

Evaluation of the 2023 Approach to National Qualifications Assessment

Performance in National 5 Mathematics

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Notes

- 1 The data presented here is taken from the August Attainment data before the results appeals service.
- 2 Figures for both Mathematics and Applications of Mathematics combine results for courses in English and Gaelic (Matamataigs and Gnìomhachas Matamataigs).
- 3 Percentages are calculated using figures prior to rounding. Percentages are rounded to the nearest tenth, with a value greater than zero and less than 0.5% marked up with the shorthand [low].

Introduction

In 2023, the awarding of National Qualifications operated using the established procedure as far as possible but was sensitive to the impacts of disruption to teaching and learning caused by the pandemic, modifications to course assessments, and the removal of revision support. A to C attainment across most courses at National 5, Higher and Advanced Higher is above pre-pandemic levels. This reflects the achievement of learners, combined with the sensitive approach to grading adopted in 2023. A notable exception is A to C attainment for National 5 Mathematics, which is below pre-pandemic levels. Additionally, lower mean marks and a larger spread of marks achieved were found compared to previous years.

While several factors influenced attainment, here we explore possible underlying reasons that might have caused low attainment in National 5 Mathematics, particularly the impact of candidates also presented to National 4 Mathematics in the same exam diet (referred to in this report as dual presented or dual entered). A comprehensive study on dual entry presentation during the 2022–23 academic year can be found in the Trends in Entries and Attainment of Dual Presentation Candidates from 2019 to 2023 Report.

Moreover, the uptake of National 5 Applications of Mathematics (AoM) has more than quadrupled with 19,020 entries this year, up from 4,460 in 2019. With the total number of National 5 candidates remaining stable over recent years (around 80,000), this significant rise in AoM entries is coupled with a less substantial drop in entries at National 5 Mathematics, decreasing by only 4,025 candidates from 2019 to 2023. We review candidate presentation to both National 5 Mathematics and AoM (referred to in this report as double presented or double entered), candidate performance, and effects of these candidates on the overall National 5 Mathematics attainment rates.

Lastly, the proportion of candidates enrolled in National 5 Mathematics in S4 has increased by 11.7 percentage points since 2016 (72.7% in 2023 compared with 61.0% in 2016). This is coupled with a reduction in the combined S5 and S6 cohort by 11.3 percentage points (25.2% in 2023 compared with 36.5% in 2016). Here, we review candidate attainment dependant on their stage, with an additional look into candidate performance on their first attempt and those re-sitting within each stage.

Due to dual running Mathematics awards at Intermediate 2 in 2014 and 2015 (National 5 and Intermediate 2), the uptake of National 5 Mathematics was less than the typical uptake over the years since. Until 2019, the Recognising Positive Achievement (RPA) measure was in place, which meant that those who were unsuccessful at National 5 received an automatic fallback to National 4, providing all necessary units were complete. In 2020, examinations were cancelled and grades were assigned from teacher estimates; in 2021, the Alternative

Certification Model (ACM) was in place following the cancellation of exams as a response to the COVID-19 pandemic.

AoM was introduced in 2019; prior to this, the course was known as 'Lifeskills Mathematics'. While no changes were made to the course content, the external examination approach was altered for AoM. Lifeskills Mathematics did not gain the same traction as AoM, so comparisons with Mathematics pre-2019 are not discussed here. This essential contextual information should be considered in full when comparing the following data.

Figure 1 and Table 1 show the A and A to C attainment rates for National 5 Mathematics since the course's inception (from 2014 to 2023).

Figure 1: National 5 Mathematics A and A to C attainment rates from 2014 to 2023. The area between the grey dotted lines indicates alternative approaches to assessment in 2020 and 2021.



Attainment (%)

 Table 1: A and A to C attainment (%) for National 5 Mathematics, from 2014 to 2023.

