Cognitive Abilities Test (CAT) and GCSE grades: 2009/10

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This Report

GL Assessment provides updated tables and progress charts to enable schools to estimate pupils' GCSE subject grades based on their CAT scores. This report explains how to use these tables and charts. It also gives guidance on setting targets and discussing them with individual pupils. Information on how the estimates (or indicators) were developed, and on how to calculate estimates for groups, is included in the appendix. The results of a recent large scale study looking at the relationship between CAT scores and pupil/school factors is included at the end of the appendix for your information.

Estimating GCSE indicators

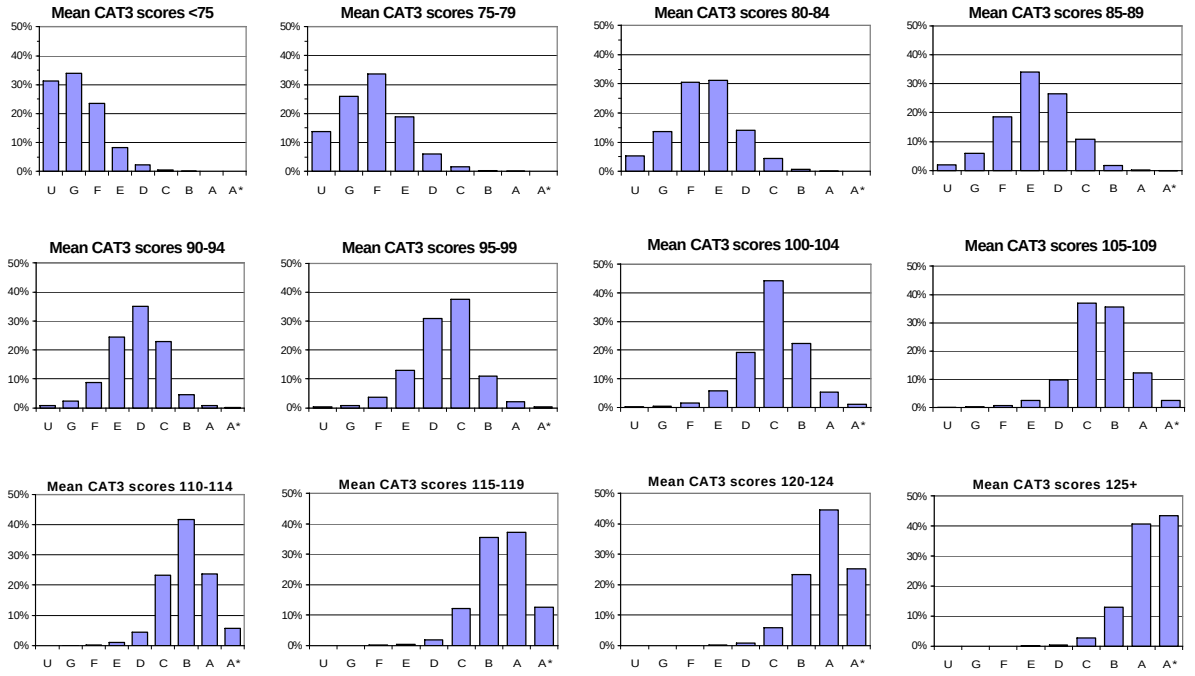
GCSE indicators for 30 GCSE subjects are available in tables and progress charts on the online and paper test reports from the scoring service as well on the GL Assessment website www.gl-assessment.co.uk. All the 30 subject indicators are on the CAT3 school data disk. The following examples draw on figures from the tables and charts for CAT3.

Using Progress Charts

The progress charts give indicated test levels for CAT score bands. They can be particularly useful in discussing target setting with individual pupils. Figure 1 below shows the charts for mathematics.

Figure 1

CAT3 scores and GCSE Mathematics Progress Charts - 2009/10



The figures in the charts are based on the percentages of pupils, with CAT scores in these bands, who actually achieved the GCSE grades. To use the charts to get indicated levels for each pupil, choose the chart labelled with the CAT score band within which the pupil's score lies. For example, for a student with a mean CAT score of 97 look at the progress chart labelled "Mean CAT scores 100 - 104". For this score a range of GCSE results are possible. The most likely outcome is grade C since 44% of pupils achieved this grade. However other grades are also possible, since 7% achieved E or below, 19% achieved Grade D, 22% achieved Grade B, and 6% achieved Grade A or A*. These charts demonstrate that a range of scores is possible. Whilst most pupils will achieve grade C some will achieve lower and some higher grades. This is important to emphasise to pupils to show what might be achieved with sufficient motivation and effort, and to guard against complacency.

