

# Food & Nutrition subject report

2021 cohort

February 2022

ISBN

Electronic version: 978-1-74378-195-1



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# Contents

<b>Introduction</b> .....	<b>1</b>
Audience and use .....	1
Report preparation .....	1
<b>Subject data summary</b> .....	<b>2</b>
Subject completion .....	2
Units 1 and 2 results .....	2
Units 3 and 4 internal assessment (IA) results .....	2
Total marks for IA .....	2
IA1 marks .....	3
IA2 marks .....	4
IA3 marks .....	5
External assessment (EA) marks .....	6
Final subject results .....	7
Final marks for IA and EA .....	7
Grade boundaries .....	7
Distribution of standards .....	7
<b>Internal assessment</b> .....	<b>8</b>
Endorsement .....	8
Confirmation .....	8
<b>Internal assessment 1 (IA1)</b> .....	<b>10</b>
Examination (20%) .....	10
Assessment design .....	10
Assessment decisions .....	12
<b>Internal assessment 2 (IA2)</b> .....	<b>17</b>
Project — folio (25%) .....	17
Assessment design .....	17
Assessment decisions .....	19
<b>Internal assessment 3 (IA3)</b> .....	<b>22</b>
Project — folio (30%) .....	22
Assessment design .....	22
Assessment decisions .....	24
<b>External assessment</b> .....	<b>28</b>
Examination (25%) .....	28
Assessment design .....	28
Assessment decisions .....	28

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# Introduction

Despite the challenges brought about by the COVID-19 pandemic, Queensland's education community can look back on 2021 with satisfaction at having implemented the first full assessment cycle in the new Queensland Certificate of Education (QCE) system. That meant delivering three internal assessments and one external assessment in each General subject.

This report analyses that cycle — from endorsing summative internal assessment instruments to confirming internal assessment marks, and designing and marking external assessment. It also gives readers information about:

- applying syllabus objectives in the design and marking of internal and external assessments
- patterns of student achievement.

The report promotes continuous improvement by:

- identifying effective practices in the design and marking of valid, accessible and reliable assessments
- recommending where and how to enhance the design and marking of valid, accessible and reliable assessment instruments
- providing examples of best practice where relevant, possible and appropriate.

## Audience and use

This report should be read by school leaders, subject leaders and teachers to:

- inform teaching and learning and assessment preparation
- assist in assessment design practice
- assist in making assessment decisions
- help prepare students for external assessment.

The report is publicly available to promote transparency and accountability. Students, parents, community members and other education stakeholders can learn about the assessment practices and outcomes for General subjects (including alternative sequences (AS) and Senior External Examination (SEE) subjects, where relevant) and General (Extension) subjects.

## Report preparation

The report includes analyses of data and other information from endorsement, confirmation and external assessment processes. It also includes advice from the chief confirmer, chief endorser and chief marker, developed in consultation with and support from QCAA subject matter experts.



# Subject data summary

## Subject completion

The following data includes students who completed the General subject.

**Note:** All data is correct as at 17 December 2021. Where percentages are provided, these are rounded to two decimal places and, therefore, may not add up to 100%.

Number of schools that offered the subject: 105.

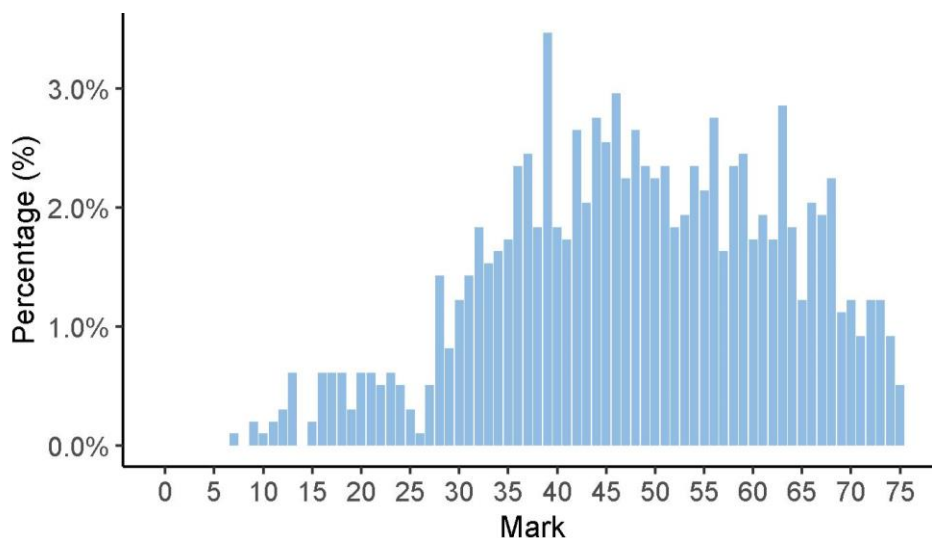
Completion of units	Unit 1	Unit 2	Units 3 and 4
Number of students completed	1326	1213	966

## Units 1 and 2 results

Number of students	Satisfactory	Unsatisfactory
Unit 1	1064	262
Unit 2	1041	172

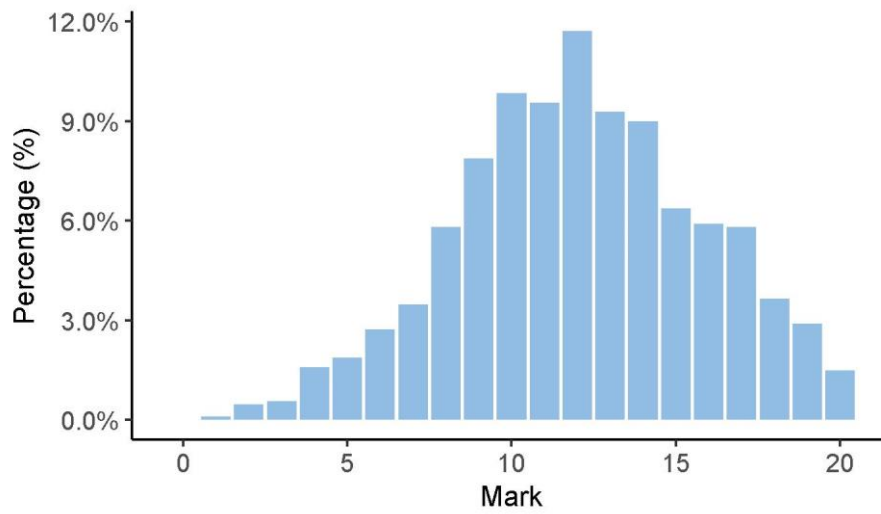
## Units 3 and 4 internal assessment (IA) results

Total marks for IA

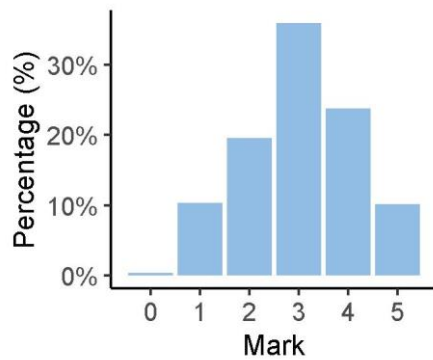


## IA1 marks

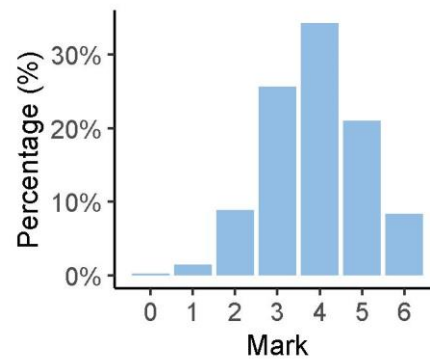
### IA1 total



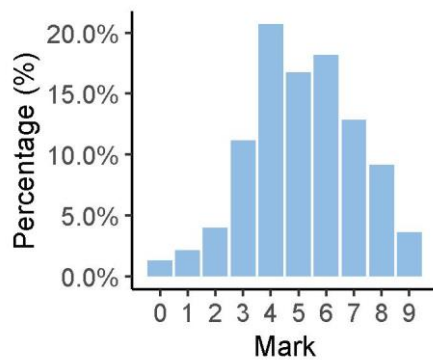
### IA1 Criterion: Recognising and explaining



