T Level Technical Qualification in Science

Employer set project (ESP)

Food Sciences

Project brief

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Contents

Guidance for students

Student instructions

- read the project brief and the task guidance carefully before starting your work
- you **must** work independently and make your own decisions on how to approach the tasks within the employer set project – your work should:
    - be in an Arial font 12pt, within standard border sizes, however you may choose to hand write your work – if you choose to hand write your work, you should ensure it is clear and legible
    - clearly show where sources have been used to support your own ideas and opinions
    - clearly reference all sources used to support your own ideas and opinions
    - reference any quotations from websites
- you **must** clearly name and date all of the work that you produce during each supervised session

At the end of each supervised session, your tutor will collect all assessment materials before you leave the room. Yo**u must not** take any assessment material outside of the room (such as via a physical memory device). You **must not** upload any work produced to any platform that will allow you to access materials outside of the supervised sessions (including email).

Student information

This employer set project will assess your knowledge, understanding and skills from across the core content of the qualification.

In order to achieve a grade for the core component, you **must** attempt both of the external examinations and the employer set project. The combined marks from these assessments will be aggregated to form the overall core component grade (A* to E and U). If you do not attempt 1 of the assessments or fail to reach the minimum standard across all assessments, you will receive a U grade.

Your tutor will explain how the assessment time is broken down per task and will confirm with you if individual tasks need to be completed across multiple sessions.

You can fail to achieve marks if you do not fully meet the requirements of the task, or equally if you are not able to efficiently meet the requirements of the task.

Plagiarism

Plagiarism may result in the external assessment task being awarded a U grade. For further guidance, refer to your student handbook.

Presentation of work

- any work not produced electronically must be agreed with your tutor, and the evidence you produce should be scanned and submitted as an electronic piece of evidence, for example a digital photograph; your tutor will arrange for any digital photographs to be taken
- all your work should be clearly labelled with the relevant task number and your student details and be legible (for example front page and headers)
- electronic files should be given a clear file name for identification purposes (see tasks for any relevant naming conventions)
- all pages of your work should be numbered in the format page X of Y, where X is the page number and Y is the total number of pages
- you must complete and sign the external assessment cover sheet (EACS) – declaration of authenticity form and include it at the front of your assessment task evidence
- you must submit your evidence to the tutor at the end of each session.

Scenario: A solution to reformulate yoghurt to help reduce the levels of sugar consumption in the UK

Introduction

The Scientific Advisory Committee on Nutrition (SACN) recommend that no more than 5% of the total calories consumed by a person should come from free sugars in the diet. For someone with a daily intake of 2000 calories, this would be a maximum level of 25g of sugar per day.

In 2018, the Soft Drinks Industry Levy, better known as the “Sugar Tax”, was introduced, Manufacturers for soft drinks would now have to pay to sell any products containing more than 5g of sugar per 100ml. This tax was part of the Government’s plan to reduce the amount of sugar in the diet of the average UK citizen. The tax aimed to encourage soft drinks manufacturers to reformulate recipes and reduce sugar levels in their drinks. Even before it came into effect, over 50% of the manufacturers had reformulated recipes. (Source: Gov.uk)

In future, this may be a technique the Government uses to force other categories to reformulate their products. In October 2020, Public Health England (PHE) published its final report on its Childhood Obesity Plan which was introduced in 2015. Over 5 years, PHE planned to cut sugar levels by 20% in a variety of products that added high levels of sugar to the diet. Examples of these products include breakfast cereals, ice cream and yoghurt. The effect of the 5-year voluntary plan was much less than the effect of the Sugar Tax for drinks. The change in the total levels of sugar sold was insignificant (Source: Action on Sugar).

Sugar – a multifunctional ingredient

Although mainly known for its sweet flavour, sugar has many properties in food products. It contributes to the brown colour in biscuits, the texture in ice cream and taste acceptability of yoghurt. Any replacement of sugar requires the use of 2-3 other ingredients to meet the sensorial gap and usually a cost increase as sugar is such a cheap ingredient.

