

T Level Technical Qualification in Science

Employer set project (ESP)

Laboratory Sciences

Project brief

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Project brief

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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 handwrite your work – if you choose to handwrite 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. You **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 one 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: Strategy to find a suitable method to test for coeliac disease at home

Introduction

You work in a lab that develops home testing kits for a variety of conditions. Your lab manager is considering designing and producing a test for detecting antibodies in the blood against gluten. Prices for these kits vary from several pounds to several hundreds of pounds. Different tests use different methods and have different levels of sensitivity and specificity.

Recent market reports have suggested that there will be an increase in demand for these kits in the UK. There are ethical and medical questions surrounding the use of home testing kits, such as the lack of professional medical advice.

Gluten is a protein found in a range of cereals such as wheat, barley and rye. About 1% of the population is allergic to gluten and produce antibodies from white blood cells which attack the small intestine. People with a gluten allergy have a condition called coeliac disease. This makes it very difficult for the small intestine to absorb nutrients from food, as a healthy person would. Symptoms include bloating, severe abdominal pain, and if untreated, malnutrition. Antibodies in the blood for gluten can be detected using a pinprick test at home.

The human immune system is designed to prevent microbes and viruses from infecting host cells and causing harm. One way to stop the spread of these “non-self” organisms is to produce proteins called antibodies, which can attach to the organism and prevent it from entering the cells. These antibodies also target the immune system to destroy microorganisms (including viruses) and infected cells. In coeliac disease, an enzyme which is involved in breaking down gluten, called tissue transglutaminase (tTG) is seen by the body as being harmful, so the immune system produces antibodies which attack the lining of the small intestine and cause painful symptoms.

Brief

You have been asked to investigate the most suitable method that could be used to test for coeliac disease at home. You need to consider the reliability of the test and what materials you would need in the kits. You should also investigate the cost of making the kit and how the test is packaged. You may wish to consider the current products on the market, and how they work in testing for coeliac disease.

This will involve the following steps:

- researching
- planning a strategy
- testing the strategy
- analysing and evaluating the effectiveness of the proposed strategy
- reporting on your findings

- reflecting on the process

Use the tasks below to guide you through the process.

SAMPLE

Task 1: research a strategy for the most effective method of testing for coeliac disease at home

(22 marks)

What you have to do

You have been provided with a database containing a range of potentially relevant sources for your research (appendix 1). All the resources are linked to the investigation of coeliac disease at home. Different tests may be more accurate. Some of these sources are more relevant to the research brief than others. You will need to carry out a literature review and:

- justify why you have chosen specific sources and rejected others. Your justification should be based on:
 - how reliable you think the source is
 - how relevant you think the source is
- 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 and website links (appendix 1)
- 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.

SAMPLE

Task 2: plan a project

(36 marks)

Your company has provided three types of coeliac home testing kits that fit the brief. Use the sources you selected in your literature review to complete a project plan.

The project plan must set out how you will investigate the methods used in each test kit and determine which one would be best to use in the company's new coeliac home testing kit. In the plan, you should consider what test the kits do and how they will show the result. (These kits use the pinprick method of testing and are not sent away for lab processing).

What you have to do

Use the sources you selected in your literature review to complete a project plan.

The project plan must:

- provide a method to explain how you will investigate the best type of home test kit for the company to develop
- include all appropriate risk assessments (a proforma has been provided)
- identify the primary data you need to collect prior to the investigation in order to be able to conduct it
- identify the data you would expect to collect throughout 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.

Your company is interested in marketing this product to undiagnosed people who have relatives with coeliac disease. According to research, there is a greater chance of having coeliac disease if you are closely related to someone with the disease. Therefore, you have been provided with a raw data pack, obtained from a biochemical laboratory which tested the blood of 40, 13 –year old children to determine whether this information is correct. 20 of the children have a close relative with coeliac disease and 20 children do not.

To make sure that the level of antibodies against gluten could be measured, all patients ate a diet that contained gluten. Any patients with levels above 11 U/ml may have the disease.

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

- 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.

SAMPLE

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 LIMS spreadsheet
- your analysis report
- A2 paper, various coloured markers, scissors and glue and/or IT software/applications to create a 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.

