Calculating learners' scores
Numerical Reasoning Tests
Years 2–6

National Numeracy Tests

2016

Llywodraeth Cymru
Welsh Government

Purpose of this document

The purpose of this booklet is to enable schools to convert raw scores from the tests to age-standardised scores and progress measures where these have not been collected via the Welsh National Tests Data Collection (WNTDC). This will be relevant for independent schools. It will also be relevant where a learner has taken a test outside of the test window or an out-of-year test for diagnostic purposes.

Please note: only progress measures can be calculated for learners taking out-of-year tests.

Calculating learners' scores from national tests

The age-standardised scores and the progress measures were established using the data submitted by all schools in Wales with learners who had taken the 'live' numerical reasoning tests in May 2016.

Age-standardised scores

The age-standardised score scales make it possible to compare an individual learner's performance on the test in 2016 with the performance of all other learners of the same age, in years and completed months, taking the test.

Age-standardised scores are adjusted for age.

Working out age at date of test

You can use the 'age calculator' tool at http://learning.gov.wales/resources/browse-all/reporting-and-interpreting-national-test-results-2016/?lang=en to calculate age at date of test using the learner's date of birth and the date on which the test was taken. This will give you the learner's age in years and completed months.

Working out an age-standardised score

To work out the age-standardised score for an individual learner you will need:

- their raw score (total number of marks awarded when the test was marked)
- their age on the date the test was taken in years and **completed** months.

Use Tables 1–5 to look up the corresponding age-standardised score. Using the appropriate table for the test taken, locate the learner's raw score on the left-hand side of the table. Then read across the row to the column headed by the learner's age. The age-standardised score for this learner is in the cell where the row and column intersect. For example, a learner who has taken test 3ER16/3CRh16 and is 8 years and 3 months (8.03) and has a raw score of 13 would have an age-standardised score of 109.

Interpreting an age-standardised score

When age-standardised score scales are developed, the average raw score for all the learners of a given age taking the test is set to be equivalent to a standardised score of 100. About 68 per cent of learners would be expected to have age-standardised scores

between 85 and 115. An age-standardised score lower than 85 **might** suggest some difficulty with numerical reasoning as measured on the test. An age-standardised score greater than 115 **might** suggest that a learner is performing well in comparison with other learners of the same age and that it may be appropriate to provide them with more challenging numerical reasoning activities.

Very low age-standardised scores are shown in the table as * which can be interpreted as 'less than 70' and very high scores are shown as **, which can be interpreted as 'more than 140'. The tests are designed to measure the range of performance in numerical reasoning that would be expected from learners in the specified year groups. In the case of learners whose numerical reasoning skills are developing more slowly than would be expected for their age or learners who achieve very highly on the tests, their scores cannot be determined as accurately as those for learners scoring within the range expected. If a school wishes to calculate class averages, the use of 69 or 141 would be accurate enough estimates for these learners.

Table 1: 2ER16/2CRh16 raw score to age-standardised score conversion table

Raw score	Year 2 Numerical Reasoning 2ER16/2CRh16												
	Age in years and (completed) months												
	6.08	6.09	6.10	6.11	7.00	7.01	7.02	7.03	7.04	7.05	7.06	7.07	7.08
0	70	70	70	70	*	*	*	*	*	*	*	*	*
1	82	81	81	80	80	79	79	79	79	79	78	78	78
2	87	86	85	85	84	84	83	83	82	82	81	81	81
3	91	90	89	88	88	87	87	86	85	85	84	84	83
4	94	93	92	92	91	90	89	89	88	87	87	86	86
5	97	96	95	94	94	93	92	91	91	90	89	89	88
6	99	99	98	97	96	95	95	94	93	92	91	91	90
7	102	101	100	99	99	98	97	96	95	94	94	93	92
8	104	103	102	102	101	100	99	98	97	97	96	95	94
9	106	106	105	104	103	102	101	100	100	99	98	97	96
10	109	108	107	106	105	104	103	103	102	101	100	99	98
11	111	110	109	108	107	107	106	105	104	103	102	101	101
12	113	112	111	111	110	109	108	107	106	105	104	104	103
13	116	115	114	113	112	111	110	109	109	108	107	106	105
14	118	117	116	115	115	114	113	112	111	110	109	109	108
15	120	120	119	118	117	116	116	115	114	113	112	111	110
16	123	122	121	121	120	119	119	118	117	116	115	115	114
17	125	125	124	124	123	122	122	121	121	120	119	118	117
18	129	128	128	127	127	126	125	125	124	124	123	122	122
19	135	134	134	133	132	132	131	130	130	129	129	128	127
20	**	**	**	**	**	**	**	**	**	**	**	**	**

