation and screening and the development of the named product	3
• Provides characteristics and features of idea generation and screening associated with the development of the named product	2
• Provides general information on idea generation and screening	1

**Sample answer:**

The new Cherry Berry Muffin range came from initial market research, where feedback from consumers provided useful insights into the current muffin ranges. In addition, ideas for muffin flavours came from recipe books and the internet. Ideas for possible new flavours were brainstormed and recorded to assist in narrowing down flavour options.

The ideas were screened to ensure the likelihood of success.

This may include consideration of financial, processing, marketing and legislative requirements. These considerations were then reflected in the final product.

**Question 22 (b) (ii)**

Criteria	Marks
• Makes the relationship evident between testing of product prototype and the development of the named product	3
• Provides general characteristics and features of testing of product prototype associated with the development of the named product	2
• Provides general information on testing of product prototype	1

**Sample answer:**

Testing of the product prototype is necessary to ensure the product meets the needs of the company, consumer and market.

The Cherry Berry Muffin package was tested to ensure it met the functions of a package, eg it was dropped from a height to test its ability to protect the muffin. There were also storage trials to ensure the package adequately preserved the contents. The findings of this testing were used to adapt the packaging.

Sensory evaluation was conducted amongst the target market. This gave an insight into preferences, and necessary modifications to the muffins were made. An example of this was an increase in the amount of Cherry Berry pieces included in the muffin.

**Question 22 (c)**

Criteria	Marks
• Supports an argument for a place and distribution strategy for the marketing of the named product	4
• Sketches in general terms a place and distribution strategy for the marketing of the named product	2–3
• Provides general information on a place and distribution strategy	1

**Sample answer:**

The Cherry Berry Muffin could be sold in cafés, coffee shops, mobile trucks, street markets and gourmet online food stores. By placing this product at these outlets it would be readily available to the target market. It would suit exclusive distribution, which is a limited supply of the product sold in a few retail outlets. This strategy would position the muffin as a premium product. Transport would involve air, rail and road depending on the distances to be covered and the urgency of the delivery. Distribution needs to be timely as holding too much stock would be expensive and increase the chances of damage and deterioration to the product.

**Question 23 (a)**

Criteria	Marks
• Provides information on a range of causes of food deterioration and spoilage	3
• Recognises and names causes of food deterioration and spoilage	2
• Recognises and names a cause of food deterioration and spoilage	1

**Sample answer:**

Spoilage and deterioration of a food product may be caused by one or more of the following: physical damage caused by micro-organisms; enzymic activity such as the over-ripening of fruit; microbial activity; rodent activity or infestation by bugs such as weevils in flour; or environmental factors such as warm temperatures.

**Question 23 (b)**

Criteria	Marks
• Provides reason/s why and/or how a preservation process that uses restriction of moisture extends the shelf life of food	4
• Provides characteristics and features of a preservation process that uses restriction of moisture to extend the shelf life of food	3
• Sketches in general terms a preservation process that uses restriction of moisture to extend the shelf life of food	2
• Names a preservation process	1

**Sample answer:**

Drying/dehydration – occurs when the water content of a food is reduced. This is usually the result of the water being evaporated. Drying reduces the moisture content of a food to between 5 and 6 per cent. Moulds and bacteria require a moisture content between 13 and 20 per cent to grow, therefore they cannot grow in dehydrated foods and hence the extended shelf life. A moisture content of 5 to 6 per cent also reduces the action of some enzymes contributing to an extended shelf life of the product.

**Question 24**

<b>Criteria</b>	<b>Marks</b>
• Shows how the promotion of health foods is similar to and/or different from the promotion of fast foods	6
• Provides characteristics and features of the promotion of health foods and the promotion of fast foods	4–5
• Sketches in general terms the promotion of health foods and/or the promotion of fast foods	2–3
• Provides general information on health foods and/or fast foods	1

***Sample answer:***

Fast foods, which are usually unhealthy, are often promoted to children who are impressionable. Often a gift with purchase is used to entice consumers and this could be viewed as an unethical marketing practice. Fast food companies have large advertising budgets which enable them to gain wide exposure. Fast food company sponsorship of sporting activities further promotes company brands. Celebrity endorsement may be a strategy employed by fast food companies to influence consumer purchases.

Health foods do not gain the exposure via media promotion that fast foods do. This is generally related to budgets. Health foods such as fruit and vegetables receive very little media exposure. Some community and advisory groups such as the Heart Foundation and the Apple Growers Association run campaigns to promote awareness of the benefits of health foods. An example of this is the ‘make your body sing’ promotion by the Australian Banana Growers Council. The use of the catchy jingle is a similar strategy used in the promotion of fast foods.

