VCE 1998

Board of Studies
Report for Teachers

Mathematics

Cycle 1

VCE REPORT FOR TEACHERS 1998

Further Mathematics CAT 1: Investigative project

GENERAL COMMENTS

Generally the students' handling of the CAT continued the improvement shown in previous years. Most work demonstrated a sound grasp of what was required in the completion and presentation of the CAT report.

CAT summary and format

Most reports were presented in a logical, organised format, although there continues to be reports which comprise a number of pages of text followed by numerous pages of mathematical analysis, graphs, tables, and other material. Students must integrate their mathematical analysis with their interpretation and evaluation. Some students continue to place important mathematical analysis into appendixes. Any use of appendixes needs to be carefully considered, as work which is required for assessment must be integrated into the main text.

Students demonstrated a more confident use of technology in the mathematical analysis of the data. However, students must ensure that they demonstrate their own understanding of the process being performed by the technology. Mathematical formulation is essential and unfortunately some students relied too heavily on technology, merely producing the answers without demonstration of formulation, or an explanation of what they were trying to achieve and how it was to be obtained.

Although students are encouraged to take advantage of technology, care needs to be taken in the report to clearly formulate their analysis. Basically, students need to justify their choice of analysis, state relevant formulae, carefully define all variables and then, using a calculator or computer, arrive at the required result. Many students took care to define all variables and this has become more important with the use of technology. Some students provided an extensive list of variables and formulae at the beginning of their report and then, throughout the report, used the appropriate technology to generate results with little or no explanation or justification. There should be clear links between definitions and their use.

Mathematical formulation should be integrated into the text where relevant. Students do not need to repeat a detailed formulation, however the decision to use the analysis again must be carefully justified and integrated into the text.

Word length continues to be a problem for some students. Removing sections which are over the word limit can have a significant effect on the quality of a report. Teachers should ensure students comply with the stated requirements.

The vast majority of work presented no concerns regarding authentication issues. There were a small number of cases where the guidance given by some teachers provided a restrictive and overly structured approach to the CAT.

Reviewers were given the same assessment advice as that forwarded to schools and were instructed to use this to assess the CATs. It was stressed that the criteria had not changed from that sent to schools.

General approaches to the CAT

It was observed that the three starting points were more evenly attempted than in previous years. Starting point 1 – Student transport survey, was the most popular. Starting point 2 – Births and unemployment, and Starting point 3 – Exchange rates and tourism, were attempted by approximately equal numbers. The approximate ratio of starting points being 2:1:1. The fact that all starting points were attempted by significant numbers of students was pleasing.

High-scoring CATs

The vast majority of work demonstrated that students can produce the required mathematical analysis. This continued improvement of students' work reflects positively on teachers of Further Mathematics.

On the occasions where reports relied too heavily on the computer to generate results, the quality of the CATs was diminished. These reports often demonstrated a lack of understanding, along with poor interpretation and evaluation. Better reports, where students formulated their work carefully, often demonstrated the level of understanding which allowed for detailed and accurate interpretation, evaluation and the formation of thorough conclusions.

Interpretation, evaluation and formation of conclusions continues to be the area which distinguishes a high-scoring CAT. Often, students merely describe their results, rather than tackle the more demanding aspect of interpretation and evaluation. Conclusions are often a summary of results with little attempt to tie findings together and develop an overall conclusion. Students should remember that the series of questions posed are part of an overall question and the completion of all sections is meant to provide a focus from which to view the intended theme of the question.

Another feature of a high-scoring CAT is the level of understanding demonstrated in the area of interpreting aspects of analysis. For example, length of moving average was generally poorly handled, as was students attempting to justify their choice of linear regression and data transformation. Of great concern was the interpretation of correlation results and the use of r^2 . There needs to be supporting interpretation which links numerical values of these statistics to the context being analysed.

SPECIFIC COMMENTS ON THE CRITERIA

The advice sent to schools attempted to identify important aspects of the report for each question and was organised so that each criterion had the relevant points listed in the form of a check list. The following is a summary of items of concern for each starting point.

