

Draft - subject to accreditation and change

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1F

Edexcel GCSE

Statistics

Controlled assessment material

Estimation

Draft Teachers' notes

Estimation is a practical investigation suitable for GCSE Statistics students across both tiers of entry. The project must be undertaken by collecting primary data.

It is important that teachers advise students to include statistical techniques based on the content appropriate to the GCSE tier at which they are entered. The use of ICT to produce diagrams and to find statistical functions should be encouraged. The marks are awarded for the students' explanation of how they have used these tools and why they have used particular techniques.

The assessment should be conducted in 3 stages.

1: Planning

Formal supervision (Classroom/IT suite)

10 Marks
(1 - 2 hours)

This will take place under formal supervision. The students should be supervised at all times, but this is not examination conditions and students should be encouraged to discuss their planning with the teacher. Whilst word processors and spreadsheets may be useful NO INTERNET ACCESS should be available.

The teacher could conduct a whole class discussion of theme/s and possible data that might be collected. The class may discuss possible problems and how these could be overcome.

Suggestions as to how the task can be approached:

1. Discuss with students:
 - What sorts of things can be estimated
 - How can we investigate people's ability to estimate
 - What might affect a person's ability to estimate

2. Discuss ideas for hypotheses or questions:
 - The hypotheses the students choose to investigate will determine the data to be collected
 - More able students will investigate the interrelationship of more than one variable, e.g. age and gender
 - Are older people more able to make accurate estimates?
 - Are males better at estimating than females?
 - Do physical factors such as size/orientation/colour affect our ability to make accurate estimates?

3. Discuss the issues relating to data collection:
 - What is the population?
 - What data is to be collected? (and how will it be recorded?)
 - Which sampling method will be used? (and why?)
 - How large should the sample be?

- Who will collect the data and how will bias be minimised?

Students may plan to share the collection of data in groups, but they will need to give an explicit account of how they will do this and the part they will play in their planning.

Whilst the use of techniques must be an integral part of the project, students require some guidance as to what is expected at each level. It should be pointed out that making a **choice** of techniques with reasons is essential if the student is to achieve marks for planning. Students should not attempt to demonstrate all known techniques. Some statistical techniques are more sophisticated than others. Students should be advised that the complexity of their investigation will be limited if the techniques they choose are not at a sufficiently complex level.

Students should write a plan and this should be reviewed and commented on before they are allowed to continue with their task. All feedback to the student should be written on the student record form.

Students should be advised to investigate questions or hypotheses that enable them to use appropriate diagrams/calculations at their ability level.

The guidance given by the teacher is essential at this stage to ensure each student is tackling a project which will enable them to demonstrate their statistical ability. Choosing too trivial a project will not allow a student to access the higher marks.

Here are some suggested questions and related possible analyses. **There are many other possibilities.** Questions should suit the student's ability level.

Are males better at estimating than females?

Collect data for males and females; draw comparative box plots; compare the distributions.

Are estimates normally distributed?

Collect data; draw a histogram; try to fit a normal distribution; discuss.

Are older people more able to make accurate estimates?

Collect data for older people and younger people; draw diagrams; determine spread; discuss.

Do people who under/over estimate small things also under/over estimate large things?

Collect data; draw a scatter diagram; calculate; discuss correlation.

Are people better at estimating discrete variables than they are at estimating continuous variables?

Collect data; draw suitable diagrams; calculate suitable measures of average and dispersion; compare and discuss.

Occasionally a very able student wants to go beyond the specification and this can be encouraged, however, the highest marks may be awarded for the creative application of techniques within the specification.

2 Collecting and processing data

Informal supervision

Students may use the internet and bring in work from outside the classroom but the teacher will need to monitor the work in the classroom to ensure it relates to the initial plan.

The initial plan may be developed and adapted and this is to be encouraged but only following discussion with the teacher. This is to ensure that the project is the work of the individual student.

Collecting Data

8 Marks

(approx 2 - 3 hours)

Students **should** collect primary data for this task.

Data may be collected individually or in groups.

The method of collecting the data must be fully described and any problems should be fully discussed.

Processing, analysing and representing Data

12 Marks

(approx 2 - 4 hours)

The use of ICT should be encouraged, and there is no need to show evidence of calculations or hand drawn diagrams as these skills are assessed in the external assessments.

It is essential that sensible scales are used and labelled.

3 Interpret and evaluate

Formal supervision (Classroom/ICT suite)

10 Marks
(up to 2 hours)

Students may will bring in work from outside the classroom but the teacher will need to monitor the work in the classroom to ensure it relates to the initial plan. The initial plan may have been developed and adapted and this is to be encouraged, but only following discussion with the teacher. This is to ensure that the project is the work of the individual student.

Students bring all the work they have compiled to the classroom and put together the whole report.

They will need to produce in final form:

- The written up hypothesis/es with their planned strategy.
- The data collection discussion describing exactly what they did.
- Raw data should be in an appendix with summary tables in the main body of the report.
- Discussion of problems and limitations of the data should be discussed.
- Reasons for choice should accompany the analysis. Diagrams and calculations should be interpreted.
- There should be an interpretation in the context of the whole investigation relating back to the original questions and hypotheses.
- Conclusions linking together the strands of their enquiry.
- Evaluation of the work discussing any limitations.
- A completed Student Record form should accompany the work and the student should sign the authentication form.
- Work can be handwritten or word processed.

When completed the work is handed in. This must be at the end of the highly controlled time - there must be no extension for finishing at home.

The teacher will need to complete the student record form, with their marks and any other information, which should be attached to the front of the project.