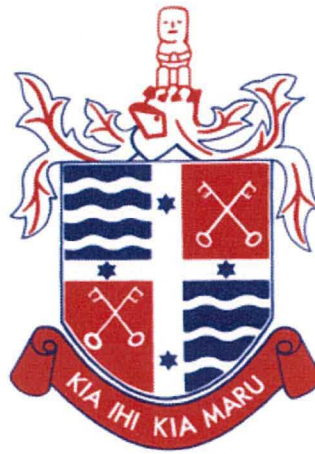


NAENAE COLLEGE

Department Report

Academic Year 2023-2024

Mathematics



SUMMARY OF 2023 ACADEMIC YEAR

SECTION ONE: Executive Summary

Vision

To enable all students to develop a positive identity as mathematics learners, to support them as they use mathematics to make sense of the world, and to help them make critical decisions based on mathematically sound principles.

Mathematics Department Goals 2023

The mathematics department goals were co-constructed with the mathematics staff to meet the needs of our students. The goals are in line with the school goals, which allow students to progress and achieve their highest educational potential and continue to pursue lifelong learning in the world around them.

School Goals Measures	Department Goals
1 (a) All students attend school at least 90% of the time.	All students attend school at least 90% of the time.
1 (b) More than 85% of our students leave with NCEA Level 2 or move to further education or training. 1 (c) Level 1 NCEA pass rates will be at least at the national average of 72%.	At least 60% of Year 9 students finish the year with a minimum average grade of 12 . At least 60% of Year 10 students finish the year with a minimum average grade of 12 . All leavers have Level 1 Numeracy. More than 85% of Year 11 students achieve a minimum of 16 credits in Level 1 Maths and more than 85% of Year 12 and 13 students achieve a minimum of 12 credits in Level 2 and 3 Maths.
2 (b) Delivering highly engaging programmes, with quality review processes for continuous improvement.	Implement differentiated teaching and learning in all junior classrooms.

Highlights and Concerns for the 2023 Academic Year

Highlights

- The progress of NUM100 students was closely monitored to identify those at risk of not passing Level 1 Numeracy.
- A differentiated program was offered to Year 10 students who passed the Numeracy CAA to create more opportunities for further success.
- ~~Andrew Wang~~ was placed in the Top 30 in the Otago University Mathematics Competition. ~~Andrew~~ in the top 15% of the students and was awarded a Certificate of Distinction.

Areas to Develop

- Literacy strategies (reading and comprehension): This is a major barrier for students who are to explain how they solve problems, in particular, for students in NUM100.
-

- o Developing practical activities and engaging tasks in abstract mathematics is challenging.
- o More real-life-based activities and resources for the junior curriculums need to be developed to engage students and help them understand mathematics in everyday life.
- o Identifying knowledge gaps students might have developed during COVID and supporting them to fill the gaps
- o A more rigorous plan needs to be in place to improve student attendance and engagement.
- o External results in Years 11–13 are not as good as internal results.

Staffing

~~Mr. Behave~~ joined the Mathematics Department in Term 2 and taught in both junior and senior levels.

Staff code	Responsibility	Y9	Y10	Y11	Y12	Y13
WV	HOF		WV	WV		WV
WV	Assistant HOF				WV WV	WV
WV			WV WV	WV WV		
WV	WV		WV	WV		WV
WV		WV	WV	WV		
WV		WV	WV		WV	
WV				WV	WV	WV
WV		WV WV	WV WV			
WV		WV WV				
WV				WV		

Te Whanau Tahī

- o All mathematics department members talk with students about our core intent and identity as a unified community.
- o All cultures are valued, and students are encouraged to bring their cultural knowledge to the classroom.
- o Opportunities are offered for students to show their leadership. Students are encouraged to share their ideas and collaborate with others, supporting the achievement of the group. Māori and Pasifika students seem to value peer collaboration and group work.
- o Students are frequently reminded of their responsibilities for learning and achievement.
- o All mathematics teachers pay attention to building relationships with students. When relationships are strengthened, students become more engaged, and ultimately, mathematics learning is enhanced.



SECTION TWO: Results Analysis for [REDACTED]

Total Credits Offered and Number of Students

Total credits offered and the number of students in each course over subsequent years:

Subject	Total Credits Offered			Number of Students		
	2021	2022	2023	2021	2022	2023
[REDACTED]	19	16	20	34	28	28
[REDACTED]	18	18	21	46	55	50
[REDACTED]	17	17	17	59	88	82
[REDACTED]	17	19	19	23	19	15
[REDACTED]	18	17	17	43	30	29
[REDACTED]	16	16	14	33	26	27
[REDACTED]	22	22	22	10	14	9
[REDACTED]	22	18	20	20	30	25
[REDACTED]	16	14	16	20	28	17

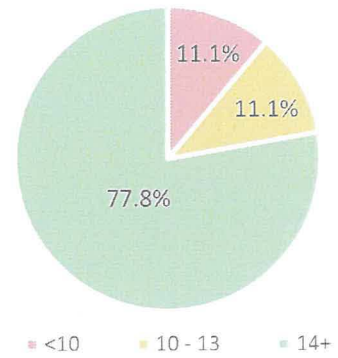
- The number of credits offered has been similar over the last three years, ranging between 14 and 22 credits.
 - The number of students in both levels of Calculus (MAT201 and MAC301) is a significant concern, particularly MAC301. Advanced students were advised to take Calculus, but many of them preferred Statistics as an easy option. Efforts should be made to encourage students to challenge themselves and choose Level 2 and 3 Calculus.
-

Merit/Excellence Grades per Standard

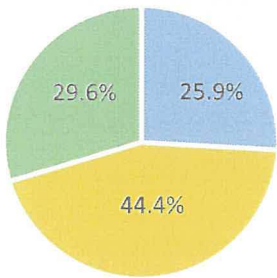
Level 1 Mathematics – MAT191

- Students were offered a choice between two externals (AS91028 Tables, Equations and Graphs and AS91037 Chance and Data). This allowed students to think about their pathways and focus on developing the required skills after Year 11. In general, students wanting to move to Calculus were advised to take AS 91028.
- The class started preparing for externals from the start of the year and repeated similar questions to reinforce the concepts. This improved the pass rate of AS91027 Algebra and produced overall pleasing results.
- AS91028 has the lowest pass rate in 2023. AS91028 has had the lowest pass rate for the last few years. This needs to be taken into consideration when teaching the Year 11 curriculum.
- Most of the students who didn't earn 14 credits had low attendance or didn't show up for the internal assessments offered.
- The results for internals were better than the results for externals.
- Students had a good work ethic but lacked perseverance.

