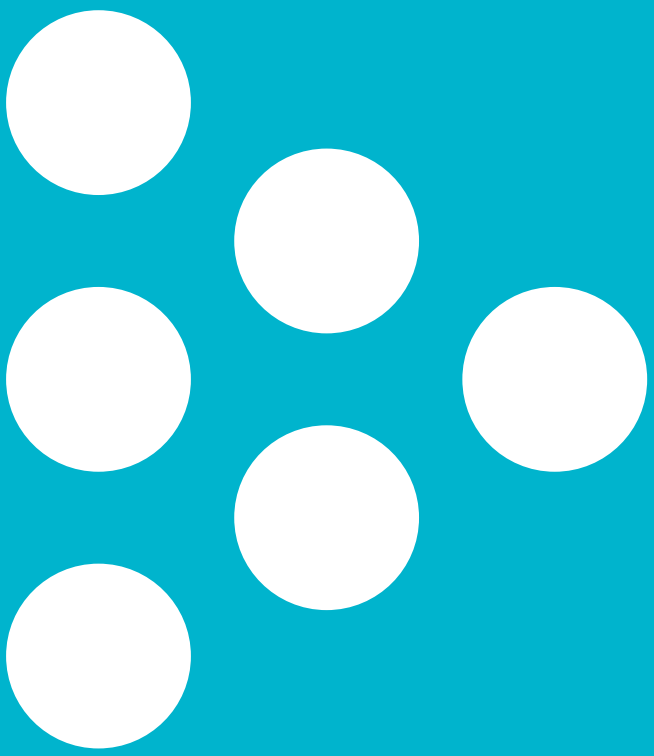
NFER Classroom

Technical Report

Technical information for NFER tests in reading and mathematics Suite 2 (autumn)



Technical information for NFER tests in reading and mathematics Suite 2 (autumn)

Centre for Assessment

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Contents

1 Introduction

In 2013, NFER produced a suite of reading and mathematics tests for schools to use with years 3, 4 and 5 to help inform teacher assessment. These assessments have been very positively received.

Following the introduction of the new national curriculum in 2014 and the abolition of the eight-level scale of assessment, a new suite of tests has been developed. The design of these tests reflects the changes to the model of assessment used at the end of key stage 2 from 2016. The suite consists of a series of tests intended for use in the autumn term and a series intended for use in the summer term.

These tests were standardised with pupils who had been taught the new curriculum for at least a year.

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 trial.

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 trial. 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 tests in reading and mathematics suite 2 (autumn) were standardised in February 2016 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: government office 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 representation across the above characteristics are shown and compared with the national population in Tables 1 to 6. The gender breakdown of the sample is shown in Table 7.

Generally, the samples were representative of the national population at the school level. In the Y4 reading sample, schools in the South were under-represented and schools in the North and Midlands were over-represented. In the Y5 reading sample, schools in the two lowest KS2 performance bands and the highest KS2 performance band were under-represented, whilst schools in the two middle KS2 performance bands were over-represented.

Table 1: Representation of the sample at school level - Year 3 reading

		population		sample	
		Number	%	Number	%
KS2 overall performance band 2015 (av. point score)	Lowest 20%	2930	18	6	13
	2nd lowest 20%	2829	17	6	13
	Middle 20%	2556	16	9	19
	2nd highest 20%	2691	16	15	31
	Highest 20%	3082	19	10	21
	missing	2368	14	2	4
Primary school type	Infant & Junior (Primary)	13855	84	44	92
	Junior	1090	7	3	6
	Independent schools	1376	8	0	0
	All Through school	135	1	1	2
School governance	Academy or Free school	3173	19	7	15
	Maintained	11907	72	41	85
	Independent	1376	8	0	0
Region	North	5026	31	20	42
	Midlands	5014	30	15	31
	South	6416	39	13	27
Total schools		16456	100	48	100

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

Table 2: Representation of the sample at school level - Year 4 reading

		population		sample	
		Number	%	Number	%
KS2 overall performance band 2015 (av. point score)	Lowest 20%	2930	18	8	18
	2nd lowest 20%	2829	17	8	18
	Middle 20%	2556	16	7	16
	2nd highest 20%	2691	16	7	16
	Highest 20%	3082	19	14	31
	missing	2373	14	1	2
Primary school type	Infant & Junior (Primary)	13855	84	40	89
	Junior	1090	7	4	9
	Independent schools	1381	8	1	2
	All Through school	135	1	0	0
School governance	Academy or Free school	3173	19	7	16
	Maintained	11907	72	37	82
	Independent	1381	8	1	2
Region	North	5029	31	20	44
	Midlands	5017	30	16	36
	South	6415	39	9	20
Total schools		16461	100	45	100