### IA1 Criterion: Analysing and determining

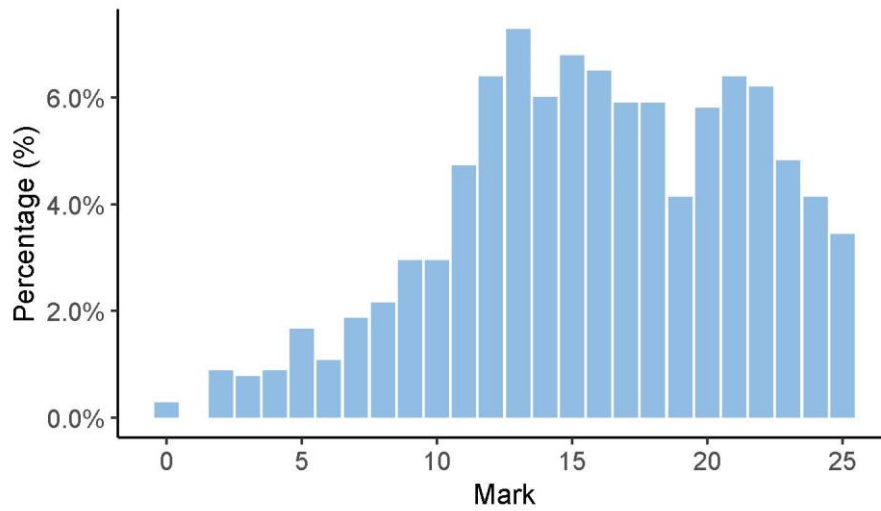


### IA1 Criterion: Synthesising and evaluating

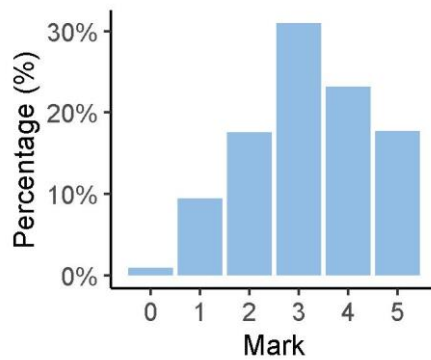


## IA2 marks

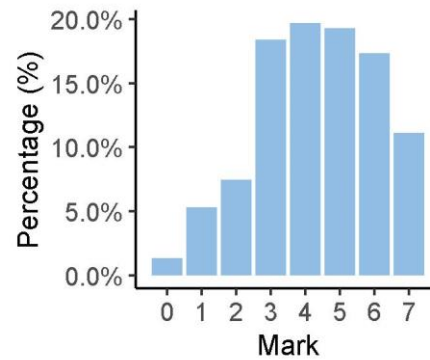
### IA2 total



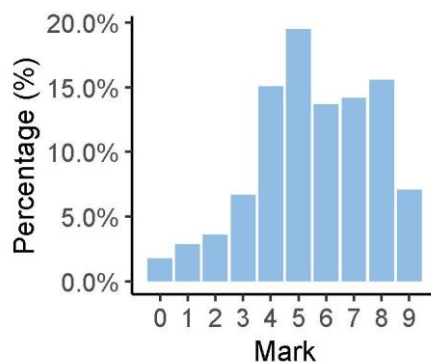
### IA2 Criterion: Recognising and explaining



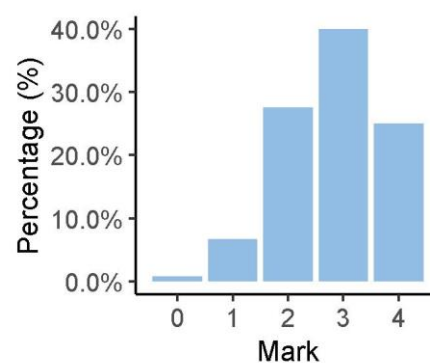
### IA2 Criterion: Analysing and determining



### IA2 Criterion: Synthesising, generating and evaluating

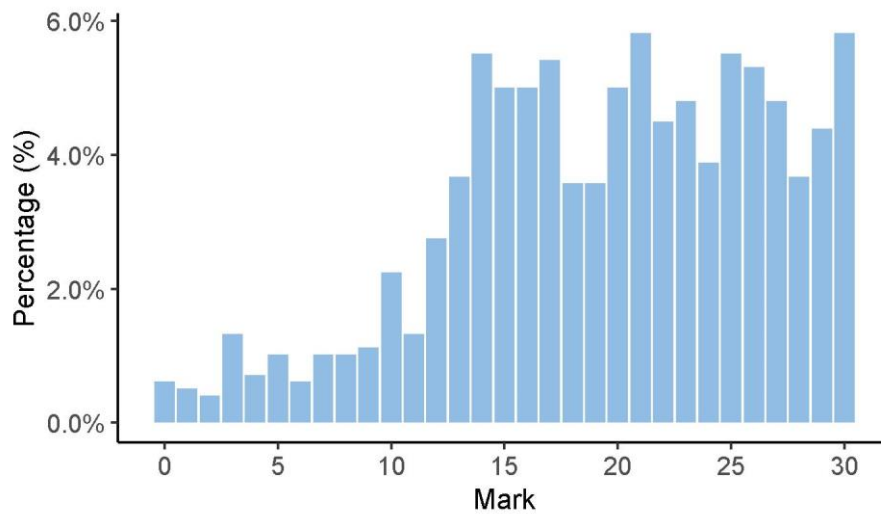


### IA2 Criterion: Communicating

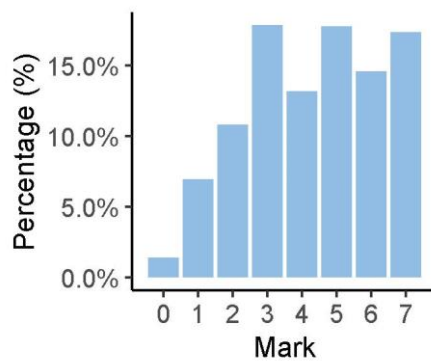


## IA3 marks

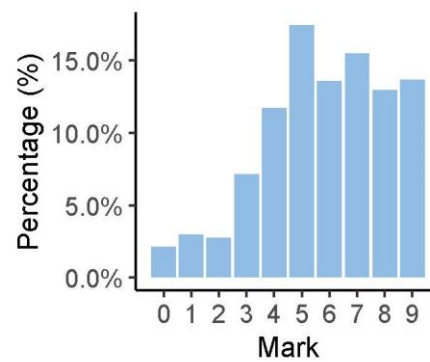
### IA3 total



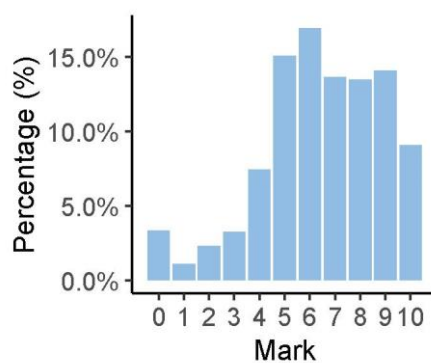
### IA3 Criterion: Recognising and explaining



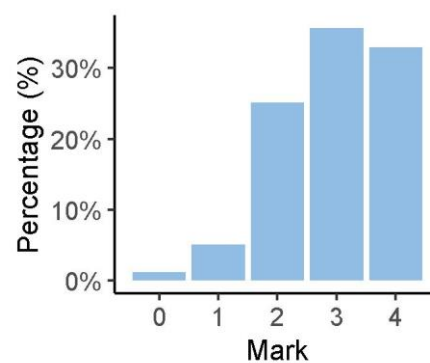
### IA3 Criterion: Analysing and determining



