Food & Nutrition 2019 v1.1

IA1 high-level annotated sample response

August 2018

Examination — short and extended response (20%)

This sample has been compiled by the QCAA to assist and support teachers to match evidence in student responses to the characteristics described in the instrument-specific marking guide (ISMG).

Assessment objectives

This assessment instrument is used to determine student achievement in the following objectives:

1. recognise and describe facts and principles related to the processing, and nutritional, chemical, functional and sensory properties, of carbohydrate- or fat-based food

2. explain food science ideas and problems related to carbohydrate- or fat-based food

3. analyse problems, information and data related to the properties and processing of carbohydrate- or fat-based food

4. determine solution requirements and criteria for carbohydrate- or fat-based food problems

5. synthesise chemical, functional and nutritional information and data for carbohydrate- or fat-based food solutions

7. evaluate and refine ideas and carbohydrate- or fat-based food solutions to make justified recommendations for enhancement.

Note: Unit objectives 6 and 8 are not assessed in this instrument.

Instrument-specific marking guide (ISMG)

Criterion: Recognising and explaining

Assessment objectives

1. recognise and describe facts and principles related to the processing, and nutritional, chemical, functional and sensory properties, of carbohydrate- or fat-based food

2. explain food science ideas and problems related to carbohydrate- or fat-based food

The student work has the following characteristics:	Marks
• accurate and discriminating recognition and discerning description of facts and principles related to the processing, and nutritional, chemical, functional and sensory properties, of carbohydrate- or fat-based food • discerning explanation of food science ideas and problems related to carbohydrate- or fat-based food.	4–5
• appropriate recognition and description of some facts and principles related to the processing, or nutritional, chemical, functional or sensory properties, of carbohydrate- or fat-based food • appropriate explanation of food science ideas and problems related to carbohydrate- or fat-based food.	2–3
• variable recognition and superficial description of the processing, or nutritional, chemical, functional or sensory properties, of carbohydrate- or fat-based food • superficial explanation of food science ideas and a problem related to a carbohydrate- or fat-based food.	1
• does not satisfy any of the descriptors above.	0

Criterion: Analysing and determining

Assessment objectives

3. analyse problems, information and data related to the properties and processing of carbohydrate- or fat-based food

4. determine solution requirements and criteria for carbohydrate- or fat-based food problems

The student work has the following characteristics:	Marks

• insightful analysis of relevant problems, information and data related to the properties and processing of carbohydrate- or fat-based food to identify essential characteristics and constraints
• astute determination of
  – essential solution requirements from the brief
  – self-determined criteria that include the relevant impacts and implications, and the quality, functionality and reliability indicators for carbohydrate- or fat-based food problems.
	5–6

• appropriate analysis of problems, information and data related to the properties and processing of carbohydrate- or fat-based food to identify some of the characteristics and constraints
• reasonable determination of some
  – solution requirements from the brief
  – self-determined criteria that include impacts and implications, and the quality, functionality or reliability indicators for carbohydrate- or fat-based food problems
	3–4

• makes statements about a problem or information related to a carbohydrate- or fat-based food problem • vague identification of some solution requirements for carbohydrate- or fat-based food problems.	1–2
• does not satisfy any of the descriptors above.	0

Criterion: Synthesising and evaluating

Assessment objectives

5. synthesise chemical, functional and nutritional information and data for carbohydrate- or fat-based food solutions

7. evaluate and refine ideas and carbohydrate- or fat-based food solutions to make justified recommendations for enhancement

The student work has the following characteristics:	Marks
• coherent and logical synthesis of chemical, functional and nutritional information, and primary and secondary data for chosen solutions • critical evaluation and discerning refinement of ideas and carbohydrate- or fat-based food solutions against self-determined criteria to make astute recommendations for enhancements, justified by data.	8–9
• logical synthesis of chemical, functional and nutritional information, and primary and secondary data for chosen solutions • reasoned evaluation and effective refinement of ideas and carbohydrate- or fat-based food against self-determined criteria to make effective recommendations for enhancements, justified by data.	6–7
• simple synthesis of chemical, functional or nutritional information, and primary or secondary data for chosen solutions • feasible evaluation and adequate refinement of ideas and carbohydrate- or fat-based food solutions against some self-determined criteria to make fundamental recommendations for enhancements, justified by data.	4–5
• rudimentary synthesis of information and data for a chosen solution • superficial evaluation and refinement of ideas and a carbohydrate- or fat-based food solution against some criteria to make elementary recommendations for enhancements.	2–3
• unclear combination of information about a solution for a carbohydrate- or fat-based food problem • identification of a change to an idea or solution.	1
• does not satisfy any of the descriptors above.	0

Task

See the sample assessment instrument for IA1: Examination — short and extended response (20%) (available on the QCAA Portal).