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

Table 3: Representation of the sample at school level - Year 5 reading

		population		sample	
		Number	%	Number	%
KS2 overall performance band 2015 (av. point score)	Lowest 20%	2930	18	7	15
	2nd lowest 20%	2829	17	4	9
	Middle 20%	2556	16	10	21
	2nd highest 20%	2691	16	18	38
	Highest 20%	3082	19	6	13
	missing	2378	14	2	4
Primary school type	Infant & Junior (Primary)	13855	84	40	85
	Junior	1090	7	4	9
	Independent schools	1386	8	2	4
	All Through school	135	1	1	2
School governance	Academy or Free school	3173	19	6	13
	Maintained	11907	72	39	83
	Independent	1386	8	2	4
Region	North	5030	31	20	43
	Midlands	5019	30	13	28
	South	6417	39	14	30
Total schools		16466	100	47	100

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

Table 4: Representation of the sample at school level - Year 3 maths

		population		sample	
		Number	%	Number	%
KS2 overall performance band 2015 (av. point score)	Lowest 20%	2930	18	13	23
	2nd lowest 20%	2829	17	9	16
	Middle 20%	2556	16	8	14
	2nd highest 20%	2691	16	7	13
	Highest 20%	3082	19	15	27
	missing	2368	14	4	7
Primary school type	Infant & Junior (Primary)	13855	84	54	96
	Junior	1090	7	0	0
	Independent schools	1376	8	2	4
	All Through school	135	1	0	0
School governance	Academy or Free school	3173	19	13	23
	Maintained	11907	72	41	73
	Independent	1376	8	2	4
Region	North	5026	31	22	39
	Midlands	5014	30	15	27
	South	6416	39	19	34
Total schools		16456	100	56	100

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

Table 5: Representation of the sample at school level - Year 4 maths

		population		sample	
		Number	%	Number	%
KS2 overall performance band 2015 (av. point score)	Lowest 20%	2930	18	11	19
	2nd lowest 20%	2829	17	9	16
	Middle 20%	2556	16	7	12
	2nd highest 20%	2691	16	12	21
	Highest 20%	3082	19	13	23
	missing	2373	14	5	9
Primary school type	Infant & Junior (Primary)	13855	84	53	93
	Junior	1090	7	1	2
	Independent schools	1381	8	3	5
	All Through school	135	1	0	0
School governance	Academy or Free school	3173	19	10	18
	Maintained	11907	72	44	77
	Independent	1381	8	3	5
Region	North	5029	31	19	33
	Midlands	5017	30	18	32
	South	6415	39	20	35
Total schools		16461	100	57	100

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

Table 6: Representation of the sample at school level - Year 5 maths

		population		sample	
		Number	%	Number	%
KS2 overall performance band 2015 (av. point score)	Lowest 20%	2930	18	12	21
	2nd lowest 20%	2829	17	9	16
	Middle 20%	2556	16	5	9
	2nd highest 20%	2691	16	10	18
	Highest 20%	3082	19	15	26
	missing	2378	14	6	11
Primary school type	Infant & Junior (Primary)	13855	84	52	91
	Junior	1090	7	2	4
	Independent schools	1386	8	3	5
	All Through school	135	1	0	0
School governance	Academy or Free school	3173	19	10	18
	Maintained	11907	72	44	77
	Independent	1386	8	3	5
Region	North	5030	31	20	35
	Midlands	5019	30	18	32
	South	6417	39	19	33
Total schools		16466	100	57	100

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

Table 7: Representation of the sample at pupil level: gender

		population	sample	
		%	Number	%
Reading	Boys	51	1757	50
	Girls	49	1753	50
	Total	100	3510	100
Maths	Boys	51	2105	52
	Girls	49	1937	48
	Total	100	4042	100

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

4 Whole test functioning

The following tables provide information on the overall functioning of each test separately by year group.