Criterion 1 Identification of important information, variables and constraints

This criterion focuses on the student's ability to establish a framework for mathematical analysis. All variables and constraints needed to be clearly defined. Some important aspects were:

- random number generation ensures equally likely outcomes
- appropriate scatter plots
- appropriate linear regression analysis
- predictions with mathematical approach to reliability
- residual analysis using r^2 to evaluate fit
- data transformation either x^2 or $\log_{10}x$
- residual analysis of transformed data
- establishment of preferred model.

Most of the work reviewed demonstrated a good grasp of the information that had to be generated. The question was specific in the instructions to the students and consequently most students completed the actual mathematical analysis required. Similarly to last year, many students transformed the data using both x^2 and $\log_{10}x$ transformations. This was not required and more advantage would have been gained by carefully justifying their choice of one type of transformation and discussing the results obtained.

Criterion 2 Correct and appropriate mathematical formulation of the problem, situation or issue

Students were required to carefully provide a mathematical basis for all their analyses. Thorough reasons needed to be given for the selection of the techniques used. For example:

- scatter plots, graphs correctly constructed
- boxplots appropriately constructed, outliers considered
- linear regression correct with relevant formulation shown
- residual analysis relevant formulation shown
- correlation formulation shown
- suitable data transformation.

The report submitted by the student had to convey to the reader a clear understanding of the actual mathematical analysis being undertaken. The reason for selection of mathematical analysis had to be apparent and pertinent. Many students found it difficult to adequately justify their choice and often demonstrated a lack of understanding in their attempts.

Mathematical formulation of all analysis is required. On many occasions linear regression, residual plots, graphs of transformed data, along with their corresponding r and r^2 values, just appeared in reports.

Criterion 3 Analysis of information

Students were required to mathematically manipulate the data and provide a comprehensive explanation of the analysis and discussion of the findings. The choice of analysis and relevance to the investigation must be clear. For example:

- correct graphing techniques to present data
- justification of linear regression method selected
- mathematically reasoned approach to reliability of predictions
- use of residual analysis, including r^2, to evaluate the fit of their model
- explanation of their choice of data transformation.

Generally, reports demonstrated a reasonable grasp of this criterion. However, teachers must emphasise the importance of introducing the mathematical analysis to be undertaken and careful justification of choices, in particular emphasising the relevance to the investigation.

Criterion 4 Appropriateness of mathematics

Students need to have used suitable mathematics for the project. Efficient and effective procedures must be used and all statistical analysis should have demonstrated a clear purpose and understanding. Typical items looked for include:

- statistical measures appropriate for the task
  random numbers
  linear regression
  scatter plots
  reliability of predictions
  residual analysis including residual plot
  data transformation
  calculation of r and r^2
- all statistical measures used for a clearly defined and relevant purpose
- answers given to appropriate degree of accuracy.

Students generally scored well on this criterion, as most produced the appropriate mathematical analysis as they moved through each section of their chosen starting point. Students did not attempt to introduce techniques from outside the Further Mathematics course.

Criterion 5 Knowledge of mathematical language, symbols and conventions

Students are required to demonstrate their ability to use mathematical language in an appropriate and correct manner. This was shown in:

- clear and distinguishable graphs with axes labelled, and correctly scaled
- all symbols clearly defined
- common symbols used correctly (no computer language)
- tables appropriately designed, information presented clearly with logical headings
- mathematical techniques correctly set out.

Students are using the technology to advantage when producing graphs. Most graphs are very clearly presented, although because students are integrating the appropriate graph into the text, on occasions they become too small and do not clearly convey the required information. Students often do not define all symbols and variables used and commonly use the same symbol, usually x, to represent many different values.

Criterion 6 Mathematical understanding

Students were required to demonstrate their understanding of the mathematics they had selected to use. Students must provide clear explanations for their selection of statistical analyses and their interpretations of assumptions made. Typical items looked for include:

- explanation of their random number process
- correct and accurate use of mathematics
- appropriate % of two way frequency table
- explanation of usefulness of r^2 and relation to the variables under consideration
- an appropriate method of residual analysis including a residual plot
- where technology is used, demonstration of the ownership of the processes used
- understanding reflected in the analysis and interpretation.