### IA3 Criterion: Synthesising, generating and evaluating

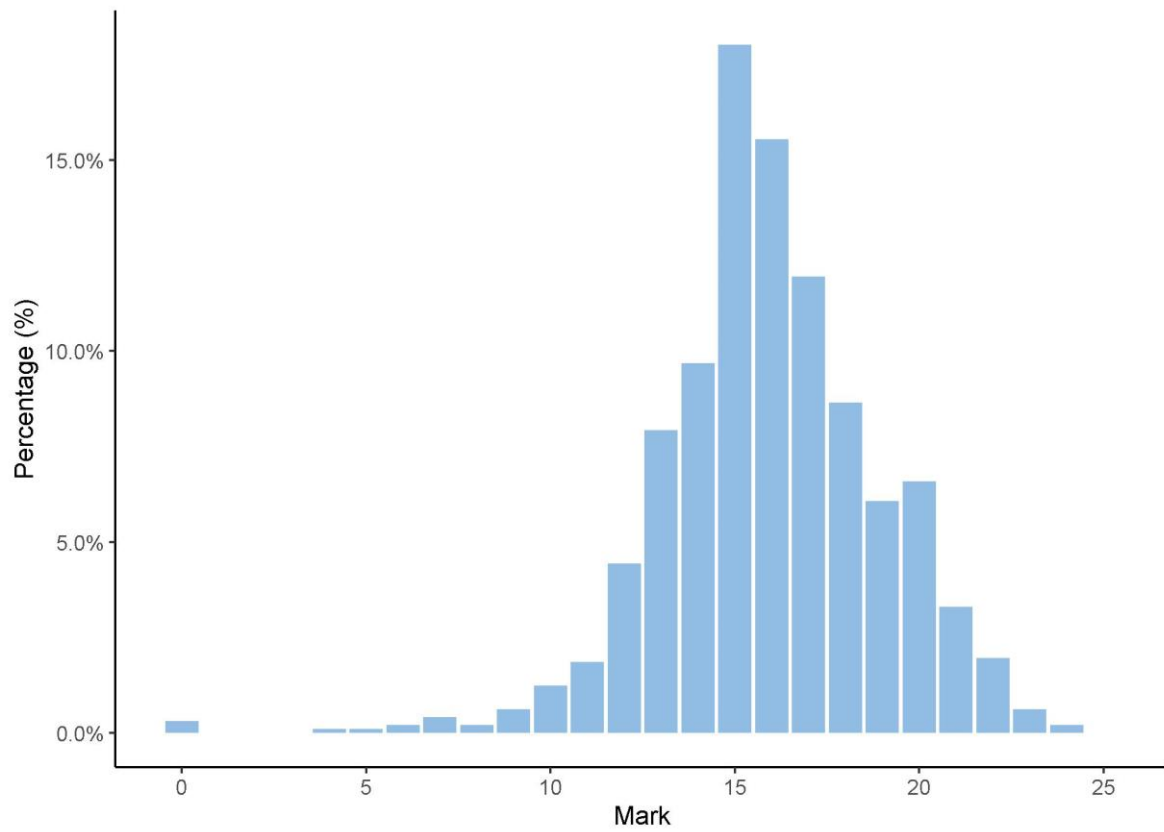


### IA3 Criterion: Communicating



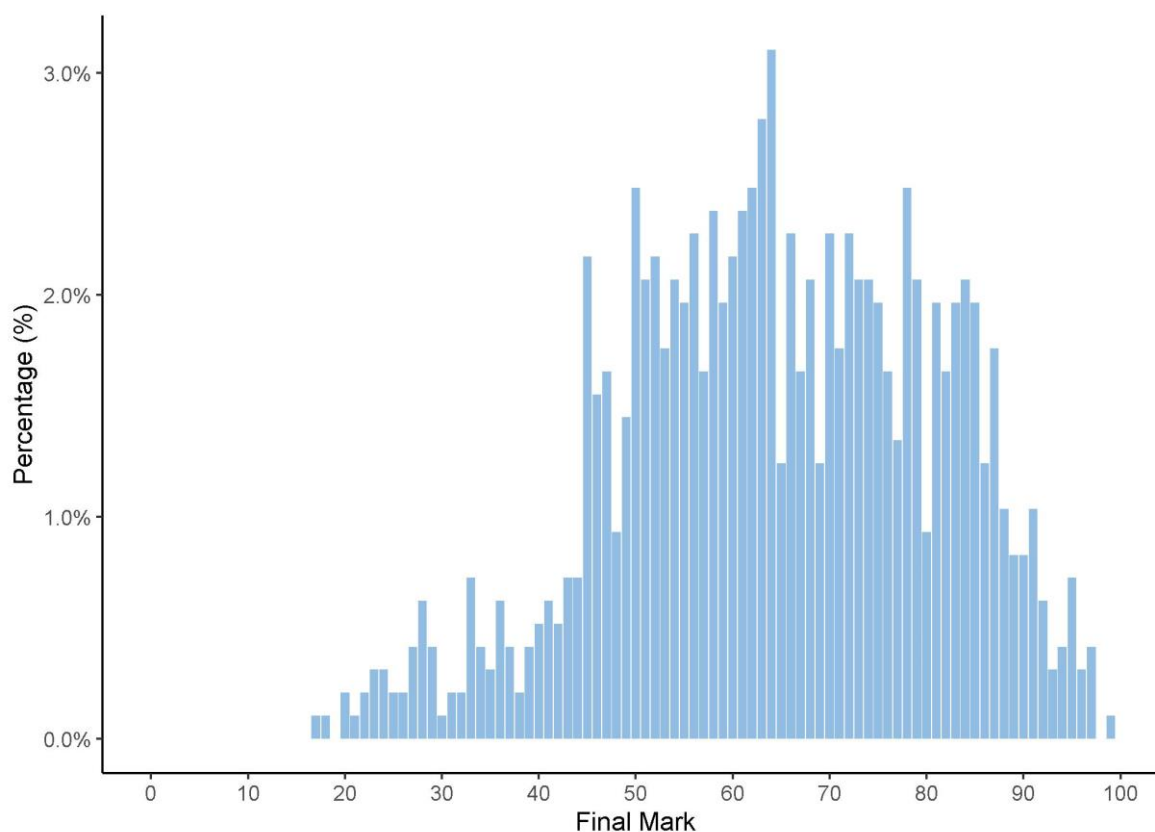


## External assessment (EA) marks



# Final subject results

## Final marks for IA and EA



## Grade boundaries

The grade boundaries are determined using a process to compare results on a numeric scale to the reporting standards.

Standard	A	B	C	D	E
Marks achieved	100–84	83–65	64–45	44–18	17–0

## Distribution of standards

The number of students who achieved each standard across the state is as follows.

Standard	A	B	C	D	E
Number of students	132	337	401	95	1



# Internal assessment

The following information and advice pertain to the assessment design and assessment decisions for each IA in Units 3 and 4. These instruments have undergone quality assurance processes informed by the attributes of quality assessment (validity, accessibility and reliability).

## Endorsement

Endorsement is the quality assurance process based on the attributes of validity and accessibility. These attributes are categorised further as priorities for assessment, and each priority can be further broken down into assessment practices.

Data presented in the Assessment design section identifies the reasons why IA instruments were not endorsed at Application 1, by the priority for assessments. An IA may have been identified more than once for a priority for assessment, e.g. it may have demonstrated a misalignment to both the subject matter and the assessment objective/s.

Refer to the quality assurance tools for detailed information about the assessment practices for each assessment instrument.

### Percentage of instruments endorsed in Application 1

Number of instruments submitted	IA1	IA2	IA3
Total number of instruments	103	103	103
Percentage endorsed in Application 1	31%	38%	62%

## Confirmation

Confirmation is the quality assurance process based on the attribute of reliability. The QCAA uses provisional criterion marks determined by teachers to identify the samples of student responses that schools are required to submit for confirmation.

Confirmation samples are representative of the school's decisions about the quality of student work in relation to the ISMG and are used to make decisions about the cohort's results. If further information is required about the school's application of the ISMG to finalise a confirmation decision, the QCAA requests additional samples.

Schools may request a review where an individual student's confirmed result is different from the school's provisional mark in one or more criteria and the school considers this result to be an anomaly or exception.

The following table includes the percentage agreement between the provisional marks and confirmed marks by assessment instrument. The Assessment decisions section of this report for each assessment instrument identifies the agreement trends between provisional and confirmed marks by criterion.