Using Tables

The tables provide more detailed information than the charts as they give indicated GCSE results for specific CAT scores. An extract from the CAT3 to GCSE summary table showing some of the indicators is shown below. For example, a student with a mean CAT3 score of 107 is likely to achieve GCSE total points score of 452 and have a 90 percent chance of obtaining 5 or more GCSE grades A*-C. The 'Best 8' GCSE points score is the points score for the eight subjects in which the pupil recorded their highest grades. This student is also likely to be a borderline grade B/C for English language.

Table 1
CAT3 GCSE Indicators - 2009-10

CAT3 score	GCSE /GNVQ 'Best 8' points score	GCSE/GNVQ Total points score	Probability of 5+ A*-C grades	Probability of 5+ A*-G (including English & maths)	English Language	English Literature	French	Geography	History	Information Technology	Mathematics	Religious Education	Science - Double Award
91	273	329	44%	92%	C/D	**C/D**	D/E	**D/E**	D/E	**D**	D/E	**C/D**	D/E
92	279	337	48%	93%	C/D	**C/D**	D/E	**D/E**	D/E	**D**	D	**C/D**	D
93	285	346	51%	94%	C/D	**C/D**	D	**D**	D	**D**	D	**C/D**	D
94	290	354	55%	95%	C/D	**C/D**	D	**D**	D	**C/D**	D	**C/D**	D
95	296	363	59%	95%	C/D	**C/D**	D	**D**	D	**C/D**	D	**C/D**	D
96	302	371	62%	96%	C/D	**C**	D	**D**	D	**C/D**	C/D	**C**	D
97	307	379	66%	97%	C/D	**C**	D	**C/D**	C/D	**C/D**	C/D	**C**	C/D
98	312	387	69%	97%	C	**C**	D	**C/D**	C/D	**C/D**	C/D	**C**	C/D
99	318	395	73%	97%	C	**C**	C/D	**C/D**	C/D	**C/D**	C/D	**C**	C/D
100	323	402	76%	98%	C	**C**	C/D	**C/D**	C/D	**C**	C	**C**	C/D
101	328	410	78%	98%	C	**C**	C/D	**C**	C/D	**C**	C	**B/C**	C/D
102	332	417	81%	98%	C	**C**	C/D	**C**	C	**C**	C	**B/C**	C
103	337	424	83%	99%	C	**B/C**	C/D	**C**	C	**C**	C	**B/C**	C
104	342	431	85%	99%	C	**B/C**	C/D	**C**	C	**C**	C	**B/C**	C
105	346	438	87%	99%	B/C	**B/C**	C/D	**B/C**	C	**C**	B/C	**B/C**	C
106	351	445	89%	99%	B/C	**B/C**	C	**B/C**	B/C	**B/C**	B/C	**B/C**	C
107	355	452	90%	99%	B/C	**B/C**	C	**B/C**	B/C	**B/C**	B/C	**B/C**	B/C
108	359	459	92%	99%	B/C	**B/C**	C	**B/C**	B/C	**B/C**	B/C	**B**	B/C
109	363	465	93%	99%	B/C	**B/C**	C	**B/C**	B/C	**B/C**	B/C	**B**	B/C

Individual subject tables are also available which give the probabilities of getting each GCSE grade associated with each CAT score.

Setting Targets

The tables and charts show what pupils with different CAT scores actually achieved in the GCSE tests. CAT scores can therefore be helpful in providing forecasts for pupils' attainment at the end of GCSE. However, targets are more than forecasts, since targets should also include an element of challenge. Your wide and detailed knowledge of each individual pupil, and your class/school aspirations in relation to the benchmark tables contained in the RAISE and other data, will contribute to translating these forecasts into challenging yet achievable targets.

The tables and charts confirm the need for suitably cautious interpretation when using the estimates with staff, parents and, particularly, if sharing them with individual pupils. In the latter context, we would advise the school staff to follow the established best practice of schools using the results for mentoring purposes by:

- Stressing to pupils that the indicators are a statistical prediction, not a prophecy of their actual GCSE results;
- Using the progress charts for each GCSE subject (as available from the website) to emphasise to pupils the range of outcomes that could be achieved;
- Emphasising the importance of a pupil's motivation and effort in determining the results obtained and identifying any areas in which the pupil requires greater support from the teacher;
- Not using the indicators to label pupils as actual or potential "failures";
- Emphasising the upper limits of the range shown in the progress charts when setting personal targets; BUT
- Considering and setting the indicators in the context of all other known relevant factors and assessment information, thus making sure targets are reasonable and achievable.

