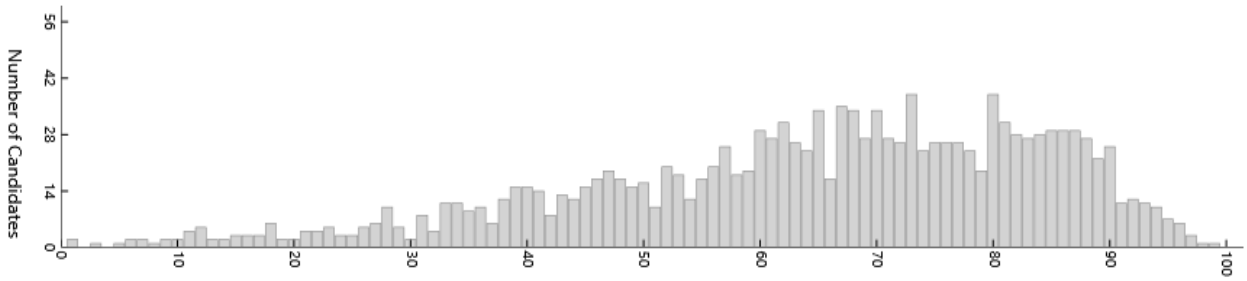
Government of **Western Australia**
School Curriculum and Standards Authority

Summary report of the 2016 ATAR course examination:
Mathematics Specialist

Year	Number who sat	Number of absentees
2016	1427	17

Examination score distribution



Summary

The examination had a mean of 64.13%. Candidate scores ranged from 0.66% to 97.66% with a standard deviation of 19.70%. The section means were: Section One: Calculator-free 73.61% with a standard deviation of 19.64%; and Section Two: Calculator-assumed 59.20% with a standard deviation of 20.34%.

Attempted by 1427 candidates	Mean 64.13%(/100)	Max 99.33%	Min 0.66%
Section means were:			
Section One: Calculator-free	Mean 25.76(/35)	Max 35.00	Min 0.66
Section Two: Calculator-assumed	Mean 38.49(/65)	Max 64.33	Min 0.00

General comments

The paper proved to be very accessible, and from all reports, well received by candidates. Most candidates appeared to have sufficient time to answer all questions. There was a very large diversity in the standard of responses, with many candidates performing at a very high level while other candidates struggled. The Calculator-free questions were a little too straightforward as evidenced with a mean of 73.61%. The Calculator-assumed questions were deemed to be of an appropriate standard with a mean of 59.20%.

Sections of the course that were generally not understood well are listed below.

- In Question 1(b) of Section One, the ability to determine the domain and range of a composite function. This was surprising since this was not a new part of the course.
- Candidates' decision to use polar form versus Cartesian form for a complex number in Question 2(b). A significant number of candidates chose not to convert to polar form, to their peril.
- The use of a relevant trigonometric identity to integrate a function in Question 5(b).
- With Question 7(a) the vector equation of a sphere given the end points of the diameter, candidates were commonly unable to correctly determine the position vector for the centre.
- The use of the domain and range of a function in determining the defining rule for the inverse function in Question 8(d) was an area of concern.
- In Section Two, Question 11(a) and Question 15(a), the idea of showing a result is true from given information, found many candidates assuming what was meant to be obtained, or did not show how the result had been obtained.
- The concept of the slope field and the information contained in the given diagram was required for Question 18(a). This was from a new part of the course, and despite the

question being almost identical to that in the sample paper, candidates seemed ill-prepared.
- The use of a single sample mean to produce a confidence interval for an unknown population mean in Question 19(e) caused some consternation. The words 'significantly more' should have been interpreted in the context of making a reasoned comment. This new section of the course showed that candidates did not appear to understand what had to be done.

Advice for candidates
- Write legibly using a ball point pen, or at least a dark 2B pencil as using faint pencil does not scan particularly well.
- If an error is made using a pen, simply put a line through it.
- Show all your working particularly in questions where a CAS calculator routine has been used.
- When you are working in the statistics section, write mathematical statements, not language specific to a CAS calculator.
- Acknowledge a variable is normally distributed and show clearly the parameters (mean and standard deviation) used.
- When questions are worth three or more marks, do not simply write an answer as this will not attract full marks.

Advice for teachers
- Provide students with opportunities to explain ideas, using appropriate mathematics language.
- Ensure students understand the importance of the legibility of their work, the need to show all working, to write clear mathematics statements rather than language specific to a CAS calculator.
- Focus students' conceptual understanding on the new syllabus areas. Notably, the idea of using a sample mean to determine an interval for an unknown population mean, and then comparing this to the distribution of another variable.
- Interpretation of a diagram of a slope field needs emphasis.
- Provide opportunities for students to develop skills in showing a result is true from given information.

Comments on specific sections and questions

Section One: Calculator-free

Attempted by 1425 candidates Mean 25.76(/35) Max 35.00 Min 0.66

Candidates found this section to be very straightforward, with many candidates achieving a perfect score. Candidates performed well in the in the following areas:

- use of partial fractions to integrate a function (Question 4)
- standard techniques of integration using a change of variable (Question 5(a))
- knowledge of how a system of equations may have no solution (Question 6(b))
- graphing functions $y = \dfrac{1}{f(x)}$ and $y = f\left(|x|\right)$ (Question 8(a) and (b))
- solving an equation in the complex plane (Question 3(b)).

Section Two: Calculator-Assumed

Attempted by 1424 candidates Mean 38.49(/65) Max 64.33 Min 0.00

Candidates found this section to be more challenging than the Calculator-free section, providing opportunities for the more able candidates to show their capabilities. Most candidates seemed to have had time to answer the vast majority of the questions, including attempting the last question on the paper. Candidates performed well in the in the following areas:

- determining the speed of a particle using vectors (Question16(b))
- determining the size of a sample to achieve a given difference from a population mean (Question 19(d))
- finding the position vector for the intersection of a line and a plane (Question 20(a))
- integration using a change of variable (Question 9)
- solving an equation in the complex plane (Question14(a)).