Attainment	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
A to C (%)	70.6	61.8	63.2	63.8	64.7	65.5	79.1	73.0	69.7	62.4
A (%)	36.3	30.3	29.0	31.1	31.4	30.9	36.8	37.9	36.8	28.3

2023 National 5 Mathematics performance

In 2023, there were 37,560 entries for National 5 Mathematics, a decrease of 1.9 percentage points from 38,295 in 2022 and a decrease of 9.7 percentage points from 41,585 in 2019. The A to C attainment rate was 62.4%, a decrease of 7.3 percentage points from 69.7% in 2022 and a decrease of 3.1 percentage points from 65.5% in 2019. The A attainment rate was 28.3%, a decrease of 8.5 percentage points from 36.8% in 2022 and a decrease of 2.6 percentage points from 30.9% in 2019 (Figure 1).

Prior to the COVID-19 pandemic (2016 to 2019 inclusive), the A and A to C attainments averaged 30.6% and 64.3%, respectively. The highest and lowest A to C attainments were in 2020 (79.1%) and 2015 (61.8%), respectively; the highest and lowest A attainments were seen in 2021 (37.9%) and 2023 (28.3%), respectively.

Observing the overall mark attainment distribution (as a percentage) for each year, there is a clear positive skew when comparing 2023 to both 2022 and 2019 (Figure 2). This year, the mean and median percentage attained by all National 5 Mathematics candidates was 50.0% and 48.9%, respectively. Comparatively, in 2022, the mean and median were both higher at 56.7% and 58.9%, respectively. In 2019, the mean and median were both higher than 2023 but lower than in 2022 at 53.3% and 54.5%, respectively. Mark data is not available for the pandemic years when alternative awarding systems were in place, and so are not compared here.

Figure 2: Density plot showing the distribution of marks (as a percentage) for 2019, 2022, and 2023.



Density of Candidates at Each Mark

The cumulative percentage of candidates' achieving marks as a percentage is shown in Table 2 to highlight this positive skew in the mark distribution data.

Year	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
2019 (%)	[low]	3.0	9.0	18.2	29.9	44.3	59.9	74.4	87.0	95.9	100
2022 (%)	[low]	3.0	9.0	17.6	28.0	39.9	52.8	66.4	79.6	91.9	100
2023 (%)	[low]	6.5	15.6	27.0	39.7	51.9	63.3	74.3	84.2	93.4	100

Table 2: The cumulative percentage of candidates achieving 0% through to 100% inNational 5 Mathematics, for years 2019, 2022 and 2023.

In 2023, a higher proportion of candidates (15.6% or 5,885 candidates) achieved 20% of marks or less when compared with 2022 (9.0% or 3,460 candidates) and 2019 (9.0% or 3,745). This overall performance change observed from pre- to post-pandemic, alongside the noted change in presentation styles, calls for further analysis into the effects of these presentation types on the overall cohort performance.

National 4 dual presentation

There are several reasons why candidates may be presented to both National 4 and National 5 in the same year. Whatever the reasons for dual presentation, these candidates have the potential to affect the attainment rates if the number of dual candidates presented is high. In 2023, 5,320 candidates or 14.2% of the National 5 Mathematics cohort were dual presented, the highest proportion since 2018 (Figure 3, Table 3). The lowest proportion of dual entry candidates occurred during the pandemic years in 2020 and 2021 with only 6.2% of the cohort entered for both National 4 and National 5 Mathematics. In 2017, the largest percentage of dual entries occurred, with 20.9% of the cohort presented to both courses, coinciding with the final year of unit assessments for National 5 courses.

If this dual entry cohort is large enough and displays a different performance to the overall cohort (for example, higher or lower attainment rates), this may influence the overall attainment rates. While 2023 dual entry proportion is in line with pre-pandemic levels, it is still a large portion of the cohort and merits some analysis into whether this could explain the lower-than-expected attainment. As mentioned, the reasons for dual entry are varied and unknown to this dataset. A point to note is that some candidates may be aspirational to National 5, while others may be using National 4 as a 'fallback'; some centres also dual present large volumes of candidates, which is highly discouraged, and makes it difficult to see how the aspirational dual entries are attaining over time. Analysing the performance of the single-entry cohort by removing those dual entered from the whole cohort allows evaluation of the dual entry impact on the overall attainment rates.

Figure 3: National 5 Mathematics cohort breakdown, those dual entered to National 4 Mathematics and those presented only to National 5 from 2014 to 2023.



