



T Level Technical Qualification in Science

Occupational specialism assessment (OSA)

Food Sciences

Assignment 1
Mark scheme

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Task 1: develop a product brief

1.1(a) and 1.1(b)

Band	Mark	Descriptor
4	17–21	<p>The student has justified their rationale for the product selected, demonstrating a comprehensive understanding of key characteristics and concepts related to current trends, target markets and marketing opportunities and their inter-relationships.</p> <p>The rationale is well-organised and well-supported by detailed references to current and reliable sources of information. Supporting information is relevant, specific and precise.</p> <p>A wide range of relevant sources has been used (for example, Google Trends, Mintel newsletter, IGD newsletter, industry journals).</p> <p>The student has developed a convincing product name and unique selling point, a detailed product description and complete set of conditions, including packaging/storage.</p>
3	11–16	<p>The student has presented a rationale for the product selected, demonstrating a broad understanding of key characteristics and concepts related to current trends, target markets and marketing opportunities.</p> <p>The rationale is supported by references to reliable sources of information. Supporting information is relevant and specific.</p> <p>The student has developed a relevant product name and unique selling point, and a simple product description and set of conditions, including packaging/storage.</p>
2	6–10	<p>The student has explained reasons for the product selected, demonstrating a basic knowledge of key characteristics and concepts related to current trends, target markets or marketing opportunities.</p> <p>The rationale is supported by references to sources of information. Supporting information is relevant.</p> <p>The student has produced a product name and attempted to give a unique selling point, giving a partial product description and set of conditions.</p> <p>The student has provided some of the required details, although their relationship to each other (whether the name relates directly to the description or the conditions) may be tenuous or unclear.</p>
1	1–5	<p>The student has listed reasons for the product selected, supported by general knowledge and/or assertions.</p> <p>The student has produced a product name and attempted to give a unique selling point, giving minimal product description and conditions.</p> <p>Answers may be presented as a series of unrelated statements.</p>
0	0	No creditworthy material as described in bands 4 to 1.

Indicative content – 1.1(a):

The rationale includes a description of the product (for example, a vegan cupcake is to be developed that is also gluten free). The rationale for its selection, including current trends (for example, increased consumers following vegan diets), target markets (for example, young adults) and marketing opportunities (for example, only one that contains natural ingredients) is detailed.

Sources of reference are stated (for example, FSA, The Food Labelling Regulations 1996, Google Trends, IGD newsletter, supermarket reviews).

Indicative content – 1.1(b):

Included a product name, a clear, detailed description with a clear, well-described unique selling point, realistic target weight/volume, and relevant packaging type and storage conditions.

The product description includes reference to the main ingredients and packaging type (for example, 2 chocolate flavour sponge cupcakes with chocolate flavour icing, hand finished with decorations, packaged in a recyclable plastic tray in a sealed cardboard box). The unique selling point is stated (for example, currently no similar product on the market). A realistic target weight/volume is stated (for example, 55g per cupcake).

1.2(a) and 1.2(b)

Band	Mark	Descriptor
3	9–12	<p>The student has provided a detailed, well-reasoned and relevant explanation of how the selected ingredients and packaging requirements each contribute to the selected consumer trend.</p> <p>The student has given a relevant and balanced explanation of how their selected product is manufactured which includes all processes or steps.</p> <p>The student has ordered the explanation logically and concisely with little extraneous detail, highlighting key food safety and quality controls (for example, temperature, colour, appearance, taste).</p>
2	5–8	<p>The student has provided a relevant and coherent description of the selected ingredients and packaging requirements and how they contribute to the selected consumer trend, demonstrating some understanding of the relevant content.</p> <p>The student has described how their selected product is manufactured, which includes all processes or steps and most of the key quality and food safety controls (for example, temperature, colour, appearance, taste).</p>
1	1–4	<p>The student has provided a statement about how the selected ingredients and packaging requirements contribute to the selected consumer trend. Reasons are supported by general knowledge and/or assertions (rather than occupational knowledge in context).</p> <p>The student has listed most of the processes or steps required to manufacture their selected product and included some quality and food safety controls.</p> <p>Elements of the list may be ambiguous or unclear, and there may be some confusion about which detail is pertinent and which is not required.</p>
0	0	No creditworthy material as described in bands 3 to 1.