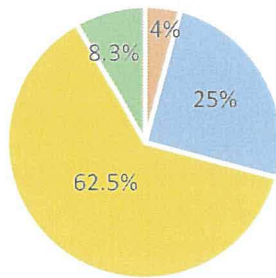
AS91027 Total Credits per Student



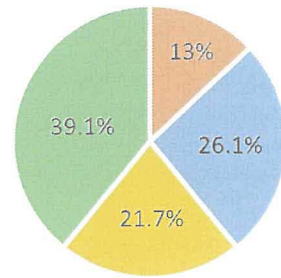
Internal Assessment Algebra **Internal Assessment with the** **Internal Assessment Algebra**



Achieved Merit Excellence

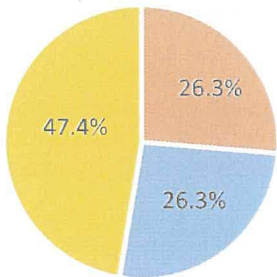


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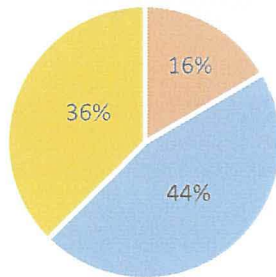


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Internal AS91028 - Graphs **Internal AS91037 - Chance and Data**



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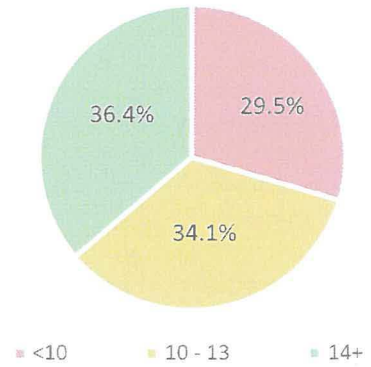


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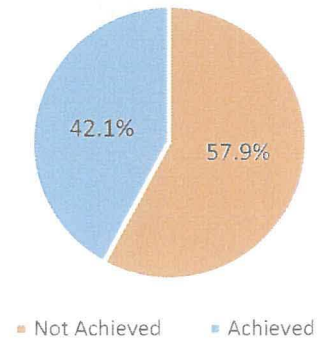
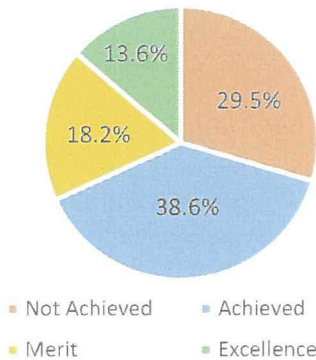
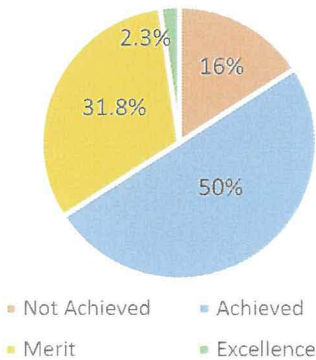
Level Mathematics - MAS101

- o Many students struggled with writing reports in Statistics due to low literacy skills.
- o The first internal AS91026 Number has the highest pass rate. This could be due to the familiarity of the topic, as students have learned Number since primary school. Support should be given for all students to pass this standard.
- o The results for AS91029 Linear Algebra **Low 57.9% Not Achieved**. It is likely due to students' lack of understanding of Algebra. More time and support in junior school are needed to improve students' logical thinking and algebraic skills.
- o The results for AS91038 Elements of Chance **are disappointing, with 43.8% Not Achieved**. This was the last internal assessment offered in term 4, and students didn't do their best to pass the assessment.
- o **Approx 40%** of the students didn't sit for the external exam.

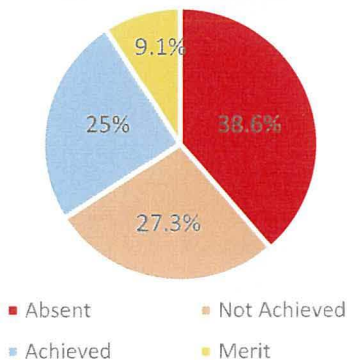
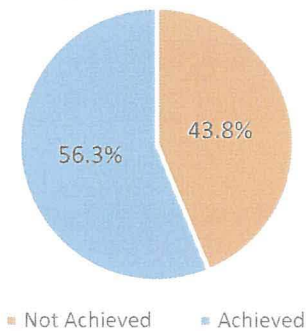
AS91026 Total Credits per Student



Internal AS91026 - Number **Internal AS91035 - Multivariate** **Internal AS91029 - Linear Algebra**



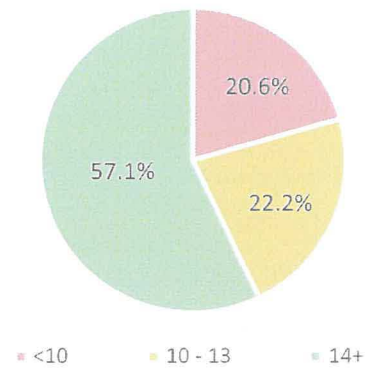
Internal AS91038 - Elements of Chance **External AS91037 - Chance and Data**



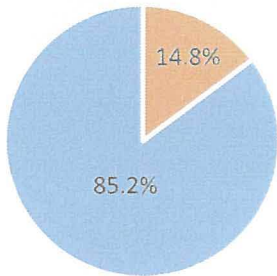
Level 1 Mathematics - NUM100

- 84% of NUM100 students passed Level 1 Numeracy. The students who didn't pass Numeracy showed low attendance and a lack of engagement.
- The pass rate of US26626 Statistics is the highest out of the three unit standards. This could be due to not requiring many calculations in the standard. In US26626, students were asked to analyse graphs and interpret their answers in context.
- 71% of students achieved 14 credits or more from the course. They were encouraged to take Level 2 Mathematics.
- Literacy demand is high in this course. Students with low literacy skills struggled to comprehend the tasks given in class.
- Attendance and engagement were of concern. Consistent collaboration and frequent communication with whanau need to be in place.