School canteens may promote the sale of health food items through adoption of the ‘Traffic Light’ system whereby different foods are sold on ‘Red’ and ‘Green’ days. Many schools are now aligned with the Healthy School Canteen Association, which promotes the sale of more health food options to staff and students. This initiative, by its nature, excludes the promotion of fast foods.

**Question 25**

<b>Criteria</b>	<b>Marks</b>
• Shows a relationship between considerations associated with the development of the vending machine and the apples to be sold	6
• Provides characteristics and features of considerations associated with the development of the vending machine and the apples to be sold	4–5
• Sketches in general terms considerations associated with the development of the vending machine and/or the apples to be sold	2–3
• Provides general information on apples or vending machines	1

***Sample answer:***

The shelf life of the apples would need to be considered. Storage conditions such as modified atmosphere and temperature control within the vending machine could prolong the shelf life of the apples.

A suitable mechanism for dropping the sold apples would need to be developed. This may include a padded receptacle to prevent bruising. The variety of apple, including size, shape and resistance to impact would need to be considered to maximise product quality. Setup costs will be a major consideration as the sale price of apples is likely to be less profitable than other snack foods. Servicing and refilling will be significant because fresh foods have a short defined shelf life.

The form in which the apples are sold is open for consideration. For example, bags of sliced apples using MAP, dehydrated apples or shrink-wrapped apples may be better suited to the extended shelf life and size requirements.



**Question 26 (a)**

Criteria	Marks
• Provides characteristics and features that highlight the differences between a food allergy and a food intolerance	4
• Sketches in general terms the differences between a food allergy and a food intolerance	3
• Sketches in general terms a food allergy and/or a food intolerance	2
• Provides general information on a food allergy or a food intolerance	1

**Sample answer:**

A food allergy is an immunological response to a protein in food whereas intolerance is a response to a specific chemical or combination of chemicals in foods. A food allergy can be life threatening, whereas intolerance is usually associated with unpleasant side effects such as skin rashes and abdominal pain.

A severe food allergy can result in the body going into anaphylactic shock. This may involve swelling of the airways, drop in blood pressure and possible heart failure. This would not happen in the case of an intolerance.

Food substances associated with intolerances include salicylates, amines and glutamates. Common foods associated with food allergies include peanuts, egg, milk, seafood, sesame, wheat and soy. Avoidance of these foods is the only way to prevent an allergic reaction.

**Question 26 (b)**

Criteria	Marks
• Provides characteristics and features of the economic costs associated with food allergies and food intolerances	3
• Sketches in general terms the economic costs associated with food allergies and food intolerances	2
• Provides general information on economic cost/s	1

**Sample answer:**

Economic costs may include the cost of hospital treatment and medication, eg epi-pens. Doctor and specialist appointments add to the medical bills. Counsellors and dieticians may be involved. Recuperative time can be long and time off work may be extensive, leading to potential loss of wage(s) or costs to the employer. Special foods may need to be purchased eg gluten-free products. These can be expensive.

Complications and further health issues could result and further use of expensive resources would be needed to treat such conditions.

### Section III

#### Question 27 (a)

Criteria	Marks
• Sketches in general terms a range of functions of packaging in relation to the product	3
• Sketches in general terms function/s of packaging	2
• Recognises and names the function/s of packaging	1

**Sample answer:**

The packaging of 'SPUDS' meets a range of functions including containment and protection of the chips. The packaging is rigid providing resistance to crushing. It has a label including ingredients, which informs the consumer. The lid means the product is resealable and adds to convenience. The package could use modified atmosphere packaging which would assist in the preservation of the product.

#### Question 27 (b)

Criteria	Marks
• Makes a judgement about the extent to which the product satisfies current legislative requirements for food labelling	4
• Provides characteristics and features of legislative requirements for food labelling	2–3
• Provides general information on food labelling	1

**Sample answer:**

This product meets a number of the legislative requirements of labelling, including provision of an ingredient list, in descending order, country of origin and a name and description of the food.

However, there is much information missing from this label and therefore it is not effective in satisfying current legislative requirements.

To be successful the following needs to be included:

- Nutrition labelling
- Warning and advisory statement/s
- Date mark
- Numbering system of additives used
- Identification of the lot number (food recall information)
- Percentage labelling
- Street address of supplier

**Question 27 (c)**

Criteria	Marks
<ul style="list-style-type: none"> <li>Judges the success of current developments in packaging in extending the shelf life of the product shown and other food products</li> </ul>	7–8
<ul style="list-style-type: none"> <li>Provides characteristics and features of current developments in packaging, may include a judgement of the success in extending the shelf life of the product</li> </ul>	5–6
<ul style="list-style-type: none"> <li>Sketches in general terms current development/s in packaging</li> </ul>	3–4
<ul style="list-style-type: none"> <li>Provides general information on packaging</li> </ul>	1–2

**Answers could include:**

Current developments in packaging have been highly successful in extending shelf life while maintaining product characteristics close to the original product.

