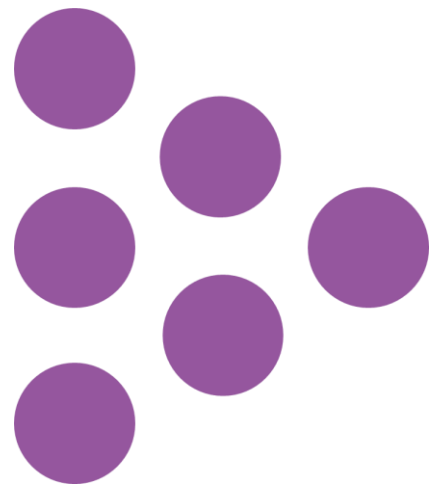


Report

National Reference Test Results Digest 2024

National Foundation for Educational Research (NFER)



National Reference Test Results Digest 2024

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1. Introduction

Ofqual has contracted the National Foundation for Educational Research (NFER) to develop, administer and analyse the National Reference Test (NRT) in English and maths. The first NRT took place in 2017 and established a baseline from which any future changes in standards can be detected. This report represents an overview of the findings of the 2024 testing process.

The NRT, which consists of a series of test booklets, provides evidence on changes in the performance standards in GCSE English language and maths in England at the end of key stage 4. It does this by testing content taken from the GCSE English and maths curricula. It has been designed to provide additional information to support the awarding of GCSEs in English language and maths and is based on a robust and representative sample of Year 11 students who will, in the relevant year, take their GCSEs.

More information about the NRT can be found in the [NRT document collection](#).

The outcomes of the 2017 GCSE examinations in English language and maths provided the baseline percentages of students at 3 grade boundaries and these were mapped to the NRT for 2017 to establish the corresponding proficiency level. The percentages of students achieving those proficiency levels in each subsequent year are calculated and compared.

The NRT structure remains the same each year. For each of English and maths, there are 8 test booklets in use. Each question is used in 2 booklets, so that effectively all the tests can be analysed together to give a single measure of subject performance. This is similar to other studies that analyse trends in performance over time, for example, international surveys such as the Programme for International Student Assessment ([PISA](#)) and Trends in International Mathematics and Science Study ([TIMSS](#)).

This report provides summarised information of the key performance outcomes for English and maths in 2024 and provides information on the changes from the baseline standards established in 2017. It also includes data on the achievement of the samples, their representativeness and the performance of the students on the tests. Further information on the nature of the tests, the development process, the survey design and its conduct, and the analysis methods used is provided in the accompanying document: [Background Report: National Reference Test](#).

2. The sample

The NRT took place between 16 February and 4 March 2024. The numbers of participating schools and students are shown in Table 2.1 and Table 2.2. In 2024, the number of schools in the sample was consistent with previous years (apart from 2021, when participation was impacted by the pandemic) and was above target.

The sample was stratified by the historical attainment of schools in GCSE English language and GCSE maths and by school size. In addition, the types of schools were monitored. Checks were made on all 3 of these variables to ensure that the achieved sample reflects the sampling frame. Students at independent schools are under-represented in the NRT, which may have contributed to a slight deviation between the distribution of school historical GCSE performance for the achieved sample relative to the sampling frame at the upper end of the distribution, this difference is small and broadly consistent across the years. Overall, the match in historical GCSE performance between the sample and population is very good, confirming the quality of the sample.

Table 2.2 shows the number of students in the final sample for whom booklets were dispatched and the number completing the tests for both English and maths. This shows that just over 80% of students who were selected took part in the tests. In total, 1,549 students from 339 schools were recorded as non-attendees during the English NRT, which is 19% of the total number of 8,206 students allocated tests during student sampling¹ spread across the schools participating in the assessment. A total of 1,507 students from 341 schools were recorded as non-attendees during the maths NRT, which is 18% of the total number of 8,230 students allocated tests during student sampling spread across the schools participating in the test.

The pattern of non-attendance is similar in maths and English. The principal reason given for non-attendance was absence due to illness or other authorised reason, which accounted for 58% of non-attendance for English and 62% of non-attendance for maths. Students being absent from the testing session but present in school remains the second most frequently recorded reason, accounting for 12% of non-attendance in both subjects. Of the remaining reasons for non-attendance, 6% of students for both English and maths had left the school and around 6% of students were studying at a different venue (6% for English and 5% for maths).

The percentage of non-attendance in 2024 was similar to that seen in 2023 but was higher than pre-pandemic cycles of the NRT. Student participation rates in 2024 were 81% for English and 82% for maths. Although student participation rates in the NRT continue to be lower compared with pre-pandemic administrations of the NRT (on average 85%) they are still comparable with the response rates required in large scale international studies.

The lower participation rates for the NRT in 2024 reflect the higher absence rates in the state secondary school population in March 2024 compared with pre-pandemic rates, indicating that students were absent from school rather than absent from the NRT administration specifically.

¹ Two schools were allocated tests but were not included in the final results; both schools withdrew during the testing window due to exceptional circumstances. A further 24 eligible English students were categorised as other (U) non-attendance due to a test administrator's car breakdown which meant the administration could not take place.