Getting the Best from CAT

It is not possible in this document to provide in-depth answers to all the questions users may have concerning the use of the CAT test and the KS3 indicators. A full and comprehensive guide to using CAT3 is contained in **"*Getting the Best from CAT: A practical guide for secondary schools***", which can be ordered from GL Assessment customer advisers (0845 602 1937). It contains detailed guidance on using the quartile graphs and progress charts, as well as many other practical issues in interpreting and using CAT3 scores, such as identifying learning styles and using the results to adapt instruction. GL Assessment also holds public training courses on "***Getting the Best from CAT***". Bespoke sessions can also be created to meet the unique training requirements of your school. For further details contact GL Assessment customer advisers on 0845 602 1937.

Updating the indicators

The tables and charts give useful indicators based on current levels of performance in end of GCSE tests. However, if the challenging national targets for GCSE are to be met, then national levels of performance should increase over the next few years. GL Assessment will therefore update the indicators to reflect changes in national standards.

GL Assessment website

Please refer to the website www.gl-assessment.co.uk/cat for the latest indicators in detail. The website also contains case studies on the use of CAT in schools and gives you the opportunity to send in your comments on CAT or the Scoring and Analysis service.

Appendix

How are the end of GCSE indicators calculated?

Matched CAT and GCSE results were obtained from a large representative sample of students. These students completed the CAT on entry to Year 7 and the subsequent GCSE tests. The GCSE estimates are based on the relationship between the CAT scores of these students and their subsequent GCSE outcomes. The relationship was modelled using regression methods.

How strong is the relationship between CAT scores and GCSE test results?

Figure 1 shows the probability of obtaining 5 or more GCSE grades A*-C. It is clear that students' scores on the CAT are strongly related to their subsequent attainment in the GCSE. As the mean CAT score increases, there is a corresponding increase in the proportion of students achieving 5 or more GCSE grades A*-C.