Modified atmosphere packaging (MAP) has had the air space around the food altered by the manufacturer. This creates the ideal mix of gases to reduce spoilage and successfully increase shelf life of the food. In the case of this product, the head space within the package would be flushed with nitrogen. This prevents the oil reacting with oxygen, which would produce a rancid flavour. Other foods which use MAP are fresh salad packs, where high ratios of carbon dioxide to oxygen inhibit the action of enzymes and microorganisms, thereby extending shelf life. Likewise, gas flushing of meat with carbon dioxide extends the shelf life of fresh meat from 3 to 21 days and fresh pasta from 3 to 60 days.

Active packaging is another successful packaging development which uses ethylene, oxygen or carbon dioxide scavengers to absorb undesirable gases. A reduction of ethylene slows the ripening of plant foods thus delaying spoilage. Active packaging films allow oxygen to be let in and carbon dioxide to be let out thus slowing respiration.

Sous vide involves cooking, rapidly chilling, vacuum packaging and low temperature storage. Polyester films are used because they are able to withstand variations in temperature. Microorganisms are reduced in the cooking process and the packaging eliminates oxygen, acting as another preservation hurdle. The packaging also prevents contamination, successfully preserving the product.

## Section IV

### Question 28

Criteria	Marks
<ul style="list-style-type: none"> <li>• Draws out and relates the effect that drivers of food product development have had on the nutritional status of Australians</li> <li>• Presents a logical and cohesive response using appropriate terminology and relevant examples</li> </ul>	13–15
<ul style="list-style-type: none"> <li>• Shows a relationship between the drivers of food product development and the nutritional status of Australians</li> <li>• Presents a logical and cohesive response and/or uses appropriate terminology and/or relevant examples</li> </ul>	10–12
<ul style="list-style-type: none"> <li>• Provides characteristics and features of the drivers of food product development and/or the nutritional status of Australians</li> <li>• Provides a logical and cohesive response and/or uses some appropriate terminology and/or relevant examples</li> </ul>	7–9
<ul style="list-style-type: none"> <li>• Sketches in general terms the drivers of food product development and/or the nutritional status of Australians</li> </ul>	4–6
<ul style="list-style-type: none"> <li>• Provides general information on food product development and/or the nutritional status of Australians</li> </ul>	1–3

#### *Sample answer:*

One of the major drivers of food product development is market concerns, particularly those related to health and dietary considerations. Osteoporosis is a disease in which bones become porous and weak and then become susceptible to fractures. A range of calcium enriched products, such as Shape milk, have been developed to assist people in achieving maximum bone density and thereby reducing the incidence of osteoporosis.

Another market concern regarding health is anaemia which is a disorder caused by lack of iron in the diet. This reduces the capacity of red blood cells to carry oxygen around the body resulting in fatigue and weakness. Women are particularly susceptible to this due to blood losses that occur during menstruation. The best source of iron comes from animal sources (haem iron), which is more easily absorbed than that from vegetable sources (non-haem iron). Therefore iron supplies can be a particular problem for vegetarians. Food product developers have attempted to reduce this problem by developing products that are iron enriched such as milks and breakfast cereals.

Food product developers have responded to the high levels of coronary heart disease by developing products with plant sterols, which are thought to reduce the incidence of heart attacks. The addition of plant sterols to margarines, such as Proactive, is thought to reduce the level of blood cholesterol and therefore heart disease.

The increasing incidence of diabetes has become a point of focus for food product developers. Low GI, high fibre foods such as Hi Maize bread have been developed to assist in the management of blood sugar levels and to reduce the incidence of Type 2 diabetes.

Food product developers have responded to the increasing incidence of food allergies and intolerances through the development of a range of products. The ever-increasing number of

gluten free products means that those suffering from coeliac disease can eat a balanced diet and reduce the risk of the development of symptoms. Likewise the development of a range of 'milk' products – soy, rice and almond milk–mean that those suffering from lactose intolerance have access to these products. Improved labelling such as warnings about possible allergens has meant that those with allergies can consume manufactured foods with confidence.