Table 2.1 Target sample sizes and achieved samples in current and previous years

Subject	NRT Target Sample	Achieved sample 2024	Achieved sample 2023	Achieved sample 2022	Achieved sample 2021	Achieved sample 2020	Achieved sample 2019	Achieved sample 2018	Achieved sample 2017
English: Number of Schools	330	339	343	334	214	332	332	312	339
Maths: Number of Schools	330	341	341	334	216	333	331	307	340

Table 2.2. Completed student test returns for English and maths in all NRT administrations

Year	No. of students: dispatched English tests	No. of students: completed English tests	% of students: completed English tests	No. of students: dispatched maths tests	No. of students: completed maths tests	% of students: completed maths tests
2024	8,158	6,609	81	8,181	6,674	82
2023	8,200	6,630	81	8,152	6,567	81
2022	7,969	6,457	81	7,961	6,406	80
2021	5,124	4,030	79	5,152	4,143	80
2020	7,845	6,639	85	7,886	6,756	86
2019	7,928	6,739	85	7,917	6,825	86
2018	7,354	6,193	84	7,320	6,169	84
2017	8,040	7,082	88	8,080	7,144	88

2.1. Access arrangements

The NRT offers access arrangements consistent with JCQ requirements (for GCSE examinations) in order to make the test accessible to as many sampled students as possible. Schools were asked to contact NFER in advance of the NRT to indicate whether any of their students required modified test materials or if students' normal working practice was to use a word processor or laptop during examinations. In cases where additional time would be needed for particular students, schools were asked to discuss this need with the NFER test administrator and ensure that the extra time for the testing session could be accommodated. All requests from schools for access arrangements and the type of arrangement required were recorded. Table 2.3 shows the different types of access arrangements that were provided to students for the 2024 NRT, organised by NFER. This table includes instances where students required more than one access arrangement. These are the access arrangements facilitated by NFER for the NRT in 2024; we do not collect complete data on the permitted arrangements that are organised by the school such as readers, scribes, extra time and examination pens so they are not included in the table below. Overall, the percentage of students whose school requested access arrangements for them for the NRT has decreased slightly to 5.8% compared with 6.8% in 2023.

Table 2.3. Number of access arrangements facilitated by NFER in 2024

Arrangement provided	No. of students English	No. of students maths	Total number of students	% of tested students
Word processor	356	228	584	3.6
Different colour test paper	161	160	321	2.0
Modified enlarged print, enlarged print and braille copies	13	18	31	0.2
Total	530	406	936	5.8%

NB: Due to some students having multiple access arrangements, they will be featured twice in the table.

3. Results for the test booklets in 2024

Details of the analysis procedures are given in the accompanying document: [Background Report: National Reference Test Information](#). The analysis process followed a sequence of steps. Initially, the tests were analysed using Classical Test Theory to establish that they had performed well, with appropriate difficulty and good levels of reliability. The subsequent analyses used Item Response Theory (IRT) techniques to link all the tests and estimate the ability of all the students on a common scale for each subject, independent of the test or items they had taken. These ability estimates were then used for calculating the ability level at the percentiles associated with the GCSE grade boundaries in 2017. From 2018 onwards, the percentages of students achieving above these baseline ability levels are estimated from the NRT.

3.1. English

The results of the Classical Test Theory analyses are summarised in Table 3.1. This shows the range of the main test performance statistics for the 8 English test booklets used.

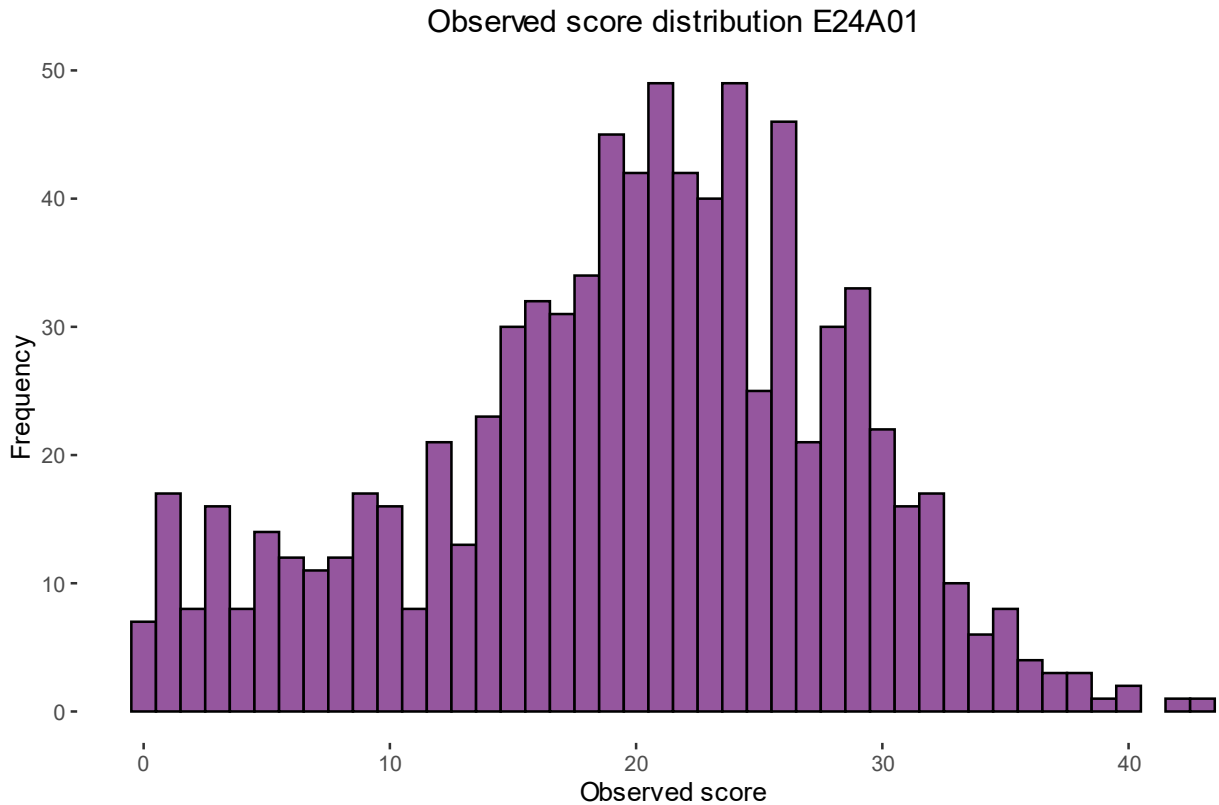
Table 3.1. Range of Classical Test Theory statistics for the English tests in 2024