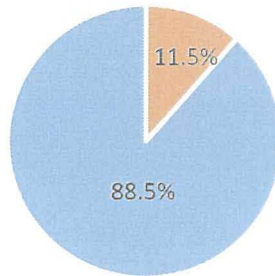
NUM100 Total Credits per Student



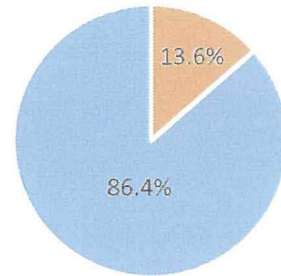
Internal US26629 - Numeracy **Internal US26626 - Statistics** **Internal US26627 - Measurement**



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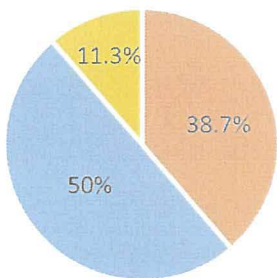


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Internal US26629 - Numeracy

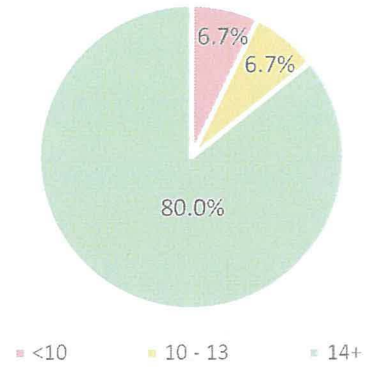


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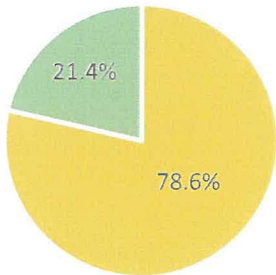
Level 2 Mathematics - MA1211

- Only 80% of the students earned 14 credits or more. The students in this class are top-performing students and everyone should gain at least 14 credits.
- The results of AS91261 Algebra are concerning, with 46.7% of the students not sitting the exam. This is likely due to students having already chosen their pathways and not needing Level 3 Algebra or Calculus.
- Students find AS91257 Graphs challenging. The class teacher needs to explore new strategies and practice tasks to support students.
- The results of AS91256 Coordinate Geometry and AS91264 Inference are pleasing; every student passed and gained credits.
- The class size was small, with only 15 students. Over the years, students' algebraic skills have been steadily dropping. Year 9 and 10 curriculums need to be revised to support students.

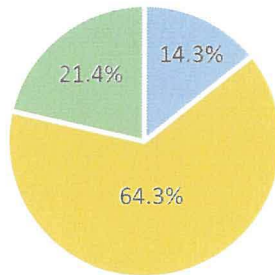
MA1211 - Total Credits per Student



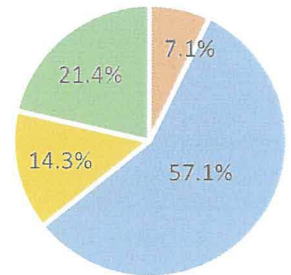
Internal AS91256 - Coordinate Geometry **Internal AS91264 - Inference** **Internal AS91257 - Graphs**



Merit Excellence

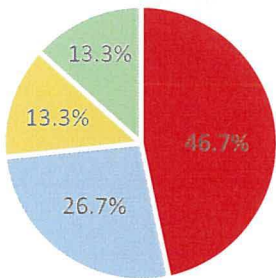


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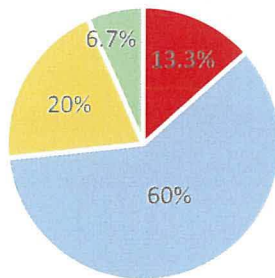


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External AS91256 - Coordinate Geometry **External AS91264 - Calculus**



Absent Achieved Merit Excellence

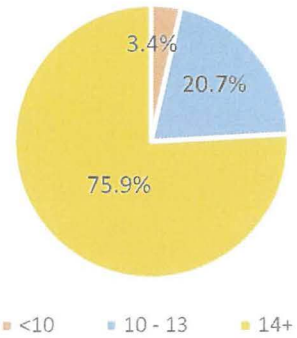


Absent Achieved Merit Excellence

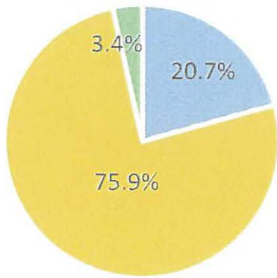
Level 2 Mathematics - MAS201

MAS201 Total Credits per Student

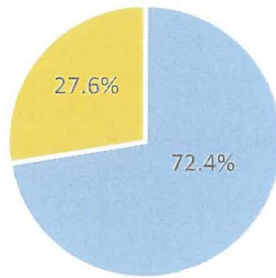
- o This was the best performing class in Years 11-13. 75.9% of the students gained at least 14 credits from the course. The percentage goes up to 100% when looking at students with 12 credits or more. There is one student who didn't get 1 credits and left school during the year.
- o All the students, except for one who left school, passed all the internals, earning at least 13 credits from the course.
- o The results of AS91262 Probability External were very good. 23 out of 25 students who sat for the assessment passed the standard and earned four credits. This is the best external result in Years 11-13.
- o Positive learning Pumanawatanga was created by the class teacher and the students, and it was well maintained throughout the year. This improved students' engagement and their sense of self agency.



