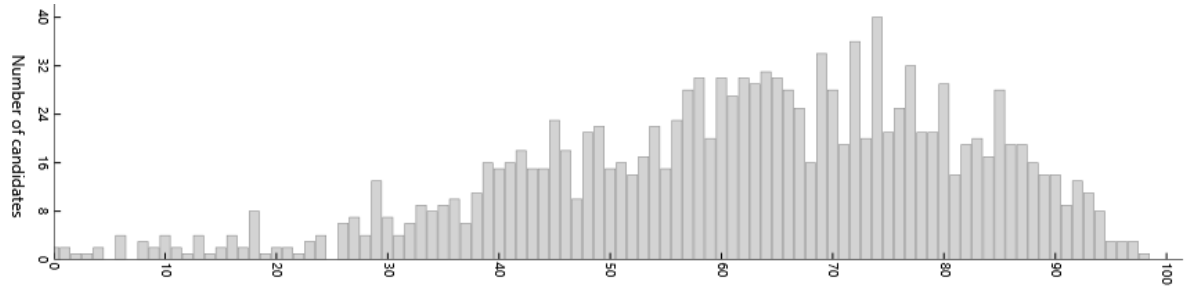
Summary report of the 2022 ATAR course examination report: Mathematics Specialist

Year	Number who sat	Number of absentees
2022	1350	28
2021	1503	18
2020	1526	23
2019	1435	32

The number of candidates sitting and the number attempting each section of the examination can differ as a result of non-attempts across sections of the examination.

Examination score distribution–Written



Summary

Attempted by 1348 candidates	Mean 61.78%	Max 97.76%	Min 0.00%
Section means were:			
Section One: Calculator-free	Mean 71.14%		
Attempted by 1348 candidates	Mean 24.90(/35)	Max 35.00	Min 0.00
Section Two: Calculator-assumed	Mean 56.75%		
Attempted by 1346 candidates	Mean 36.88(/65)	Max 63.49	Min 0.00

General comments

The 2022 Mathematics Specialist examination provided candidates with many opportunities to demonstrate their knowledge of standard techniques and related concepts. The mean score of 61.78% compared favourably with the 2021 mean of 60.77%. The Calculator-free section was well received, as it provided some straightforward questions testing standard techniques. The Calculator-assumed section provided an appropriate balance of questions testing routine concepts and questions requiring a deeper level of understanding. The mean of 56.75% for the Calculator-assumed section perhaps reflected candidates not having the depth of understanding required.

Questions such as Question 6 part (c) and Question 19 part (c) required candidates to show a greater depth of understanding of some concepts. The distribution of marks indicated a very diverse cohort. There were a number of candidates that were not able to respond to many questions.

The length of the paper appeared to be appropriate. There was a significant decrease in the number of candidates who attempted to answer Question 19 part (c), though this may have been due to an inability to answer the question, rather than a time factor.

Advice for candidates

- Show a clear sequence of ideas and write a clear conclusion. Markers should not be expected to search for the 'answer', or to construct meaning out of a solution for themselves.
- Check your work from one line to another. An example of this is omitting a negative sign in the next line of working.
- Be specific in explanations in the context of the question and refer directly to the relevant key words. Do not use the words 'it' or 'they', as this is meaningless.
- Ensure you include absolute value brackets when writing a natural logarithm anti-derivative.

Advice for teachers

- Give students practise in solving algebraic inequalities.
- Develop students' understanding in 3D vectors to a more conceptual level. In particular, the case where three planes do not intersect in a unique point is an area of concern.

Comments on specific sections and questions

Section One: Calculator-free (48 Marks)

Candidates were able to answer the standard technique style of questions well. This was observed in:

- sketching the graph of the reciprocal of a function (Question 2 part (b))
- evaluating a definite integral using trigonometric identities (Question 3)
- integration using partial fractions (Question 4 part (b)).

Areas that were seen to cause difficulties were:

- determining the domain for the composition of a function (Question 1 part (b))
- writing the solution for the case where planes intersect in a line (Question 5 part (b)).

In Question 5 part (b), most candidates did not correctly specify the solutions in the case of planes intersecting in a line. This was true even for many of the higher scoring candidates. It was very common for candidates to cease working once they had stated that there were infinitely many solutions.

Section Two: Calculator-assumed (86 Marks)

The performance on the Calculator-assumed section did not match that of the Calculator-free work. The wider array of questions and concepts appeared to challenge a large number of candidates.

Difficulties were observed with:

- forming the correct expression for the area of a regular hexagon (Question 8)
- algebraically working with a complex number equation (Question 9 part (b))
- expressing a given locus equation correctly (Question 9 part (c))
- dealing with motion where the velocity is given as function of displacement (Question 11)
- using correct mathematics or vector notation (Questions 10 and 19).