Table 8: Whole test functioning by test: Year 3

	Year 3 reading	Year 3 mathematics arithmetic paper	Year 3 mathematics Test 1	Year 3 mathematics Test 2
Standardisation sample *n*	1204	1157	1165	1159
Reliability (Cronbach's alpha)	0.930	0.898	0.868	0.873
Maximum score	37	30	25	25
Mean	19.18	14.14	10.82	10.27
Median	19.00	14.00	10.00	10.00
Standard deviation	9.98	6.70	5.84	5.86

Table 9: Whole test functioning by test: Year 4

	Year 4 reading	Year 4 mathematics arithmetic paper	Year 4 mathematics Test 1	Year 4 mathematics Test 2
Standardisation sample *n*	1168	1242	1217	1230
Reliability (Cronbach's alpha)	0.904	0.913	0.893	0.913
Maximum score	40	35	30	30
Mean	20.10	16.06	13.80	13.38
Median	21.00	16.00	13.00	13.00
Standard deviation	9.39	7.94	7.12	7.63

Table 10: Whole test functioning by test: Year 5

	Year 5 reading	Year 5 mathematics arithmetic paper	Year 5 mathematics Test 1	Year 5 mathematics Test 2
Standardisation sample *n*	1164	1137	1193	1161
Reliability (Cronbach's alpha)	0.893	0.928	0.906	0.902
Maximum score	46	40	35	35
Mean	20.56	18.43	17.07	13.35
Median	20.00	17.00	16.00	12.00
Standard deviation	9.61	9.67	8.58	7.98

5 Item level functioning

Item level statistics

Information about item functioning is available in the analysis spreadsheets. These are downloadable from the NFER portal for 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 questions where statistical differences between groups have been identified. It is important to note that these statistical differences do not necessarily indicate that a particular question is globally biased towards one group or the other (e.g. gender), but may reflect genuine differences in performance for this sample of pupils.

Table 11: Differential item functioning for gender: reading (Years 3, 4 and 5)

	Question number	DIF favours
Year 3	Q6	Girls***
	Q8	Girls*
	Q14	Girls**
	Q19	Boys*
	Q20a	Boys*
	Q20b	Boys*
	Q21	Boys**
Year 4	Q1d	Girls**
	Q1e	Boys*
	Q3	Girls*
	Q4	Girls*
	Q6	Girls***
	Q13	Boys*
	Q18	Boys***
	Q19	Girls*
	Q25	Boys*
Year 5	Q1c	Boys*
	Q3	Girls*
	Q7	Girls*
	Q8	Girls*
	Q13	Girls*
	Q14	Boys***
	Q21	Boys**
	Q24	Girls**
	Q27	Boys***
	Q28	Boys*

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

Table 12: Differential item functioning for gender: mathematics (Years 3, 4 and 5)

	Mathematics TA		Mathematics T1		Mathematics T2	
	Question number	DIF favours	Question number	DIF favours	Question number	DIF favours
Year 3	Q1	Girls**	Q1	Boys*	Q1	Boys**
	Q5	Girls**	Q2	Girls*	Q2	Girls**
	Q7	Girls*	Q4	Boys*	Q3	Girls*
	Q8	Girls**	Q8	Boys***	Q5	Girls*
	Q9	Boys*	Q10	Girls*	Q7	Boys**
	Q14	Boys*	Q11	Girls***	Q10	Girls*
	Q16	Girls**	Q13	Girls*	Q12	Girls***
	Q21	Boys***	Q14	Boys***	Q13	Boys**
	Q23	Girls***	Q17a	Boys*	Q15	Boys*
	Q25	Boys*	Q17b	Girls**	Q16	Boys***
	Q26	Boys***	Q20	Boys*	Q17	Boys***
	Q27	Girls*			Q19b	Girls***
	Q30	Boys*			Q20	Girls**
Year 4	Q2	Girls**	Q2	Boys*	Q1	Boys**
	Q9	Girls***	Q10	Girls***	Q3	Girls*
	Q12	Girls**	Q11	Girls*	Q6	Girls***
	Q14	Girls***	Q17	Boys**	Q14	Girls***
	Q16	Boys***	Q18	Boys**	Q16	Girls*
	Q17	Boys*	Q22	Boys**	Q17	Boys*
	Q18	Boys***	Q24	Girls*	Q21	Boys**
	Q19	Girls**			Q26	Boys***
	Q22	Boys*				
	Q23	Girls***				
	Q29	Boys***				
	Q33	Girls**				
Year 5	Q1	Boys*	Q3	Boys**	Q1	Girls**
	Q3	Girls*	Q4a	Girls**	Q2	Boys***
	Q14	Boys*	Q4b	Boys**	Q6	Girls***
	Q17	Girls*	Q6	Boys**	Q7	Boys**
	Q21	Girls*	Q8	Boys**	Q11	Girls**
	Q29	Boys**	Q10	Girls*	Q17	Boys***
	Q32	Boys*	Q11	Girls*	Q19	Boys*
	Q33	Girls***	Q15	Boys*	Q20	Boys*
	Q34	Boys***	Q17	Boys***	Q21	Boys*