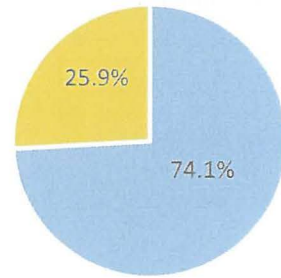
Internal AS91263 - Networks **Internal AS91255 - Co-ordinate Geometry** **Internal AS91264 - Inference**



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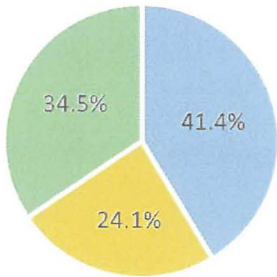


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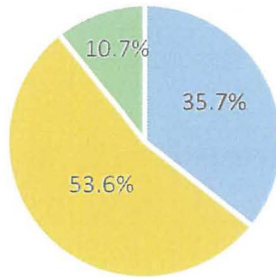


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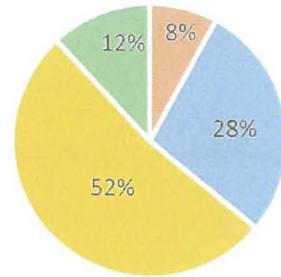
Internal AS91262 - Simulation **Internal AS91259 - Trigonometry** **External AS91267 - Probability**



■ Achieved ■ Merit ■ Excellence



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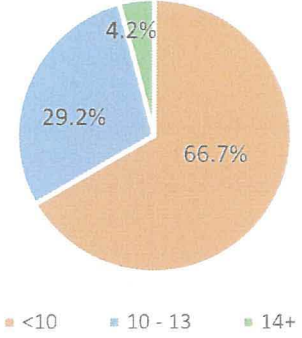


■ Not Achieved ■ Achieved ■ Merit ■ Excellence

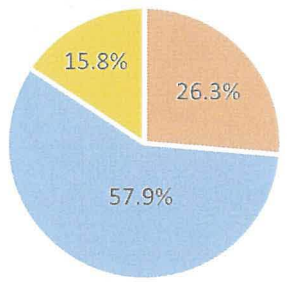
Level 2 Mathematics - MAS20

MAT202 Total Credits for Students

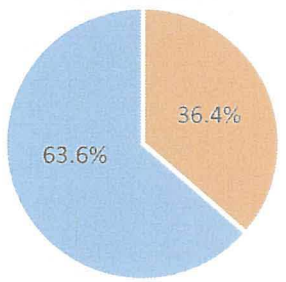
- o MAT202 had the lowest pass rate in Years 11-12. Only one student gained 14 credits, and only four students gained 12 credits or more.
- o Students' low literacy had a negative impact on the outcome. More practice assessments are to be offered to overcome the barrier.
- o Students didn't show disruptive behaviour, but their engagement was low in class. Many of them used their phones and didn't pay full attention in class. Students also showed a lack of motivation and low attendance in general.
- o The class teacher was a first-year teacher and overestimated students' ability to take responsibility for their own learning. Clear instructions and more communication with whanau are required for better output from students.
- o The pass rates in AS91259 Trigonometry and AS91258 Sequences and Series are very low and can be improved by providing pre-rearranged formulas in the assessments.
- o US28094 Household Budgeting has the highest pass rate and is the most relevant topic for MAT202 students.



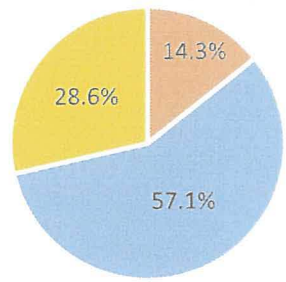
Internal AS91258 - Coordinate Geometry **Internal AS91258 - Coordinate Geometry** **Internal US28094 - Household Budgeting**



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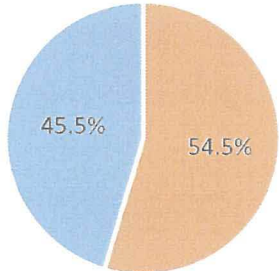


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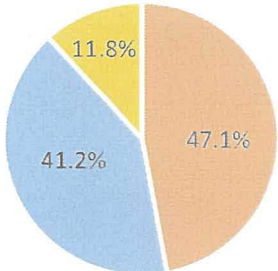


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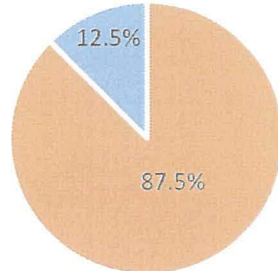
Internal AS91259 - Trigonometry **Internal AS91259 - Trigonometry** **Internal AS91258 - Sequences and Series**



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Not Achieved Achieved Merit

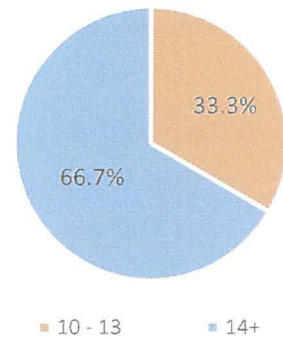


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Level 3 Mathematics - MAC301

MAC301 Total Credits per Student

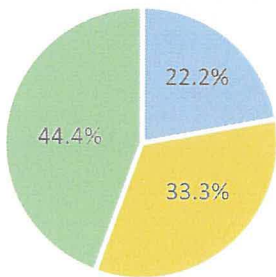
- The pass rate ~~was decreased in 2023~~ compared to previous years. Students who had enough credits to pass NCEA Level 3 didn't sit the external exams.
- ~~The class size was alarming, with only 9 students in 2023.~~ Students preferred Statistics as an easy option and didn't want to spend extra hours learning Algebra. Good support in Years 11 and 12 should be provided for students to be more confident in taking Level 3 Calculus.
- Students who worked hard to get high grades achieved Excellence grades ~~in all or many of the standards offered.~~
- Some students, although their understanding is not up to the level, were allowed to take MAC301 because their pathway after college required Level 3 Calculus. In such cases, the class teacher is to give extra feedback and support to improve their algebraic skills.



