



T Level Technical Qualification in Science

Occupational specialism assessment (OSA)

Food Sciences

Assignment 1 - Pass

Guide standard exemplification materials

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Food Sciences

Assignment 1

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Introduction

The material within this document relates to the Food Science Occupational Specialism sample assessment. These exemplification materials are designed to give providers and students an indication of what would be expected for the lowest level of attainment required to achieve a pass or distinction grade.

The examiner commentary is provided to detail the judgements examiners will undertake when examining the student work. This is not intended to replace the information within the qualification specification and providers must refer to this for the content.

In assignment 1, the student must design a new product to meet a consumer trend, including rationale for product, ingredients, timings, safety and calculations of cost and nutritional value.

After each live assessment series, authentic student evidence will be published with examiner commentary across the range of achievement.

Task 1: develop a product brief

Develop a product brief that includes:

1.1(a): Rationale for your selection for the new or improved product, including sources of information used to identify current trends, target market and marketing opportunities

1.1(b): The name, description and conditions of the new or improved product concept, including unique selling point, target weight/volume, packaging and storage details

(21 marks total)

1.2(a): How your ingredients and packaging requirements contribute to your selected consumer trend

1.2(b): A brief description of how the product is manufactured, from the intake of raw materials to the final packaged product. The overview should include the basic details of how the product will be made, and what the key process steps are, to include key food safety and quality controls

(12 marks total)

2 hours 10 minutes

Student evidence

1.1(a) & 1.1(b)

My product is a new development, and it is aimed at the vegan market which is growing at a fast rate. According to **Real Business**, published on 2 January 2020, there are now approximately 600,000 vegans currently living in the UK. 25% of the British population drank plant based milk in 2019, which has increased by 19% since 2018. During 2019, 1 in 3 stopped or reduced meat consumption, and in 2018, the UK launched more vegan products than any other nation.

The growth of veganism is also reinforced in the Mintel “the continued rise of veganism” broadcast found on YouTube at [The continued rise of veganism - YouTube](#). This states that since in January 2021 500,000 million people have joined the Veganuary challenge.

This is the main reason I have chosen a vegan cupcake as my new product.

An overview of my product is as follows:

- name - Vegan Chocolate Cherry Cupcakes
- aimed at vegans and non-vegans aged 5+
- suitable for – vegans
- pack size - it will be sold in packs of 4 individual cakes
- composition - each cake will comprise of a vegan chocolate flavour sponge cake with a cherry jam centre and topped with vegan chocolate frosting and a glacé cherry
- packaging – recyclable brown food grade cardboard boxes with an outer recyclable sleeve with product name and details; this will provide adequate protection in transit
- shelf life – ambient product with best before date of 5 days postproduction

1.2(a) & 1.2(b)

Ingredients (for batch)

Vegan cupcakes:

- 350ml unsweetened soya milk
- 1 tbsp apple cider vinegar
- 330g caster sugar
- 100g dairy-free spread
- 300g plain flour
- 1 tsp bicarbonate of soda
- 80g cocoa powder
- ½ tsp instant coffee granules
- ½ tsp salt

Cherry jam:

- 300g of morello cherries
- 200g of granulated sugar
- ½ lemon, juiced

Vegan icing:

- 75g cocoa powder
- 500g icing sugar
- 100g dairy-free spread
- 125ml unsweetened soya milk

Topping:

- ½ glacé cherry per cupcake

Packaging:

- recycled paper cupcake cases
- brown cardboard cake boxes with window
- pre-printed cardboard sleeve with nutritional information and full labelling requirements

Equipment:

- 2 x 12 hole cupcake tins lined with recycled paper cupcake cases
- 1 heavy bottom pan
- large mixing bowl
- small bowls
- small plates
- medium bowl
- electric handheld mixer
- variety of cutlery including forks, teaspoons, dessert spoons and tablespoon
- spatula
- piping bag and medium size nozzle
- small sharp knives

- thermometer
- a thin, stainless steel skewer
- whisks
- jug
- sieve
- measuring jug
- scales
- cooling racks

I have seen the supplier information to support the vegan claim for the soya milk, cocoa powder and the dairy-free spread and packaging information from the packaging supplier is also provided to show that it is from a sustainable source.