Classical Test Theory statistic	Lowest	Highest
Number of students taking each test booklet	805	846
Maximum score attained (out of 50)	39	47
Average score attained	18.50	19.87
Standard deviation of scores attained	8.23	9.47
Reliability of the tests (Coefficient Alpha)	0.76	0.81
Average percentage of students attempting each item (%)	91	95

These results show that the English test booklets functioned well, and similarly to previous years. The booklets were challenging, with few students attaining over 40 marks and average scores somewhat less than half of the available marks. Maximum raw scores ranged from 39 to 47 across the 8 booklets, showing a wider range compared with 2023 where maximum raw scores were between 40 and 44. The standard deviation shows that the scores were well spread out, allowing discrimination between the students. This is confirmed by the reliability coefficients, which are at a good level for an English test of this length. Finally, the average percentage of students attempting each item was over 90% for all booklets, indicating that the students were engaging with the test and attempting to answer the majority of questions.

These results were confirmed by the distribution of scores students achieved on the tests. This is shown for one of the tests in Figure 3.1. It is an example of one test booklet only but the distributions were similar for the other tests. The figure shows that students were spread across the range, although no students attained the very highest marks.

Figure 3.1. Score distribution for one of the English tests



In addition, a full item analysis was carried out for each test, in which the difficulty of every question and its discrimination were calculated. These indicated that all the questions had functioned either well or, in a small number of cases, adequately and there was no need to remove any items from the analyses. Additionally, an analysis was conducted to establish if any items had performed markedly differently in 2024 compared with the previous years. Where there are such indications, a formal procedure is followed for reviewing the items to establish whether there could be an external reason for the change. In 2024, no items were removed from the link between years, so all items were treated as common with the previous year.

Using the common items, the IRT analysis equated the 8 tests. The IRT analysis also used the items common between years to equate the tests over years, allowing ability estimates for students in all 8 years to be on the same scale. After this had been done, the results showed that the mean ability scores for students were similar for all the tests, confirming that the random allocation to tests had been successful. The results also showed that the level of difficulty of the 8 tests was fairly consistent, with only small differences between them.

Both the Classical Test Theory results and the IRT results for the English tests showed that these had functioned well to provide good measures of the ability of students, sufficient for estimating averages for the sample as a whole.

3.2. Maths

The results of the Classical Test Theory analyses are summarised in Table 3.2. This shows the range of the main test performance statistics for the 8 maths tests used.

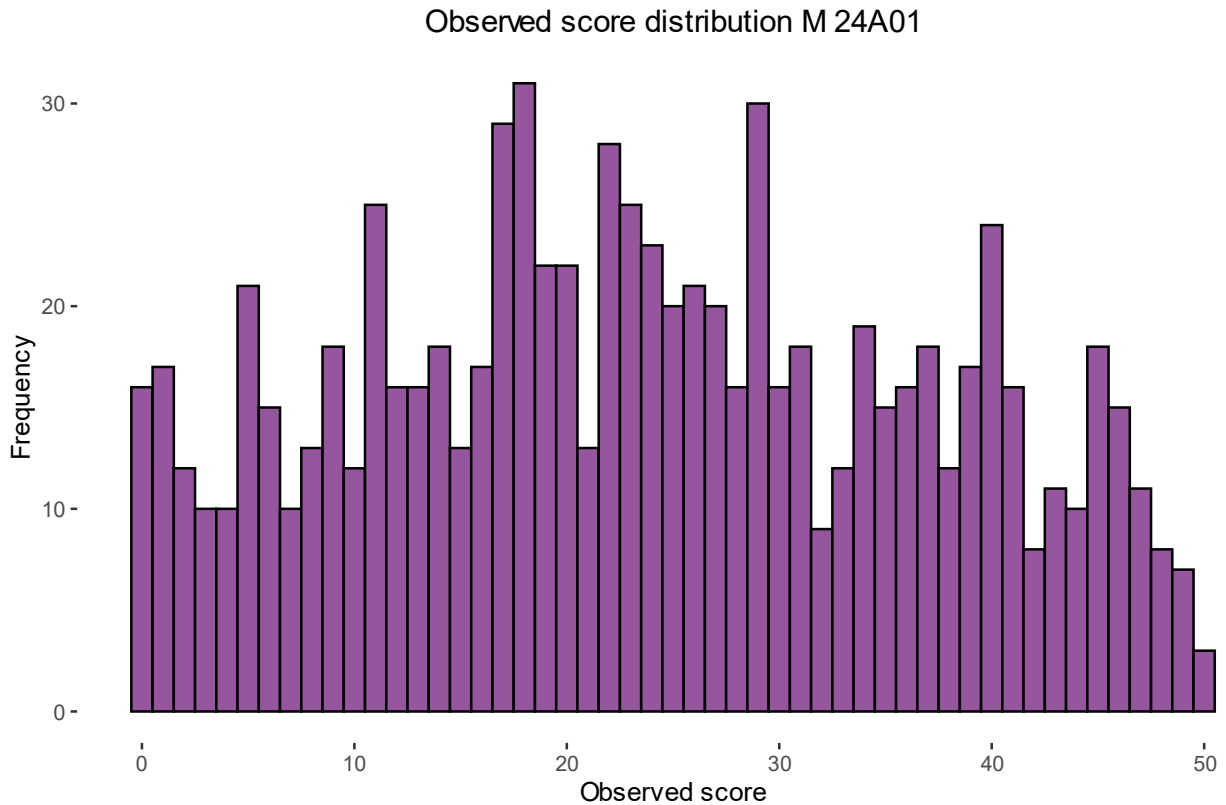
Table 3.2. Range of Classical Test Theory statistics for the maths tests in 2023