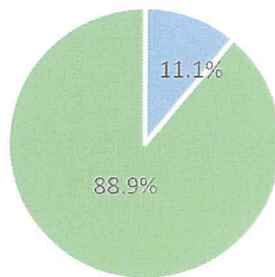
Internal AS91575 - Trigonometry

Internal AS91587 - Systems of Equations

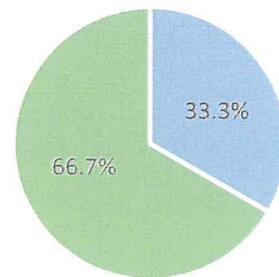
Internal AS91574 - Linear Programming



Achieved Merit Excellence



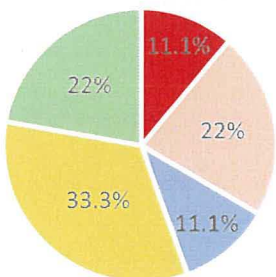
Achieved Excellence



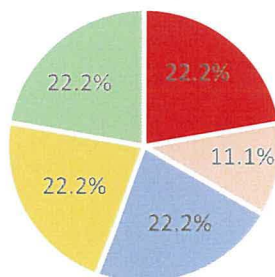
Merit Excellence

External AS91576 - Differentiation

External AS91579 - Integration



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Achieved Merit
Excellence

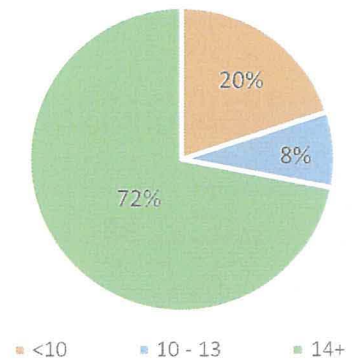


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Excellence

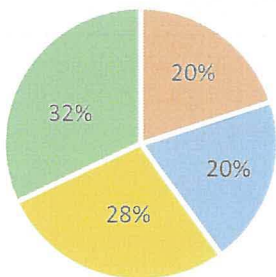
Level 2 Mathematics - MA 50

AS91584 Total Credits per Student

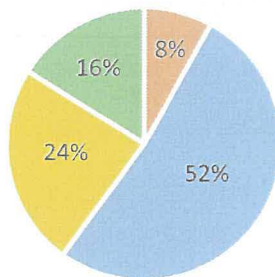
- o It is our first time to offer AS91584 Statistical Report External and the results are not as good as other externals we offered in the past. In 2024, AS91585 Probability Concepts or AS91586 Probability Distribution will be offered.
- o The literacy demands are very high in this course. Although most students who enter this course have already been offered via their success in Level 2 Mathematics or Statistics, they still find it challenging to comprehend some of the terms used in the report writing.
- o 50% of the students did not sit the external exam. This is likely due to students having enough credits to pass NCEA Level 3.
- o A better work ethic is needed for students to attain high grades.



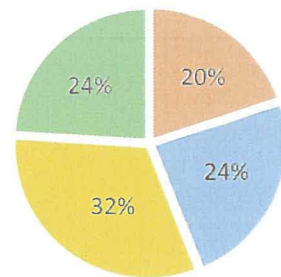
Internal AS91581 - Bivariate **Internal AS91584 - Linear Programming** **Internal AS91582 - Inference**



Not Achieved Achieved
Merit Excellence

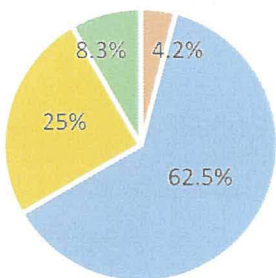


Not Achieved Achieved
Merit Excellence

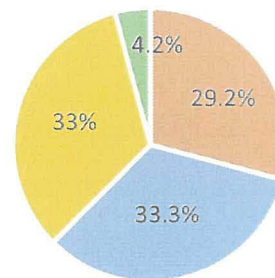


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Merit Excellence

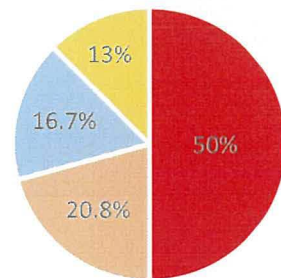
Internal AS91587 - Systems of Equations **Internal AS91586 - Critical Path** **External AS91584 - Statistical Report**



Not Achieved Achieved
Merit Excellence



Not Achieved Achieved
Merit Excellence

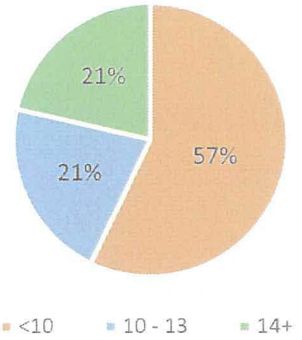


Absent Not Achieved
Achieved Merit

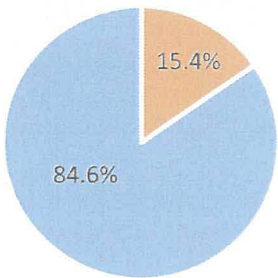
Level 3 Mathematics - MAT302

MAT302 Total Credits per Student

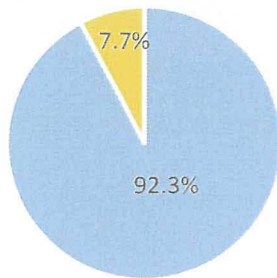
- Both AS91581 Bivariate and AS91580 Time Series are report-based, but the results are quite different. In Bivariate, the pass rate is 84.6%, whereas in Time Series, it is 38.5%. One reason could be the time of assessment. Students in general perform better in the assessments done at the beginning of the year. Another reason could be the teacher change. HR dropped MAT302 to teach PHY201, and MAT302 was picked up by SEB. The low pass rate is likely due to SEB teaching Level 3 Mathematics for the first time.
- The results of AS91576 Critical Path are low, with a pass rate of 46.2%. Students need to do more practice assessments before they sit the real assessment.
- The student's low literacy was a barrier in this course. The class teacher is to provide more opportunities to do research, reading and writing to improve their literacy.
- Although students have used the statistical enquiry cycle since Year 9, many struggled to identify useful information and integrate it with statistical features.