**Number of samples reviewed and percentage agreement**

<b>IA</b>	<b>Number of schools</b>	<b>Number of samples requested</b>	<b>Number of additional samples requested</b>	<b>Percentage agreement with provisional marks</b>
<b>1</b>	102	538	199	61.76%
<b>2</b>	102	548	165	55.88%
<b>3</b>	102	545	92	70.59%



## Internal assessment 1 (IA1)

### Examination (20%)

The examination assesses the application of a range of cognitions from Recognising and explaining to Synthesising and evaluating. Student responses must be completed independently, under supervised conditions, and in a set timeframe. The examination uses a combination of one extended response and a number of short response questions related to Unit 3 topics. It must provide students with sufficient opportunities to demonstrate the assessable objectives at the highest performance level.

### Assessment design

#### Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

#### Reasons for non-endorsement by priority of assessment

Validity priority	Number of times priority was identified in decisions*
Alignment	26
Authentication	0
Authenticity	31
Item construction	13
Scope and scale	26

\*Each priority might contain up to four assessment practices.

Total number of submissions: 103.

#### Effective practices

Validity priorities were effectively demonstrated in assessment instruments that:

- included carefully constructed items using a range of appropriate cognitions that aligned with the assessment objectives but gave students sufficient opportunities to demonstrate the assessable objectives at the highest performance level
- used a context that was different to the context for the IA2, i.e. one used a fat-based food context while the other used a carbohydrate-based food context
- included stimulus material that was relevant to the extended response question using either a fat-based or carbohydrate-based context and provided sufficient data on the prototypes to give students the opportunity to solve the problem with a unique response
- prescribed authentication strategies reflecting QCAA guidelines for assuring student authorship

- used questions that were sufficiently different from the QCAA sample and allowed for unique student responses under examination conditions.

### Practices to strengthen

It is recommended that assessment instruments:

- provide sufficient opportunities for students to demonstrate their ability in a range of cognitions required for the examination
- align to the chosen context of either Unit 3 Topic 2: Carbohydrate or Unit 3 Topic 3: Fat
- include stimulus items of suitable scope and scale that give students the opportunity to solve the problem with a unique response. Data provided in the stimulus should be succinct and clear without leading students to a predetermined response
- ensure stimulus is not copied from information or texts that students have previously used in class
- ensure stimulus for the extended response is unseen. If students are able to see this stimulus before the examination, it is difficult to authenticate their response as authentic or unique
- avoid questions on topics from other units, such as food drivers or nutrition consumer markets, as these are outside the scope of Unit 3.

### Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

#### Reasons for non-endorsement by priority of assessment

Accessibility priority	Number of times priority was identified in decisions*
Bias avoidance	4
Language	13
Layout	4
Transparency	11

\*Each priority might contain up to four assessment practices.

\*Total number of submissions: 103.

### Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that:

- included clear instructions to inform students of the cognitions and processes required to complete each response
- contained accurate spelling, grammar, punctuation and other textual features
- used appropriate language and avoided the use of jargon and specialist or colloquial language
- used a clear layout for, and alignment to, the syllabus assessment specifications, following the sample IA1 layout available on the QCAA website
- had no obvious patterns in the data provided, to avoid leading students to a particular response.

## Practices to strengthen

It is recommended that assessment instruments:

- reinforce the importance of the cognitions as cues in instructions within the task
- use language that is appropriate, technically correct and aligned with the syllabus, e.g. *formulation, reformulation, process, prototype*
- use only one topic context — either Unit 3 Topic 2: Carbohydrate or Unit 3 Topic 3: Fat
- ensure stimulus material contains relevant, sufficient and correct data to allow students the opportunity to respond to the higher performance levels
- include a response space that reflects the required length of the response
- be sufficiently different to the QCAA sample assessment instrument.

## Additional advice

- Some schools used Part A to assess the Recognising and explaining criterion, leaving Part B to assess the Analysing and determining criterion. Schools could take the opportunity to assess both criteria across Parts A and B.
- Stimulus material provided for the extended response question requires sufficient data (e.g. nutritional data and processing information), in addition to sensory profiling data, to enable students to demonstrate logical and coherent synthesis.
- Sensory profiling in stimulus must not be so obvious that it leads students to an expected response.

## Assessment decisions

### Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

### Agreement trends between provisional and confirmed marks

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Recognising and explaining	86.27%	9.8%	1.96%	1.96%
2	Analysing and determining	81.37%	15.69%	1.96%	0.98%
3	Synthesising and evaluating	64.71%	30.39%	4.9%	0%

## Effective practices

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- responses matched to the upper and mid performance levels in the Analysing and determining criterion when evidence in the student response explicitly referenced stimulus data the student response showed keen discernment of the problem in self-determined criteria
- evidence of refinement of ideas and solutions showed perception and relevance when recommendations for enhancement were justified from the stimulus data.

## Samples of effective practices

The following are excerpts from responses that illustrate the characteristics for the criteria at the performance level indicated. The excerpts may provide evidence of more than one criterion. The characteristics identified may not be the only time the characteristics have occurred throughout a response.

This student response excerpt has been included:

- to demonstrate an accurate and discriminating recognition, and discerning description, of facts and principles related to the processing, and nutritional, chemical, functional and sensory properties of fat-based food
- to show an appropriate explanation of food science ideas and problems related to fat-based food.

<p><b>Recognising and explaining (4–5 marks)</b></p> <ul style="list-style-type: none"> <li>• accurate and discriminating recognition and discerning description of facts and principles related to the processing, and nutritional, chemical, functional and sensory properties of fat-based food</li> <li>• appropriate explanation of food science ideas and problems related to fat-based food</li> </ul>	<p>Explain the possible health impacts of over and under consumption of fat. (Write your response in dot points – 50 - 250 words.)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">a) Overconsumption</td> </tr> <tr> <td style="padding: 2px;">• linked to a higher risk of obesity</td> </tr> <tr> <td style="padding: 2px;">• linked to a higher risk of cancer (breast, colon and prostate)</td> </tr> <tr> <td style="padding: 2px;">b) Underconsumption</td> </tr> <tr> <td style="padding: 2px;">• can cause a deficiency in fat-soluble vitamins such as vitamins A, D, E and K</td> </tr> </table> <p>overconsumption:</p> <ul style="list-style-type: none"> <li>• linked to an increased risk of heart disease and high cholesterol</li> </ul> <p>Explain the multiple functions of fat in the diet. (Write your responses in dot points 50 - 250 words)</p> <ul style="list-style-type: none"> <li>• provides heat and energy. Fat is stored in the tissue and helps insulate the body to maintain core body temperature and keep the body warm when carbohydrates are not available, fats can be used as an energy source.</li> <li>• provides protection for bones and organs from sudden impacts. <i>*see additional paper question 2.</i></li> <li>• provides a vessel for fat-soluble vitamins (A, D, E, K)</li> </ul>	a) Overconsumption	• linked to a higher risk of obesity	• linked to a higher risk of cancer (breast, colon and prostate)	b) Underconsumption	• can cause a deficiency in fat-soluble vitamins such as vitamins A, D, E and K
a) Overconsumption						
• linked to a higher risk of obesity						
• linked to a higher risk of cancer (breast, colon and prostate)						
b) Underconsumption						
• can cause a deficiency in fat-soluble vitamins such as vitamins A, D, E and K						



This student response excerpt has been included:

- as it provides evidence of accurate application of the ISMG for the Analysing and determining criterion
- to demonstrate the appropriate analysis of relevant problems, information and data related to the properties and processing of fat-based food.

**Analysing and determining  
(4–6 marks)**

- appropriate analysis of relevant problems, information and data related to the properties and processing of fat-based food

After analysing the processes and food components used in each formulation, and to sensory profiling data, it is clear that formulation 1 ~~is~~ has the most effective fat to use when making the dressing. This is because:

- formulation one has good sensory feedback from the customers. ✓
- the rice bran oil does not have a strong effect on the taste of the dressing.

question 5 (a):

- when compared to the other fats used in F2 & F3, the taste, aroma, appearance and texture is better for a potato salad. ✓

This student response excerpt has been included:

- as it provides evidence of reasoned evaluation and effective refinement of ideas and a solution against self-determined criteria to make effective recommendations for enhancement.