Classical Test Theory statistic	Lowest	Highest
Number of students taking each test booklet	824	842
Maximum score attained (out of 50)	50	50
Average score attained	20.70	23.75
Standard Deviation of scores attained	12.15	14.29
Reliability of the tests (Coefficient Alpha)	0.90	0.91
Average percentage of students attempting each item (%)	83	90

These results show that the maths tests also functioned well. The maximum score was attained on all booklets. The average scores were less than half marks for all booklets which is similar to 2023 but continues to be lower than in pre-pandemic years of the NRT. The standard deviation shows that the scores were well spread out, allowing discrimination between the students. This is confirmed by the reliability coefficients which are at a very good level for a maths test of this length and higher than for English, which is usual. Finally, the average percentage of students attempting each item (between 83% and 90%) is similar to the percentages seen in 2023. As has been the case in previous years, the average percentage of students attempting each item for maths was also lower than that seen for the English test. However, there are more individual items for students to attempt in the maths test.

These results were confirmed by the distribution of scores achieved on the tests. This is shown for one of the tests in Figure 3.2. The distributions were similar for the other tests. The figure shows that scores were attained over the range of possible marks and that the students were fairly evenly spread over the range.

Figure 3.2. Score distribution for one of the maths tests



In addition, a full item analysis was carried out for each test, in which the difficulty of every question and its discrimination were calculated. These indicated that all the questions had functioned either well or, in a small number of cases, adequately. All items were therefore retained for the IRT analyses. Additionally, an analysis was conducted to establish if any items had performed markedly differently in 2024 compared with the previous years. Where there are such indications, a formal procedure is followed for reviewing the items to establish whether there could be an external reason for the change and if there is sufficient evidence to remove the item from the link between years. In 2024, no items were removed from the link. There was also no evidence that the continued provision of formulae sheets for GCSE maths exams has had an impact on performance on the NRT items.

Using the common items, the IRT analysis was used to equate the 8 tests. The IRT analysis also used the items common between years to equate the tests over years, allowing ability estimates for students in all 8 years to be on the same scale. After this had been done, the results showed that the mean ability scores for students were similar for all the tests, confirming that the random allocation to tests had been successful. The results also showed that the level of difficulty of the 8 tests was fairly consistent, with only small differences between them.

Both the Classical Test Theory results and the IRT results for the maths tests showed that these had functioned well to provide good measures of the ability of students, sufficient for estimating averages for the sample as a whole.

Summary

These initial stages of the analysis, the Classical Test Theory evaluation of test functioning and the IRT equating of the tests, indicate that the NRT performed as well in 2024 as it had in previous years. This allowed the final stages of the analysis, the estimation of the percentages of students above the same ability thresholds as in 2017 and the calculation of their precision, to be undertaken with confidence. These are described in Sections 4 and 5 for English and maths respectively.

4. Performance in English in 2024

The objective of the NRT is to get precise estimates of the percentages of students each year achieving at a level equivalent to 3 key GCSE grades in 2017: these key grades are 4, 5 and 7. For the NRT in 2017, these baseline percentages were established from the 2017 GCSE population percentages. The NRT ability distribution, based on the IRT analysis, was then used to establish the ability thresholds which corresponded to those percentages. From 2018 onwards, the thresholds correspond to the same level of student ability as the thresholds established in 2017, thus allowing us to estimate the percentage of students above each of those thresholds and track performance over time. Alongside this, based on the sample achieved and the reliability of the tests, we can model the level of precision with which the proportion of students achieving the ability thresholds can be measured. The target for the NRT is to achieve a 95% confidence interval of plus or minus no more than 1.5 percentage points from the estimate at each ability threshold.

Ofqual provided the percentages of students at or above the 3 relevant grades (grades 4, 5 and 7) taken from the 2017 GCSE population. These are shown in Table 4.1. These percentages were mapped to 3 ability threshold scores in the NRT in 2017.