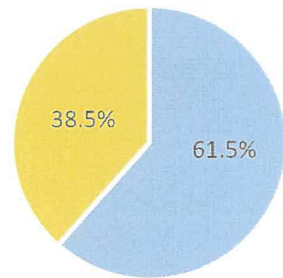
Internal AS91581 - Evolve **Internal AS91577 - Systems of Equations** **Internal AS91574 - Linear Equations**



Not Achieved Achieved

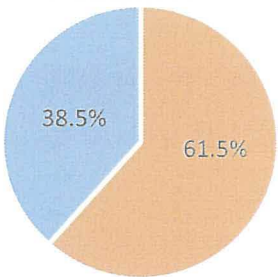


Achieved Merit

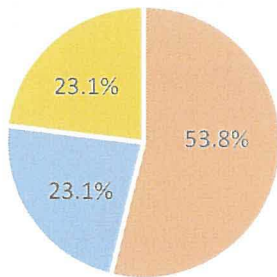


Achieved Merit

Internal AS91580 - Time Series **Internal AS91576 - Critical Path**



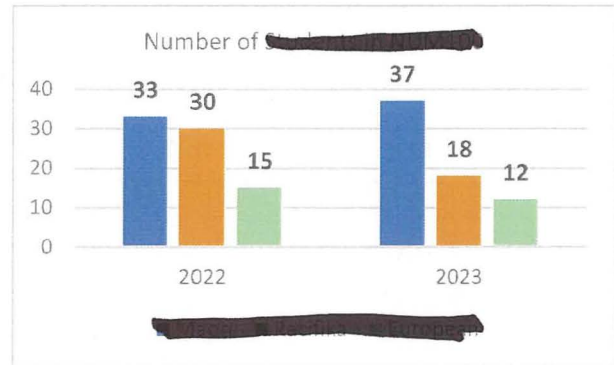
Not Achieved Achieved



Not Achieved Achieved Merit

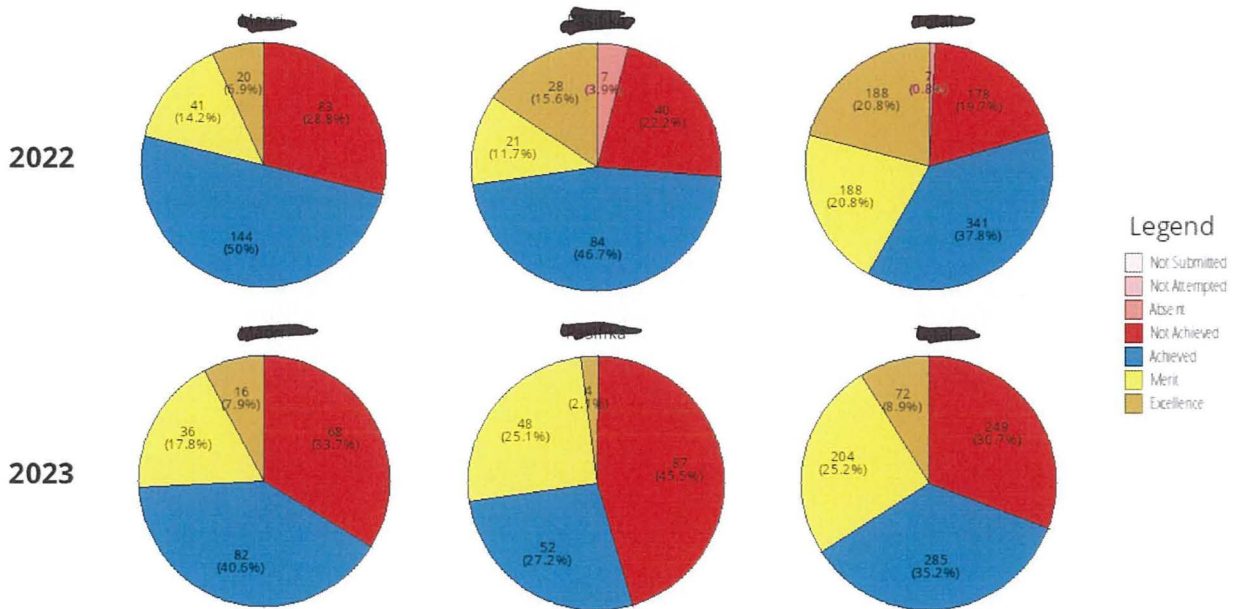
Achievement of Māori and Pasifika Students

Level 1 – MAT101, MAS101 and NUM100



- The number of Māori students in MAT101/MAS101 decreased in 2023, whereas the number of Māori students in NUM100 increased in 2023.
- About 55% of the students in NUM100 were Māori students in 2023. This is a continuation of Year 10 results, where a large number of Māori students achieved at Level 2 or 3.