Indicative content – 1.2(a):

The explanation shows which ingredients and packaging are relevant to the trend selected and why (for example, a cupcake made with egg-free and dairy-free ingredients achieves a vegan on pack claim). The ingredients are chosen to meet the trend (for example, gluten-free flour, soy milk, dairy-free chocolate and date syrup to meet natural and vegan ingredients). The packaging does not in itself contribute to the trend; however, we will use a recyclable plastic tray and cardboard box to recognise that this health trend can also support environmental responsibility.

Indicative content – 1.2(b):

All raw materials are received and stored under either chilled or ambient conditions before being weighed and mixed using an electric whisk. For example, for cupcakes, the mix is portioned into cupcake cases, before being baked for approximately 20 minutes at 180°C to ensure an evenly distributed golden colour. On removal from the oven, the cupcakes are left to cool before being decorated, and are then packaged in labelled, clear plastic film (2 per pack) and stored under ambient conditions.

Content mapping

K1.16: How to implement and maintain a hazard analysis and critical control point (HACCP)-based food safety management system

K2.1: The stages and principles of the product development process, from concept to launch

K2.6: The first principles of recipe balance:

- proportionality
- nutrient balance
- organoleptic properties
- ingredient substitution where appropriate

K2.9: The reasons for selecting ingredients for specific applications

K2.11: A range of packaging innovations used to reduce plastic waste/increase opportunities for recycling

S2.26: Perform an impact assessment of consumer trends on the design of both a new product development and an existing product development

S2.27: Formulate a recipe from first principles, taking into consideration the customer requirements

S2.30: Recommend packaging when developing a new food product, considering innovations in packaging, to reduce plastic waste and increase opportunities for recycling

Task 2: define the product brief objectives

2.1

Band	Mark	Descriptor
3	5–6	The student has written a well-justified and thought through estimated timeline, detailing all of the stages from product concept to product launch, with realistic and justified estimations of timings for each stage. The student has made clear links between the stages in the process and the overall timeline.
2	3–4	The student has written an estimated timeline, detailing all of the stages from product concept to product launch, with estimations of timings for each stage that are generally realistic and explained. The student has made some links between the stages in the process and the overall timeline.
1	1–2	The student has written an estimated timeline, detailing most of the stages from product concept to product launch, and included some realistic timings. The student has attempted to give a rationale for the timings but these may be tenuous.
0	0	No creditworthy material as described in bands 3 to 1.

Indicative content:

Stages are ordered chronologically from product concept to product launch (for example, brief details, idea generation, initial review meeting and feasibility study). Estimations of timings for each stage are realistic (for example, 1 week for idea generation, 1 day for review meeting (allowing for preparation time and meeting time)). The justifications for the timings of the individual stages on the overall timeline are made clear.

2.2

Criteria	Marks awarded
Definition of a consumer unit (the final size of the product a customer will purchase)	1 mark for clear definition of a consumer unit seen (for example, 110g of product packaged for individual sale). (maximum 1 mark)
Calculation of cost of ingredients	1 mark for each correct calculation of an ingredient seen, based on: <ul style="list-style-type: none"> • (shown) source costings • proportion of quantities within proposed recipe Note: Different calculations will be appropriate for different ingredients with possible conversions also required for consistency, due to units in which ingredients are sold/measured If more than 6 ingredients, marks to be given as a percentage. For example, 10 ingredients with 5 correct would be 3 marks (50%). If less than 6 ingredients, award by number of errors or omissions in calculations. For example, no error is 6 marks, 1 error is 5 marks, and 1 error and 1 omission is 4 marks. If omitted more than half of the ingredients, award 0 marks. (maximum 6 marks)
Calculation of cost of packaging	1 mark for a correct calculation seen based on (shown) source costings. (maximum 1 mark)
Calculation of other relevant costs	1 mark for each additional relevant costs associated with production included in calculation (for example, labour, utility, equipment, distribution or other relevant cost). (maximum 2 marks)
Calculation of final cost per consumer unit	1 mark for correct final calculation method (for example, sum of the cost of each ingredient per batch + the cost of packaging per batch ÷ by the number of consumer units per batch). 1 mark for correct cost per consumer unit (based on student calculations). Allow follow through (for example, if one calculation is incorrect, can still award correct final cost based on student's calculated values; do not penalise an error more than once). (maximum 2 marks)
Total marks:	12 marks