Table 4.1. English 2017 NRT baseline thresholds

Threshold	Percentage of students above threshold from 2017 GCSE
Grade 7 and above	16.8
Grade 5 and above	53.3
Grade 4 and above	69.9

In 2024, the NRT data for the years 2017 to 2024 were analysed together using IRT modelling techniques. By analysing all the data concurrently, ability distributions can be produced for the samples for each year on the same scale. The percentages of students at each of the 3 GCSE grade boundaries, fixed on the 2017 distribution, can then be mapped on to the distributions for the subsequent years to produce estimates of the percentage of students at the same level of ability in those years. For example, the percentage of students at the ‘Grade 4 and above’ threshold in the 2017 GCSE population was 69.9%. This is mapped on to the 2017 distribution to read off an ability value at that grade boundary. The same ability value on the distributions for all other years can then be found, and the percentage of students at this threshold or above in those years can be established. In this way, we are able to estimate the percentage of students at the same level of ability as represented in the 2017 GCSE population for each year of the NRT going forward. The precision of these estimates is dependent on both the sample achieved and the reliability of the tests as measures.

Table 4.2 presents the percentages of students achieving above the specified grade boundaries for the years 2017 to 2024. The 95% confidence intervals for the percentages are provided in brackets alongside the estimates. This is important as it shows that, although there have been changes in

performance, these are often within the confidence intervals. The statistical interpretation of the differences is discussed below.

Table 4.2. Estimated percentages at grade boundaries in English

Year	Estimated percentages at grade 4 and above	Estimated percentages at grade 5 and above	Estimated percentages at grade 7 and above
2017	69.9 (68.4-71.4)	53.3 (51.7-54.9)	16.8 (15.6-18.0)
2018	69.3 (67.5-71.0)	53.3 (51.5-55.2)	17.5 (16.3-18.8)
2019	66.1 (64.4-67.8)	50.2 (48.4-51.9)	16.6 (15.4-17.8)
2020	68.3 (66.6-69.9)	52.7 (51.0-54.4)	18.4 (17.1-19.7)
2021	67.5 (65.5-69.6)	53.1 (51.0-55.3)	19.7 (18.1-21.4)
2022	65.9 (64.2-67.6)	50.1 (48.4-51.9)	17.4 (16.1-18.8)
2023	66.2 (64.4-67.9)	50.9 (49.0-52.7)	17.8 (16.5-19.2)
2024	65.1 (63.4-66.8)	49.1 (47.4-50.8)	16.4 (15.3-17.6)

The 2017 figures in the table above are based on the NRT study, rather than the 2017 GCSE percentages. Note that, because of the way in which they have been computed, they match closely with the GCSE percentages. The confidence intervals for them reflect the fact that the NRT 2017 outcomes carry the statistical error inherent in a sample survey, as per the subsequent years.

In each year of the NRT, the percentages for previous years are re-estimated due to the concurrent calibration approach which analyses all of the data together in a single IRT model. Some degree of variation is therefore expected with the addition of more data, and the differences seen are generally small.

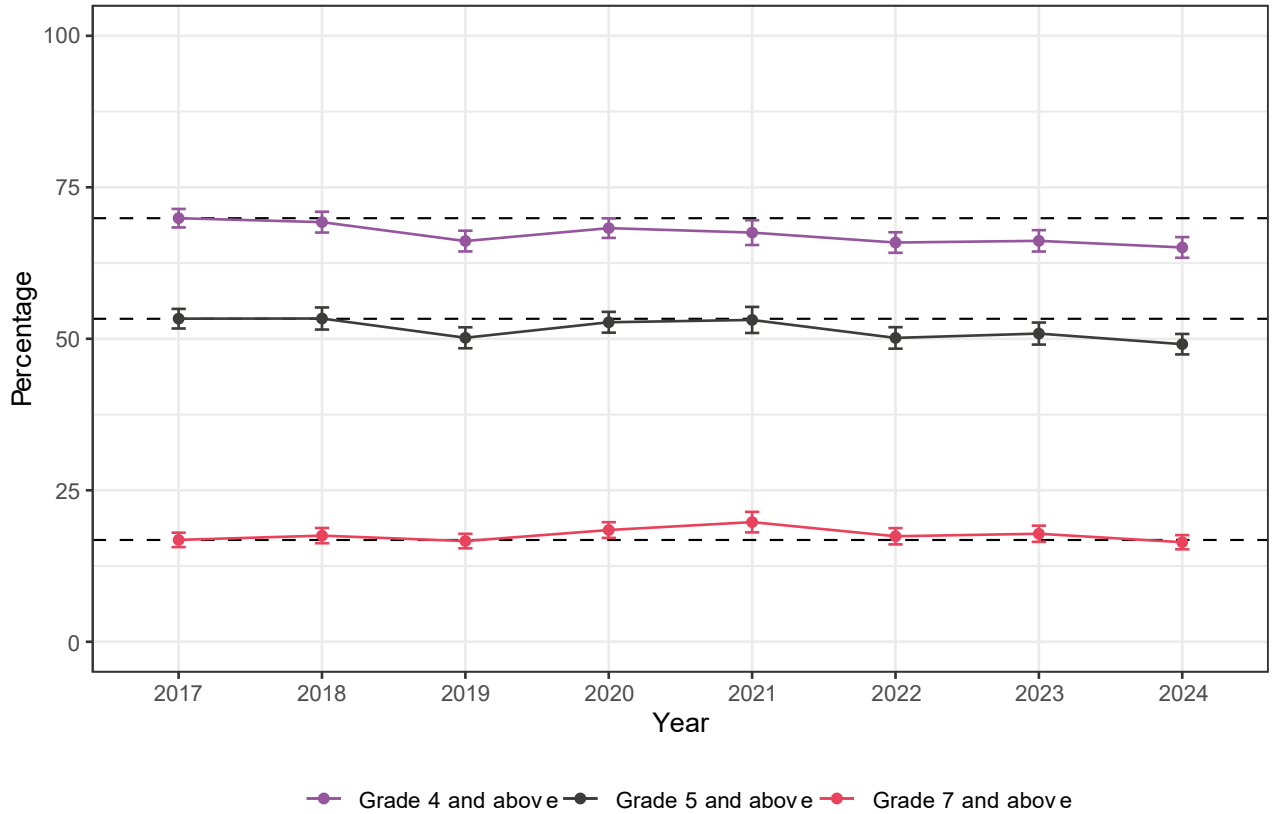
Table 4.3 shows the half widths of the confidence intervals. The confidence intervals for all years are narrower than those reported prior to 2023, following a change in 2023 in the way precision is calculated for the NRT. The confidence intervals for 2021 are wider than other years, reflecting the smaller sample size in that year. For NRT 2024, the precision for all 3 grade boundaries is in line with the values for other years.