Much of the work demonstrated a reasonable level of mathematical understanding. However, on numerous occasions, attempts to justify the choice of a particular statistical method and then the resulting interpretation showed a lack of understanding. Aspects which seem to give students most difficulty include the interpretation of r in terms of causation and r^2 when being used to measure the appropriateness of fit to their model. Other areas include justification of appropriate length of a moving average and the choice of a suitable transformation.

Some reports lacked the demonstration of ownership in relation to their use of technology, and results appeared with little justification. Students must demonstrate their understanding of the statistical analysis being undertaken by careful explanation and formulation, relying on the technology to then perform the number work to arrive at the desired result.

Criterion 7 Interpretation and evaluation of outcomes at different stages of the investigation

Students were expected to interpret all aspects of their work. They needed to have evaluated their results, relating them back to previous findings and the overall theme. Some important aspects were:

- discussion of all scatter plots
- interpretation and evaluation of predictions
- interpretation of 'goodness' of fit based on residuals
- clear choice of transformation based on residual analysis
- concise discussion of transferred model and consequent preferred model
- evaluation of their chosen model for future predictions.

Teachers need to emphasise that the task is not merely a set of unrelated questions to be answered. More importantly, the questions are designed to lead students along a path to **investigate an overriding theme upon which the question is based**. Many students find this criterion difficult. Often they do not properly interpret their findings and find it even more difficult to evaluate them. Students must be encouraged to tie their results together and evaluate them in light of the overall theme.

Criterion 8 Synthesis of outcomes

Conclusions could be drawn throughout the project. Students should have linked outcomes together, drawn implications and related them to the theme. All conclusions should have been founded on the analysis performed and the results obtained. Important aspects include:

- discussion of predicting values in the future
- discussion of causation
- comment of other factors that affect their predicted value
- consideration of constraints within the investigation
- all results linked and comprehensively discussed
- outcomes used to investigate the overall theme.

Many students find this aspect very challenging. Often students merely summarise their results under the title of conclusions. Individual results are not drawn together to form a basis from which to focus on the original theme.

Criterion 9 Depth of investigation

Students were required to identify, account for and analyse the important aspects. All parts of the starting point were expected to be completed thoroughly. Particular aspects were:

- all important aspects within the starting point were addressed in detail
- all results and findings interpreted and evaluated
- the ability to predict future trends thoroughly examined
- meaningful and detailed use of residual analysis for establishing a preferred model.

Generally, students performed well on this criterion as most generated the required mathematical analysis. However, inadequate interpretation, evaluation and conclusions will lower the final grade obtained.

Criterion 10 Skills of communication

The quality of presentation of the report is important. Information should be logically presented and easily accessible to the reader. Important features were:

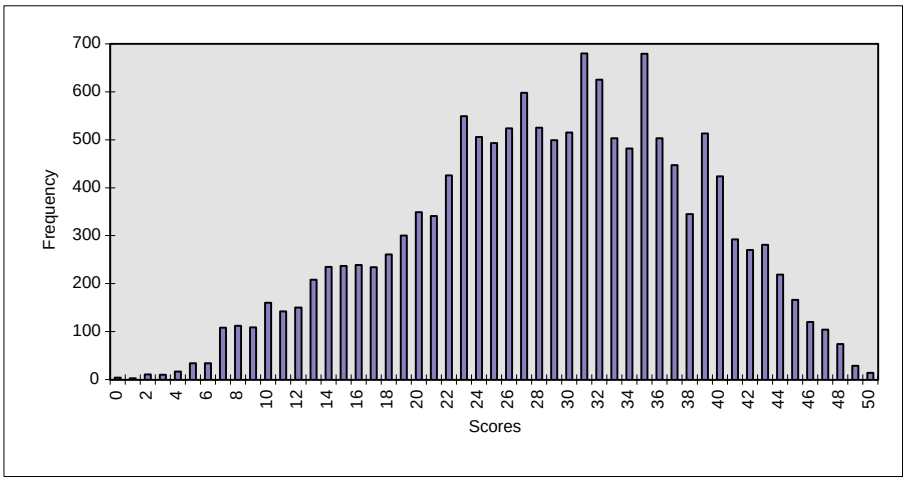
- report presented in prescribed format
- calculations, graphs, mathematics and interpretation integrated into the main text
- tables, graphs and diagrams present information clearly
- the report clearly demonstrates the student's understanding of the mathematical analysis.