Figure 1

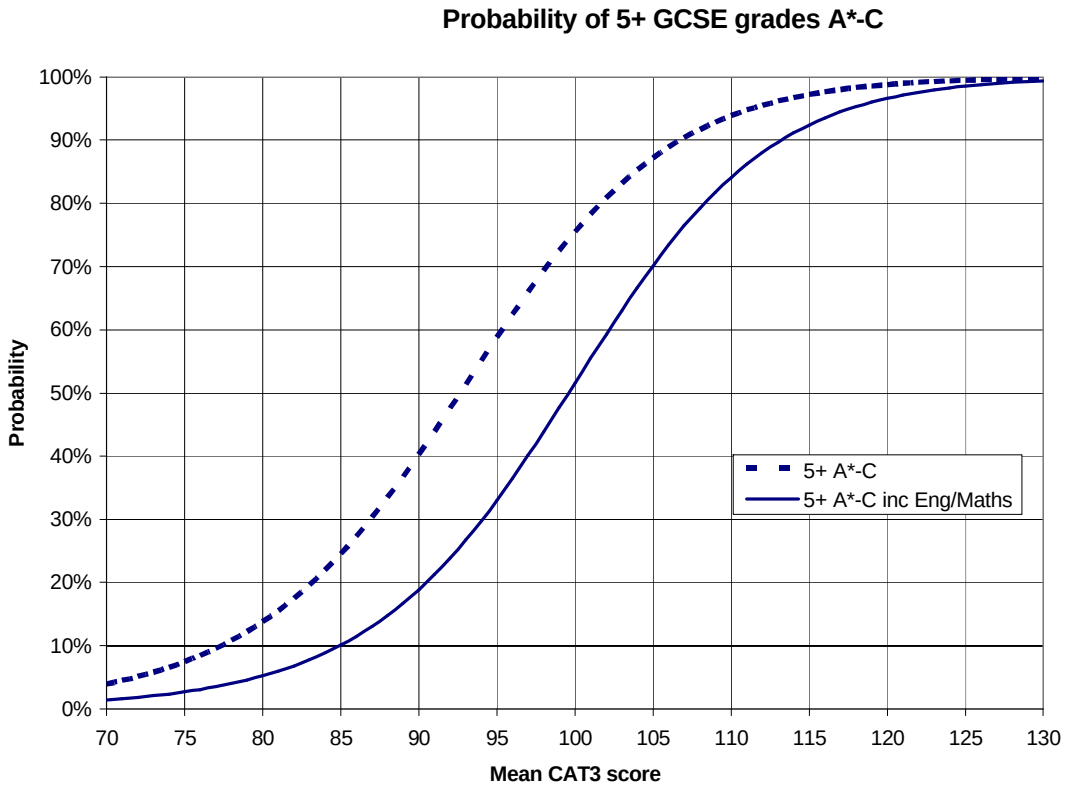


Table 2 shows the correlations between the CAT Standard Age Scores (SAS) and GCSE grades. The mean CAT score is the average of the verbal, quantitative and non-verbal reasoning SAS scores. The correlation coefficients are all highly significant. The figures in bold are the highest correlations with each GCSE outcome. The mean CAT score gives the highest correlations with GCSE, with the exception of English Language, English Literature, French, German and Spanish where the verbal battery gives a slightly higher correlation than the mean CAT score.

Table 2: Correlations between the CAT standard age scores and GCSE outcomes

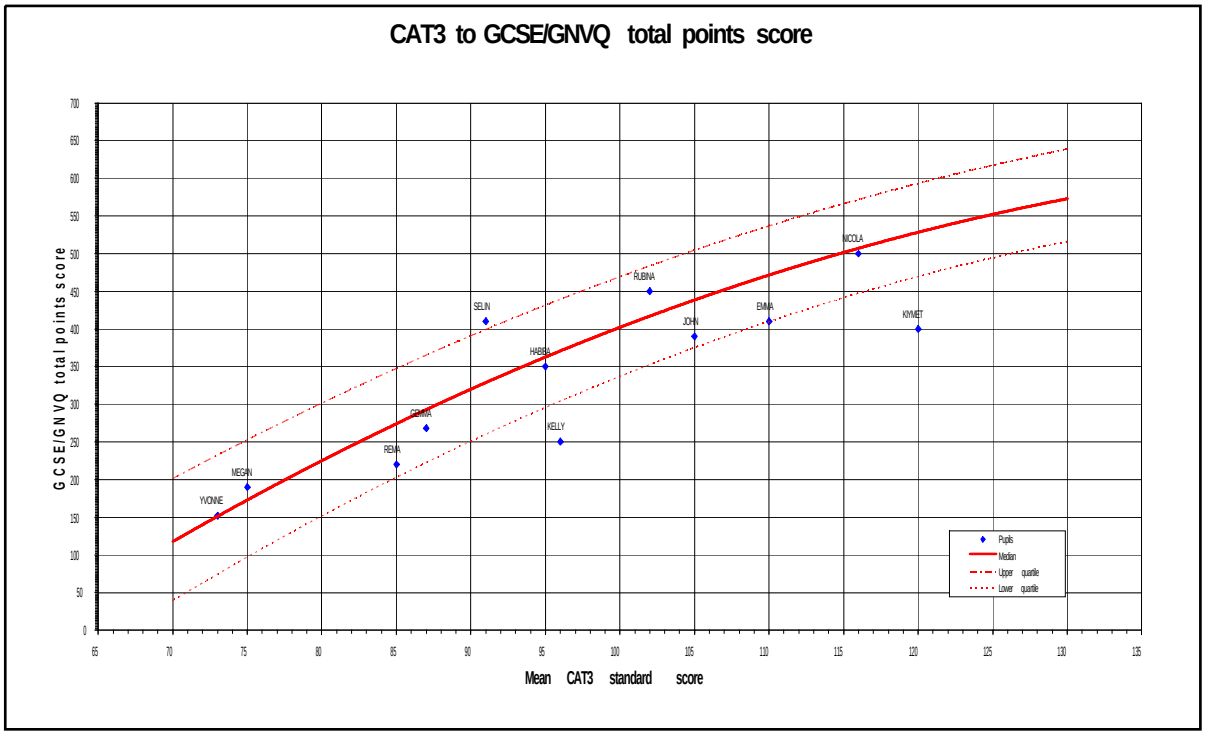
	Mean CAT Score	**Verbal**	**Quantitative**	**Non Verbal**
GCSE/GNVQ Total points score	**0.70**	0.67	0.63	0.57
GCSE/GNVQ Best 8 points score	**0.72**	0.69	0.65	0.59
Art & Design	**0.44**	0.42	0.38	0.39
Business Studies	**0.57**	0.55	0.51	0.42
Design & Tech. - Electronic	**0.49**	0.45	0.44	0.40
Design & Tech. - Food	**0.54**	0.52	0.48	0.43
Design & Tech. - Graphics	**0.49**	0.45	0.42	0.42
Design & Tech. - Resistant Materials	**0.47**	0.43	0.40	0.42
Design & Tech. - Systems & Control	**0.49**	0.45	0.42	0.40
Design & Tech. - Textiles	**0.54**	0.50	0.49	0.47
Drama	**0.49**	0.49	0.43	0.39
English Language	0.68	**0.69**	0.61	0.52
English Literature	0.61	**0.62**	0.54	0.46
French	0.63	**0.63**	0.56	0.46
Geography	**0.66**	0.64	0.59	0.53
German	0.60	**0.60**	0.54	0.44
History	**0.63**	0.63	0.56	0.48
Home Economics	**0.52**	0.51	0.46	0.40
Information Technology	**0.51**	0.48	0.46	0.40
Mathematics	**0.75**	0.66	0.71	0.64
Media & Film Studies	**0.48**	0.47	0.43	0.35
Music	**0.55**	0.54	0.48	0.43
Office Technology	**0.61**	0.58	0.55	0.48
Physical Education	**0.56**	0.53	0.51	0.43
Religion	**0.55**	0.55	0.48	0.41
Science - Biology	**0.57**	0.52	0.48	0.40
Science - Chemistry	**0.54**	0.46	0.47	0.38
Science - Double Award	**0.69**	0.65	0.61	0.57
Science - Physics	**0.52**	0.45	0.45	0.34
Science -Single Award	**0.61**	0.59	0.53	0.50
Sociology	**0.53**	0.53	0.46	0.40
Spanish	0.61	**0.61**	0.54	0.45
Statistics	**0.57**	0.49	0.52	0.45