Table 4.3. English NRT half width of confidence intervals each year

Year	Half width of confidence intervals: grade 4 and above	Half width of confidence intervals: grade 5 and above	Half width of confidence intervals: grade 7 and above
2017	1.5	1.6	1.2
2018	1.7	1.8	1.3
2019	1.7	1.7	1.2
2020	1.6	1.7	1.3
2021	2.0	2.2	1.7
2022	1.7	1.8	1.3
2023	1.8	1.8	1.3
2024	1.7	1.7	1.2

Figure 4.1 presents 95% confidence intervals around the percentages achieving at least the specified grade boundary in 2024, as compared with previous years and the 2017 population baseline percentages. The 2017 population percentages are represented as dotted lines and the trend lines across years as solid lines. This format has been used to encourage the reader to compare the point estimate confidence bands for each year with the 2017 baseline population percentages, bearing in mind the confidence intervals.

Figure 4.1. Long term changes in NRT English over time from 2017 baseline



Some patterns in the results can be observed from the chart, though care should be taken not to over-interpret small differences which may arise due to statistical uncertainty around the measurements. Nevertheless, the chart suggests that performance in English in 2024 may have declined relative to 2023. There had previously been a small decline in the percentage of students achieving at-or-above both grades 4 and 5 from the baseline in 2017 to 2019, but 2020 had seen an upturn in performance, bringing performance much closer to that seen in 2017. This performance then remained stable in 2021, despite the impact of school closures due to the pandemic. Indications in 2023 were of some slight recovery, following a dip in 2022, but performance in 2024 appears similar to that in 2022. At grade 7 and above, performance has been relatively consistent across the years, with an improvement in 2020 and 2021, followed by a dip in 2022, and seemingly stable performance since then.

A key question arising for the NRT results in a given year is to determine if differences in outcomes across the years are statistically significant. For the NRT, several comparisons could be made between different pairs of years at different grade boundaries, and this gives rise to the possibility that changes arising by chance may seem real. Hence, the criteria for significance that have been used are adjusted for multiple comparisons. For more information, see Appendix A.

The research question NFER was asked to address is to compare the performance in 2024 with the performance in the baseline year of 2017 at each of the 3 grade boundaries. Adjusting for 3

comparisons, the NRT English data shows that there has been a statistically significant drop in performance between 2017 and 2024 at the grade 4 and grade 5 boundaries, significant at the 1% level of significance. There is no statistically significant difference in performance between 2017 and 2024 at the grade 7 grade boundary.

5. Performance in maths in 2024

The objective of the NRT is to get precise estimates of the percentages of students each year achieving at a level equivalent to 3 key GCSE grades in 2017: these key grades are 4, 5 and 7. For the NRT in 2017, these baseline percentages were established from the 2017 GCSE population percentages. The NRT ability distribution, based on the IRT analysis, was then used to establish the ability scores which corresponded to those percentages. From 2018 onwards, the thresholds correspond to the same level of student ability as the thresholds established in 2017, thus allowing us to estimate the percentage of students above each of those thresholds and track performance over time. Alongside this, based on the sample achieved and the reliability of the tests, we are able to model the level of precision with which the proportion of students achieving the ability scores can be measured. The target for the NRT is to achieve a 95% confidence interval of plus or minus no more than 1.5 percentage points from the estimate at each ability threshold.

Ofqual provided the percentages of students at or above 3 relevant grades (grades 4, 5 and 7) taken from the 2017 GCSE population. These are shown in Table 5.1. These percentages were mapped to 3 ability threshold scores in the NRT in 2017.

Table 5.1. Maths 2017 NRT baseline thresholds

Threshold	Percentage of students above threshold from 2017 GCSE
Grade 7 and above	19.9
Grade 5 and above	49.7
Grade 4 and above	70.7

In 2024, the NRT data for the years 2017 to 2024 were analysed together using IRT modelling techniques. By analysing all the data concurrently, ability distributions can be produced for the samples for each year on the same scale. The percentages of students at each of the 3 GCSE grade boundaries, fixed on the 2017 distribution, can then be mapped on to the distributions for the subsequent years to produce estimates of the percentage of students at the same level of ability in those years. For example, the percentage of students at the ‘Grade 4 and above’ threshold in the 2017 GCSE population was 70.7%. This is mapped on to the 2017 distribution to read off an ability value equivalent to that grade boundary. The same ability value on the distributions for all other years can then be found, and the percentage of students at this threshold or above in those years can be established. In this way, we are able to estimate the percentage of students at the same level of ability as represented in the 2017 GCSE population for each year of the NRT going forward. The precision of these estimates is dependent on both the sample achieved and the reliability of the tests as measures.