National 5 Cohort Presentation

Table 3: The presentation percentage of candidates dual and single entered to National 5Mathematics from 2014 to 2023.

Presentation	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Dual entered (%)	10.3	18.1	19.8	20.9	15.6	13.2	6.2	6.2	11.3	14.2
Single entered (%)	89.7	81.9	80.2	79.1	84.4	86.8	93.8	93.8	88.7	85.8

The performance of both dual or single entered candidates allows analysis of the performance of these sub-cohorts at a grade level. Their performance is shown in Figure 4, alongside the full National 5 cohort, followed by the tabulated format in Table 4.

Figure 4: National 5 Mathematics performance (% at each grade) as a function of the full cohort, dual or single presentation in 2023.



Mathematics Attainment

Table 4: The National 5 Mathematics performance of candidates in each presentation cohort grouping in 2023.

2023 cohort	A (%)	B (%)	C (%)	D (%)	No Award (%)	A to C (%)
Full cohort: 37,560 entries	28.3	16.3	17.8	17.8	19.8	62.4
Dual cohort: 5,320 entries	6.7	9.3	17.8	26.7	39.5	33.8
Single cohort: 32,240 entries	31.9	17.5	17.8	16.3	16.6	67.1

For the full National 5 Mathematics cohort, 28.3% of candidates achieved an A grade and a total of 62.4% attained an A to C grade. Of those dual entered, the most likely grade is No Award (39.5%), decreasing sequentially to an A, the least likely award (6.7%). The dual entered cohort has an A to C attainment of 33.8% (28.6 percentage points lower than the full cohort).

However, those candidates entered solely for National 5 show similarity to the full cohort across the grade structure. When compared to the full cohort, the A and B attainment rates are higher (by 3.6 and 1.2 percentage points, respectively), C award is the same, and D and No Award are lower (by 1.5 and 3.3 percentage points, respectively).

Highlighting the performance of these sub-cohorts over the five-year reporting period, it is clear that the outcomes observed in 2023 are not unique. Dual entered candidates typically have a lower A to C attainment compared to those who are single entered to National 5 only

(Figure 5); however over the last five years, their attainment has increased over four-fold from 7.4% in 2019 to 33.8% in 2023.

Figure 5: The A to C attainment of National 5 Mathematics as a function of the full cohort, dual or single presentation, from 2019 to 2023. The area between the grey dotted lines indicates alternative approaches to assessment in 2020 and 2021



Ato C Attainment

Table 5: The A to C attainment of National 5 Mathematics as a function of the full cohort, dual or single presentation, from 2014 to 2023.

Presentation	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Full cohort (%)	70.6	61.8	63.2	63.8	64.7	65.5	79.1	73.0	69.7	62.4
Dual cohort (%)	1.3	0.5	2.0	0.8	7.9	7.4	37.4	26.8	45.8	33.8
Single cohort (%)	78.5	75.4	78.3	80.5	75.2	74.3	81.9	76.0	72.7	67.1

Analysing further those dual entered for National 4 and National 5, grades for both levels are mapped to highlight how candidates performed in both courses. In Figure 6, counters are proportionate to the number of candidates achieving those grades, whereby a large red counter denotes a high proportion of candidates, and a small green counter denotes a low proportion.

Of those candidates who received a Pass at National 4, attainment of an A to C grade at National 5 is low (34.1%). Additionally, the most populated result was a Pass at National 4 and No Award at National 5 (1,945 candidates), with the median result being a grade D (Table 6).

Figure 6: Mapped performance of Mathematics grade at National 5 and National 4 award, for those dual entered in 2023.



National 5

Table 6: Mathematics grade performance at National 5 as a function of National 4 award, in 2023.

National 4 Award	A (%)	B (%)	C (%)	D (%)	No Award (%)	A to C (%)
Pass: 4,975 candidates	6.9	9.2	18.0	26.8	39.1	34.1
No Award: 345 candidates	4.9	9.3	14.5	25.5	45.8	28.7

Overall, those dual entered for both National 4 and National 5 have a lower A to C attainment rate compared with those single entered. Over the five-year period, we see a significant change in the performance of the dual presentation cohort, perhaps suggesting a change to the candidate type being dual presented. Removal of dual entries increases the overall A to C attainment from 62.4% to 67.1% (an increase of 4.7 percentage points).