	Q36	Boys**	Q22	Girls***	Q22	Girls**
	Q37	Girls*	Q27	Girls*	Q25	Girls**
					Q30	Girls*

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

Table 13: Differential item functioning for EAL: reading (Years 3, 4 and 5)

	Question number	DIF favours
Year 3	Q7a	EAL*
	Q7c	EAL*
	Q10c	EAL***
	Q15	not EAL*
Year 4	Q1b	EAL*
	Q3	not EAL*
	Q5	EAL*
	Q15	not EAL*
Year 5	Q5	not EAL*
	Q8	EAL**
	Q15	EAL*

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

Table 14: Differential item functioning for EAL: mathematics (Years 3, 4 and 5)

	Mathematics TA		Mathematics T1		Mathematics T2	
	Question number	DIF favours	Question number	DIF favours	Question number	DIF favours
Year 3	Q26	EAL**	Q3 Q11 Q12 Q14 Q20	EAL** EAL* not EAL* EAL*** not EAL*	Q4 Q10 Q16 Q17 Q20 Q21	not EAL* not EAL* EAL* EAL** not EAL* not EAL*
Year 4	Q4 Q19 Q21 Q22 Q23 Q26 Q29 Q34	EAL* EAL*** EAL*** not EAL** EAL* not EAL*** not EAL*** not EAL*	Q5 Q9 Q14 Q16 Q17 Q20	not EAL* not EAL** not EAL*** not EAL** EAL*** not EAL**	Q4 Q7 Q14 Q15A Q20 Q21 Q22	not EAL* not EAL** EAL** not EAL*** EAL*** not EAL* EAL**
Year 5	Q9 Q12 Q30 Q32	EAL** not EAL** EAL* not EAL*	Q1 Q2B Q3 Q4A Q10 Q15B Q19 Q23	not EAL** not EAL* not EAL*** not EAL* EAL*** not EAL* EAL* not EAL**	Q5 Q15 Q20 Q24 Q26 Q27 Q30	not EAL* not EAL** not EAL* EAL** EAL* not 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

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

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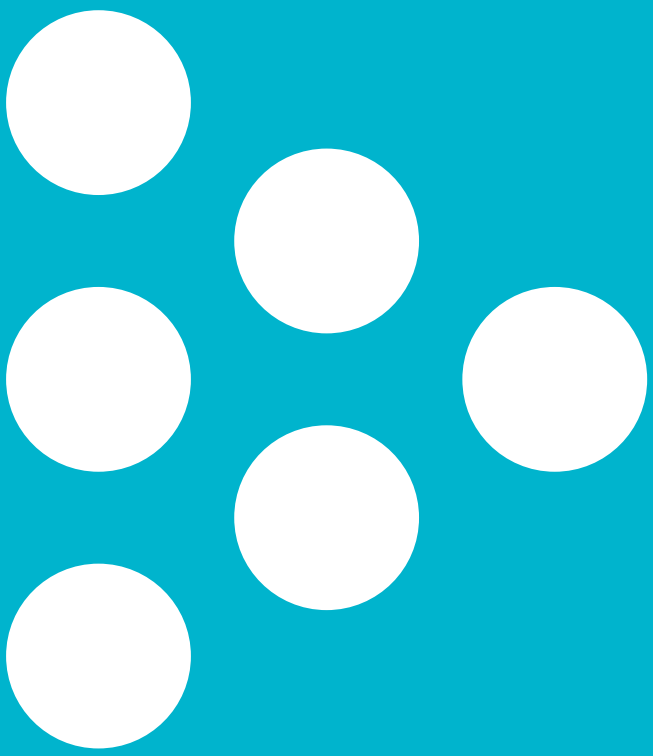

Evidence for excellence in education

The Mere, Upton Park, Slough, Berks SL1 2DQ
T: +44 (0)1753 574123 • F: +44 (0)1753 691632
enquiries@nfer.ac.uk

www.nfer.ac.uk

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