Drivers of societal changes, including an ageing population, increased working hours and single person households, have resulted in the development of convenience foods. These foods are often high in fat, salt and sugar and low in fibre and their consumption is closely linked to the development of obesity and overweight. These conditions exist when energy intake exceeds energy output and are closely linked to mortality and morbidity rates. Over 50% of the Australian population suffer from one of these conditions.

Convenience foods can, however, have a positive impact on the nutritional status of Australians. For example home meal replacements such as Lean Cuisine could be part of an energy controlled eating plan, which assists people in losing weight. Food such as Healthy Choice Dinners may also play a significant role in contributing to a balanced diet for people who are less mobile or unable to easily prepare food for themselves. The ageing population provides motivation for food product developers to design foods that meet the need for both convenience and health.

Food product developers can take advantage of the technology driver to produce healthier foods. An example of this is the selective breeding of beef to result in meat which is lower in saturated fats and rich in polyunsaturated fats. Developments in canned foods have meant that canned seafood, which is rich in fatty acids, is more accessible and affordable for a greater percentage of the population. Products such as Tuna Tempters have meant that children are more likely to eat these valuable foods with the nutritional benefit of consumption of omega-3 fatty acids.

Improved use of packaging materials and processing equipment by food product developers has meant that nutrients are better retained in food processing. In a population which is heavily reliant on others for the production of food, this has a positive impact on health with most Australians having good levels of vitamins and minerals in their diet. This driver has also resulted in a greater range of food products from around the world, all contributing to the improved health of the nation.

The driver of company profitability has had positive and negative effects on the health of Australians. Foods such as \$1.00 cheeseburgers and ice creams have increased profits for fast food companies but contributed to increased levels of obesity. Some developers have recognised the potential of value adding and functional foods as a way of increasing profits and this has produced foods such as Yakult and specialised breakfast cereals, which, while offering good profits and an extension of market share to the company, may also be useful in the prevention of a range of health concerns including bowel cancer, heart disease and constipation.

# Food Technology

## 2014 HSC Examination Mapping Grid

### Section I

Question	Marks	Content	Syllabus outcomes
1	1	Nutrition – Active non-nutrients	H2.1
2	1	Food Manufacture – Food storage	H4.2
3	1	FPD – Internal factors	H1.3
4	1	FPD – Types of food product development	H1.3
5	1	AFI – Waste minimisation	H1.4
6	1	Nutrition – Physical effects of malnutrition	H2.1
7	1	AFI – Value adding	H1.2
8	1	AFI – Legislation	H1.2
9	1	FPD – External factors	H1.3
10	1	AFI – Career opportunities	H1.4
11	1	AFI – Research and development	H1.2
12	1	Nutrition – Role of government organisations in promoting health	H2.1
13	1	FPD – Steps in food product development	H4.1
14	1	FPD – Marketing – Price structure	H1.3
15	1	Nutrition – Functional foods	H2.1
16	1	Food Manufacture – Raw materials	H1.1
17	1	FPD – SWOT analysis	H1.3
18	1	Food Manufacture – Principles behind food preservation techniques	H4.2
19	1	Food Manufacture – Characteristics of equipment	H1.1
20	1	Food Manufacture – Production systems and processing	H1.1

### Section II

Question	Marks	Content	Syllabus outcomes
21 (a)	4	AFI – Levels of operation and mechanisation	H3.1
21 (b)	8	AFI – Impact of organisation on individuals, society and the environment	H1.4
22 (a)	2	FPD – Types of food product development	H1.3
22 (b) (i)	3	FPD – Steps in food product development	H1.3, H4.1
22 (b) (ii)	3	FPD – Steps in food product development	H1.3, H4.1
22 (c)	4	FPD Marketing– Place and distribution strategy	H1.3
23 (a)	3	Food Manufacture – Causes of deterioration and spoilage	H4.2

Question	Marks	Content	Syllabus outcomes
23 (b)	4	Food Manufacture – Principles of preservation	H4.2
24	6	Nutrition – Media and ethical issues	H2.1
25	6	Food Manufacture – Storage and distribution and FPO – technological developments	H1.1, H4.2, H1.3
26 (a)	4	Nutrition – Food allergies & intolerances	H 2.1
26 (b)	3	Nutrition – Economic costs	H2.1

**Section III**

Question	Marks	Content	Syllabus outcomes
27 (a)	3	Food Manufacture – Functions of packaging	H4.2
27 (b)	4	AFI – Policy/legislation & labelling	H1.2
27 (c)	8	Food Manufacture – Current developments in packaging	H1.1, H4.2

**Section IV**

Question	Marks	Content	Syllabus outcomes
28	15	Food Product Development – Drivers of the development of food products Nutrition – Health and the role of diet in the development of conditions	H 1.3, H 2.1