Process

Goods receipt and storage:

- supplier, batch number and best before date recorded for all dry goods and held in dry store at ambient temperature below 21°C:
 - caster sugar
 - granulated sugar
 - flour
 - bicarbonate of soda
 - cocoa powder
 - coffee granules
 - salt
 - icing sugar
 - glacé cherries
 - apple cider vinegar
- supplier, batch number, use by date recorded for all chilled goods and held in chiller at 3°C:
 - soya milk
 - dairy free spread
 - morello cherries
 - lemon
- packaging – batch number and date of receipt recorded, labelling checked and moved to packaging area for storage in dry area

Preparation:

- PPE – I put on the relevant PPE for the task – mob cap, overall, safety shoes
- cleanliness:
 - I checked all work surfaces were clean by swabbing surface areas with ATP swab and confirming that the area was free contamination
 - I collected the required cake tins, pan, large mixing bowl, small bowls, plates, jugs, scales, whisks, hand-held electric mixer, spoons, forks, juicer, spatula, sharp knives, thermometer, cooling racks and skewer from the equipment store and took it to the preparation area
 - I checked all equipment for damage and checked the PAT sticker on the handheld mixer to ensure it was recently checked
- I put the oven on

- I then collected all ingredients from the dry store and chiller, and the paper cases from the packaging area
- all ingredients were measured and laid out in the work area

Cooking

Jam:

I removed all stones and stalks from the cherries and placed them in the pan, I juiced the ½ lemon into the small bowl. I added all cherries, lemon juice and 200g of granulated sugar to the pan and placed it on the hob at a high heat to bring to the boil. Once boiling, I checked the temperature was as 220°C, then reduced the hob to a medium heat and left it to simmer for 15 minutes. I then mashed the cherries down with a fork. I checked the consistency of the jam by taking a small amount on a teaspoon and checking it stuck to the spoon which it did. I then removed the pan from the heat and emptied the contents into a small bowl which was then left to cool.

Cakes:

I lined both cupcake tins with the paper cupcake cases, whisked the soya milk and tablespoon of cider vinegar together in the jug and placed it to one side. I then placed the caster sugar and dairy free spread in the large bowl and creamed them together with the electric mixer and placed it to one side. I then sifted the plain flour, teaspoon of bicarbonate of soda and cocoa powder into a small bowl and mixed in the coffee granules and salt. I then added all the dry ingredients and the soya milk mixture to the large mixing bowl containing the dairy free spread and caster sugar and stirred them together until the mixture was smooth and lump free using a whisk. I filled each cupcake case with the batter until it was 2/3 full. I then baked the cakes in the oven for 25 minutes and checked a sample of 2 cakes on each tray with the skewer to ensure they were fully cooked. I removed the cakes from the oven and the trays and placed them on the cooling racks to cool. I checked the cakes to ensure that the colour was an even brown and they were soft and springy to the touch. All of the cakes were contained within the cupcake case and measured 3cm in diameter.

Frosting

I sifted the icing sugar and cocoa powder into a small bowl and added dairy free spread and mixed together with a fork, I then added the soya milk gradually until the frosting had thickened and the ingredients had combined.

Assembly

I cut a hole in the top of each cake approximately halfway down each cake and retained the cut piece. I then placed some cherry jam in each of the cavities and replaced the cut piece in each cake. I placed the prepared frosting in the piping bag, and I placed a swirl of frosting on each of the cakes ensuring that the top of the cake was covered. Each cake was then topped with ½ glacé cherry placed in the middle of the frosting.

Packing

Each cake box was constructed, and a tray placed in each box. 4 cupcakes were placed in each insert and the insert was placed into the box. The cardboard sleeve was then placed around the box.

Taste Panel

- 1 box was then removed for the taste panel, and the remaining 5 boxes were moved to the dry despatch area
- the taste panel measured each cake against the specification to check for the colour and texture of the cake and the frosting for taste, aroma, and consistency, to ensure each cake looked the same and the sizes were consistent and checking the labelling information was corrected

Despatch

- having confirmed that the product met the specification requirements, I then released the product from despatch

Task 2: define the product brief objectives

Define the product brief objectives to include:

2.1: An estimation of the timings of each stage from product concept to product launch, explaining how the stages in the process affect the overall timeline

(6 marks)

2.2: A calculation of the cost of ingredients and packaging per consumer unit with reference to your proposed recipe. Outline other costs associated with the production of your product. You must state the source of your ingredients and packaging

(12 marks)

2.3: Use a relevant piece of software to calculate the mandatory nutritional data. List the ingredient data, including the source of the data

(7 marks)

2.4(a): An explanation of how the ingredients, processing and packaging selected contribute to the product's safety and shelf life

2.4(b): Explain how the relevant ingredients and processing steps contribute to the product's nutritional profile

(20 marks total)

2 hours 55 minutes

Student evidence

2.1, 2.2 & 2.3

The estimated timeframe for the development of a product from concept to launch is 18 to 22 weeks.