**Synthesising and evaluating (7–9 marks)**

- reasoned evaluation, and discerning refinement of ideas and the generated solution

created some air pockets but not many leaving it dense in some places. This product has a lower melting point but not quite low enough to make the product greasy. Out of 16 people 14 people either liked it or liked it very much which is still over half. Most sensory profilings are lower than the land except the flavour, ~~which~~ aroma and colour which people preferred the sweet and coconutty senses more and the golden colour. The last formulation, Olive oil spread is also Australian made, but has a low melting point which makes the final product greasy, also because it is an unsaturated fat the pastry does not stay together making it crumbly and gritty. Of the 16 none liked it or liked it very much and this is also evident in the sensory profile as it has a bland and greasy flavour, it is odorless and has a yellow colour. The last thing to evaluate is the feasibility, the 3rd formulation is the cheapest at \$0.74/100ml but also has done the worst everywhere else, the next cheapest is formulation 2 but this product has not got the desired texture. This leaves the first formulation, the most expensive at \$1.43/100g although this is still feasible as it is a high quality product. For further improvements

Logical synthesis of data & info.

don't generalise be specific

Reasoned situation

I would recommend combining the land and copha to help reduce costs but still maintain the sensory profile of a decent pastry.

## Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG for this IA, it is recommended that:

- when making judgments about the Recognising and explaining criterion, responses that match to the higher performance levels are accurate and discriminating and include discerning explanations
- when making judgments about the Analysing and determining criterion, responses that match to the higher performance levels include insightful analysis of both properties and processing of food
- when making judgments about the Synthesising and evaluating criterion, responses that match to the 8–9 performance level synthesise the chemical, functional, sensory properties and nutritional information in a coherent and logical manner. Evaluations need to be justified with data and information from the stimulus.

## Additional advice

- Schools take the opportunity to assess the Recognising and explaining criterion across Parts A and B.
- Stimulus material provided for the extended response question requires sufficient data (e.g. nutritional data and processing information), in addition to sensory profiling data, to enable students to demonstrate logical and coherent synthesis.
- Sensory profiling data in stimulus must not be so obvious that it leads students to an expected response.



## Internal assessment 2 (IA2)

### Project — folio (25%)

In Food & Nutrition, a folio involves individual students documenting the application of the problem-solving process in response to an identified real-world problem that requires a solution. In Unit 3, students define and analyse the problem, develop ideas, generate prototypes and evaluate a solution for a carbohydrate- or fat-based problem. Students document the iterative process undertaken to develop a solution to a food-related problem. The response is a coherent work that may include written paragraphs, annotations and diagrams and occurs over an extended and defined period of time.

### Assessment design

#### Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

#### Reasons for non-endorsement by priority of assessment

Validity priority	Number of times priority was identified in decisions*
Alignment	22
Authentication	2
Authenticity	20
Item construction	18
Scope and scale	28

\*Each priority might contain up to four assessment practices.

Total number of submissions: 103.

#### Effective practices

Validity priorities were effectively demonstrated in assessment instruments that:

- replicated the syllabus specifications within the task. The task provided clear instructions that informed students about the processes required to complete the response, without leading them to a predetermined response
- provided a context that was relevant to the subject matter for the unit/topic, as well as a clear overview and framework for the assessment task
- provided an accurate representation of the scale of information, knowledge and skills that students were required to demonstrate when completing the task
- ensured all stimulus material was relevant to the task, specific to the syllabus, and useful to students without directing their responses

- prescribed authentication strategies reflecting QCAA guidelines for assuring student authorship
- were sufficiently different to the QCAA sample assessment instrument, other school assessments and previous cohorts' assessments.

### Practices to strengthen

It is recommended that assessment instruments:

- ensure the wording of the IA2 matches the syllabus specifications and either Unit 3 Topic 2: Carbohydrate or Unit 3 Topic 3: Fat
- ensure all stimulus material is relevant to the task, specific to the syllabus, and free of information that should be found through research
- facilitate a unique student response and avoid directing students to a set solution
- suit the local school context and be sufficiently different from the QCAA sample instrument to ensure students are able to demonstrate authentic responses.

### Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

#### Reasons for non-endorsement by priority of assessment

Accessibility priority	Number of times priority was identified in decisions*
Bias avoidance	0
Language	3
Layout	0
Transparency	2

\*Each priority might contain up to four assessment practices.

Total number of submissions: 103

### Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that:

- included visually engaging stimulus material, with tables, diagrams and information that were easy to read and interpret
- used appropriate language and avoided the use of jargon and specialist or colloquial language
- were free of errors and modelled accurate spelling, grammar, punctuation and other textual features.

## Practices to strengthen

It is recommended that assessment instruments:

- use instructions that direct students to include the assessable evidence for the IA2 in their responses
- use the terminology of the syllabus, e.g. *formulations*, *food components*
- provide clear instructions, using cues that align to the syllabus specifications, objectives and ISMG.

## Assessment decisions

### Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

### Agreement trends between provisional and confirmed marks

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Recognising and explaining	78.43%	19.61%	1.96%	0%
2	Analysing and determining	75.49%	22.55%	1.96%	0%
3	Synthesising, generating and evaluating	64.71%	30.39%	2.94%	1.96%
4	Communicating	90.2%	6.86%	2.94%	0%

### Effective practices

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- the identification of constraints and essential characteristics was developed through the analysis of information and data from the context, task and stimulus
- generation of solutions at the higher performance level was supported by logical synthesis of information and data from student research, experimentation and sensory testing
- evaluation of the generated solution at the higher performance level addressed all self-determined criteria and data and was justified by data from the sensory profiling of the prototype.

## Samples of effective practices

The following are excerpts from responses that illustrate the characteristics for the criteria at the performance level indicated. The characteristics may provide evidence of more than one criterion. The characteristics identified may not be the only time the characteristics have occurred throughout a response.

This student response excerpt has been included:

- to demonstrate insightful analysis of a relevant problem at the higher performance level for the Analysing and determining criterion
- to demonstrate critical evaluation of prototypes justified by data at the higher performance level for the Synthesising, generating and evaluating criterion.

<p><b>Analysing and determining (6–7 marks)</b></p> <ul style="list-style-type: none"> <li>• insightful analysis of a relevant problem, information and data</li> </ul> <p><b>Synthesising, generating and evaluating (8–9 marks)</b></p> <ul style="list-style-type: none"> <li>• critical evaluation, and discerning refinement of ideas and the generated solution</li> </ul>	<p>From the analysis of the above sensory feedback, it is evident that prototype 1 has large room for improvement, in all 5 areas. For taste, which was one of the lowest quality areas, 50% of sensory profilers reviewed it as 'bad' and the other 50% as 'average'. This implies that there is a lot of room for refinements to improve the taste of the cake, likely as a result of the over inclusion of spices cinnamon and nutmeg, which resulted in a strong, overpowering taste. Profiler's recommendations also suggested that the cake should be less overpowering in terms of aroma. For texture, which was the aspect with the best-received sensory data overall, the majority (50%) of profilers reviewed it as 'average', while 16.7% said it was 'bad' and the other 33.3% as 'good', implying that there is room for improvement, however the texture is not 'bad'. This is likely due to its moist texture that was achieved by the incorporation of pumpkin puree, and the use of raising agents. For appearance, the large majority (66.7%) rated prototype 1 as 'average', with 16.7% as 'poor' and the other 16.7% as 'good'. This spread in review is likely a result of personal opinion of sensory profilers, where some thought it was better than others. Profiler recommendations suggested that adding an icing will improve the overall appearance. It is noted that the appearance of prototype 1 was quite average, with no icing or top decorations, which is reflected in the average reviews. For the level of leavening, the majority of profilers (66.7%) rated prototype 1 as 'average', with the other two 16.7% rating 'bad' and 'good'. This implies that there is room for improvement to increase the quality of leavening in the cake, which was attempted through the incorporation of chemical raising agents: bicarbonate soda and baking powder. For aroma, 66.7% or 2/3 of profilers reviewed the formulation as 'average', with the other 1/3 or 33.3% reviewing it as 'bad'. This suggests further room for improvement to the aroma, which is likely due to the overuse of spices, which resulted in an overpowering aroma once baked. Sensory profilers additionally suggested further improvements to the overall sensory quality of the formulation which are listed above</p>
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This student response excerpt has been included:

- to demonstrate critical evaluation of the generated solution and discerning refinements against self-determined criteria and justified by data at the higher performance level for the Synthesising, generating and evaluating criterion.