SAMPLE

Task 5: group discussion

(9 marks)

What you have to do

You have been contacted by an online health journal about the potential of the test for detecting and diagnosing coeliac disease.

In your research team, discuss the issues raised by the email and the best way to respond. You will need to refer 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 an approach. It is suggested that groups consist of 5 or 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 as a video. Take notes of the points and suggestions made during the discussion.

Following the discussion, you will need to (individually) draft a response to the health journal to address the question raised. This 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 health journal in your group
- 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 health journal (see appendix 3 for more information)
- draft a response to the health journal 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 health journal (appendix 2)
- additional information about further testing (appendix 3).

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 response to the health journal.

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 data analysis and report
- your A2 scientific poster and its presentation
- 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 how well the outcome meets the brief (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.

SAMPLE

Appendix 1: literature database

Information on coeliac disease and testing

https://en.wikipedia.org/wiki/Coeliac_disease

<https://www.nhs.uk/conditions/coeliac-disease/treatment/#gluten-free-diet>

<https://www.medicalnewstoday.com/articles/gluten-intolerance-test>

<https://www.nhs.uk/conditions/coeliac-disease/diagnosis/>

<https://www.biospace.com/article/at-home-coeliac-testing-kits-demand-increasing-at-8-percent-cagr-following-advent-of-rapid-test-solutions-for-gluten-intolerance-fact-mr-concludes-in-a-latest-market-study/>

<https://www.nice.org.uk/guidance/ng20/>

<https://gutscharity.org.uk/advice-and-information/conditions/coeliac-disease/>

Different kits

<https://homehealth-uk.com/all-products/prima-home-coeliac-coeliac-disease-wheat-gluten-intolerance-test>

<https://www.healthcheckshop.co.uk/store/coeliac-disease-test>

<https://www.letsgetchecked.co.uk/home-coeliac-test/>

<https://www.personaldiagnosics.co.uk/Products/CoeliacScreen.html>

<https://www.londondoctorsclinic.co.uk/services/blood-tests/coeliac-disease>

<https://loretogallo.com/uk/mytest-coeliac-kit>

<https://www.cooppharmacy.coop/products/pharmacy/home-screening-test-kits/selfcheck-Gluten-test>

<https://www.verywellhealth.com/gluten-detectors-and-test-kits-comparing-the-options-4126736.coeliac.org.uk/information-and-support/coeliac-disease/getting-diagnosed/home-tests/>

Information on the kits

https://www.ed.ac.uk/files/atoms/files/reducing_single-use_laboratory_plastics_0.pdf

<https://www.healthline.com/health-news/test-your-food-for-gluten>

<https://www.gardnerdenver.com/en-gb/tricontinent/solutions/lab-solutions>

<https://www.davids-bio.com/data/orderforms/monoclonal-antibody-production.pdf>

Children and testing for coeliac disease

<https://mft.nhs.uk/app/uploads/2020/01/Coeliac-Disease-Antibodies.pdf>

Appendix 2: email from online health journal

Dear Research team

We are following your research into new home testing kits for coeliac disease and would like to feature your tests in an article we are writing for an upcoming blog. We would appreciate if you could answer some questions to help us in our research.

1. Your home kit only uses one blood sample; how will you reduce the risk of a false positive result?
2. Why would you recommend the method of use in your home kits over other available methods or tests?
3. If a person tests positive using one of your kits, what would you advise them to do next?

We look forward to hearing from you.

Many thanks

The Healthy Website People

SAMPLE

Appendix 3: additional testing

How do the tests work and any further tests that could be done?

The patients in the sample were tested for the presence of an antibody called IgA. The antibody is produced against the enzyme tTG which breaks down gluten. People with coeliac disease normally produce 10 times more of this antibody than those who do not have the disease.

Further tests to confirm the disease would be:

- to measure another antibody which is IgA
- to test the DNA for the HLA gene, and
- to possibly take a biopsy (sample of intestinal tissue).

SAMPLE

Document information

The T Level Technical Qualification is a qualification approved and managed by the Institute for Apprenticeships and Technical Education.

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Owner: Head of Assessment Design

Change History Record

Version	Description of change	Approval	Date of Issue
v1.0	Additional sample materials		September 2022
v1.1	Sample added as a watermark.	November 2023	20 November 2023