Table 2: 3ER16/3CRh16 raw score to age-standardised score conversion table

Raw score	Year 3 Numerical Reasoning 3ER16/3CRh16

Raw score	Age in years and (completed) months												
	7.08	7.09	7.10	7.11	8.00	8.01	8.02	8.03	8.04	8.05	8.06	8.07	8.08
0	*	*	*	*	*	*	*	*	*	*	*	*	*
1	78	78	78	78	77	77	77	77	76	76	76	76	75
2	83	82	82	81	80	80	79	79	79	79	78	78	78
3	88	87	86	85	84	84	83	82	82	81	80	80	79
4	92	91	90	89	88	87	87	86	85	84	84	83	82
5	95	94	93	92	91	91	90	89	88	87	86	86	85
6	98	97	96	95	94	94	93	92	91	90	89	88	88
7	101	100	99	98	97	96	95	95	94	93	92	91	90
8	103	102	101	101	100	99	98	97	96	95	94	94	93
9	106	105	104	103	102	101	100	100	99	98	97	96	95
10	108	107	106	105	105	104	103	102	101	100	99	98	98
11	110	109	109	108	107	106	105	104	103	103	102	101	100
12	112	112	111	110	109	108	108	107	106	105	104	103	102
13	114	114	113	112	111	111	110	109	108	107	107	106	105
14	117	116	115	114	114	113	112	112	111	110	109	108	108
15	119	118	118	117	116	115	115	114	113	113	112	111	110
16	121	121	120	120	119	118	117	117	116	115	115	114	113
17	124	123	123	122	122	121	121	120	119	119	118	117	117
18	127	126	126	125	125	124	124	123	123	122	122	121	121
19	132	132	131	131	130	130	129	129	128	128	127	127	126
20	**	**	**	**	**	**	**	**	**	**	**	**	**

Table 3: 4ER16/4CRh16 raw score to age-standardised score conversion table

Raw score	Year 4 Numerical Reasoning 4ER16/4CRh16												
	Age in years and (completed) months												
	8.08	8.09	8.10	8.11	9.00	9.01	9.02	9.03	9.04	9.05	9.06	9.07	9.08
0	70	70	70	70	*	*	*	*	*	*	*	*	*
1	79	78	78	78	78	78	78	78	77	77	77	77	77
2	82	82	81	81	80	80	80	79	79	79	79	79	79
3	85	85	84	84	84	83	83	82	82	81	81	81	80
4	88	88	87	87	86	86	85	85	84	84	83	83	82
5	91	90	90	89	88	88	87	87	86	86	85	85	84
6	93	93	92	91	91	90	89	89	88	88	87	87	86
7	96	95	94	94	93	92	92	91	90	90	89	89	88
8	98	97	96	96	95	94	94	93	92	92	91	91	90
9	100	99	99	98	97	97	96	95	95	94	93	93	92
10	102	101	101	100	99	99	98	97	97	96	95	95	94
11	104	103	103	102	101	101	100	99	99	98	97	97	96
12	106	106	105	104	104	103	102	102	101	100	100	99	98
13	108	108	107	106	106	105	104	104	103	102	102	101	100
14	110	110	109	109	108	107	107	106	105	105	104	103	103
15	113	112	111	111	110	110	109	109	108	107	107	106	105
16	115	114	114	113	113	112	112	111	111	110	109	109	108
17	117	117	117	116	116	115	115	114	114	113	113	112	111
18	120	120	120	119	119	118	118	117	117	117	116	116	115
19	125	125	124	124	123	123	123	122	122	121	121	121	120
20	**	**	**	**	**	**	**	**	**	**	**	**	**