2.3

Criteria	Marks awarded
Selecting calculation method	1 mark for selecting relevant method of calculation (for example, nutritional analysis calculation software).
Calculation of nutritional profile	3 marks for providing a mandatory nutritional profile based on: <ul style="list-style-type: none"> complete list of ingredients (1 mark) correct ingredient proportions (1 mark) correct nutritional information calculated from the list of ingredients (1 mark)
Recognition of mandatory values	1 mark for clear identification of mandatory values: energy value, fat, saturates, carbohydrates, sugars, protein, salt. Award 0 marks if any of the above categories are missing.
Including ingredient data and source	1 mark for listing all ingredient data, including source of data.
Presentation of information	1 mark for clear presentation of information (this may include printouts directly from the software).
Total marks:	7 marks

2.4(a) and 2.4(b)

Band	Mark	Descriptor
4	16–20	<p>The student has written a comprehensive and relevant explanation of how the ingredients, processing and packaging selected contribute to the product's safety and shelf life that is well-evidenced, logical, and details the relative importance of each contributor (ingredients, processing, packaging) and how they work together or interact to ensure product safety and shelf life.</p> <p>The student has provided a detailed, balanced and well-evidenced explanation of how the ingredients and selected processing methods contribute to the nutritional profile (for example, low fat) and how the ingredients and/or processing method contribute to it.</p>

Band	Mark	Descriptor
3	11–15	<p>The student has written an explanation of how the ingredients, processing and packaging selected contribute to the product's safety and shelf life that is well-evidenced and includes most of the relevant detail.</p> <p>The student has provided an explanation of how the ingredients and selected processing methods contribute to the nutritional profile, with some relevant detail and sound reasoning.</p>
2	6–10	<p>The student has written a description of how the ingredients, processing and packaging selected contribute to the product's safety and shelf life that includes some relevant evidence.</p> <p>The student has provided a description of the ingredients and selected processing methods and their contribution to the nutritional profile, with some relevant detail.</p>
1	1–5	<p>The student has written a list of general knowledge and/or assertions (rather than occupational knowledge in context) to support their reasoning for how the ingredients, processing and packaging selected contribute to the product's safety and shelf life.</p> <p>There may be some confusion about which detail is pertinent and which is not required.</p> <p>The student has provided a list of ingredients and selected processing methods, with limited reference to their contribution to the nutritional profile.</p>
0	0	No creditworthy material as described in bands 4 to 1.

Indicative content – 2.4(a):

The explanation needs to include the relevant safety and shelf-life characteristics for the selected product (for example, water activity, pH, salt content, preservative) and their parameters for safety (for example, max water activity of 0.8 for a fruit cake, max pH of 4.6 for a meringue), and the product shelf life.

The explanation needs to show logically how the ingredients, processing and packaging selected contribute to the product's safety and shelf life (for example, adding an amount of lemon juice to ensure a pH target of 4.6 is reached, cooking at 180°C for 50 minutes to reduce the water activity to less than 0.80, the use of an impermeable film to ensure the desired water activity is maintained through shelf life).

Indicative content – 2.4(b):

The explanation needs to show logically how the ingredients and processing selected contribute to the product's nutritional profile.

For example, skimmed milk reduces the fat and energy content. Skimmed milk has a fat content of 0.1g/100ml compared to a fat content of 3.7g/100ml for whole milk. Skimmed milk has an energy value of 150kJ/35kcal per 100ml and whole milk has an energy value of 267kJ/66kcal per 100ml. Sugar has been replaced with sweetener to achieve a low sugar claim at <5%.

An example of the effect of processing on the nutritional profile is the use of oil versus margarine in baked goods (for example, vegetable oil has a saturates content of 7g/100g whereas butter contributes around 50g/100g of saturates).

Content mapping

K1.16: How to implement and maintain a HACCP-based food safety management system

K1.41: The functionality of raw materials, including:

- to meet specific product requirements (for example, preservatives, colour, binding agent, emulsifier)

K1.43: What to consider when selecting raw materials for a particular product, including:

- food safety requirements (for example, allergens)

K1.51: The intrinsic and extrinsic factors used to determine the shelf life of food

K1.53: How a range of food additives (including preservatives) and ingredients with food additive properties can extend the shelf life of food

K1.56: How heat processing techniques may change food and drinks:

- microbial growth, spore formation and survival which impacts on shelf life of food

K1.58: Why heat removal-based food technology is used within the food and drinks industry

K1.60: Why ambient temperature processing is used within the food and drinks industry:

- to control pH levels and water activity
- to prevent the growth and multiplication of micro-organisms

K1.61: The advantages, limitations and uses of the different types of packaging used in the food and drinks industry