Product concept:

Timescale 1 February to 21 February. The following was considered:

I looked at various vegan products and considered which product was most feasible while considering local facilities, ingredient availability, and labour resource. I decided through research that vegan products were definitely a growing market and with the ingredients available I would be able to meet the requirements of the intended market. The final product will have a net weight of 216g.

The product price point for the customer is £2.20 per pack. Internal costings include raw materials, packaging and labour at a total cost of £2.245, leaving a 7% profit margin per pack.

Idea generation:

Timescale 21 February to 28 February. The following was considered:

I looked at products already on the market. Aldi have recently launched Biscoff cupcakes and chocolate cupcakes, which are receiving good reviews from customers, and they are both similar in size and price, but are sold in packs of 2 rather than 4.

In conversation with commercial and NPD contacts, it was decided that chocolate alone would not work, and I decided to introduce cherry which is traditionally used with chocolate cake to provide moisture without substantially

raising the amount of Aw. The addition of jam in the middle would also add flavour.

Feasibility check:

Timescale 1 March to 14 March

I checked with my tutor that all of the equipment would be available and gave her a typed list of what I required. I also checked with her that I was able to source the raw materials required and that those materials would be suitable for a vegan product by checking the raw material specification from the supplier. I also checked that I would have sufficient time to order the raw materials and get them in with time to check that I had sufficient quantities; in particular, I focused on the packaging and discussed with the artwork team that the labelling would be printed on the sleeves within the agreed timeframes. Soya milk needs to be declared as containing allergens on all product labelling, as stated in Food Information for Consumers Regulations 2014, Regulation 1169/2001

Customer review of the product:

Timescale 14 March to 28 March. I carried out the following actions:

I carried out a taste panel comprising 4 people of various ages on 18th March. I asked the taste panel to compare 2 cupcakes, Aldi Chocolate and the proposed chocolate and cherry cupcake. The chocolate and cherry cupcake scored highly on texture and taste, and the younger participants liked the use of sustainable packaging. The full results of the taste panel can be found at annex C.

Concept approval:

Timescale 25 March to 28 April

During this period, I carried out 2 product trials and gained approval from my tutor to make the product within the development kitchen. I was able to produce costs as listed below, providing a full breakdown of raw material, packaging and labour. Costs proved to be higher than expected, and by producing a batch of 6 I would have to increase the price to £2.57 per pack. My packaging was confirmed by tutor and the artwork was created. Following this, I completed my finished product specification which I could use to ensure consistency of finished product.

Trial run:

Timescale 29 April to 20 May

I ordered the materials to be delivered from the approved suppliers 5 days prior to the start of production. This was to ensure the materials were received on time. I identified areas within the development kitchen where I could work, avoiding the risk of cross contamination as I went. My raw materials were all held in the mixing area and my packaging was at the other side to reduce the risk of foreign body contamination during the production process. I drew up my process flow diagram and agreed with my tutor that my cooking process was key to both the food safety and quality of the product. Key areas were sieving of dry raw materials to prevent foreign body contamination, temperature control of oven to ensure product was cooked, temperature of jam to ensure setting process worked, and final quality checks including taste panel.

Issues I had from the trial runs were that the cake was not fully cooked as I did not wait long enough for oven to preheat, and the frosting was too runny as I added the soya milk too quickly. I was also able to slightly increase the jam, and reduce the cake mix, to increase the yield to 7 packs per batch, thereby reducing the price to £2.20 per pack.

2 samples per batch were sent for microbial testing to check levels of Escherichia coli, Salmonella and Staphylococcus aureus at 2 days and 5 days. All samples were within the limit of <10cfu/g for each pathogen. One sample per batch was used for nutritional analysis and one sample per batch was used for the taste panel. The artwork for the cardboard sleeve was checked by me, and particular attention was paid to the labelling

requirements to ensure accuracy. I carried out a final trial run on 21st May and presented the product and my findings to my customer (tutor) at college.