***Notes**: Figures in bold are the highest correlations for each GCSE outcome.*

Figure 2 illustrates the relationship between mean CAT score and the Total GCSE/GNVQ points score.

One way of expressing the variability across indicated outcomes is to consider the lower quartile, median and upper quartiles of the distribution of indicated outcomes for each CAT score. Half of the students will have outcomes in the area between the lower quartile and the upper quartile. At a mean CAT score of 100, the indicated Total GCSE/GNVQ points score is 402 in a national sample. This means for a mean CAT score of 100, around 50% of the pupils had points scores in the range 337 to 469. Twenty five percent of pupils achieved scores below 337 and 25% had scores above 469. The figure below shows the results for twelve hypothetical pupils compared to the quartiles for a national sample.

Figure 2



Schools can plot their CAT scores and GCSE/GNVQ results to compare the relative progress made by their pupils with progress made by pupils nationally. There are separate workbooks for value added analysis based on CAT3, KS3 and GCSE results.

How do we calculate school or class level estimates of GCSE levels?

The school level indicator is the mean of the probabilities for all pupils in the year. Table 3 gives an example of how group estimates are calculated for this fictitious class with five pupils who have been assessed with CAT3. The following example shows how the group indicators have been calculated for the best eight GCSE/GNVQ Points score, the probability of obtaining 5 or more A* to Cs, and the probabilities associated with getting different mathematics grades.

Table 3 Calculating group indicators for English for a fictitious class of five pupils

Pupil	Mean CAT Score	GCSE/GNVQ Total points score	Probability of 5+ A*-C grades	Mathematics GCSE Grades – probabilities								
				U	G	F	E	D	C	B	A	A*
1	70	118	4%	41%	33%	18%	6%	1%	0%	0%	0%	0%
2	85	274	25%	3%	8%	23%	35%	21%	8%	1%	0%	0%
3	100	402	76%	0%	1%	2%	8%	24%	43%	17%	4%	1%
4	115	502	97%	0%	0%	0%	1%	3%	16%	39%	32%	9%
5	130	573	100%	0%	0%	0%	0%	0%	2%	9%	34%	55%
Group indicator		**374**	**60%**	**9%**	**8%**	**9%**	**10%**	**10%**	**14%**	**13%**	**14%**	**13%**

Our research has shown that this method provides the most accurate set of group level indicators. However group indicators are extremely sensitive to variations in the number of pupils in the group, and may be very unstable for groups of less than 30 pupils. Group indicators should only ever be taken as a rough guide to the possible future performance of a class.

Relationship between pupil background and CAT scores

The table below shows the means and standard deviations (SD) of the CAT standardised scores for various pupil background factors. This is based on a recent large scale study looking at pupils at the start of secondary schooling. You may find this table useful when comparing the it with CAT scores for you own subgroups.