K2.1: The stages and principles of the product development process, from concept to launch

K2.2: Why an existing product may need to be changed

K2.9: The reasons for selecting ingredients for specific applications

K2.13: How to calculate total production run costs:

- raw material cost (recipe ingredients and packaging x number of products)
- labour cost (number of people x hourly rate x number of hours)
- utility costs (hourly rate x number of hours)
- equipment (hourly rate x number of hours)
- distribution and transportation costs (batch size and number of vehicles required)

S1.88: Select raw materials as per recipe/client requirement, to ensure that the finished product:

- meets recipe requirements
- provides the required nutritional value and organoleptic requirements
- meets product specification (for example, preservatives, colour, binding agent, emulsifier, origin of raw materials)

S1.91: Check all customer requirements have been met in order to ensure quality of product and shelf life of food

S2.27: Formulate a recipe from first principles, taking into consideration the customer requirements

S2.30: Recommend packaging when developing a new food product, considering innovations in packaging to reduce plastic waste and increase opportunities for recycling

S2.31: Carry out a product costing on a new product and on a modification to an existing product

Task 3: food safety and quality management

3.1(a) and 3.1(b)

Band	Mark	Descriptor
3	15–21	<p>The student has produced a comprehensive, detailed and very clear process flow that includes all process steps and logically shows how they are connected.</p> <p>The student has created a concise and complete monitoring procedure including all key aspects of the procedure that demonstrates an identified food hazard is under control.</p> <p>The student has included an associated record that captures all relevant information and data for the monitoring procedure. The record has a clear layout and style to aid effective and accurate completion.</p>
2	8–14	<p>The student has produced a process flow that includes all process steps and how they are connected.</p> <p>The student has created a credible monitoring procedure including most key aspects of the procedure that demonstrates an identified food hazard is under control.</p> <p>The student has included an associated record that captures most of the relevant information and data for the monitoring procedure. It is reasonably clear how the record can be completed.</p>
1	1–7	<p>The student has produced a process flow that includes most process steps with some attempt to show how each step is connected, although this may be ambiguous or insufficient in detail.</p> <p>The student has created a monitoring procedure that indicates an identified food hazard is under control and includes most key aspects of the procedure.</p> <p>The student has included an associated record that captures some relevant information and data for the monitoring procedure, although the information may be ambiguous or unclear.</p>
0	0	No creditworthy material as described in bands 3 to 1.

Indicative content – 3.1(a):

The process flow should be a step by step diagram that describes in sufficient detail the process steps required to make the selected product, and should be targeted to be easily understood by a food manufacturing audience. For example, its presentation is of industry standard and it uses appropriate style, the appropriate and sufficient level of detail and correct terminology.

Indicative content – 3.1(b):

The monitoring procedure gives clear and unambiguous instruction for carrying out the monitoring of the control measure selected and outlines the required equipment, people involved, frequency of checks, method of checks and recording of data required to achieve control, in a practical way, operating within the defined safety limit.

The corrective action for the selected control measure must be included, should results be out of range, if applicable or relevant.

Other information required on the associated record includes the product name, the trace or batch code of the lot being checked, the result attained by the check, the date and time of the check, if the result is satisfactory or not, the signature or initials of the checker, and verification by a more senior member of staff.

Content mapping

K1.16: How to implement and maintain a HACCP-based food safety management system

K1.25: The purpose of monitoring food safety management systems

K1.26: The purpose of a range of checks that are carried out to verify food safety

S1.79: Contribute to a HACCP plan for a simple product, following the 12 steps, by creating a HACCP flow diagram as outlined in step 4 of the 12 HACCP steps

Task 4: product specification and analysis

4.1

Band	Mark	Descriptor
4	13–16	<p>The student has produced a well-structured, comprehensive and relevant product specification that includes:</p> <ul style="list-style-type: none"> • relevant food safety attributes and nutritional target values • quality attributes that include at least 3 sensory or organoleptic characteristics with realistic testing parameters • all requirements for packaging, including all mandatory labelling and key aspects for storage and transportation within the product specification
3	9–12	<p>The student has produced a coherent and complete product specification that includes:</p> <ul style="list-style-type: none"> • relevant food safety attributes and nutritional target values • quality attributes that include at least 2 sensory or organoleptic characteristics with realistic testing parameters • all requirements for packaging, including all mandatory labelling and key aspects for storage and transportation within the product specification
2	5–8	<p>The student has produced a credible product specification that includes:</p> <ul style="list-style-type: none"> • some relevant food safety attributes and some of the mandatory nutritional target values • quality attributes that include at least 2 sensory or organoleptic characteristics with realistic testing parameters • all requirements for packaging, including all mandatory labelling and key aspects for storage and transportation within the product specification
1	1–4	<p>The student has produced a simple product specification that includes:</p> <ul style="list-style-type: none"> • some food safety attributes and mandatory nutritional target values • quality attributes that include at least 1 sensory or organoleptic characteristic with realistic testing parameters • most of the requirements for packaging, including all mandatory labelling and key aspects for storage and transportation within the product specification
0	0	No creditworthy material as described in bands 4 to 1.