Most of the work demonstrated good skills of communication. Students should be encouraged to use the available technology to their advantage, but they do not have to learn word processing skills for this CAT. Many students presented satisfactory handwritten work with graphs drawn by hand. There are no extra marks awarded for a word-processed document. The most important consideration is that the work is easily accessible to the reader and that all important work is meaningfully integrated into the main text.

CAT MA071 MATHEMATICS: Further Mathematics INVESTIGATIVE PROJECT

HISTOGRAM OF TOTAL SCORES 1998

Count **14703** Mean **28.70** Standard Deviation **9.59** NA Result **1191**



HISTOGRAM OF TOTAL GRADES 1998

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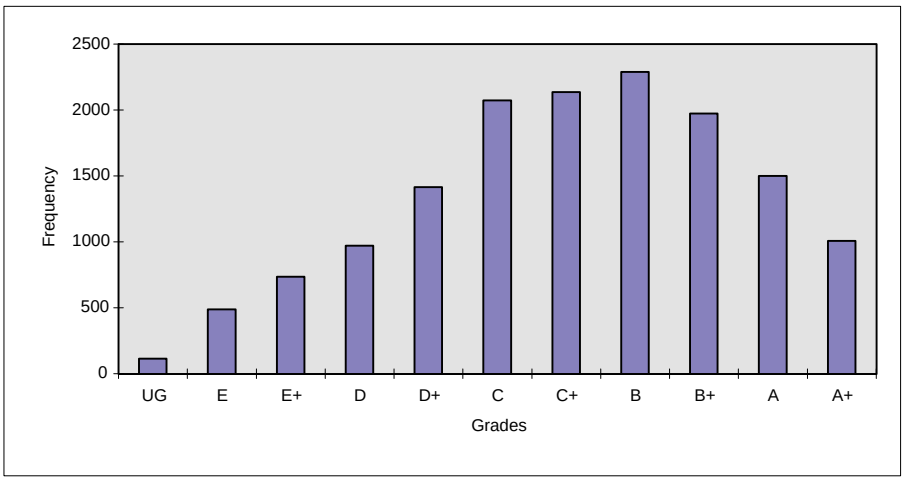


ENROLMENTS		%
Female	**8160**	**51.4**
Male	**7725**	**48.6**
Total	**15885**	

GLOSSARY OF TERMS

Count Number of students undertaking the CAT. This excludes those for whom NA was the result.

Mean This is the 'average' score; that is all scores totalled then divided by the 'Count'.

Standard Deviation This is a measure of how widely values are dispersed from the average value (the mean).

Mathematical Methods CAT 1: Investigative project

GENERAL COMMENTS

CAT summary and format

Each of the two starting points involved similar mathematics applied to different functions appropriate to two different physical situations. Both required the exploration of functional behaviour, and interpretation and evaluation of this when a function is used to model physical behaviour in the context of an application.

A greater proportion of students did Starting Point 1 and investigated the motion of the point at the end of the pendulum of Chris's Cuckoo Clock. The modelling function was the product of an exponential function and a sine function. One reason for its being more popular may have been that it was similar to a starting point used previously, but the focus, the length of the investigation, the questions asked and the exact function used were different. A wide range of students did tackle Starting Point 2 where the investigation into the time required for a computer to solve an algorithm was a little more theoretical and conceptually rather more difficult, requiring some insightful consideration of methods for comparison of the behaviour of an exponential function and a power function without direct calculation of intersection points.

There was less variety seen in the student project work this year. Both the nature of the project as an investigation and the structure of the assessment criteria continue to allow for variation of approaches and this should be encouraged by teachers.

It is important to stress that the *Assessment Advice Notes* sent to schools do not comprise a 'project report'; they simply outline one way of tackling the task mathematically, with some brief notes where appropriate. The first page of these reminds teachers of two critical aspects of the use of the notes when assessing students' work. First, the methods and particularly the mathematical notation used are not necessarily an indication of the way in which students are expected to express their work. Second, the extent to which students have met the requirements of the criteria characteristics and thereby demonstrated the qualities assessed by each of the criteria is the only basis for assessment of a student's project report.