<p><b>Synthesising, generating and evaluating (8–9 marks)</b></p> <ul style="list-style-type: none"> <li>critical evaluation, and discerning refinement of ideas and the generated solution</li> </ul>	<p>Therefore, after thorough analysis and consideration, the proposed solution for the carbohydrate-based, ready-made, breakfast product line extension is the peanut butter and chocolate chip pancakes. This is due to this product addressing multiple criteria including:</p> <ul style="list-style-type: none"> <li>Being an appropriate and suitable product for a line extension, fitting in with the company's current line of a carbohydrate-based, ready-made breakfast food.</li> <li>The solution could easily be converted into a dry mix and packaged similarly to the other products already in the line. As a result, no new equipment for packaging would be required for the company to invest into.</li> <li>The solution upholds the values and brand of the company. All ingredients are ethically sourced and produced, as well as being natural and organic. Hence, the food fits with the company's ethos.</li> <li>When the product is converted into a dry mix, the product would have a reasonably long shelf-life <u>as long</u> as the product is stored properly and the packaging is not damaged in any way, allowing air and moisture into the product. Furthermore, this long shelf-life is not achieved through the addition of harmful preservatives or additives, or the application of cold.</li> <li>The product takes into consideration of the chemical and functional properties, which include: physical manipulation, aeration, leavening, the addition of chemical agents, the addition of preservatives, the application of heat and the process of dextrinization.</li> <li>It is a ready-made pancake product, which was highly recommended by 89% of the focus market. Similarly, it is a product that has a unique flavour, which was also highly desired by the focus market.</li> <li>Once the product is converted into a dry mix, minimal further preparation will be required to produce the product.</li> </ul> <p><b>Refinements of Ideas and Solution</b></p> <p>Whilst the solution meets many of the requirements within the developed constraints and criteria, there were a few which the product did not meet, and which could be improved upon. This included:</p> <ul style="list-style-type: none"> <li>The product did not meet the recommendation of 15-25% of the RDI for energy, which is 8700kJ (Betts, et al., 2014). Instead, in one serve of 160g, there is 1080kJ. This is equivalent to 12.4% of the recommended daily intake of energy. Whilst the difference is minimal and does not take into consideration other food or beverages which the consumer may have for breakfast along with this product, it is necessary to at least make the product equal to the lowest energy suggestion of 15%.</li> <li>The product is not necessary classified as healthy or nutritious as one serve contains 12.6g of sugar and 2.7g of saturated fat. Whilst neither of these are as high as some of the other prototypes, it would not satisfy health-conscious consumers.</li> <li>The product is neither vegan or gluten free, which may be a consideration for possible improvements, particularly as 32% of the focus market would like to see more gluten free products.</li> </ul> <p>The proposed solution could be refined by using fat reduced peanut butter, to lower both the sugar and fat content of the product. In addition to this, instead of plain flour, buckwheat flour could be used. This would result in the product being gluten free, and subsequently increase the amount of energy in the product, to perhaps result in a serve that contains 15% of the RDI of energy. Changing the plain flour to buckwheat flour additionally increases the nutritive value of the overall product, making it both healthier and more nutritious.</p>
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### Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG in this IA, it is recommended that:

- the response space provided be consistent with the assessment conditions of 10–12 A3 pages. This encourages students to be succinct and concise in their explanation, analysis, synthesis and evaluation.
- when making judgments about synthesis, schools should consider how well the response demonstrates the generation of a solution, e.g. a response that demonstrates partial demonstration of a solution is unlikely to demonstrate logical synthesis
- schools note that identifying chemical and functional properties requires an in-depth analysis of the properties the folio will be using to investigate, e.g. if the problem does not require developing prototypes for sugar products, crystallisation does not need to be discussed in the folio.





## Internal assessment 3 (IA3)

### Project — folio (30%)

The examination assesses the application of a range of cognitions to provided items from Recognising and explaining to Synthesising and evaluating in a selection of questions, scenarios and problems. Student responses must be completed independently, under supervised conditions, and in a set timeframe. The examination uses a combination of one extended response and a number of short-response questions related to Unit 3 topics. It must provide students with sufficient opportunities to demonstrate the assessable objectives at the highest performance level.

### Assessment design

#### Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

#### Reasons for non-endorsement by priority of assessment

Validity priority	Number of times priority was identified in decisions*
Alignment	23
Authentication	0
Authenticity	12
Item construction	15
Scope and scale	16

\*Each priority might contain up to four assessment practices.

Total number of submissions: 103

#### Effective practices

Validity priorities were effectively demonstrated in assessment instruments that:

- replicated the syllabus specifications and directly used them in the task. Scaffolding provided clear instructions to inform students and provide opportunities to develop unique responses
- provided a context that was relevant to the subject matter for the unit/topic, as well as a clear overview for the assessment task, e.g. a specific nutrition consumer market problem
- had instructions for students about how their work would be authenticated. Authentication strategies included guidance for one draft and teacher feedback
- used checkpoints that were suited to the task and aligned with the authentication strategies.

## Practices to strengthen

It is recommended that assessment instruments:

- match to the syllabus specifications. The use of samples from websites and/or attempts to personalise specifications changes the intent of the task
- avoid including every nutrition consumer market from the syllabus, and allow students to individually identify a nutrition consumer market problem from the set assessment task to help ensure authenticity
- exclude the nutrition consumer market of lactose intolerant nutrition consumers. This will minimise similarities to the IA3 sample response available on the QCAA Portal
- include stimulus that is concise, aligns with the purpose of the task, assists students to complete a unique response, and allows students to conduct their own research
- include specifications in relation to supporting evidence. These specifications should be included in the section that begins 'To complete this task ...'

## Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

### Reasons for non-endorsement by priority of assessment

Accessibility priority	Number of times priority was identified in decisions*
Bias avoidance	0
Language	0
Layout	0
Transparency	1

\*Each priority might contain up to four assessment practices.

Total number of submissions: 103.

## Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that:

- provided clear instructions using cues that aligned to the syllabus specifications, objectives and ISMG
- used clear and unambiguous language and avoided complex and convoluted sentence construction
- used layout and presentation of stimulus material to support students in providing an appropriate response
- were free from errors and modelled accurate spelling, grammar, punctuation and other textual features.

## Practices to strengthen

It is recommended that assessment instruments:

- provide clear instructions, using cues that align to the syllabus specifications, objectives and ISMG
- be free of errors in spelling, grammar, punctuation and other textual features
- provide a clear layout of stimulus material, and ensure all stimulus is specific, relevant to the task and referenced from a reliable source
- use syllabus and food industry language and terminology. All tasks should be developed with an industry context and be selected from only the nutrition consumer markets specified in the syllabus.

## Assessment decisions

### Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

### Agreement trends between provisional and confirmed marks

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional	Percentage both less and greater than provisional
1	Recognising and explaining	85.29%	12.75%	1.96%	0%
2	Analysing and determining	79.41%	18.63%	0.98%	0.98%
3	Synthesising, generating and evaluating	74.51%	18.63%	1.96%	4.9%
4	Communicating	90.2%	7.84%	0.98%	0.98%

### Effective practices

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- the generation of solutions at the higher performance levels was supported by logical synthesis of information and data — from both the sensory profiling data and nutritional data — in the student response
- high-level responses included detailed recommendations for enhancement that were justified using data from students' research and experimentation.

### Samples of effective practices

The following are excerpts from responses that illustrate the characteristics for the criteria at the performance level indicated. The excerpts may provide evidence of more than one criterion. The characteristics identified may not be the only time the characteristics have occurred throughout a response.

This student response excerpt has been included:

- to illustrate the characteristics for the Synthesising, generating and evaluating criterion at the high performance level
- to show critical evaluation of the three products against self-determined criteria, justified by the data.