Brief

The employer

Yo-good! is a manufacturer of a wide range of fruit and dessert themed yoghurts. Their strawberry cheesecake flavour has won “Best Flavoured Yoghurt” 3 years running.

The project

Yo-good! want to investigate a combination of ingredients to successfully reformulate and reduce sugar in their yoghurts. Yo-good! can accept a small price increase as they know that a Sugar Tax in the future may be more expensive than any cost increase from new ingredients. The company is concerned about safety, about any limitations (for example, “off flavours”) and that customers perceive their yogurt as ’natural’. The main thing they cannot compromise on is the flavour of their yoghurts. They are a market leader and well-loved for the characteristic flavour of their well-known products.

You are part of the Research and Development team at Yo-good! and you need to investigate ingredients for sugar reduction in their top selling strawberry cheesecake variant. First you will need to research advantages and limitations for ingredients for bulking, texture and sweetness. The end summary should propose which ingredients have the most promise based on scientific research in the field.

You will then need to put together a scientific investigation plan. The plan should provide the primary data that will prove the ingredients are suitable as sugar replacers. You will need to present your plan to the senior management team to obtain approval for time in the pilot plant.

The following ingredients have been recommended as a good starting point:

- sweetening ingredients – stevia and aspartame
- texture and bulk – chicory root fibre (also known as inulin).

The project involves research, analysing data, planning scientific investigations, collaborative working and presenting findings.

You must complete the following steps:

- researching
- producing a plan for investigation
- analysing and evaluating the effectiveness of the investigation
- reporting on your findings to the wider team
- participating in a group discussion
- reflecting on the process

Complete the tasks below to guide you through these steps.

Task 1: research a strategy

(22 marks)

You need to provide evidence on which new ingredients might be suitable for Yo-good! to reduce sugar in their market leading yoghurt. You need to research the potential of each sugar replacement (aspartame, stevia, and inulin).

You will need to undertake a literature review using the provided sources.

Some of the information will be useful and will provide evidence to support your recommendations of which new ingredients Yo-good! should use. The data will also help you to think about which scientific investigations you should plan to provide primary data that would further support your recommendations.

What you have to do

- carry out a literature review
- justify why you have chosen specific sources and rejected others
- your justification should be based on
  - how reliable you think the source is and why?
  - how relevant you think the source is and why?
- use an academic referencing technique when citing or referencing literature

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation. You can use any format you like for your project diary – your tutor will discuss this with you.

Resources

- employer set project brief and task 1 student guidance
- computer access
- literature database
- project diary

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (18 marks)

AO4: Use English, mathematics, and digital skills as appropriate (4 marks)

Core Skills

CS2: Researching

CS7: Reflective evaluation

The evidence I have to submit for this task

A literature review.

How the evidence will be assessed

This will be externally marked by examiners.

Time for completion of task 1

3 hours. Plus 30 minutes for completion of project diary.

Task 2: plan a project

(36 marks)

What you have to do

Use the sources that you selected in your literature review to complete a project plan.
The project plan must:

- produce a high-level detail for a scientific experiment to investigate the effectiveness of the new sugar reduction ingredients
- include all appropriate risk assessments
- identify the primary data you need to collect in order to conduct the investigation
- describe how you will collect the required data

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

Resources

- project brief and task 2 student guidance
- literature database
- literature review (from task 1)
- project diary
- risk assessment form template
- risk matrix

Assessment objectives

AO1: Plan their approach to meeting the project brief (12 marks)

AO2: Apply core knowledge and skills to the development of a scientific project (12 marks)

AO4: Use English, mathematics, and digital skills as appropriate (4 marks)

AO5: Realise a project outcome and review how well the outcome meets the brief (8 marks)

Core Skills

CS1: Project management

CS2: Researching

CS3: Working with others (risk assessment)

CS4: Creativity and innovation

CS6: Communication (written)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your project plan.

How the evidence will be assessed

This will be externally marked by examiners.

Time allowed for completion of task 2

3 hours. Plus 30 minutes for completion of project diary.