Review trial of the product:

Timescale 21 May

I delivered a presentation to my customer (tutor) on my trials and explained how I achieved food safety limits and how this linked to my HACCP flow diagram. I showed the customer how I checked the quality of the raw materials through sieving dry ingredients and a visual inspection of the fruit and packaging. I also provided my evidence through my checkweigh monitoring sheet of production yields.

Pre-production:

Timescale 22 May to 29 May

During this time, I carried out a production run whilst being observed by the customer (my tutor). This run went as expected and all products were produced safely. I reviewed all of the raw material specifications to check that the ingredients met all requirements and sent 2 samples for microbial analysis, and one for nutritional analysis to check shelf life. I checked the packaging again to check artwork and labelling was correct, and the packaging met the specification as supplied by the supplier.

Launch product:

Timescale 30 May to 28 June

I set up a stall in the foyer of the college every Friday lunchtime during this period and gave potential buyer the opportunity to taste a small piece of the product before buying. I managed to sell a total of 28 packs of the cupcakes, giving a profit of £25.76 which I gave to the college charity, which is Macmillan. I advertised the sales in advance, through the creation of posters, which I placed on the noticeboard and throughout the college, and I also advertised in the college paper.

Product costing should include all raw materials and packaging:

Recipe costing

Ingredient	Price Per Kg	Price per batch	Supplier
Plain flour	£2.37	£0.71	ABC dry store
Granulated sugar	£1.40	£0.28	ABC dry store
Caster sugar	£1.41	£0.47	ABC dry store
Soya milk	£3.00 (per litre)	£1.43	Veganicious
Cider vinegar	£1.60	£0.03	ABC dry store
Dairy free spread	£3.00	£0.60	Veganicious
Coffee granules	£26.60	£0.10	ABC dry store
Salt	£0.47	£0.01	ABC dry store

Morello cherries	£12.50	£3.75	Red diamond produce
Glacé cherries	£9.00	£0.18	ABC dry store
Icing sugar	£1.70	£0.85	ABC dry store
Lemon	£2.00	£0.30	Red diamond produce
Cocoa powder	£12.50	£1.94	Veganicious
Bicarbonate of soda	£5.10	£0.02	ABC dry store

Total cost was £15.42 per batch, and by increasing the yield to provide 7 packs per batch I was able to retail packs at £2.20 per pack. Labour costs covering preparation, cooking and assembly was £2.25, packaging costs were £2.50 and raw materials totalled £10.67 for packs, leaving a total profit of £0.92 per batch.

2.4(a) & 2.4(b)

I was able to identify a suitable shelf life of the product through the reduction of A_w through the baking process and sugar content, and the product was also sent for microbial testing 2 days and 5 days postproduction.

Ingredients

The ingredients within this recipe were designed to provide an ambient baked product which would have a best before date of 5 days from the date of production. As the product is baked and has a higher sugar content, there is a low level of available water, and microbial testing demonstrated that the levels of Escherichia coli, Salmonella and Staphylococcus aureus were all in the range of <10cfu/g at 5 days.

Packaging

My packaging was designed to be sustainable as all of it was recyclable, and the supplier was able to supply information that the polypropylene used in the window of the cake box met the legal migration limits as required in (EC) No 1935/2004. This packaging was designed to protect the product, both in transit and while on display.

Nutritional calculations

Using Nutricalc I was able to calculate the following:

Energy kJ	1394kj
Energy kcal	333kcal
Protein	4g
Carbohydrates	79g
of which sugars	44g
Total Fat	9.3g
of which saturates	3.3g
Fibre	2.2g
Salt	0.4g

Task 3: food safety and quality management

3.1(a): Produce a flow diagram for your product as outlined in step 4 of the 12 steps of HACCP. This should:

- demonstrate a clear understanding of all steps of the process for subsequent risk assessment
- be presented in a suitable digital format of your choice
- be presented to industry standard