Table 4: 5ER16/5CRh16 raw score to age-standardised score conversion table

Raw score	Year 5 Numerical Reasoning 5ER16/5CRh16												
	Age in years and (completed) months												
	9.08	9.09	9.10	9.11	10.00	10.01	10.02	10.03	10.04	10.05	10.06	10.07	10.08
0	*	*	*	*	*	*	*	*	*	*	*	*	*
1	78	78	77	77	77	77	77	77	77	77	77	77	76
2	79	79	79	79	79	79	79	79	79	78	78	78	78
3	83	83	82	82	82	81	81	81	80	80	80	79	79
4	86	86	85	85	84	84	84	83	83	83	82	82	82
5	89	88	88	87	87	86	86	86	85	85	85	84	84
6	91	91	90	90	89	89	88	88	87	87	87	86	86
7	94	93	93	92	92	91	91	90	90	89	89	88	88
8	96	95	95	94	94	93	93	92	92	91	91	91	90
9	98	98	97	97	96	96	95	95	94	94	93	93	92
10	101	100	100	99	99	98	97	97	96	96	95	95	94
11	103	102	102	101	101	100	100	99	99	98	98	97	97
12	105	105	104	104	103	103	102	102	101	101	100	100	99
13	108	107	107	106	106	105	105	104	104	103	103	102	101
14	111	110	110	109	109	108	107	107	106	106	105	105	104
15	113	113	112	112	111	111	110	110	109	109	108	108	107
16	116	116	115	115	114	114	113	113	113	112	112	111	111
17	119	119	118	118	118	117	117	116	116	116	115	115	114
18	123	122	122	122	121	121	121	121	120	120	119	119	118
19	128	127	127	127	126	126	126	125	125	125	125	124	124
20	**	**	**	**	**	**	**	**	**	**	**	**	**

Table 5: 6ER16/6CRh16 raw score to age-standardised score conversion table

Raw score	Year 6 Numerical Reasoning 6ER16/6CRh16												
	Age in years and (completed) months												
	10.08	10.09	10.10	10.11	11.00	11.01	11.02	11.03	11.04	11.05	11.06	11.07	11.08
0	*	*	*	*	*	*	*	*	*	*	*	*	*
1	75	75	75	75	75	74	74	74	74	73	73	73	73
2	78	78	78	78	78	77	77	77	77	76	76	76	76
3	81	81	80	80	79	79	79	79	79	78	78	78	78
4	85	84	84	83	83	82	82	81	81	80	80	79	79
5	88	87	87	86	85	85	84	84	83	83	82	82	81
6	91	90	90	89	88	88	87	86	86	85	85	84	84
7	94	93	92	92	91	90	90	89	88	88	87	87	86
8	96	96	95	94	94	93	92	92	91	90	90	89	88
9	99	98	97	97	96	95	95	94	93	93	92	91	91
10	101	100	100	99	98	98	97	96	96	95	95	94	93
11	103	103	102	101	101	100	99	99	98	98	97	96	96
12	105	105	104	104	103	102	102	101	101	100	99	99	98
13	107	107	106	106	105	105	104	103	103	102	102	101	101
14	109	109	108	108	107	107	106	106	105	105	104	104	103
15	112	111	111	110	110	109	109	108	108	107	107	106	106
16	114	114	113	113	112	112	111	111	110	110	109	109	108
17	117	116	116	116	115	115	114	114	113	113	112	112	111
18	120	119	119	119	118	118	118	117	117	116	116	116	115
19	124	124	124	123	123	123	122	122	122	121	121	121	120
20	**	**	**	**	**	**	**	**	**	**	**	**	**

Progress measures
The progress measure scales are calculated separately for each national curriculum year group and each test.

