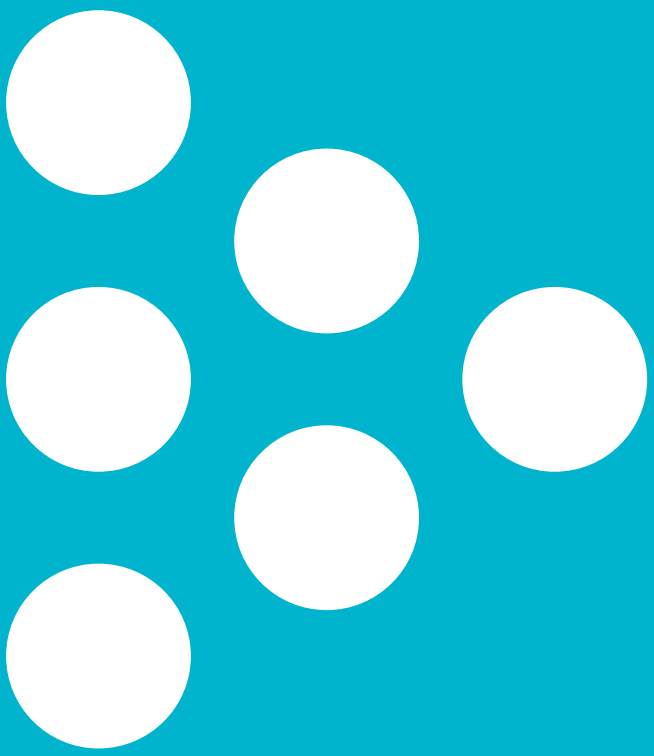
NFER Classroom

Technical Report

Technical Information for NFER Assessments in Reading and Mathematics Year 1 (Summer)



Technical Information for NFER Assessments in Reading and Mathematics Year 1 (Summer)

Centre for Assessment

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Contents

1 Introduction

The Year 1 mathematics and reading assessments form part of a new Key Stage 1 series of materials that can be used to monitor pupil attainment and progress across Years 1 and 2 to the national assessment at the end of Key Stage 1. They are aligned to the 2014 National Curriculum and in turn are part of a wider series of assessments intended for use through Years 1 to 5.

True to the model of all NFER assessment development, these assessments are the end result of extensive review, trialling and analysis. This report details the development process and provides technical data relating to the sampling, trialling and standardisation of the assessments.

2 Early development of texts and items

Following the initial development of texts / contexts and items (questions) by the researchers at NFER, informal trialling was conducted at a variety of primary schools. Informal trialling involves discussing the texts and / or items with small groups of pupils and gathering information on how these can be improved. This provides early feedback on the appropriateness of the texts and items, contributes to an informed review of the materials and influences the selection of items in preparation for the standardisation.

Teacher feedback is very important in the development of NFER tests. Not only is teacher input gathered on the early versions of the materials during informal trialling but it is also collected through a questionnaire completed by teachers taking part in the large scale standardisation. This questionnaire gathers teacher feedback on different aspects of the tests; this information is very useful in refining the materials and informing the selection of items that comprise the final tests.

In addition to feedback from teachers, the materials were reviewed by inclusion and subject experts. This allows us to ensure that, as far as possible, the tests are appropriate for the pupils who will be taking them.

3 Sample characteristics

The NFER assessments in reading and mathematics Year 1 (summer) were standardised in June 2017 with a sample of schools from across England. The standardisation sample was stratified according to the following characteristics:

- KS2 overall performance band 2015 (average point score)
- Primary school type
- School governance
- Region

In order to ensure the characteristics of the schools included in the standardisation sample were representative nationally, school level characteristics were compared with the national population and chi-square significance tests were conducted. The achieved sample representations across the above characteristics are shown and compared with the national population in Tables 3.1 and 3.2. The gender breakdown of the samples is shown in Table 3.3.

The samples were representative of the national population in all four of the above stratification characteristics at the school level.

Table 3.1. Representation of the sample at school level: Reading

		population		sample	
		Number	%	Number	%
KS2 overall performance band 2015 (av. point score)	Lowest 20%	2709	16	15	12
	2nd lowest 20%	2589	15	19	15
	Middle 20%	2319	14	16	12
	2nd highest 20%	2450	14	26	20
	Highest 20%	2838	17	26	20
	missing	4217	25	27	21
Primary school type	Nursery, Infants, First School, Infant & Junior (Primary)	15677	92	117	91
	Independent schools	1307	8	10	8
	All Through school	138	1	2	2
School governance	Academy or Free school	3867	23	18	14
	Maintained	11947	70	101	78
	Independent	1308	8	10	8
Urban/Rural	Rural	5004	30	43	33
	Urban	11873	70	86	67
Region	North	5156	30	43	33
	Midlands	5346	31	39	30
	South	6620	39	47	36
Total schools		17122	100	129	100

Since percentages are rounded to the nearest integer, they may not always sum to 100.

Table 3.2. Representation of the sample at school level: Mathematics

		population		sample	
		Number	%	Number	%
KS2 overall performance band 2015 (av. point score)	Lowest 20%	2709	16	14	11
	2nd lowest 20%	2589	15	19	15
	Middle 20%	2319	14	16	13
	2nd highest 20%	2450	14	25	20
	Highest 20%	2838	17	26	21
	missing	4217	25	26	21
Primary school type	Nursery, Infants, First School, Infant & Junior (Primary)	15677	92	114	90
	Independent schools	1307	8	10	8
	All Through school	138	1	2	2
School governance	Academy or Free school	3867	23	18	14
	Maintained	11947	70	98	78
	Independent	1308	8	10	8
Urban/Rural	Rural	5004	30	42	33
	Urban	11873	70	84	67
Region	North	5156	30	41	33
	Midlands	5346	31	39	31
	South	6620	39	46	37
Total schools		17122	100	126	100

Since percentages are rounded to the nearest integer, they may not always sum to 100.