Applications of Mathematics double presentation

Similar to dual presentation for National 4 and National 5 Mathematics, there are many reasons why candidates may be presented at both Mathematics and AoM (double presented). Again, these candidates have the potential to affect the attainment rates if the number of double presentations is high. The number of candidates double presented has steadily increased since AoM began in 2019 (Figure 7, Table 7); in 2019, 2.7% (or 1,135) of candidates were double presented compared with 16.6% (or 6,220) of candidates in 2023, an increase of 13.9 percentage points.

Figure 7: National 5 Mathematics cohort breakdown, those double entered for AoM and Mathematics and those single entered to Mathematics only, from 2019 to 2023.



National 5 Cohort Presentation

Table 7: National 5 Mathematics cohort breakdown, those double entered to AoM and

 Mathematics and those single entered to Mathematics only, from 2019 to 2023.

Presentation	2019	2020	2021	2022	2023
Double entered (%)	2.7	9.7	8.1	10.5	16.6
Single entered (%)	97.3	90.3	91.9	89.5	83.4

While the proportion of candidates double presented in 2023 is larger than we have previously seen, what is not clear is the attainment rates of these candidates. Here, we aim to determine the overarching ability of those candidates double presented for both courses and compare this with the overall cohort. Isolation of those candidates who were double entered or single entered allows review of the performance of these sub-cohorts. Their

performance is shown in Figure 8, alongside the full National 5 cohort; this demonstrates the attainment of each grade within each group, followed by the tabulated format in Table 8.

Figure 8: National 5 Mathematics performance (% at each grade) as a function of the full cohort, double or single presentation with Applications of Mathematics, in 2023.



Mathematics Attainment

Table 8: The performance of candidates in National 5 Mathematics in each presentation cohort grouping in 2023.

2023 cohort	A (%)	B (%)	C (%)	D (%)	No Award (%)	A to C (%)
Full cohort: 37,560 entries	28.3	16.3	17.8	17.8	19.8	62.4
Double cohort: 6,220 entries	41.3	19.6	15.8	12.9	10.4	76.7
Single cohort: 31,340 entries	25.7	15.7	18.1	18.8	21.7	59.5

As discussed previously, for the full National 5 Mathematics cohort, 28.3% achieved an A grade and 62.4% attained an A to C grade, as highlighted in Table 8. Of those double presented for both courses, the highest attained grade is an A (41.3% of double entry candidates) and the least likely is No Award (10.4% of double entry candidates). This double presented cohort has an A to C attainment of 76.7% (14.3 percentage points higher than the full cohort).

Those candidates entered solely for Mathematics show similarity to the entire cohort across the grade structure, with grades A and No Award showing the highest degree of disparity.

Overall, those double entered for both Mathematics and AoM are attaining higher grades compared to those entered solely for Mathematics. Removal of those candidates double entered decreases the overall A to C attainment from 62.4% to 59.5% (a decrease of 2.9 percentage points).

Highlighting the performance of these sub-cohorts over the five-year reporting period (Figure 9, Table 9), it is clear the behaviour observed in 2023 is not unique. Double entered candidates typically have a higher A to C attainment compared to those that are single entered to National 5 only.

Figure 9: The A to C attainment of National 5 Mathematics as a function of the full cohort, double or single presentation, from 2019 to 2023. The area between the grey dotted lines indicates alternative approaches to assessment in 2020 and 2021



Ato C Attainment

Table 9: The A to C attainment of National 5 Mathematics as a function of the full cohort, double or single presentation, from 2019 to 2023.

Presentation	2019	2020	2021	2022	2023
Full cohort (%)	65.5	79.1	73.0	69.7	62.4
Double cohort (%)	76.9	87.7	81.4	84.3	76.7
Single cohort (%)	65.2	78.2	72.3	68.0	59.5

This double presented cohort presents a unique opportunity to map candidates' performance across both courses (Figure 10), highlighting the similarity or difference in attainment of

National 5 Applications of Mathematics to the Mathematics course. Counters are proportionate to the number of candidates attaining those grades, whereby a large red counter denotes a high proportion of candidates, and a small green counter denotes a low proportion.