Task 3: analyse data

(34 marks)

What you have to do

Due to the limitations of time and resources, you are **not** required to carry out the investigation you have planned.

You have been provided with a raw data pack, obtained from an organisation which developed and carried out a similar plan to solve the same problem. The raw data pack is in the form of a Food information management system (LIMS) spreadsheet.

You must:

- analyse the data provided to measure the effectiveness of the organisation's plan
- produce a report of your analysis, to include:
  - presentation of data to enable peer review
  - selection of appropriate statistical techniques
  - application of appropriate statistical techniques
  - justification for your conclusions

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

Resources

- employer set project brief and task 3 student guidance
- computer access
- NCFE LIMS spreadsheet
- project diary

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (16 marks)

AO3: Select relevant techniques and resources to meet the brief (6 marks)

AO4: Use English, mathematics, and digital skills as appropriate (6 marks)

AO5: Realise a project outcome and review how well the outcome meets the brief (6 marks)

Core Skills

CS4: Creativity and innovation

CS5: Problem solving

CS6: Communication (written)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your analysis report including any charts and graphs.

How the evidence will be assessed

This will be externally marked by examiners.

Time allowed for completion of task 3

3 hours. Plus 30 minutes for completion of project diary.

Task 4: present outcomes and conclusions

(28 marks)

What you have to do

4(a) Use your report from task 3 to produce an A2 scientific poster. The poster may be produced and displayed electronically rather than printed.

Your poster must show:

- the problem being addressed/investigated
- the results of your analysis, including any graphs and charts
- your conclusion

4(b) Present the main points from your poster to your tutor. Your tutor will make observations on your presentation and ask questions if further detail is needed. The presentation will be recorded by video, and this video submitted for marking. Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

Resources

- project brief and task 4 student guidance
- computer and printer access
- access to NCFE provided LIMS spreadsheet
- your analysis report
- A2 paper, various coloured markers, scissors and glue and/or IT software/applications to create poster (or parts of) for printing, and printing facilities
- project diary

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (12 marks)

AO3: Select relevant techniques and resources to meet the brief (6 marks)

AO4: Use English, mathematics, and digital skills as appropriate (4 marks)

AO5: Realise a project outcome and review how well the outcome meets the brief (6 marks)

Core skills

CS4: Creativity and Innovation

CS6: Communication (written and verbal)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your A2 scientific poster.

Video recording of presentation.

How the evidence will be assessed

This will be externally marked by examiners using the video recording and tutor commentary.

Time allowed for completion of task 4

4(a) 3 hours.

4(b) 1 hour. Plus 30 minutes for completion of project diary.

Task 5: group discussion

(9 marks)

What you have to do

Yo-good! have recently been contacted by a leading newspaper. The newspaper has questions regarding the use and safety of aspartame in food products. In your research team, discuss the issues raised regarding aspartame by the newspaper and the best way to respond. You will need to refer back to your research notes to contribute effectively to the discussion. It is suggested 10 minutes are given to this at the start of the discussion.

Each group member will then take it in turns to make suggestions and to agree on an approach. It is suggested that groups consist of a maximum of 5 to 6 individuals to allow sufficient time for discussion in 40 minutes; this will allow ample time for individuals to give their opinion and respond to others. Your group discussion will be recorded.

Take notes during the team discussion of the points and suggestions made.

Following the discussion, you will need to (individually) draft an email response to the newspaper to respond to the concerns raised. This email response can be handwritten or produced in suitable word processing software – it does not need to be written in an email client. Usual exam conditions apply during this part of the task (max 10 minutes).

There is an overall time limit of 1 hour for this task. In this time, you will:

- be asked to read the email from the newspaper in your groups
- be given 10 minutes to familiarise yourself with your literature review, your plan, your data analysis and scientific poster
- discuss your suggestions for responding to the newspaper
- draft an email to the newspaper to respond to the concerns raised.