It was clear that the mathematical techniques required were all within the Mathematical Methods course and those students with a good understanding of basic differential calculus as well as good algebraic skills were in the best position mathematically to undertake the investigation. Students were able to structure their reports to address the criteria and students found the word limit (1200–1500) and the recommended number of pages (no more than 20) appropriate to the task, allowing for completion of the task at a high level. It was pleasing to see that many students followed the clearly stated advice given in the Prescribed Conditions and presented the mathematical calculations in their report in handwritten form. This virtually eliminates transcription errors from line to line, a feature which impacts on assessment of Criteria 5 and 6.

High-scoring CATs

Correct formulation of the problem together with general mathematical analysis, correct and accurate mathematics and insightful interpretation of the outcomes were sufficient to give a student access to a high grade.

There were several common general features of high-scoring reports:

- A clear focus on the overall direction of the investigation was evident from the mathematical analysis, comprehensive interpretation and clear discussion throughout the report. This was associated with a very high level of understanding of the starting point with, for example, variables and domains clearly identified and a logical and well-established mathematical argument presented throughout, with careful consideration of assumptions and constraints and their significance (Criteria 1, 2, 4, 6 and 9).
- When technology was used, there was clear evidence of what was being analysed and why, with careful mathematical formulation and definition of terms (Criteria 1, 2 and 3).
- Observations and results produced with the aid of computer packages or graphics calculators were supported with mathematical analysis, thereby demonstrating a high level of understanding and enabling high level interpretation of results (Criteria 4, 6 and 7).

- Interpretation and evaluation of results was thoughtful in relation to the context. General results were supported by reference to specific cases (Criterion 7).
- There was an appropriate balance of material between the various sections with the latter part(s) being appropriately related to the earlier work (Criteria 1, 3, 8 and 9).
- The mathematics was well-formulated, correct and presented with the mathematical analysis nicely done through the general case where appropriate. There was clear demonstration of understanding of the mathematical processes (Criteria 2, 4, 5 and 6).
- The investigation was tied together with linking of outcomes from the different stages as the investigation has evolved. The conclusions were validly based on the outcomes in the report and were reasonable (Criterion 8).
- There was a nice integration of text, graphs, tables and mathematics to give a logical flow to the presentation. Graphs were well-drawn and scaled to show patterns and key features. Answers were clearly displayed and there was appropriate referencing to appendixes, graphs and equations (Criterion 10).

Features of the CAT

It was not assumed this year that students would have access to graphics calculators, though their use is common. Students generally showed a high level of expertise in the use of technology and were able to incorporate the output in a discriminating manner throughout the investigation. Effective use was shown in the initial exploration of the behaviour of functions and in gaining an awareness of the effects of changing values of arbitrary constants on the shape of graphs. Graphs were generally well-scaled and well-presented to show key features.

There was high correlation between the task and the test scores. The intention of the test is to assess the mathematical skills underlying the task and it was clear that those who had worked through and understood the mathematics necessary to the investigation also performed well on the test.

Of concern was a number of responses that indicated some students were simply trying to directly reproduce exactly what they had done in the task rather than answering the question asked. For example, in Starting Point 1, the differentiation asked for in Question 1b was frequently carried out as the answer to Question 1a, or even repeated in Question 1c. Question 1a was not done well by a number of students. This may have been because they had not justified the values of the t-intercepts for their graphs mathematically when doing the task but had relied on technology. Asked a similar question in class work, the same students may well have had no difficulty. In Starting Point 2, students who possibly did not have a good grasp of the mathematics in the investigation had difficulty with Question 3.

Students should be able to provide answers in exact form where required as well as numerical answers to a specified accuracy.