Of those candidates who received an A in Applications of Mathematics, attainment of an A to C grade at Mathematics is likely at a rate of 96.2% (Table 10). Additionally, the most populated result was an A grade at both courses with a total of 2,260 candidates attaining this.

Figure 10: Mapped Mathematics performance at National 5 as a function of Application of Mathematics presentation in 2023.



Mathematics

Table 10: Mathematics performance at National 5 as a function of Application of Mathematics presentation in 2023.

AoM Award	A (%)	B (%)	C (%)	D (%)	No Award (%)	A to C (%)
A: 3,325 candidates	68.0	19.6	8.6	3.0	0.8	96.2
B: 1,350 candidates	19.5	28.3	27.4	19.2	5.7	75.1
C: 860 candidates	4.3	17.1	27.0	31.0	20.6	48.4
D: 420 candidates	1.4	7.6	19.6	30.8	40.6	28.6
No Award: 265 candidates	0.0	1.9	4.9	17.8	75.4	22.7

Overall, those double entered for both Mathematics and Applications of Mathematics are typically high attaining candidates compared with those single entered, with a higher A to C attainment of 76.7% (compared with 59.5% for those single entered). Further analysis into the grade mapping of both courses suggests that the largest group of learners is those achieving an A in both subjects (36.4% of double entry candidates).

Removal of double entry candidates decreases the overall A to C attainment from 62.4% to 59.5% (a decrease of 2.9 percentage points).

Learner stage presentation

The proportion of S4 candidates in National 5 Mathematics has seen a steady rise from 2016 onwards. Prior to 2016, new Mathematics courses were dual run with the previous qualifications, which explains the cohort shift from 2014 to 2016. Using the five-year reporting period, however, only 63.6% of candidates were in S4 in 2019 compared with 72.7% in 2023, an increase of 9.1 percentage points from 2019 (Figure 11, Table 11).

This rise in S4 candidates comes with a decrease in both S5 and S6 cohorts, with 25.2% of 2023 candidates in S5 or S6, coinciding with a decrease of 7.7 percentage points since 2019 (32.9%).

Figure 11: The proportion of candidates in stages S4, S5 and S6 for National 5 Mathematics, from 2019 to 2023.



Presentation	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
S4 (%)	96.0	67.5	61.0	61.4	61.3	63.6	65.0	68.9	69.7	72.7
S5 (%)	2.6	26.8	25.8	24.6	24.1	22.6	22.5	20.0	20.7	18.5
S6 (%)	0.8	4.7	10.7	11.1	11.2	10.3	9.5	8.3	7.2	6.7

Table 11: The proportion of candidates in stages S4, S5 and S6 for National 5 Mathematics,from 2014 to 2023.

The A to C attainment of each of these cohorts over the five-year reporting period is shown in Figure 12 and Table 12. It is clear that candidates in S4 have a higher attainment than their counterparts in both S5 and S6. With the exception of the pandemic years in 2020 and 2021, candidates in S5 have a higher attainment than those in S6.

Figure 12: The A to C attainment of candidates in stages S4, S5 and S6 for National 5 Mathematics, from 2019 to 2023. The area between the grey dotted lines indicates alternative approaches to assessment in 2020 and 2021



Ato C Attainment

Table 12: The A to C attainment of candidates in stages S4, S5 and S6 for National 5Mathematics, from 2019 to 2023.