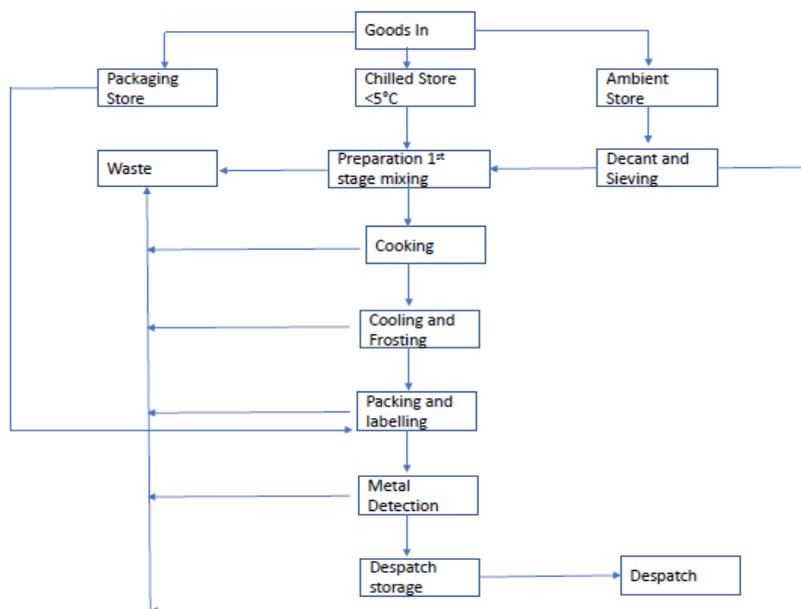
3.1(b): Create a monitoring procedure and associated record to demonstrate how a food safety hazard is under control within the chilled storage area

(21 marks total)
1 hour 15 minutes

Student evidence

3.1(a) & 3.1(b)

I created a HACCP flow diagram as shown below:



I have identified the following hazards and implemented the following controls:

Chilled storage – CCP1 microbial contamination - chiller should be set at 3°C and critical limit is 5°C. Monitoring record should be in place to ensure temperature is consistently maintained <5°C. Regular checks should be carried out, and the time and signature of checker is to be placed on monitoring form. If critical limit breached, contents should be moved to additional chiller and the engineer should be informed.

Decant and sieving – foreign body contamination and microbial – all dry goods to be decanted into bowls and then sieved. Any dry goods containing store product insects to be sent straight to waste and supervisor informed. The batch number, ingredient name, time and date is to be recorded along with signature of operative on monitoring sheet.

Prep and mixing – allergen – allergenic products used with the introduction of soya milk. Product to be returned

immediately to relevant segregated area after storage. Foreign body contamination through poor maintenance of tools and equipment. All equipment to be checked for damage prior to use. Any equipment or tool showing signs of damage not to be used, supervisor should be informed, and damaged tools/equipment removed immediately from production area.

Metal detection – CCP2 - all packs should be check for metal contamination prior to going to despatch. The following test pieces should be used 1.5 ferrous, 2.0 nonferrous, 2.5 stainless steel. Checks carried out at regular intervals and all test pieces must be rejected, if not, the product needs to be put on hold since last check. Monitoring sheet with date, time, batch number of product reject/no reject. Signature of checker and comments.

Here are examples of a monitoring record I created:

CCP 1 – Chiller 1 Temperature						
Date	Time	Area	Temp	Result	Action Taken	Initials
01/01/20	1400	Goods In	3°C	OK		TC
01/01/20	1500	Goods In	3°C	OK		TC
01/01/20	1600	Goods In	3°C	OK		TC
01/01/20	1700	Goods In	4.5°C	OK		TC
01/01/20	1800	Goods In	6°C	OK	Moved all stock to Chiller 2 and engineer informed	TC
Supervisor Signature J Smith						
Date 01/01/2020						

Task 4: product specification and analysis

4.1: Create a product specification that clearly describes:

- food safety attributes and nutritional target values
- quality testing parameters, that include sensory or organoleptic characteristics
- requirements for packaging, mandatory labelling, storage and transportation

(16 marks)

1 hour 10 minutes

Student evidence

An example of a product specification sheet is as follows:

Product name	Vegan Chocolate and Cherry Cupcake
Description	Vegan, dairy free, chocolate sponge with cherry jam centre and chocolate frosting with glacé cherry on top
Organoleptic	3cm diameter, aroma of cherry and chocolate, and springy moist cake with fruity jam
Shelf life	5 days from date of production
Microbiological limits	Under 10 cfu/g
Escherichia coli	All <10 cfu/g
Salmonella	
Staphylococcus aureus	
Packaging	Plain polyprop film window on recyclable brown cake box with insert and recyclable cardboard sleeve with labelling information
Pack size	4 per pack
Storage and transportation	Cool dry place away from direct sunlight and strong odours, maximum 20°C temperature - do not freeze
Ingredients	Plain flour, vegan dairy free spread, vegan cocoa powder, sugar, soya milk , cider vinegar, coffee, salt, morello cherry, glacé cherry, icing sugar, lemon, bicarbonate of soda
Suitable for	Vegans
Allergens	Soy
Typical nutritional analysis	Energy kJ 1394kj