NCEA Credits by Ethnicity



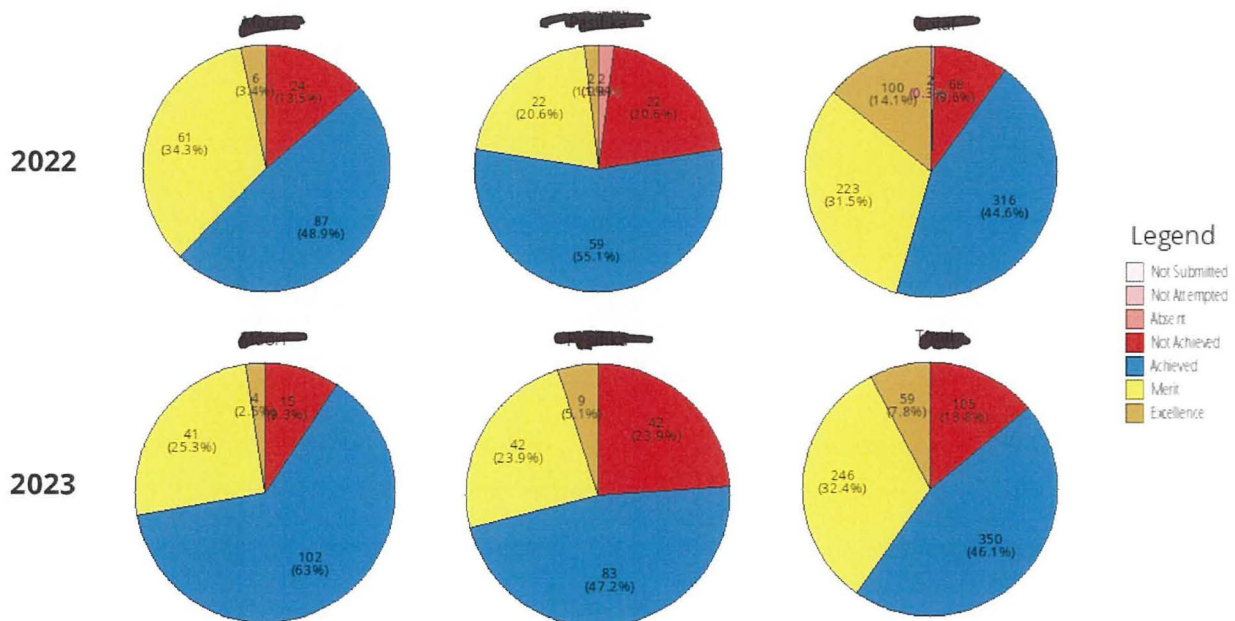
- There is no significant change in the percentage of each grade among Māori students. The percentage of Achieved decreased in 2023 and there was an increase in all other grades.
- The percentage of Not Achieved in Pasifika students doubled in 2023.
- The percentages of Excellence decreased in all three groups in 2023.

Level 2 – MAT201, MA3201 and MAT202

- o The number of students taking a Level 2 Mathematics course in 2023 is similar to that in 2022.
- o There is a decrease in the number of **Māori** **students** taking Level 2 Mathematics in 2023, but the change is not significant.
- o **Māori** students show the lowest percentages out of the three ethnic groups: **10% in 2022 and 21% in 2023.**



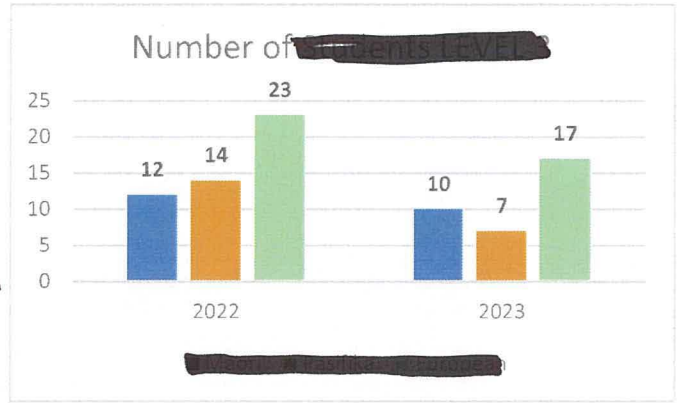
ACCA Credits by Subject



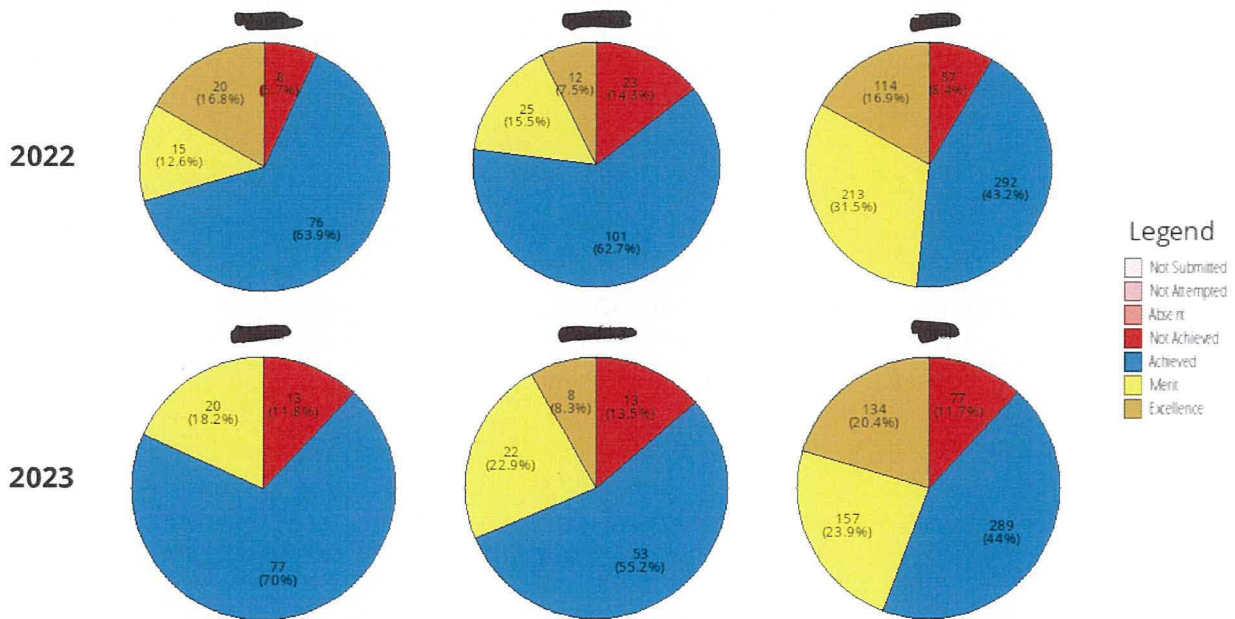
- o **Most** students performed better in 2023 compared to 2022. The percentage of Not Achieved decreased from **13.5% to 9.3%**, and the percentage of Achieved increased from **48.9% to 63%**.
- o The percentage of **Not Achieved** by Pasifika students increased from **20.6% to 23.9%**. This is not a huge increase, but extra support is needed to support and monitor the achievement of **Pasifika students.**
- o Overall, there isn't a significant change in 2023 compared to 2022. The percentage of each grade remained largely static.