Presentation	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
S4 (%)	71.8	71.1	72.9	73.6	75.3	75.6	85.1	81.6	78.6	71.7
S5 (%)	35.5	44.5	49.2	48.8	48.2	47.5	65.5	51.7	49.8	36.3
S6 (%)	27.8	24.9	42.9	43.9	40.9	41.9	67.9	54.1	39.9	32.1

The attainment of those candidates in S5 and S6 is substantially lower than those in S4. Looking into S5 and S6 candidates further, in 2023, 44.5% (or 4,215 candidates) are repeating the course for either the first or second time, with 55.5% (or 5,245 candidates) on their first attempt. Repeating candidates account for 11.2% of the total National 5 Mathematics cohort and have considerably different A to C attainment rates compared to the overall rate (Table 13). Conversely, prior to the pandemic (from 2017 to 2020 inclusive), a higher proportion of S5 and S6 candidates repeating National 5 Mathematics for either the first or second time (with an average of 53.8%), compared with 44.5% this year.

Presentation	2019	2020	2021	2022	2023
S4 first attempt (%)	75.6	85.1	81.6	78.6	71.7
S5 first attempt (%)	30.7	47.8	39.4	38.4	27.6
S5 re-sit attempt (%)	66.3	85.8	76.7	71.0	49.6
S6 first attempt (%)	20.7	40.5	34.6	25.3	23.7
S6 re-sit attempt (%)	53.6	81.1	67.6	49.2	37.9

Table 13: The A to C attainment of candidates in the senior phase, broken down by Stage and attempt number, from 2019 to 2023.

From Table 1, the A to C attainment in 2023 for National 5 Mathematics was 62.4%, which is 7.3 percentage points lower than 2022 and 3.1 percentage points lower than 2019. As expected, the attainment for each learner stage follows a similar pattern. Contrary to this, S6 first attempt candidates had a higher A to C attainment in 2023 compared to 2019 by 3.0 percentage points.

Re-sit candidates had a larger change in attainment when comparing 2023 to 2019. S5 and S6 re-sit candidates saw a decrease in A to C attainment by 16.7 and 15.7 percentage points, respectively. S4 re-sit candidates are not shown here as fewer than five candidates were repeating National 5 Mathematics in S4 for each year shown.

Conclusion

While changes to the cohort have effects on the overall attainment rates, these have been consistent over the five-year reporting period and are not new to 2023. Of note, the percentage of candidates dual entered for National 4 and National 5 Mathematics decreased substantially during the COVID-19 pandemic, with dual entry numbers returning to pre-pandemic levels in 2023. The attainment of dual entered candidates is consistently lower than those entered only to National 5 Mathematics across all years as analysed in this report. However, the A to C attainment of the dual presented cohort has increased from 7.4% in 2019 to 33.8% in 2023. This may suggest a shift in the cohort being presented for both National courses, with some centres presenting large volumes of candidates, which is highly discouraged.

Entering learners into National 5, when reliable assessment information suggests they are not yet prepared, can result in unnecessary additional workload as well as a discouraging learning and assessment experience. This can negatively impact upon their confidence in that subject. Equally, dual presenting a learner who is on track to safely achieve at National 5 level also results in unnecessary additional workload and over assessment. In a very limited number of exceptional circumstances, presenting learners at both National 4 and National 5 may be in their best interests. However, the dual presentation approach is not an intended or expected presentation pattern to be applied to whole cohorts of students.

AoM observes a different trend, whereby learners double presented to AoM and Mathematics at National 5 tend to be higher attaining. This has been the case since the AoM course began in 2019, and the number of candidates has been growing, whether single or double presented to the course. The A to C attainment of those double entered has remained at around 77% between 2019 and 2023. This highlights that even with increasing numbers of double entered candidates, higher attaining learners are consistently presented.

National 5 Mathematics and National 5 AoM were designed as separate pathways; entry into both courses is not an intended or expected presentation pattern. Additionally, double entry can create unnecessary additional workload for both learners and schools, and may result in a discouraging learning and assessment experience.

Lastly, the stage in which a learner is presented has significant impact on their attainment at National 5. Candidates in S4 have a higher attainment than their counterparts in S5 and S6, with approximately double the A to C attainment. Those who take National 5 for the first time in S5 and S6 are lower attaining compared with those re-sitting the course in the same stage. It is also noted that since the COVID-19 pandemic, there has been a shift in S5 and S6 presentation, with an approximate 10% rise in candidates taking National 5 for the first time in S5 and S6. Again, this suggests a shift in the cohort presented to National 5 Mathematics as a whole.