Student resources required

- project brief and task 5 student guidance
- your literature review (task 1)
- your project plan (task 2)
- your data analysis and report (task 3)
- your A2 scientific poster and its presentation (task 4)
- email from newspaper (appendix 1)

Tutor resources required

- assessment sheet for tutor commentary.
- audio visual recording equipment.

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (4 marks)

AO3: Select relevant techniques and resources to meet the brief (2 marks)

AO5: Realise a project outcome and review how well the outcome meets the brief (3 marks)

Core skills

CS3: Working with others

CS4: Creativity and innovation

CS5: Problem solving

CS6: Communication (verbal)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your recorded discussion.

Your email reply to the newspaper.

How the evidence will be assessed

This will be externally marked by examiners.

Time allowed for completion of task 5

1 hour.

Task 6: reflective evaluation

(18 marks)

What you have to do

Write a reflective evaluation of your work. This should be based on:

- your literature review (task 1)
- the experience of developing your project plan (task 2)
- your data analysis and report (task 3)
- your A2 scientific poster (task 4)

Your reflections should include:

- an evaluation of your approach to each task, including your chosen tool for analysis
- any changes you would make to your approach to each task, using each of the above bullet points as a section heading.

Resources

- project brief and task 6 student guidance
- your literature review
- your project plan
- your analysis report
- your A2 scientific poster
- your project diary
- access to the NCFE provided LIMS spreadsheet and literature database
- reflective evaluation template

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (7 marks)

AO3: Select relevant techniques and resources to meet the brief (2 marks)

AO4: Use English, mathematics, and digital skills as appropriate (4 marks)

AO5: Realise a project outcome and review against the intended project aims (5 marks)

Core skills

CS6: Communication (written)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your written reflective evaluation.

How the evidence will be assessed

This will be externally marked by examiners.

Time allowed for completion of task 6

2 hours.

Appendix 1: email from newspaper

Dear Sir/Madam

Thank you for allowing us to get in touch regarding future product development at Yo-good!. Reducing sugar consumption is a very important goal for the wellbeing of consumers however we have concerns regarding new ingredients being added and the effect on the health of consumers. We have heard you are looking to use aspartame as a sugar replacer. It is, as you know, an artificial sweetener.

Could you explain why it is defined as an artificial sweetener and what this means for the safety regarding consumption? The use of aspartame usually comes with a warning “contains a source of phenylalanine”. Why is this? Is this because it could be harmful to someone’s health?

Lastly, we have heard that aspartame breaks down into methanol which again could be harmful to health at high levels. Does aspartame prove dangerous at the doses you are using?

We look forward to hearing back from you.

Best Wishes

Appendix 2: literature database

Sugar reduction and the role of sugar:
https://www.sciencedirect.com/science/article/pii/S0022030218307409

https://www.healthline.com/nutrition/artificial-sweeteners-good-or-bad

https://www.sciencedirect.com/science/article/pii/S0308814620324353

https://www.purecirclesteviainstitute.com/ingredient-and-taste/working-with-stevia-in-applications/dairy

https://www.bbc.co.uk/news/health-44208504

Aspartame:
https://www.healthline.com/health/aspartame-side-effects

https://killcliff.com/blogs/hpc/the-dangers-of-aspartame

https://www.bbcgoodfood.com/howto/guide/sugar-substitutes-aspartame-explained

https://www.researchgate.net/publication/316204391_Comparative_stability_of_aspartame_and_neotame_in_yoghurt

Stevia:
http://www.uwm.edu.pl/polish-journal/sites/default/files/issues/articles/kalicka_et_al._2017.pdf

https://www.bbcgoodfood.com/howto/guide/sugar-substitutes-stevia-explained

https://www.ernaehrungs-umschau.de/fileadmin/Ernaehrungs-Umschau/pdfs/pdf_2014/12_14/EU12_2014_Hergesell_englisch.pdf

Inulin/chicory root fibre:
https://www.linkedin.com/pulse/sugar-reduction-chicory-root-fibre-maltodextrin-stevia-annika-breesch/

https://www.baynsolutions.com/en/inulin-sugar-reduction-in-practice/1116647

Document information