**Synthesising,  
generating and  
evaluating  
(9–10 marks)**

- critical evaluation of ideas and a solution, against self-determined criteria, justified by data

In Summary, all three products, product 1, product 2 and product 3 have been identified to contain both favourable and weaker traits. However, through comprehensively investigating all three products, it was clear that Product one (Uncle Toby's Oats) overall, complies with the daily health recommendations better than both product two and three. Therefore, product one's breakfast meal provides a more nourishing and advantageous morning meal. Despite this, further refinements and modifications would need to be made to this product in order for a reformulated breakfast meal to suit the elderly consumer market. This includes lowering the amount of fat, sodium, sugar, energy and carbohydrates present and increasing the amount of fibre, calcium, iron and protein. Resultantly, this will assure a high level of consumer acceptance of the breakfast product as the snack given will be more nutrient dense and appealing. It is clear that product one contains 49mg of sodium. When this is compared against the recommended daily intake and against product three (158mg) product one is favoured as it has a significantly lower amount of sodium present, therefore, adhering to the nutrient's requirements of a person of older age. When considering the final breakfast product to solve the identified problem a reduced amount of sodium should therefore be highly considered. Moreover, product one only contained 9.9grams of sugar per serve, this was the lowest amongst all three products and is a quality which strengthens the appearance of product one. However, the recommended daily intake of sugar is determined based on the persons level of activity and ways in which to incorporate more natural sugars should be considered. As the oats contains honey (an ingredient high in sugar) as a sweetener it could be substituted with a rice malt syrup to reduce artificial sweetening and high sugar contents. This would, therefore, reduce the consumers daily sugar intake. Refinements like these should be included and thoroughly thought out for the final breakfast product proposed. Another strength identified in product one is the acceptably low contents of saturated fat as well as the fat total. With the saturated fat only being 0.6g and the total fat intake being 3.2g, the final product should therefore aim for less than 4grams of total fat in order for the breakfast product to reduce elderly people's risk of obesity. A weaker quality seen amongst all three products is the lack of fibre with each product providing 4grams or under. As fibre is vital in maintaining a healthy digestive tract and regulate blood glucose levels it is crucial that the final product contains over 4grams to meet the recommended daily intake of an elderly consumer. It can be concluded that in order to achieve a successful product targeted at the elderly consumer market, the new line extension development must consider refinements and reformulations. This product should appeal to the nutritional demands of the elderly customer as well as the sensory requirements, to produce the most successful and popular product possible.

This student response excerpt has been included:

- to demonstrate coherent and logical synthesis of chemical, functional and nutritional information, discussing how this related to the stakeholders and the constraints of the problem.

<p><b>Analysing and determining (9–10 marks)</b></p> <ul style="list-style-type: none"> <li>coherent and logical synthesis of chemical, functional and nutritional information and a range of primary and secondary data to develop a chosen solution</li> </ul>	<p><b>Developing ideas</b></p> <p><b>2.1 Synthesis of food and nutrition information and data to develop ideas for alternative solutions</b></p> <p>The extension of ideas or substitute solutions is supported by information and data presented in section 1. The problem, stakeholder needs, constraints, chemical and functional properties are used in the prototype products as these techniques were used to deliver the elderly nutritious meals to consume, and the analysis for the Company's current line and other manufactured competing food products in meal delivery companies was combined in section 1.5 to conclude the solution and self-determined criteria.</p> <p>In section 1.1, the problem was identified as the opportunity to develop a nutritious product that compliments the company's most targeted consumers the elderly, which could also be in a range of vegan, dairy free, high in collagen and protein, and is ethically sourced, which is an extension of products currently manufactured by their company.</p> <p>The requirements of the stakeholders, the company and the target market consumers, the elderly, were investigated. The focus groups and sensory profilers were chosen to represent the elderly consumers, established on their significance and relationships to the company's, existing and future stakeholders, and the consumers trends met towards a nutritious meal that provides for all the needs of the elderly.</p> <p>The constraints for the improvement of the protein-based solution such as, using all-natural ingredients, no additives or preservatives, fresh ingredients (to current season) that are readily available and easily accessible, handmade, easy to serve with standardised packaging/plating fresh to customers, safe storage for ingredients before production, packaged with serving suggestions, minimal to preparation-free for the elderly consumer, vegan option or gluten free, dairy free, high in nutrition for elderly e.g. B12, iron, unsaturated fats, and is ethically sourced products, have been contemplated.</p> <p>The existing lines of the products are processed to develop the chemical and functional properties to aerate, dextrinize, caramelize. The functional property of dextrinization and caramelisation was utilized in the, both the company and competing manufacturers existing lines. In section 1.1.2 it was identified that manufacturing costs could be minimal if the new consumer (elderly) based product could be manufactured using current processing technology and equipment, packaging and branding, consequently using the existing processing techniques would be vital for the development of the prototyped solution.</p>
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This student response excerpt has been included:

- to show critical evaluation of the generated solution against self-determined criteria. Note that the refinements are merely *effective* because supporting data has not been included.

<p><b>Synthesising, generating and evaluating (9–10 marks)</b></p> <ul style="list-style-type: none"> <li>critical evaluation and effective refinement of ideas and a solution, against self-determined criteria, to make astute recommendations for enhancements, justified by data</li> </ul>	<p>3. Evaluation and Refinement</p> <p>3.1 Evaluation using self-determined criteria</p> <p>The proposed solution 2, Red Thai Chicken Curry with Rice has been selected as Nutrition Station's new pre-made meal as it is highly nutritious, contains a high protein content, is single serve and addresses all factors, considerations and needs of the stakeholders, solution requirements and self-determined criteria. The meal aligns with Nutrition Station's desired level of premium quality produce based upon the use of an abundance of fresh vegetables and nutritious meat and absence of artificial preservatives, flavour enhancers and additives. The chosen product optimally meets <u>all</u> of the nutritional guidelines of the company based upon the restrictions of, 2000-2200kJ of energy, at least 30g of protein, approximately 50g of carbohydrates, 20- 27g of total fat, less than 10g of sugar and less than 10g of saturated fat per meal. Additionally, the product satisfies the needs of the company and customers as the meal utilises one of the preferred cooking methods, low oil/fat content, non-stick cookware, incorporates excess cooking liquids, can be frozen for 3-6 months, is packaged to sustain the high sensory attributes of the product once defrosted and reheated. The quality sensory properties of the meal including taste, flavour, appearance, texture, and aroma, were ranked as strongly liked by the focus group, suggesting that this product will be highly competitive in the high protein pre-made meal market. The meal is saleable as it abides by the Food Standards Australia New Zealand (FSANZ) and the Australian and New Zealand Regulatory product requirements and is affordable as it is below \$10.00 and meets the needs of the company to provide affordable meals for all stakeholders while maintaining a profit. Based upon the analysis process and preliminary evaluation of the Red Thai Chicken Curry with Rice product was the most suitable and desirable option. This product fits all the needs adequately and is an optimal option for Nutrition Station to expand their market presence in the pre-made meal section and could become the new high-protein pre-made meal to suit the needs of the target market of female fitness-focused weightlifting athletes.</p> <p>3.2 Refinements of ideas and solution</p> <p>The Red Thai Chicken Curry with Rice is a suitable solution; however, the product does not utilise any natural preservatives that will help reduce the perishability of the product and extend shelf life, which is crucial for pre-made meals. The addition of salt, vinegar, sugar, castor oil or herb extracts such as oregano or rosemary would accommodate this problem. Additionally, all sensory attributes were ranked by most of the focus group in the strongly like category. However, some participants ranked the texture, appearance, flavour, and taste in the like category. A potential refinement to enhance flavour is the addition of chilli or pepper to create more depth in the flavour or by adding Worcestershire sauce to improve the savoury taste and add an umami flavour. Specifically, to improve the texture and appearance including vegetables such as bamboo shoots, cauliflower, zucchinis, or mushrooms would provide a range of different textures and enhance the vibrancy of colours to the dish. These additions are minor refinements that would improve all sensory attributes to be unanimously strongly liked as a sensory ranking. Despite these minor refinements, the product was positively received by the stakeholders and sensory profilers considering the nutritional and sensory attributes. The product meets all essential criteria and is expected to be a successful option during the trial period. Therefore, the Red Thai Chicken Curry with Rice is a considered and suitable solution to be added to Nutrition Stations pre-made meal range.]</p>
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### Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG for this IA, it is recommended that:

- when making judgments about the Recognising and explaining criterion, it be noted that responses at the higher performance levels must
  - include a discerning description and explanation of facts and principles. Responses that include an explanation of facts/principles that are not relevant to the problem do not demonstrate discrimination
  - support purposeful and effective generation of solutions with logical synthesis of information and data. If a response does not include concise and well-presented data, the solutions will not be supported
  - make recommendations for enhancements, with support from the sensory profiling data presented in the generation section of the response.



