



# Higher Applications of Mathematics Project Assessment task

This document provides information for teachers and lecturers about the coursework component of this course in terms of the skills, knowledge and understanding that are assessed. It **must** be read in conjunction with the course specification.

**Valid from session 2021-22 and until further notice.**

The information in this publication may be reproduced in support of SQA qualifications only on a non-commercial basis. If it is reproduced, SQA must be clearly acknowledged as the source. If it is to be reproduced for any other purpose, written permission must be obtained from [permissions@sqa.org.uk](mailto:permissions@sqa.org.uk).

# Contents

Introduction	1
Instructions for teachers and lecturers	2
Marking instructions	5
Instructions for candidates	8

# Introduction

This document contains instructions for teachers and lecturers, marking instructions and instructions for candidates for the Higher Applications of Mathematics project. You must read it in conjunction with the course specification.

This project is worth 30 marks. This is 27% of the overall marks for the course assessment.

This is one of two course assessment components. The other component is a question paper.

# Instructions for teachers and lecturers

## General information

This information applies to the project for Higher Applications of Mathematics. The project assesses the application of statistical skills.

The project gives candidates an opportunity to demonstrate the following statistical skills, knowledge and understanding:

- ◆ applying statistical skills to data
- ◆ analysing data, interpreting and communicating findings using statistical skills

The project offers challenge by requiring candidates to apply statistical skills, knowledge and understanding in a context that is one or more of the following:

- ◆ unfamiliar
- ◆ familiar, but investigated in greater depth
- ◆ integrating a number of familiar contexts

Candidates research and report on a topic that allows them to apply statistical skills and knowledge in Applications of Mathematics at a level appropriate to Higher.

Candidates must choose their topic with your guidance. The topic must involve a data set.

Candidates can choose the source of the data set from, for example the internet, books or journals.

The project has two stages:

- ◆ research
- ◆ report

## Assessment conditions

Controlled assessment is designed to:

- ◆ ensure that all candidates spend approximately the same amount of time on their projects
- ◆ prevent third parties from providing inappropriate levels of guidance and input
- ◆ mitigate concerns about plagiarism and improve the reliability and validity of SQA awards
- ◆ allow centres a reasonable degree of freedom and control
- ◆ allow candidates to produce an original piece of work

There are two levels of control.

Under a high degree of supervision and control	Under some supervision and control
<ul style="list-style-type: none"> <li>◆ the use of resources is tightly prescribed</li> <li>◆ all candidates are within direct sight of the supervisor throughout the session(s)</li> <li>◆ display materials that might provide assistance are removed or covered</li> <li>◆ there is no access to email, the internet or mobile phones</li> <li>◆ candidates complete their work independently</li> <li>◆ interaction with other candidates does not occur</li> <li>◆ no assistance of any description is provided</li> </ul>	<ul style="list-style-type: none"> <li>◆ candidates do not need to be directly supervised at all times</li> <li>◆ the use of resources, including the internet, is not tightly prescribed</li> <li>◆ the work an individual candidate submits for assessment is their own</li> <li>◆ teachers and/or lecturers can provide reasonable assistance</li> </ul>

The project has two stages.

Stage	Level of control
◆ research	conducted under some supervision and control
◆ report	conducted under some supervision and control

## Instructions

You must exercise your professional responsibility to ensure that the report submitted is the candidate's own work.

Candidates should spend no more than 8 hours on the whole project.

You must ensure candidates understand the requirements of the task. The instructions for candidates outline the requirements for the project, and you must give these to candidates at the outset. These must not be altered or supplemented by centre-devised materials.

You must not, at any stage, give candidates a template or model answers.

## **Choosing the topic**

At the start of the project, candidates must choose their topic. You must agree the topic choice to ensure that it:

- ◆ is appropriate for Higher Applications of Mathematics
- ◆ has an associated data set
- ◆ allows the candidate the opportunity to access all of the available marks

You must minimise the number of candidates investigating the same topic or using the same data set within a class.

Once candidates have agreed the topic with you, they must formulate an aim.

## **Formulating the aim**

To ensure the candidate's aim is achievable, you must provide advice on its suitability, taking into account:

- ◆ availability of resources
- ◆ availability of data from literature or the internet

You must not provide candidates with an aim.

# Marking instructions

In line with SQA's normal practice, the following marking instructions for the Higher Applications of Mathematics project are addressed to the marker. They will also be helpful if you are preparing candidates for course assessment.

Candidates' evidence is submitted to SQA for external marking.

## General marking principles

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.

## Detailed marking instructions

Read the whole project before assigning any marks.

Section of project	Description of marks	Marks available
Introduction (6 marks)	Introduce and explain the background and context of the statistical research project.	1
	State the research question.	1
	State the type of data being studied – categorical or numerical.	1
	Provide information on the background of the data source, for example NHS statistics, crime statistics, or personally gathered.	1
	Discuss the robustness of the data used: <ul style="list-style-type: none"> <li>◆ the validity of the source (who gathered the data)</li> <li>◆ the credibility of the method used to gather the data to ensure data is unbiased and uninfluenced</li> </ul>	2
Subjective impression (8 marks)	Generate appropriate graphical displays: <ul style="list-style-type: none"> <li>◆ bar chart, pie chart</li> <li>◆ histogram, box plot</li> <li>◆ scatter plot</li> </ul>	2
	Comment on how helpful an appropriate display is in terms of visualising relevant statistics.	1
	Comment on how helpful any further appropriate displays are in terms of visualising relevant statistics, or comment on any discarded graphical displays.	1
	Include appropriate titles, labels and scales for ease of interpretation and comparison.	1
	Include appropriate descriptive statistics: <ul style="list-style-type: none"> <li>◆ central location(s)</li> <li>◆ variability in data</li> </ul>	2
	Statistics are appropriately labelled.	1
Analysis and interpretation (6 marks)	Perform appropriate test and present additional statistical information: <ul style="list-style-type: none"> <li>◆ <math>t</math>-test, paired <math>t</math>-test, <math>z</math>-test for proportions or regression line</li> <li>◆ confidence interval and <math>p</math>-value or Pearson's product moment correlation coefficient</li> </ul>	2



