Summary report of the 2017 ATAR course examination: Mathematics Specialist

| Year | Number who sat | Number of absentees |
| :---: | :---: | :---: |
| 2017 | 1463 | 12 |
| 2016 | 1427 | 17 |

## Examination score distribution - Written



## Summary

Attempted by 1463 candidates
Mean 63.95\%
Max 98.68\% Min 4.30\%
The examination consisted of two sections: a Calculator-free section and a Calculatorassumed section.

Section means were:
Section One: Calculator-free
Mean 62.58\%
Attempted by 1463 candidates
Mean 21.90(/35) Max 35.00
Section Two: Calculator-assumed
Attempted by 1463 candidates

Mean 64.68\%
Mean 42.04(/65) Max $65.00 \quad$ Min 0.67

## General comments

The paper appeared to be well received, with all questions being accessible and with sufficient material to challenge the more able candidates. The Calculator-free section was more difficult than that of the 2016 paper. The Calculator-free mean was $62.58 \%$ and the Calculator-assumed mean was $64.68 \%$.

There was no significant evidence that candidates had a problem with the length of the paper, as shown by the high attempt rates for questions at the end. This year, there were fewer candidates writing exclusively with a pencil and more using a pen, albeit that many did not write legibly, particularly with respect to forming digits.

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

- In Question 4 (d) of Section One, to determine the domain and range of a composite function required ability to write and solve inequalities. A reluctance to form an inequality in Question 17 (d) underscores this.
- The understanding of the notion of a vector within (or in) a plane as against a position vector specifying a point in a plane. Many candidates demonstrated genuine confusion with this concept as seen in Question 7 (a) (ii) and in Question 15 (a). Combined with this confusion was a lack of attention to vector notation that made a candidate's task much more difficult, as seen throughout Question 15.
- In Section Two, throughout Question 13 candidates had difficulty in writing sensible statements, particularly with respect to the sampling of the mean and confidence intervals.
- The ability to recognise standard differential equations, specifically for simple harmonic motion and exponential decay.
- The general reluctance to use implicit differentiation to determine rates, as seen in Questions 12 (a) and 18 (c). Implicit differentiation is a key skill in the Mathematics Specialist course.


## Advice for candidates

- Write legibly using a ball point pen, particularly taking care to form digits that can be read by markers.
- Show all working and acknowledge 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 that a variable is normally distributed and show clearly the parameters (mean and standard deviation) used.
- When questions are worth more than two marks, do not simply write an answer but show valid working or justification to receive full marks.


## Advice for teachers

- Provide students with many opportunities to explain ideas, using appropriate mathematics language and using correct mathematical notation.
- Ensure students understand the importance of the legibility of their work, the need to show all working and to write clear mathematics statements rather than language specific to a CAS calculator.
- Focus students' conceptual understanding with vectors. It is a clear advantage if teachers can show students (using appropriate computer software), vector ideas in three dimensions; and also to insist on the correct use of vector notation, to distinguish between many vector ideas.


## Comments on specific sections and questions

## Section One: Calculator-free ( 53 Marks)

Candidates performed well in the in the following areas:

- showing a linear divisor is indeed a factor of a polynomial in Question 2 (a)
- sketching the graph of an inverse function in Question 4 (a) and determining the inverse rule in Question 4 (b)
- sketching the graph of a rational function in Question 5.


## Section Two: Calculator-assumed (97 Marks)

Candidates performed well in the in the following areas:

- representing complex numbers as vectors in Question 10
- determining an area between curves in Question 12 (b)
- determining the confidence interval for a population mean based on a sample in Question 13 (a)
- writing a defining rule using an absolute value function in Question 16 (a)
- solving an equation in the complex plane in Question19 (a).