Table 4: Pupil background and CAT scores

Variable	Value	number pupils	Verbal Reasoning		Quantitative Reasoning		Non Verbal Reasoning	
			mean	SD	mean	SD	mean	SD
Ethnic group	White British	146,340	101.1	*14.3*	100.2	*14.2*	101.3	*14.2*
	White Irish	492	101.3	*14.7*	100.0	*14.1*	99.8	*14.1*
	Traveller Irish	50	84.6	*15.0*	88.2	*12.9*	89.5	*12.2*
	Traveller Gypsy/Roma	110	86.8	*13.2*	87.2	*12.5*	89.6	*12.1*
	White Other groups	2,734	99.1	*16.1*	100.1	*14.5*	101.8	*15.0*
	Mixed White & African	367	100.8	*14.3*	99.6	*13.2*	100.6	*13.4*
	Mixed White & Caribbean	1,589	98.6	*13.7*	97.7	*13.4*	98.1	*13.5*
	Mixed White & Asian	853	103.3	*14.3*	103.0	*14.0*	103.7	*14.8*
	Any other mixed background	1,529	101.5	*14.7*	100.5	*14.5*	101.8	*14.7*
	Indian	3,296	97.4	*12.5*	101.8	*13.6*	100.2	*13.4*
	Pakistani	3,703	90.5	*11.9*	95.4	*13.4*	94.5	*12.8*
	Bangladeshi	1,466	90.6	*12.3*	96.3	*13.4*	97.3	*13.5*
	Any other Asian	865	95.6	*13.8*	101.3	*14.3*	102.0	*14.4*
	Black African	2,197	92.0	*13.8*	94.1	*13.5*	94.1	*12.8*
	Black Caribbean	1,978	93.6	*13.5*	93.9	*13.4*	94.6	*12.9*
	Black Other groups	475	95.0	*13.4*	95.5	*13.5*	95.6	*13.3*
	Chinese	519	100.8	*13.7*	109.6	*13.7*	112.1	*14.5*
	Any other ethnic group	979	93.5	*14.5*	99.9	*14.6*	100.8	*14.7*
	Unclassified	5,076	100.2	*14.4*	99.2	*14.1*	100.5	*14.1*
Gender	boy	86,388	99.4	*14.7*	100.7	*14.9*	100.7	*14.6*
	girl	87,230	101.3	*14.0*	99.2	*13.5*	101.1	*13.7*
Entitled to Free School Meal	No	146,075	102.0	*14.0*	101.2	*14.0*	102.1	*14.0*
	Yes	27,536	91.7	*13.3*	93.2	*13.2*	94.1	*13.1*
Stage of Special Educational Need	no SEN	140,324	103.7	*12.6*	103.0	*13.0*	103.4	*13.4*
	school action	20,708	88.2	*11.7*	88.7	*11.3*	91.5	*12.1*
	school action plus	9,257	83.4	*12.8*	85.4	*11.5*	88.7	*12.2*
	statutory assess/statemented	3,329	80.4	*13.9*	83.1	*12.2*	86.1	*12.1*
English as additional language	Mono-lingual English	160,034	101.0	*14.3*	100.1	*14.2*	101.1	*14.2*
	EAL	13,487	92.7	*13.3*	97.7	*14.1*	97.7	*14.1*
Primary school type	Community	117,162	99.4	*14.4*	99.3	*14.2*	100.3	*14.2*
	Chuch	51,223	102.3	*14.1*	101.3	*14.0*	102.1	*14.1*
	Foundation	5,614	102.0	*14.5*	100.9	*14.5*	102.6	*14.5*
	Special/PRU	113	82.2	*14.0*	83.8	*12.2*	87.5	*12.9*
	Independent	1,268	112.7	*13.2*	109.2	*13.3*	111.2	*13.6*
location	Rural	33,535	103.9	*14.1*	102.0	*14.0*	103.5	*14.1*
	Urban	141,842	99.6	*14.4*	99.5	*14.2*	100.3	*14.2*
IDACI	1 SD below mean	-	95.6	*0.03*	96.4	*0.03*	97.2	*0.03*
	1 SD above mean	-	104.7	*0.03*	103.2	*0.03*	104.2	*0.03*
Grand Total		175,380	100.4	*14.4*	100.0	*14.2*	100.9	*14.2*

IDACI= Income Deprivation Affecting Children Index. Figures in the Standard Deviation (SD) column for IDACI indicate the standard error of estimate associated with the predicted reasoning score when regressed against IDACI.