SPECIFIC COMMENTS ON THE CRITERIA

The criteria remained the same as in 1997 and teachers and students seemed to have little difficulty with their application. Broadly, the criteria fall into four groups:

- Criteria 1, 2 and 3 refer to the setting up of each stage of the investigation: interpretation of the starting point, making decisions about what is required by each section, formulation of the problem mathematically and carrying out on-going analysis of information.
- Criteria 4, 5 and 6 refer to the mathematics: the appropriateness of the mathematical analysis, the notation and setting out, and mathematical understanding as demonstrated through correctness and accuracy and awareness of the effect of assumptions and constraints.
- Criteria 7 and 8 refer to the interpretation of the outcomes and results, the way in which conclusions are validly formed from the results of the mathematical analysis and the linking of outcomes of different sections of the investigation.
- Criteria 9 and 10 refer to the thoroughness with which all aspects of the investigation have been carried out and the communication of the whole investigation in a well-organised report.

As always, each starting point was structured in such a way that the early sections were accessible to all students and the latter parts were more challenging. Students should aim for a balance between all parts of the investigation. The beginning is essential for laying the basic foundation for the application of the particular function to model the given physical situation. The final part is more challenging in terms of analysis and interpretation. It is here that a student has the opportunity to really show recognition and understanding of the depth of the investigation and the relevance of the earlier exploratory work. Once again this year the final section was the least well done and it is in this section and the conclusion that the student can pull the whole investigation together into a comprehensive and cohesive whole.

The criteria specific advice in the *Assessment Advice Notes* gave a guide to the features which were required to be demonstrated for a HIGH to VERY HIGH level of assessment on each of the criteria. The following comments summarise some particular outcomes and concerns for Starting Point 1: Chris's cuckoo clock, and Starting Point 2: Of powers and exponentials.

The extent to which the report demonstrates

Criterion 1 Identification of important information, variables and constraints

Starting Point 1

The understanding of the problem as mathematical modelling of the motion of the point P, the point at the end of the pendulum, and not the motion of 'the pendulum', was a subtlety that many students missed or lost sight of during the investigation. Most students appropriately took $t \geq 0$, representing time as positive throughout, though it was acceptable in the initial analysis of part a to let $t \in R$, with the restriction to positive values explained subsequently.

Reasons needed to be given for the choice of values for k and a, and constraints on these values due to the physical situation were less well handled, especially in part c.

There was general understanding of 'horizontal displacement' as being the signed (positive and negative) horizontal distance from the vertical, and of the 'magnitudes of the successive local maxima of the horizontal displacement' as the extreme position distances either side of the vertical. Some students interpreted the

latter as the magnitudes of the successive local maxima of the displacement function, i.e. interpreted in terms of the graph of displacement as a function of time and considered only the 'maximum' displacements, i.e. the extreme positions of P when on the right-hand (or positive) side of the vertical position. This is not as relevant in terms of the physical context but, if explained and justified was acceptable. Lack of complete understanding here did lead to some confusion when answering Question 3 in the test.

Starting Point 2

Some students failed to understand that part a of the investigation required the initial exploration of the behaviour of the two functions to be done with the domain as $\{x : x \in R\}$, with the restriction to positive reals in the context of the physical situation to be made for parts b, c and d. This had consequences for assessment on all criteria with the exception of Criterion 5.

Criterion 2 Correct and appropriate mathematical formulation of the problem, situation or issue

The mathematics outlined in the *Assessment Advice Notes* gave an indication of the depth of formulation required for a VERY HIGH on this criterion, whether those formulations or alternative ones were used.

Starting Point 1

General mathematical formulation to support the graphs was necessary for full understanding of the motion being investigated. Lack of mathematics led many students to miss the asymmetry of the motion caused by the damping factor. This further impacted on Criteria 6, 7, 8 and 9 and caused problems when doing the test questions.

Starting Point 2

In the last section, many good students graphically showed the difference between the two functions as a function of time, i.e. $d(x) = f(x) - g(x)$ for different values of n. This formulation enabled comprehensive and valid conclusions to be drawn in part d, important for assessment on Criteria 7 and 8.

Criterion 3 Analysis of information

The focus of this criterion was the purposefulness of the analysis throughout the investigation and its relevance to the particular task, i.e. investigating the relationship between time, displacement and velocity within the context of the motion of the point on the end of the pendulum of a clock after the driving force is removed, or investigating the relationship between the size of computer input and the time in which each of two particular algorithms can then solve the problem.

Graphs were generally well-presented in part a and other graphs were well-placed within the main text to enhance the investigation and complement the algebra. This facilitated interpretation (Criterion 7) and communication of the investigation (Criterion 10).