Table 5.2 presents the percentages of students achieving above the specified grade boundaries for the years 2017 to 2024. The 95% confidence intervals for the percentages are provided in brackets alongside the estimates. This is important as it shows that although there have been changes in

performance, these are often within the confidence intervals. The statistical interpretation of the differences is discussed below.

Table 5.2. Estimated percentages at grade boundaries in maths

Year	Estimated percentages at grade 4 and above	Estimated percentages at grade 5 and above	Estimated percentages at grade 7 and above
2017	70.7 (69.3-72.1)	49.7 (48.1-51.3)	19.9 (18.6-21.2)
2018	73.4 (72.0-74.8)	52.5 (50.8-54.1)	21.6 (20.3-22.9)
2019	73.2 (71.9-74.6)	52.0 (50.3-53.6)	22.7 (21.3-24.0)
2020	74.6 (73.3-75.9)	55.0 (53.4-56.5)	24.4 (23.1-25.8)
2021	70.2 (68.3-72.1)	50.0 (47.9-52.1)	22.0 (20.0-23.9)
2022	71.7 (70.2-73.1)	50.4 (48.8-52.0)	21.2 (19.9-22.6)
2023	70.2 (68.7-71.7)	48.8 (47.3-50.4)	19.9 (18.7-21.1)
2024	70.9 (69.4-72.4)	50.4 (48.8-52.0)	22.4 (21.0-23.7)

The 2017 figures in the table above are based on the NRT study, rather than the 2017 GCSE percentages. Note that, because of the way in which they have been computed, they match closely with the GCSE percentages. The confidence intervals for them reflect the fact that the NRT 2017 outcomes carry the statistical error inherent in a sample survey, as per the subsequent years.

Since the percentages for previous years have been re-estimated following the concurrent calibration with the 2024 data, these figures differ slightly from those reported in previous years. Some degree of variation is expected given the addition of more data, and the differences seen are small.

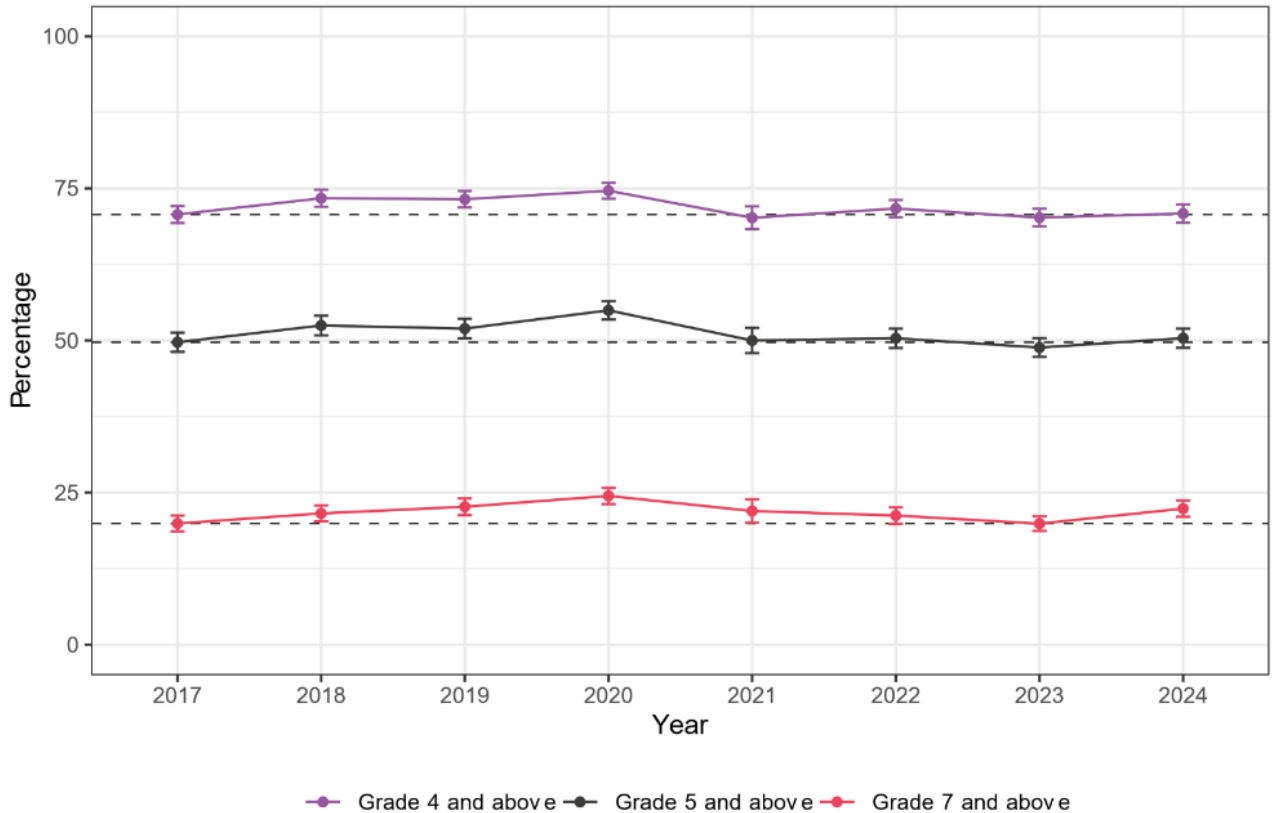
Table 5.3 shows the half widths of the confidence intervals. The confidence intervals for all years are similar to those reported previously, despite a change in the way precision is calculated for the NRT since 2023. The confidence intervals for 2021 are wider than other years, reflecting the smaller sample size in that year. For NRT 2024, the precision for all 3 grade boundaries is in line with the values for other years.