	Energy kcal 333kcal Protein 4g Carbohydrates 79g of which sugars 44g Total Fat 9.3g of which saturates 3.3g Fibre 2.2g Salt 0.4g
Issue date: 22/10/2020	Issued by: Tim Brown
Issue no: 1	Signature:

Examiner commentary

The student has developed a partial rationale for the product which is a likely gap in the marketplace with an identified market. The product name is descriptive and identifies the product use and/or content. The packaging materials are specifically named and can be reused (recycled or biodegradable). The storage conditions are stated and there is an initial indication of shelf life.

The student has provided an ingredient list which has some link to product rationale, though there is limited supplier details beyond the short answer question (SAQ).

The student provides a step by step production process with the stages clearly identified and contains required food safety and quality parameters which are measurable and will facilitate the maintenance of safety and consistency of product throughout.

The student has provided an overall timeline and linked this to each of the development stages. There is likely to be missing information from each of the key actions listed under each stage, however, it is essential that product safety is not compromised.

The student has linked the shelf life to the ingredients, and used suitable processing methods, which provides controls through changes to A_w , pH, and introduction of preservatives, to ensure food will be safe for consumption.

The packaging is suitable for the product made and will not impact on product shelf life by increasing the risk of spoilage or pathogenic growth.

Nutritional claims made are linked to ingredients or processing methods.

The student has provided a process flow showing all key steps, the direction of the process flow, and identifying all hazards. Key content of a monitoring procedure have been provided, along with a monitoring record, recording key information for due diligence and which is easily understood.

The student has created a product specification for their new product in the format as shown. All food safety and labelling information is present and shows 2 sensory/organooleptic methods for quality purposes.

Overall grade descriptors

The performance outcomes form the basis of the overall grading descriptors for pass and distinction grades.

These grading descriptors have been developed to reflect the appropriate level of demand for students of other level 3 qualifications, the threshold competence requirements of the role and have been validated with employers within the sector to describe achievement appropriate to the role.

Occupational specialism overall grade descriptors:

Grade	Demonstration of attainment
Pass	The evidence is logical but displays minimal knowledge in response to the demands of the brief.
	The student makes some use of relevant knowledge and understanding of how it informs practices of the sector and demonstrates a limited understanding of perspectives or approaches associated with food science and food product development processes.
	The student makes adequate use of facts/theories/approaches/concepts/data and attempts to demonstrate breadth and depth of knowledge and understanding.
	The student is able to identify some information from appropriate sources and makes use of appropriate information/appraise relevancy of information and can combine information to make decisions and recommendations.
	The student makes minimal judgements/takes appropriate action/seek clarification with guidance and is able to make limited progress towards solving non-routine problems in real life situations.
	The student attempts to demonstrate skills and knowledge of the relevant concepts and techniques reflected in a food science and/or food product development role and generally applies this across different contexts.
	The student shows adequate understanding of problems that have not been seen before, using limited knowledge to find solutions to problems and make justification for strategies for solving problems, explaining their reasoning.
Distinction	The evidence is precise, logical and provides a detailed and informative response to the demands of the brief.
	The student makes extensive use of relevant knowledge and has extensive understanding of the practices of the sector and demonstrates an understanding of the different perspectives/approaches associated with food science and food development processes.
	The student makes decisive use of facts/theories/approaches/concepts/data, demonstrating extensive breadth and depth of knowledge and understanding and selects highly appropriate skills/techniques/methods.
	The student is able to comprehensively identify information from a range of suitable sources and makes exceptional use of appropriate information/appraises relevancy of information and can combine information to make coherent decisions.
	The student makes well founded judgements/takes appropriate action/seek clarification and guidance and is able to use that to reflect on real life situations in a food science and/or food development role.

	<p>The student demonstrates extensive knowledge of relevant concepts and techniques reflected in a food science and/or food development role and precisely applies this across a variety of contexts and tackles unstructured problems that have not been seen before, using their knowledge to analyse and find suitable solutions to the problems.</p>
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Document information

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Owner: Head of Assessment Design

Change History Record

Version	Description of change	Approval	Date of Issue
v1.0	Published final version.		June 2021
v1.1	NCFE rebrand		September 2021