Sample response

Criterion	Marks allocated	Results
Recognising and explaining Assessment objectives 1, 2	5	5
Analysing and determining Assessment objectives 3, 4	6	6
Synthesising and evaluating Assessment objectives 5, 7	9	9
Total	**20**	**20**

The annotations show the match to the instrument-specific marking guide (ISMG) performance-level descriptors.

Recognising and explaining [4–5] accurate and discriminating recognition and discerning description of facts and principles related to the processing, and nutritional, chemical, functional and sensory properties, of carbohydrate- or fat-based food discerning explanation of food science ideas and problems related to carbohydrate- or fat-based food.	
	Part A: Short-response (50-250 words)
	Question 1 (Recognising and explaining)
	Explain the following terms related to the classification of fats and give one food source example of each. (Write the response in dot points — 50 words.)

a) Monounsaturated fats	Example*: olive oil*
• *Two carbon atoms are attached as a double bond because the pair of hydrogen atoms are missing in the chain.* • *Liquid at room temperature* • *Start to solidify if chilled*	

b) Polyunsaturated fats	Example: *safflower oil*
• *Have more than one double bond in the carbon chain therefore more than one pair of hydrogen atoms are missing in the chain* • *Liquid at room temperature and chilled*	

Recognising and explaining [4–5] discerning explanation of food science ideas and problems related to carbohydrate- or fat-based food.	**Question 2 (Recognising and explaining)** Explain the effects on health of consuming foods that are high in saturated fat and trans-fat. (Write the response in sentences — 50 words.) *Both saturated fat and trans-fat cause an increase in blood cholesterol as trans-fat acts like a saturated fat in the body. This causes an increase of cholesterol levels in the blood and may cause heart disease and stroke.*

Question 3 (Recognising and explaining)

A damaged carton of potato crisps has been found by a retailer. On opening the carton, the packets of crisps are deflated and an unpleasant odour can be detected. The crisps are soft and crumbly.

Using your knowledge of processing and properties of fat, explain what chemical process caused the deterioration of the crisps.
(Write your response in sentences — 50 words.)

Oxidative rancidity has occurred. This irreversible process occurs when exposure to oxygen causes the fat in the crisps to become rancid. Rancidity is a state of decomposition of the fat that is characterised by an unpleasant odour and results in the soft crumbly texture of the crisps.

Question 4 (Recognising and explaining, Analysing and determining)

Read the following scenario:

Australian company, Classic Baking is a manufacturer of baked goods for the retail sector. The company recently received consumer feedback about the Classic Biscuit prototypes it plans to introduce into its current range.

Use the following information to analyse the food components and procedures related to the properties and processing of fat and then respond to the questions.

(Write your responses in dot points and/or sentences — 150 words.)

Prototype formulations

Classic Biscuit formulation 1	Classic Biscuit formulation 2	Classic Biscuit formulation 3
Food components 200 g butter 250 g caster sugar 2.5 mL vanilla 1 egg 500 g plain flour 5 g baking powder	**Food components** 125 g butter 125 g caster sugar 2.5 mL vanilla 1 egg 500 g plain flour 5 g baking powder	**Food components** 60 g butter 125 g brown sugar 5 mL vanilla 2 eggs 500 g plain flour 5 g baking powder
Procedure 1. Sift flour and baking powder. 2. Rub butter into the flour and baking soda. 3. Mix in sugar. 4. Add egg and vanilla, then mix until combined. 5. Roll mixture into balls. 6. Baked at 180*c until browned.	**Procedure** 1. Sift flour and baking powder. 2. Rub butter into flour and baking soda. 3. Mix in sugar. 4. Add egg and vanilla, then mix until combined. 5. Roll mixture into balls. 6. Baked at 180*c until lightly browned.	**Procedure** 1. Beat butter and sugar into a cream 2. Add egg and vanilla, then mix until combined. 3. Sift flour and baking powder over butter mixture. 4. Stir until combined. 5. Roll mixture into balls. 6. Baked at 160*c until lightly coloured.