Section of project	Description of marks	Marks available
	<p>Results are interpreted in context:</p> <ul style="list-style-type: none"> <li>◆ confidence interval or strength of linear relationship</li> <li>◆ <math>p</math>-value and reject or fail to reject null hypothesis</li> <li>◆ descriptive statistics: <ul style="list-style-type: none"> <li>— mean and standard deviation</li> <li>or</li> <li>— median and interquartile range</li> </ul> </li> <li>◆ graphical display(s)</li> </ul>	4
Conclusion (4 marks)	<p>Provide a summary that justifies the research question, using the graphical displays and the statistics in context:</p> <ul style="list-style-type: none"> <li>◆ make a connection between the graphical displays and the conclusion</li> <li>◆ make a connection between the descriptive statistics and the conclusion</li> <li>◆ make a connection between the additional statistics and the conclusion</li> </ul>	3
	<p>State the final conclusion to the research question, where all graphical displays and statistics are referred to in context and their validity is justified clearly.</p>	1
Presentation (6 marks)	<p>Use appropriate headings and report structure with clear linkage between text and statistics and/or graphical displays and/or statistical test(s):</p> <ul style="list-style-type: none"> <li>◆ appropriate text to introduce graphical displays within appropriate sections</li> <li>◆ appropriate text to introduce descriptive statistics within appropriate sections</li> <li>◆ appropriate text to introduce additional statistics within appropriate sections</li> <li>◆ sections contain appropriate headers</li> <li>◆ report flows with linkage in context</li> </ul>	5
	<p>Include bibliography (and appendix of data).</p>	1
<b>Total marks</b>		<b>30</b>
Deductions	Deduct 3 marks if the word count exceeds 2200 words.	

# Instructions for candidates

This assessment applies to the project for Higher Applications of Mathematics.

This project is worth 30 marks. This is 27% of the overall marks for the course assessment.

It assesses the following skills, knowledge and understanding:

- ◆ applying statistical skills to data
- ◆ analysing data, interpreting and communicating findings using statistical skills

This project has two stages:

- ◆ research
- ◆ report

Your teacher or lecturer will let you know if there are any specific conditions for doing this assessment and tell you how the project will be carried out.

In this project, you have to investigate a topic of your choice with guidance from your teacher and/or lecturer. Your chosen topic must include a data set that you can analyse.

Your teacher or lecturer will not mark your report at any point. It is sent to SQA for marking.

## Research stage

### Choosing your topic and deciding your aim

- ◆ You need to choose a relevant topic to investigate.
- ◆ You must agree your topic with your teacher and/or lecturer.
- ◆ Your topic must include a data set that you can analyse.
- ◆ Once you have chosen your topic, you need to decide on the aim of your report.
- ◆ Your teacher and/or lecturer will give you advice about the suitability of your aim. They will not assess your aim.

## Report stage

### Producing the report

The report must be all your own work.

Your teacher and/or lecturer cannot provide you with feedback or tell you how to improve your report.

## Guidance on producing your report

Your report must be easy to follow. Using headings can help to make your report clear.

### Introduction

- ◆ Explain what you are going to explore and why you are exploring it. This is setting the scene.
- ◆ Explain clearly how the method you use to gather your data will affect how you can analyse it.
- ◆ If you are using bivariate data, you must acknowledge that there is only one possible approach.
- ◆ State the problem using statistical vocabulary linked to the introductory statement. This vocabulary could include: association, difference, correlation, significance, evidence, and relationship.

### Subjective impression

- ◆ Present the data using appropriate statistical diagrams, such as stem-and-leaf diagrams, dot plots, scatterplots, or box plots.
- ◆ Give your diagrams clear titles, label axes, and use appropriate scales.
- ◆ Analyse data using appropriate statistical techniques, test(s), and calculations, such as summaries of central tendencies and spread.
- ◆ Give statistics clear labels.

### Analysis and interpretation

- ◆ Perform appropriate tests, including:
  - confidence intervals
  - regression analysis
  - a  $t$ -test, a paired  $t$ -test, or a  $z$ -test for two proportions
  - a test about correlation or slope
- ◆ Make sure you clearly state any assumptions you have made, and whether you can validate any of them.
- ◆ Include all stages of your working, noting where you have used spreadsheets, calculators, and data tables.
- ◆ Any hypothesis test must include a clear statement of the hypotheses.

### Conclusions

- ◆ If you are carrying out several analyses, state your conclusions after each analysis. Draw all of your conclusions together at the end of your report.
- ◆ You must make clear reference to the results obtained from the sample and what you can infer about the parent population.
- ◆ Explain clearly and in simple terms what your findings mean in the context of your investigation.

## **Presentation**

- ◆ You must use appropriate headings and text throughout your report.
- ◆ You must link any findings in your report to the context of your project.
- ◆ You must include an appropriate bibliography.

# Administrative information

---

Published: June 2020 (version 1.0)

---

## History of changes

Version	Description of change	Date

Note: you are advised to check SQA's website to ensure you are using the most up-to-date version of this document.

## Security and confidentiality

This document can be used by SQA approved centres for the assessment of National Courses and not for any other purpose.

© Scottish Qualifications Authority 2020