Criterion 4 Appropriateness of mathematical analysis

The mathematical notes outlined in the *Assessment Advice Notes* gave a guide to the level of appropriate mathematics. The way in which the mathematics is done, such as the algebraic manipulation used in solving equations, should be considered when looking for efficient mathematics which enables progress in the analysis.

Starting Point 1

Recognition of the dependence of the ratio on both k and a led to a more comprehensive investigation of the effect of these constants on the motion in part c. Consequently, it was possible to choose realistic combinations of the constants and set realistic restrictions on their values (Criteria 6, 7, 8 and 9).

Starting Point 2

Generalisation to the case for n in considering the function $h(x) = \frac{\log_e x}{x}$, showing the relationship between the graph in part c and the points of intersection in part a, enabled valid conclusions with regard to the conditions under which each of the functions was more or less efficient and therefore to be preferred (Criteria 6, 7, 8 and 9).

Criterion 5 Knowledge of mathematical language, symbols and conventions

Students scored well on this criterion and use of mathematical language was much improved. Of prime importance were: clear presentation of graphs with correct drawing, labelling and scaling over an appropriate domain with families clearly distinguishable and key features clearly evident; proper definition of variables; accurate and clear algebraic setting out; correct use of mathematical symbols; accurate use of language in interpreting the mathematics. All of this improves communication as assessed by Criterion 10, and helps to demonstrate understanding (Criterion 6).

Criterion 6 Mathematical understanding

Generally speaking, understanding was best demonstrated through the correct and accurate use of mathematical analysis with clear discussion of the effect of all assumptions and constraints.

The mathematics in both starting points was commonly well done and the analysis appropriate throughout. However, there were students demonstrating a good understanding of the mathematics who all too frequently presented either insufficient or incorrect recognition of the effect of all assumptions and constraints on the results obtained. This was particularly evident in Starting Point 2 when investigating the number of intersection points and the regions of the domain within which they occur. Many groups of 'similar answers' were seen, yet it was clear that the level of understanding varied enormously. Some students had little idea of the implications of this part of the investigation and their explanations and interpretations, or lack of these, made this obvious.

Criterion 7 Interpretation and evaluation of results at different stages of the investigation

Of importance here was the discussion of the key features of graphs and their comparison, and discussion of the results throughout the investigation. By definition, interpretation cannot be made if the original analysis and results are not present. As a consequence, the level of assessment on this criterion is, to a large extent, dependent on the mathematical formulation, analysis and understanding (Criteria 2, 3, 4 and 6). Students must also remember that general results must be justified in terms of specific cases.

Criterion 8 Synthesis of outcomes

This aspect of the CAT was handled better this year. It was pleasing to see that most students presented conclusions which were well founded and valid, being based on the mathematical analysis in the report. However, many students still find it difficult to see connections between the results of the different sections. It is the linking and comparison of the outcomes from different stages that are necessary for students to obtain better than a MEDIUM. It is important in managing the task over two weeks, that the mathematics be basically completed as early as possible so that time can be given to synthesis which can only be comprehensively done after the mathematics and interpretation of specific results is completed.

Criterion 9 Depth of investigation

A correct, comprehensive and complete investigation required mathematical analysis of all parts. Discussion and interpretation of all outcomes was essential for a high level of assessment on this criterion. Good reports clearly demonstrated understanding of the complexity of the situation. Almost all students carried out a complete investigation.