Table 3.3. Representation of the sample at pupil level: Gender

		population	sample	
		%	Number	%
Reading	**Boys**	50	1620	50
	Girls	50	1622	50
	Total	100	3247	100
Mathematics	**Boys**	50	1594	50
	Girls	50	1607	50
	Total	100	3207	100

Since percentages are rounded to the nearest integer, they may not always sum to 100.

4 Whole test functioning

The following table provides information on the overall functioning of each assessment. As all items were trialled in two test versions during the trial, Item Response Theory (IRT) was used in determining the final form of each paper. Since IRT allows results from different papers to be analysed concurrently, the standardisation sample for each paper is the total number of pupils to have sat at least one paper in the standardisation trial.

Table 4.1. Whole test functioning

	Reading Paper 1	Reading Paper 2	Mathematics Paper 1	Mathematics Paper 2
Standardisation sample *n*	3247		3207	
Reliability (Cronbach's alpha)	0.90	0.767	0.86	0.84
Maximum score	36	12	25	15
Mean	23.05	6.00	13.95	7.53
Median	24.00	6.00	14.00	8
Standard deviation	7.74	3.14	5.58	4.01

5 Item level functioning

Item level statistics

Information about item functioning is available in the NFER Test analysis tool. This is available for all purchasers of the tests.

Differential item functioning

Differential item functioning (DIF) analysis, classified separately for gender and EAL, was carried out to identify observed differences in performance on each test. Differential item functioning identifies particular items for which two groups (e.g. girls and boys) perform differently above and beyond the disparity in their achievement on the test as a whole.

The following tables present the outcomes of the DIF analyses, showing the items where statistical differences between groups have been identified. All items were trialled in two test versions during the trial. Most items showing differential performance did so only in one of the two versions. There are two possible reasons why this might be so. Firstly, the detection of differential performance may be due to sampling effects, that is to say, the DIF may not be detected if the item were trialled again with a new sample of pupils. The statistics could be reflecting chance differences between pupils who sat one of the test versions. The second possible reason for an item to show differential performance in one test version only is that the DIF is real but is difficult to measure reliably. Therefore the results of the DIF analysis are inconclusive. Items showing differential performance in both test versions in which they were trialled have two DIF outcomes presented.

For each item listed in the tables below, Item Response Theory analysis has been used to confirm the likelihood of differential performance. Shading denotes items where bias is likely based on a review of the item characteristic curves.

Table 5.1. Differential item functioning for gender: Reading Paper 1

Booklet section	Item number	DIF favours	
Bear and Bird	5	Boys*	
	6	Boys*	
	8	Boys*	
	9	Girls*	
Sentence Completion	4	Girls*	Girls*
	9	Girls*	
	10	Girls*	
Post	5	Girls*	
	6	Girls*	

*$p < .05$ ** $p < .01$ *** $p < .001$

Table 5.2. Differential item functioning for gender: Reading Paper 2

Item number	DIF favours
7	Girls*

*$p < .05$ ** $p < .01$ *** $p < .001$

Table 5.3. Differential item functioning for gender: Mathematics Paper 1

Item number	DIF favours	
8	Boys*	
12	Girls**	
13	Girls**	
15	Girls***	
20	Boys***	Boys**
21	Girls**	
23	Boys**	
24	Boys**	

*$p < .05$ ** $p < .01$ *** $p < .001$

Table 5.4. Differential item functioning for gender: Mathematics Paper 2

Item number	DIF favours	
3	Boys***	Boys***
5	Boys**	
6	Boys*	Boys*
9	Boys*	
15	Girls*	

*$p < .05$ ** $p < .01$ *** $p < .001$

Table 5.5. Differential item functioning for EAL: Reading Paper 1

Booklet section	Item number	DIF favours	
Bear and Bird	2	not EAL*	
	8	not EAL**	not EAL*
	10	EAL*	
	11	not EAL*	not EAL**
Sentence Completion	1	EAL*	
	7	EAL**	
	8	EAL*	
	9	EAL**	
	10	EAL*	
Post	2	not EAL**	
	4	EAL*	
	5	EAL*	
	8	EAL**	
	13	EAL*	

*$p < .05$ ** $p < .01$ *** $p < .001$

Table 5.6. Differential item functioning for EAL: Reading Paper 2

Item number	DIF favours
6	EAL*

*$p < .05$ ** $p < .01$ *** $p < .001$

Table 5.7. Differential item functioning for EAL: Mathematics Paper 1

Item number	DIF favours	
2	EAL*	
4	EAL**	EAL**
9	not EAL*	
11	EAL*	
12	EAL	
13	not EAL*	
14	not EAL**	
19	EAL**	EAL**
22	not EAL*	

*$p < .05$ ** $p < .01$ *** $p < .001$

Table 5.8. Differential item functioning for EAL: Mathematics Paper 2

Item number	DIF favours	
2	not EAL*	
3	EAL***	EAL*
4	EAL*	
5	EAL**	EAL***
7	not EAL**	
8	not EAL*	
9	not EAL*	not EAL*
10	not EAL***	
11	not EAL*	
13	not EAL*	not EAL**
15	EAL**	EAL*

*$p < .05$ ** $p < .01$ *** $p < .001$

6 Test outcomes

The following outcomes are available from this suite of tests:

- Raw score – the total number of marks attained by each pupil
- Standardised score
- Age standardised score
- Age-related expectations in the National Curriculum.

More details of each are available in the relevant teacher guide.

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