# External assessment

External assessment (EA) is developed and marked by the QCAA. The external assessment for a subject is common to all schools and administered under the same conditions, at the same time, on the same day.

## Examination (25%)

### Assessment design

The assessment instrument was designed using the specifications, conditions and assessment objectives described in the summative external assessment section of the syllabus. The examination consisted of one paper:

- Paper 1, Section A consisted of short response questions (23 marks)
- Paper 1, Section B consisted of extended response questions (41 marks).

The examination assessed subject matter from Unit 4. Questions were derived from the context of Food solution development for nutrition consumer markets.

The assessment required students to:

- respond to short response items

The assessment required students to analyse, synthesise and/or evaluate to fully respond to a question, scenario or problem; to write in bullet points, with some full sentences, constructing a response that may have paragraphs, so ideas are maintained, developed and justified; and/or require other types of item responses, such as drawing, labelling, graphing and tabulation of food and nutrition data.

- respond to an unseen extended response question with unseen stimulus

This assessment required sustained analysis, synthesis and evaluation to fully respond to the problem using full sentences, constructing a response of several paragraphs so ideas are maintained, developed and justified.

The stimulus used included a range of graphs, diagrams, text related to problems for different nutrition consumer markets which was designed to elicit a solution to a problem.

### Assessment decisions

Assessment decisions were made by markers by matching student responses to the external assessment marking guide (EAMG). The external assessment papers and the EAMG are published in the year after they are administered.

## Samples of effective practices

### Short response

Criteria: Recognising and explaining

#### Question 1

This question required students to identify the information required for a food labels nutrition information panel to meet Food Standards Code requirements.

Effective student responses:

- did at least two of the following
  - accurately identified the nutrients provided per serve and per 100g
  - stated that the ingredients were listed in descending order
  - stated the requirement to include allergen information.

This student response excerpt has been included:

- to demonstrate the identification of ingredients in descending order
- as it states the requirement to include allergen information.

<b>Recognising and explaining (1–2 marks)</b>	<p>An ingredients list with the quantities of each ingredient in descending order is needed. In addition a nutritional panel, with key macronutrients and minerals: such as total energy, proteins, fats (including saturated fats), carbohydrates and sodium is listed to show the quantities used in formulating the product. Lastly, allergen information and any health claims are also needed.</p>
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#### Question 4

Part A required students to analyse information and data for two nutrition consumer markets to determine which was most in need of a new product, determine the category of meal, and justify the decision using data from the stimulus.

Effective student responses:

- accurately determined the lactose intolerant nutrition consumer market
- justified the determination of the nutrition consumer market with sensory profiling data
- accurately determined the sensory property most important for the nutrition consumer market
- accurately determined the evening meal as the most important meal
- justified the determination of the most important meal with data from the stimulus.



This student response excerpt has been included:

- as it shows the accurate determination of the nutrition consumer market (lactose intolerant), justified with data from the stimulus. The most important sensory property is stated, although the most important meal for this nutrition consumer market is incorrectly stated and not justified by data.

<p><b>Analysing and determining (3–5 marks)</b></p>	<p>The NCM that is in most need of a new food product is the lactose intolerant. This has been determined as 12.5% stated more than 10 products where as 6.25% stated for peanuts. For appearance, taste, texture majority was rated in the poor category (A-36, Taste-40, tx-50). Further more they rated appearance as the most important sensory property and 36% rated it as poor and taste as the second and 10% rated poor. The food product that is needed the most is lunch as there are only 20 products.</p>
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Part B required students to determine three solution requirements needed to develop a new product for this nutrition consumer market.

Effective student responses:

- determined that the meal should contain no lactose
- determined that the meal should be an evening meal
- determined appearance as the most important sensory property for this group.

This student response excerpt has been included:

- as an example that shows the three requirements accurately for full marks.

<b>Analysing and determining (3 marks)</b>	<p>o meet sensory properties of lactose free consumers *</p> <p>o contain no lactose</p> <p>o Create a product suitable for an evening meal</p> <p>* particularly appearance and taste.</p>
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### Extended response

Criteria: 1. Recognising and explaining, 2. Analysing and determining, 3. Synthesising and evaluating

#### Question 5

This question required students to:

- analyse the problem to determine the solution requirements, including the stakeholders, and explain their needs
- synthesise and evaluate prototypes to meet the needs of the nutrition consumer market, how the prototypes reflected consumer trends, and their performance in sensory profiling
- evaluate prototypes to make a decision, refine ideas, and make justified recommendations for enhancement.

Effective student responses:

- explained the needs of the two stakeholders
- provided an accurate determination of solution requirements to meet these needs
- provided a critical evaluation of the appropriateness of prototype formulations for the nutrition consumer market
- provided an accurate conclusion about the appropriateness of prototype formulations aligning to the consumer trends
- provided a critical evaluation of the four sensory properties of Prototype formulation 1 using data
- identified the prototype formulation that was the best solution, with refinements
- provided detailed justification with evidence from the stimulus
- provided effective recommendations for refinement
- provided detailed justification of the recommendations with evidence from the stimulus.

This student response excerpt has been included:

- to show an explanation of the needs of the two stakeholders
- to demonstrate an accurate determination of solution requirements to meet these needs.

## Analysing and determining (6 marks)

The essential characteristics for the problem include;

- a ready-made-meal. Due to the increase in dual income families there is less time spent cooking however consumers still want access to healthy and nutritious foods
- Suitable for consumers experiencing diet-related or chronic health conditions
  - low in sat fat - reduce LDL to improve blood lipid profile
  - Low GI to reduce the risk of blood sugar spikes for consumers with type 2 diabetes
  - low in sodium due to underfunctioning kidneys
  - relatively low in K<sub>2</sub> so obese individuals can reduce their K<sub>2</sub> intake to loose weight
  - high in dietary fibre to keep the satisfied for longer
  - abundant in fruit and vegetables (vege) to provide phytochemicals which have been proven to protect against certain cancers

- that the prototype undergoes a sensory profiling to gain consumer acceptance.

- aligns with the company's philosophy of 'nose to tail' by using all parts of the animal, reducing food waste and using sustainable source ingredients.

- The company must also adhere to the food trends that were identified with research into the market trends which include the following;

- Eat minimally processed foods

- Eat a more plant based diet to prevent diet-related conditions and chronic disease

- Consume less food by reducing serving size.

The solution requirements for the formulation of the prototype is that the company ~~The solution~~ undergoes a sensory profiling to gain consumer acceptance and adheres to any feedback that is given to improve the formulation. It also needs to incorporate the trends that were identified with research that was conducted in to the market

This student response excerpt has been included:

- to demonstrate the identification of a prototype formulation that is the best solution with refinements
- as an example of justification with evidence from the stimulus
- to show effective recommendations for the refinement of a prototype formulation
- to illustrate the justification of recommendations with some data from the stimulus.

Synthesising and evaluating (6–8 marks)

From an analysis of the sensory profiling and nutritional panel it is clear that the most suitable formulation is F2. F2 has been chosen as it gained the highest consumer acceptance in both the taste and aroma. The ~~meat~~ It had the best review of the meat as it was tender, the flavours were well developed however it was salty, ~~good~~ and had a good balance of meat and vege. However to improve the texture of the prototype the vegetables as they were mushy they should be cooked last and not until they are completely softened. Furthermore to reduce the saltiness only 10ml of Worcestershire sauce should be used as this contains a lot of salt. This is also

beneficial as this will reduce the sodium content making it more suitable for the target market as they may have underfunctioning kidneys

- Don't use lard - use olive oil which is high in HDL which will lower LDL which is good for CHD

- reduce serving size to 75g which will reduce KJ good for people to loose weight and trend for smaller portion size

- change potato to sweet potato - lower GI for diabetes

- put chick peas to increase fibre to keep them full also aligns with trend 2 as this is more plant based

- abundant in fruit and vege

## Practices to strengthen

It is recommended that when preparing students for external assessment, teachers consider:

- emphasising the importance of including data in responses, especially when discussing sensory profiling and nutritional requirements for the nutrition consumer market
- emphasising that recommendations for enhancement must be detailed and justified with data — not a mere list of dot points
- providing opportunities for students to practise analysing sensory profiling data and determining the best and worst sensory qualities of prototypes
- using the terminology of the syllabus, including the syllabus glossary definitions.