Criterion 10 Skills of communication

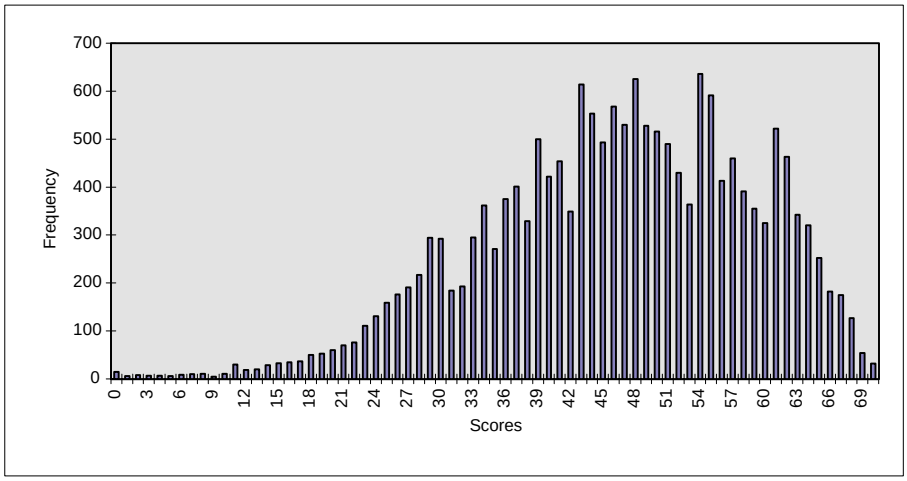
In the best reports the graphs, text and mathematics were presented as an integrated whole in a manner which demonstrated a clear focus and an overall direction to the investigation and allowed a logical flow to the report. Graphical displays comprised a well chosen and purposeful selection which was well presented to demonstrate key features, and families were clearly distinguishable.

In particular, most students began the report with an informative table of contents. Where a good report began with an abstract or summary of aims and findings it was clear and concise, providing a global picture of the investigation to follow. Otherwise, the direction of the investigation was clearly communicated throughout the investigation. To access HIGH and VERY HIGH, the language used needed to be concise and correct, and notation used needed to be accurate. Results and answers were generally clearly displayed.

CAT MA081 MATHEMATICS: Mathematical Methods INVESTIGATIVE PROJECT

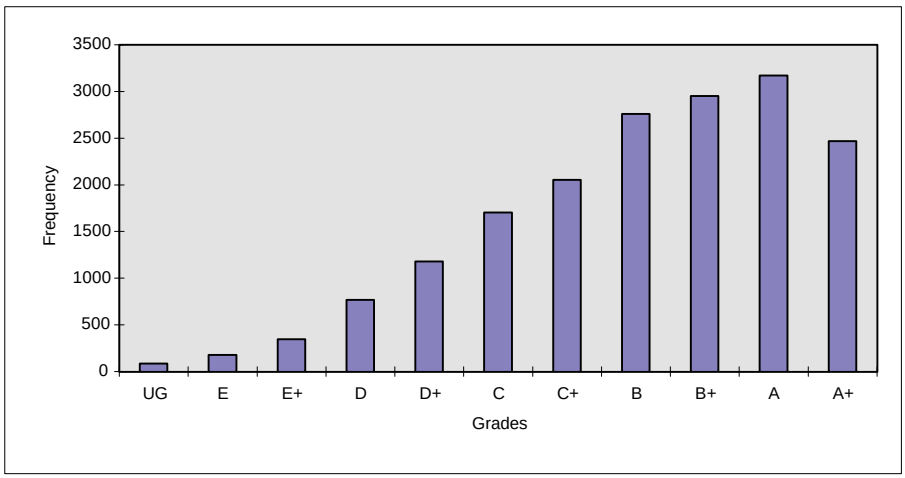
HISTOGRAM OF TOTAL SCORES 1998

Count **17664** Mean **46.15** Standard Deviation **12.40** NA Result **370**



HISTOGRAM OF TOTAL GRADES 1998

Count **17664** Mean **7.07** Standard Deviation **2.24** NA Result **370**



ENROLMENTS		%
Female	**8363**	**46.4**
Male	**9649**	**53.6**
Total	**18012**	

GLOSSARY OF TERMS

Count Number of students undertaking the CAT. This excludes those for whom NA was the result.

Mean This is the 'average' score; that is all scores totalled then divided by the 'Count'.

Standard Deviation This is a measure of how widely values are dispersed from the average value (the mean).

Notes

‘Report for Teachers’ series of booklets contain reports from Chief Assessors and State Reviewers for the common assessment tasks undertaken in 1998. Each report contains an overview of student performance on individual CATs. Chief Assessors and State Reviewers have commented on such matters as the assessment criteria and student performance on the CATs.

Users of these reports should be aware that these reports are for 1998 CATs. Changes may have been made to study designs, CATs and assessment criteria since the completion of the reports.

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