Table 5.3. Maths NRT half width of confidence intervals each year

Year	Half width of confidence intervals: grade 4 and above	Half width of confidence intervals: grade 5 and above	Half width of confidence intervals: grade 7 and above
2017	1.4	1.6	1.3
2018	1.4	1.6	1.3
2019	1.4	1.6	1.4
2020	1.3	1.5	1.3
2021	1.9	2.1	1.9
2022	1.4	1.6	1.4
2023	1.5	1.5	1.2
2024	1.5	1.6	1.4

Figure 5.1 presents 95% confidence intervals around the percentages achieving at least the specified grade boundary in 2024, as compared with previous years and the 2017 population baseline percentages. The 2017 population percentages are represented as dotted lines and the trend lines across years as solid lines. This format has been used to encourage the reader to compare the point estimate confidence bands for each year with the 2017 baseline population percentages, bearing in mind the confidence intervals.

Figure 5.1. Long term changes in NRT maths over time from 2017 baseline



Some patterns in the maths results can be observed from the chart, though care should be taken not to over-interpret small differences which may arise due to statistical uncertainty around the measurements. Nevertheless, the chart shows a relatively steady increase in the percentage of students achieving at-or-above all 3 grade boundaries from 2017 to 2020, followed by a sharp drop in 2021, back to around the 2017 level of performance. Differences between the following 2 years were small, with a slight decline overall. The chart suggests some recovery in 2024, particularly at grade 7.

A key question arising for the NRT results in a given year is to determine if differences in outcomes across the years are statistically significant. For the NRT, several comparisons could be made and this gives rise to the possibility that changes arising by chance may seem real. Hence, the criteria for significance that have been used are adjusted for multiple comparisons. For more information, see Appendix A.

The research question NFER was asked to address is to compare the performance in 2024 with the performance in 2017 at each of the 3 grade boundaries. Adjusting for 3 comparisons, the NRT maths data shows that there has been a statistically significant increase in performance between 2017 and 2024 at the grade 7 boundary, significant at the 5% level of significance. There are no statistically significant differences in performance between 2017 and 2024 at the grade 4 or grade 5 boundaries.

6. Appendix A: A brief summary of the NRT

English

The English test takes one hour to administer and follows the curriculum for the reformed GCSE in English language. In each of the 8 English test booklets, there are 2 components; the first is a reading test and the second a writing test. Each component carries 25 marks and students are advised to spend broadly equal time on each component.

The reading test is based on an extract from a longer prose text, or 2 shorter extracts from different texts. Students are asked 5, 6 or 7 questions that refer to the extract(s). Some questions of one to 4 marks require short responses or require the student to select a response from options provided. In each booklet, the reading test also includes a 6-mark question and a 10-mark question, where longer, more in-depth responses need to be given. These focus on analysis and evaluation of aspects of the text or a comparison between texts.

The writing test is a single, 25-mark task. This is an extended piece of writing, responding to a stimulus. For example, students may be asked to describe, narrate, give and respond to information, argue, explain or instruct.

Maths

For maths, a separate sample of students is also given one hour to complete the test. The test includes questions on number, algebra, geometry and measures, ratio and proportion, and statistics and probability – the same curriculum as the reformed GCSE. Each of the 8 test booklets has 13 or 14 questions with a total of 50 marks and each student takes just one of the test booklets.

Analysis

The analysis process followed a sequence of steps. Initially, the tests were analysed using Classical Test Theory to establish that they had performed well, with appropriate difficulty and good levels of reliability. The subsequent analyses used Item Response Theory techniques to link all the tests together from 2017 to 2024 and estimate the ability of all the students on a common scale for each subject for each year, independent of the test or items they had taken. These ability estimates were then used for calculating the ability level at the percentiles associated with the GCSE grade boundaries in 2017 and mapping these on to the distributions for subsequent years to generate percentile estimates for those years.

Multiple comparisons

The statistical significance of the difference between 2 percentages estimated in 2 years, say 2017 and 2024, may be approached with a 2-sample t -statistic. Because of the huge number of degrees of freedom, the value can be compared with the standard normal distribution rather than the t -distribution. For a comparison of 2 percentages, say the percentage of students at grade 4 or higher between 2 years, the critical value at a confidence level of 0.05 (5%) would usually be 1.96. However, since there are 3 grade thresholds across multiple years, there are several comparisons

which could be made (up to 84 if all pairs of years were compared across all 3 grade boundaries). As the number of simultaneous comparisons grows, the probability that some of them are significant by chance rapidly increases. To guarantee that the chosen level of significance is guaranteed overall, we have implemented a Bonferroni adjustment for multiple comparisons.

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