Consumer feedback

Classic Biscuit formulation 1	Classic Biscuit formulation 2	Classic Biscuit formulation 3
Formulation 1 • Appearance — wide, golden but speckled with white dots • Taste — sweet • Flavour — very buttery and undercooked on inside • Texture — too greasy but also grainy • Aroma — buttery and sweet but acceptable	**Formulation 2** • Appearance — golden and well-shaped, speckled • Taste — sweet • Flavour — buttery • Texture — short and grainy but with crisp texture • Aroma — sweet and biscuity	**Formulation 3** • Appearance — small, risen with golden colour • Taste — sweet • Flavour — vanilla • Texture — tough and chewy • Aroma — vanilla

a. Explain the primary function of the fat in the processing of biscuits. (Write your response in dot points.)

Recognising and explaining [4–5]

discerning explanation of food science ideas and problems related to carbohydrate- or fat-based food.

• *primary function of fat is shortening*
• *fat coats the flour grains to prevent moisture absorption and development of gluten strands*
• *texture – tender, crumbly*

b. Explain what effects the quantity of fat in each formulation will have on the finished product. (Write your response in dot points.)

* *Formulation 1 has three times more fat, than formulation 3 therefore 3 would be a much less short biscuit texture than 1.*
* *Formulation 1 is very short, fatty and crumbly due to the high fat content while Formulation 3 has a more cakey texture.*
* *Formulation 2 has a quantity of fat in between 1 and 3 which results in a short and favourable texture for a biscuit.*

c. Use a sensory profiling method to graphically represent sensory attributes of each biscuit, which could be used to evaluate the quality of each prototype.

(Respond with a graphical representation in the space below.)

Biscuit formulation comparison
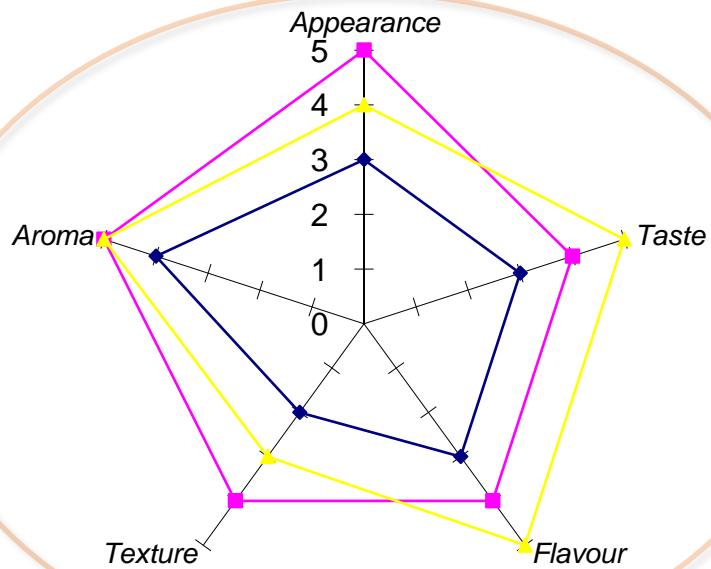
Legend for graph	Star rating	
Blue - Form 1	*Excellent*	*5*
Pink - Form 2	*Good*	*4*
Yellow - Form 3	*Satisfactory*	*3*
	Fair	*2*
	Poor	*1*

Analysing and determining [5–6]

- insightful analysis of relevant problems, information and data related to the properties and processing of carbohydrate- or fat-based food to identify essential characteristics and constraints

d. Analyse the processes and food components used in each formulation, and the sensory profiling data, to draw conclusions as to which is the most effective processing technique and appropriate combination of food components for a Classic Biscuit formulation. Justify your conclusions. (Write your response in dot points.)

The food components in formulation 2 are the best ratio of fat to flour because the appearance and texture sensory profiling data have the highest rating. The processing technique for formulation 3 would produce the best result because the sugar will be dissolved in the fat which will be aerated as evidenced in the texture and taste sensory profiling data.

Part B: Extended response (700 words)

Question 5 (Recognising and explaining, Analysing and determining, Synthesising and evaluating)

The company, Dressings and Spreads, has decided to introduce one new product to its existing product range. It has developed three prototypes and the related data is in the stimulus material.

Use the stimulus material and the Food & Nutrition problem-solving process to document a solution.

In your response:

- analyse the stimulus material to recognise and explain the needs of the relevant stakeholders, consumer trends and essential characteristics and constraints of the problem to determine the solution requirements
- determine solution criteria for the problem
- evaluate the feasibility of the solutions and use the solution criteria to determine your best possible solution
- make justified recommendations for refinements to food components or procedures for future enhancement.