Progress measures are not adjusted for age.

Working out a progress measure
To work out the progress measure for an individual learner you will need their raw score (total number of marks awarded when the test was marked).

Use Tables 6–10 to look up the corresponding progress measure.

Using the appropriate table for the test taken, locate the learner's raw score on the left-hand side of the table. Then read across the row to the progress measure.

For example, a learner who has taken test 4ER16/4CRh16 and has a raw score of 13 would have a progress measure of 1006.

Interpreting a progress measure
The progress measure shows how well an individual learner has done in a given test compared with **all other learners in the same national curriculum year group taking the same test**. The progress measure should be presented as a time series allowing for a learner's achievement in the tests to be tracked over time.

The mean of the progress measure for each year group is set at 1000, and the scores range from 950 to 1050. Learners achieving between 980 and 1020 (i.e. scores within one standard deviation of the mean) have a progress measure that is in line with learners in the same year group (taking the same test). Approximately 68 per cent of learners will have a score in this range. Learners scoring outside of this range (i.e. below 980 or above 1020) have a progress measure that is either below or above that of most learners in their year group.

The progress measure for 2016 should be considered alongside any previous progress measure for this learner. Progress measures that are broadly similar from year to year would suggest that a learner is making steady progress within their year group. Small variations in the score from year to year are to be expected but if there are large changes in the progress measure between one year and the next, then this suggests that a learner has made either more or less progress than the rest of the learners taking the test. Please refer to the practitioner guidance at http://learning.gov.wales/resources/browse-all/reporting-and-interpreting-national-test-results-2016/?lang=en for further information on interpreting progress measures.

Out-of-year testing
Where a learner has taken a test that is different from their national curriculum year group test, look up their progress measure using the table appropriate for the test taken. Their progress measure compares the learner to all other learners who have taken the same test.

For example, for a learner in national curriculum Year 4 who has taken test 3ER16/3CRh16 and has a raw score of 13 it is possible to look up a Year 3 progress measure. A raw score of 13 gives a Year 3 progress measure of 1014 which indicates that the learner has performed at around the same level as the average learner in Year 3.

When comparing progress measures over time it is important to consider the reference group (the national curriculum year group the learner is compared with), as this may be different from one year to the next.

Table 6: Year 2 Test 2ER16/2CRh16 raw score to progress measure conversion table

Total score	Progress measure
0	959
1	972
2	978
3	983
4	986
5	990
6	993
7	996
8	999
9	1002
10	1005
11	1008
12	1011
13	1014
14	1017
15	1021
16	1025
17	1029
18	1033
19	1040
20	1050

Table 7: Year 3 Test 3ER16/3CRh16 raw score to progress measure conversion table

Total score	Progress measure
0	958
1	970
2	972
3	978
4	983
5	987
6	991
7	994
8	998
9	1001
10	1004
11	1007
12	1010
13	1014
14	1017
15	1020
16	1023
17	1027
18	1032
19	1038
20	1050

Table 8: Year 4 Test 4ER16/4CRh16 raw score to progress measure conversion table

Total score	Progress measure
0	959
1	970
2	973
3	977
4	980
5	983
6	986
7	989
8	992
9	995
10	998
11	1000
12	1003
13	1006
14	1009
15	1012
16	1016
17	1020
18	1024
19	1030
20	1050

Table 9: Year 5 Test 5ER16/5CRh16 raw score to progress measure conversion table

Total score	Progress measure
0	959
1	970
2	972
3	975
4	978
5	982
6	985
7	988
8	991
9	994
10	997
11	1000
12	1003
13	1007
14	1010
15	1014
16	1018
17	1023
18	1028
19	1034
20	1050

Table 10: Year 6 Test 6ER16/6CRh16 raw score to progress measure conversion table

Total score	Progress measure
0	950
1	965
2	969
3	972
4	976
5	979
6	983
7	987
8	990
9	993
10	996
11	1000
12	1003
13	1006
14	1009
15	1012
16	1015
17	1019
18	1023
19	1030
20	1050