Indicative content:

The product specification needs to have a clear layout to enable an unambiguous description of the product and its attributes.

The relevant food safety attributes are:

- shelf life
- storage and transport conditions
- safety characteristics for the selected product
- microbiological criteria, including micro-organisms relevant to the product and their limit at the end of shelf life
- allergens that are present
- allergens that are potentially present

The target values for each food safety attribute should be stated (for example, shelf life of 10 days maximum, store and transport under ambient conditions at 8 to 25°C maximum, max water activity of 0.8 (fruit cake), max pH of 4.6 (meringue), salmonella absent in 25g).

Nutritional information should include all the mandatory nutrient target values for the product (energy, fat, saturates, carbohydrates, sugars, protein and salt), and must include mandatory information per 100g or 100ml. Nutritional information per serving/portion is not mandatory, but good practice as people eat 'servings' not at increments of 100g. Any nutrition claim should be included.

Quality attributes need to include at least 3 sensory or organoleptic characteristics with their associated testing parameters and target values (for example, mouthfeel, aroma, colour, appearance).

Packaging needs to include all of the following:

- consumer unit weight/volume
- type of contact and secondary packaging used (for example, 300g, food grade cardboard cake box with card cake board, 6 units packed in an outer cardboard box)

Mandatory labelling requirements are:

- name of food
- description
- list of ingredients (including alcohol and strength)
- allergen information (in bold)
- quantity of ingredients
- weight
- expiry date
- origin of certain raw materials
- nutritional information
- specialist storage conditions
- specific instructions (for example, cooking times)
- additional information that must be obvious to consumers (for example, packed in a protective atmosphere, contains raw milk)
- position of labels on product (for example, front of pack, back of pack, side of pack)

Storage and transportation need to be included.

Content mapping

K1.16: How to implement and maintain a HACCP-based food safety management system, by following the detailed requirements of the 12 steps

K1.61: The advantages, limitations and uses of the different types of packaging used in the food and drinks industry

K2.6: The first principles of recipe balance:

- proportionality
- nutrient balance
- organoleptic properties
- ingredient substitution where appropriate

S1.72: Identify the appropriate food safety and health and safety procedures that need to be in place to support food safety and regulatory compliance, within a specific area of the food supply chain (for example, growers/suppliers, transportation, production, distribution, retail)

S1.73: Identify the labelling requirements of food and drink products to comply with the required legislation and regulations:

- nutritional information
- quantitative ingredient declaration (QUID)
- calorific values
- all ingredients, with allergens emphasised (for example, in bold)
- origin of raw materials
- use by and best before dates
- weights and measures

S1.84: Review a specific food safety and quality management procedure to ensure that the food quality or food safety standard will be met (for example, cooking temperature, overall product quality, storage requirements, allergen controls, product nutritional value)

S1.91: Check all customer requirements have been met in order to ensure quality of product and shelf life of food

S1.92: Verify existing procedures are meeting food safety and quality standards:

- heat processing techniques:
 - checking core temperature in food is being achieved
- heat removal:
 - checking product is cooled/chilled/frozen within specified timeframe and to right temperature
- customer specifications:
 - checking finished product against specification
 - comparing the colour of cooked product to photographic specification evidence
- packaging and labelling meet the required safety and quality standards:

- checking the correct packaging and labelling have been used

S2.36: Select a suitable test method, depending on the purpose of the test:

- compliance
- product quality
- product safety

S2.37: Analyse test results to confirm nutritional information

Performance outcome (PO) grid

Task	PO1	PO2	PO3	PO4	Total
1	33	0	0	0	33
2	45	0	0	0	45
3	21	0	0	0	21
4	16	0	0	0	16
Total marks	115	0	0	0	115
% weighting	100%	0%	0%	0%	100%

Document information

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