Recognising and explaining [4–5]

discerning explanation of food science ideas and problems related to carbohydrate- or fat-based food

Analysing and determining [5–6]

- insightful analysis of relevant problems, information and data related to the properties and processing of carbohydrate- or fat-based food to identify essential characteristics and constraints

Analysing and determining [5–6]

- astute determination of
  - essential solution requirements from the brief

Analysis of the stimulus material reveals that the stakeholders for this problem are the Dressings and Spreads Company and their customers. The company revealed their plan to increase the number of products produced by adding a new high-quality product line, while the consumers require high quality products with great taste. Consumer trends from the stimulus include convenience of use, perceived quality, mindful choices and lower costs.

The stimulus material revealed that the essential characteristics of the problem include the use of simple processing and use of natural plant-based components with no use of preservatives or chemical additives so will require refrigeration. The constraints include choosing a dressing or spread from the prototyped and tested options that will fall within the nutrient reference values (NRV) for fat and use healthy fats such as polyunsaturated.

The solution requirements can be determined from the above information. The prototype chosen will need to meet the identified consumer trends of convenience, perceived quality and mindful choices and value for money. The company supports these trends in its products by using natural ingredients, minimal processing, polyunsaturated or mono-unsaturated fat and no artificial additives. Good sensory profiling data will be paramount in choosing a solution.

Consideration of all the above will be crucial in choosing a solution. Reviewing the solution requirements will assist in the determination of the solution criteria for the

Analysing and determining [5–6] – self-determined criteria that include the relevant impacts and implications, and the quality, functionality and reliability indicators for carbohydrate- or fat-based food problems **Synthesising and evaluating [8–9]** • coherent and logical synthesis of chemical, functional and nutritional information, and primary and secondary data for chosen solution • critical evaluation and discerning refinement of ideas and carbohydrate- or fat-based food solutions against self-determined criteria to make astute recommendations for enhancements, justified by data.	*problem. The solution criteria are used to evaluate the feasibility of the solution and determining the best solution. These are:* • *supports consumer trends – high quality, budget, mindfully chosen and convenient* • *meets health guidelines – use of unsaturated fats and meets NRV* • *no artificial additives therefore requiring refrigeration* • *simple processing* • *great taste.* *Using the solution criteria to evaluate the feasibility of the prototypes determines the best solution. Each of the prototypes support the consumer trends in that they will produce a high-quality product using mindfully chosen ingredients and be produced economically. This is evidenced by the choice of natural food components used and their commitment to make high-quality plant-based foods.* *Two of the prototypes proposed by the company that meet the health guidelines using unsaturated fats are Pine Nut Dressing (formulation 1) and Coffee Almond Spread (formulation 3) while Asian Peanut Salad Dressing (formulation 2) has coconut oil in the food components which is a saturated fat. Formulations 1 and 3 however yield higher kilojoules than Asian Peanut Salad Dressing (formulation 2). The use of polyunsaturated or monounsaturated fats are required for health but the kilojoules per serve should fit within the NRV for fat per day.* *While none of the formulations contain artificial additives, formulation 1 and 2 however, use emulsifiers to stabilise the emulsion, formulation 3 has no emulsification agents included. The company policy claims that their products require refrigeration as they have a strict no artificial additive policy and the adoption of any of the prototype formulations would meet the requirements. This also provides clear information for the consumer.* *The company uses simple processing techniques such as blending the food components in their existing product lines so the addition of any one of the formulations would be feasible as they already have the required processing equipment. The simple processing techniques enable a new product line to be easily adopted by the company and adds interest and variety to the existing product lines.* *Taste is paramount for consumers and reviewing the sensory profiling data, formulation 2 has the highest number of responses in the great and good category from the profilers. This makes it the most acceptable prototype with formulation 3 being very close in taste and mouthfeel.* *The solution choice is formulation 2 with refinement. This formulation meets all criteria for the problem except of type of fat for health. The Asian Peanut Salad Dressing formulation could be enhanced by replacing the coconut oil with peanut or olive oil which are unsaturated fats. Processing all the nuts for this formulation may improve the mouthfeel. The choice of peanut oil to refine the formulation is a good option as peanuts are already used in the formulation. This choice would add to the company's product lines giving a new taste and appealing to a wider consumer market.*