Level 3 - MAC301, MAS301 and MAT302

- o The total number of students taking a Level 3 Mathematics course decreased in 2023; from 49 students in 2022 to 34 students in 2023.
- o The number of students in all the ethnic groups decreased in 2023.
- o There is a significant drop in the number of Pasifika students in level 3. It was reduced by 50%.



Level 3 - MAC301, MAS301, MAT302



- o [redacted] students gained more Not Achieved and no Excellence in 2023. The percentage of Merit increased by 5.7%.
- o Pasifika students performed better in 2023. The percentage of Not Achieved decreased from 14.3% to 13.5%, and the percentages of all other grades improved. In 2023, 20% and 8.3% of the Pasifika students gained Merit and Excellence respectively.
- o Overall, students showed improvement in each grade.

SECTION THREE: Analysis of Year 9 and 10 Courses

Highlights and Concerns for the 2023 Academic Year

Highlights

- Holding high expectations of students to aim for excellence
- Providing real-life problems for students to gain greater insights and use them to make sense of the situation
- Creating opportunities for students to learn mathematical skills and solve complex real-world problems through various competitions and events
- Emphasising Kotahitanga in maths classrooms; promoting students to support their friends
- Offering a differentiation program to Year 10 students after the Numeracy CAA in June

Areas to Develop

- Improving overall Numeracy levels in junior school
- Developing an integrated junior curriculum in which students see and use mathematical concepts that link different topics
- Identifying knowledge gaps students might have developed during COVID and supporting them to fill the gaps
- Developing a more solid program for students who excel above the expected levels
- Seeking more feedback from students and whanau to improve the delivery of our junior curriculums

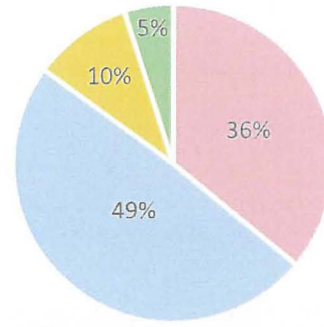
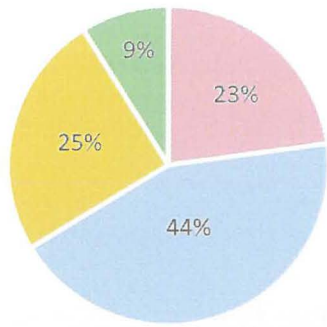
Future Focus

- Numeracy strategies: strengthening the skills of logical thinking and communication for the development of basic numeracy
- Integrated curriculum: providing opportunities to see how different topics are linked and explore multiple methods of solving a problem

Year 9 Summary of 2023 Academic Year

- 37% of year 9 students and 15% of year 9 Māori students finished the year at 4B or above. These are a lot lower than what we aimed for; we aimed for 60% of year 9 students and 60% of year 9 Māori students finished the year at 4B or above.
 - The percentage of year 9 students at 4B or above decreased by 6% compared to 2022 (41%).
 - The percentage of year 9 Māori students at 4B and above also decreased by 9% compared to 2022 (24%).
 - A large portion of students below 4B raises concerns that our year 9 students are not developing as expected. The mathematics department will review our year 9 curriculum to strengthen key skills.
-

End-of-Year Average Grades

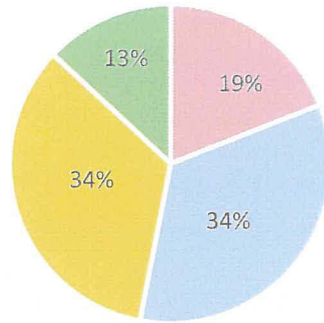
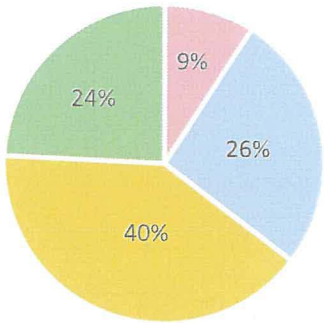


	Year 9 End-of-Year Average Grades									
	5A	5P	5B	4A	4P	4B	3A	3P	3B	2A or below
Year 9	1%	2%	7%	5%	10%	10%	11%	18%	15%	23%
Year 9 Maori	0%	0%	5%	2%	3%	5%	7%	24%	19%	36%

Year 10: Summary of the 2023 Academic Year

- 36% of year 10 students and 27% of year 10 Maori students finished the year at 4A or above. These are a lot lower than what we aimed for; we aimed for 60% of year 10 students and 60% of year 10 Maori students finished the year at 4A or above.
- The percentage of year 10 students at 4A or above increased by 17% compared to 2022 (19%).
- The percentage of year 10 Maori students at 4A and above also increased by 19% compared to 2022 (19%).
- There are many factors that explain these improvements, such as different cohorts and class sizes. One of the important factors might be teachers' high expectations of students due to the numeracy CAA.

End-of-Year Average Grade



	Year 10 End-of-Year Average Grade									
	5A	5P	5B	4A	4P	4B	3A	3P	3B	2A or below
Year 10	4%	12%	8%	12%	19%	10%	10%	11%	6%	9%
Year 10 Maori	2%	6%	6%	13%	15%	6%	13%	13%	8%	19%

SECTION FOUR: Department Goals and Student Achievement Targets for 2024

See the Mathematics Board Report 2024 on the next page.