Criterion Referenced Test (CRT)

CRT Test Design

The MSA Criterion-Referenced Test is composed of *TerraNova* items that are closely aligned with the Maryland content standards, plus custom selected-response (SR) and constructed-response (CR) items written to measure performance on the Maryland content standards. The Mathematics tests in Grades 7 and 8 also contain student-produced-response (SPR) items, sometimes referred to as "gridded response" items. *TerraNova* Form D was administered in Grade 6; *TerraNova* Form C was administered in all other grades.

Table 19 shows the number of items, by item type, in each test form. The column "SR from NRT" in that table shows the number of NRT items that contribute to CRT scores. For the Mathematics tests, Forms A, C, and E contain the same operational items and are designated as Form 1; similarly, Forms B, D (and F in grade 8) contain the same operational items and are designated as Form 2.[3] For Grade 10 Reading, only one form (Form A) was administered in 2005. As can be seen in Table 19, the total number of operational items and score points was the same for all test forms within a grade.

Table 20 shows the number of items by item function (anchor items, common items, unique items, and field test items). Anchor items were used for placing the 2005 scale on the 2004 scale. Common items (which included many, but not necessarily all, of the anchor items) were used for linking alternate forms.

Tables 21 to 27 present the number of items and score points by Maryland content reporting standards. There are five reporting standards for Mathematics across grades, and three standards for Reading. For Grades 3 through 7, the number of items and score points for each reporting standard were identical across forms within each grade. For Grade 8, the two operational forms differed by one point on standard 01 (Algebra, Patterns, and Functions) and standard 06 (Number Relationships and Computation). The actual values shown in Tables 21 to 27 are identical to the target values (shown in Table 1) for Reading and for Grades 3 through 6 Mathematics, and are within one point of all target values for Grades 7 and 8 Mathematics.

[3] The forms designated as operational Form 1 contain the same operational items in the same item positions, and are identical to one another except for the field test items included in Section 5 of each form. This is also true of the forms designated as operational Form 2. Although Forms 1 and 2 are distinct operational forms, they also share some common items.

Table 19
The Number of Items by Item Type

Grade Content	Form	CRT				Total CRT Items	Total CRT Score Points
		SR from NRT	SR	CR	SPR		
MA3	1	11	40	14	-	65	72
	2	11	40	14	-	65	72
MA4	1	10	40	14	-	64	71
	2	10	40	14	-	64	71
MA5	1	13	36	16	-	65	74
	2	13	36	16	-	65	74
MA6	1	5	43	14	-	62	70
	2	5	43	14	-	62	70
MA7	1	6	30	14	12	62	72
	2	6	30	14	12	62	72
MA8	1	11	25	16	12	64	76
	2	11	25	16	12	64	76
RD10	A	34	15	4	-	53	61

- For grades 3 through 7, Form 1 consists of Forms A, C, & E and Form 2 consists of Forms B & D.
- For grade 8, Form 1 consists of Forms A, C, & E and Form 2 consists of Forms B, D, & F.
- For all grades, counts are without field test items.

Table 20
The Number of Items by Function

Content Grade	Form	Total Items*	Anchor Items	Common Items	Unique Items	Field-Test Items
MA3	A	77	32	57	8	12
	B	77	32	57	8	12
	C	83	32	57	8	18
	D	83	32	57	8	18
	E	83	32	57	8	18
MA4	A	76	42	36	28	12
	B	76	45	36	28	12
	C	82	42	36	28	18
	D	82	45	36	28	18
	E	82	42	36	28	18
MA5	A	81	28	55	10	16
	B	81	28	55	10	16
	C	80	28	55	10	15
	D	80	28	55	10	15
	E	80	28	55	10	15
MA6	A	77	40	32	30	15
	B	73	41	32	30	11
	C	73	40	32	30	11
	D	72	41	32	30	10
	E	72	40	32	30	10
MA7	A	83	33	33	29	21
	B	83	33	33	29	21
	C	75	33	33	29	13
	D	73	33	33	29	11
	E	75	33	33	29	13
MA8	A	85	30	31	33	21
	B	80	24	31	33	16
	C	80	30	31	33	16
	D	78	24	31	33	14
	E	82	30	31	33	18
	F	78	24	31	33	14
RD10	A	53	-	-	-	0

- * Total = Common + Unique
- For grades 3 through 7, common items are items that appear both on Form 1 (Forms A, C, & E) and Form 2 (Forms B & D).
- For grade 8, common items are items that appear both on Form 1 (Forms A, C, & E) and Form 2 (Forms B, D, & F).

Table 21
The Number of Items and Score Points by Maryland Content Standard for Grade 3

	Forms A, C & E							Forms B & D						
	NRT	Custom		Total				NRT	Custom		Total			
Standards	SR	SR	CR	Items	%	Points	%	SR	SR	CR	Items	%	Points	%
01	1	11	1	13	20	13	18	1	11	1	13	20	13	18
02/03	4	9	2	15	23	15	21	4	9	2	15	23	15	21
04/05	1	12	1	14	22	14	19	1	12	1	14	22	14	19
06	5	8	3	16	25	16	22	5	8	3	16	25	16	22
07	0	0	7	7	11	14	19	0	0	7	7	11	14	19
Sum	11	40	14	65	100	72	100	11	40	14	65	100	72	100

Table 22
The Number of Items and Score Points by Maryland Content Standard for Grade 4

	Forms A, C & E							Forms B & D						
	NRT	Custom		Total				NRT	Custom		Total			
Standards	SR	SR	CR	Items	%	Points	%	SR	SR	CR	Items	%	Points	%
01	0	13	1	14	22	14	20	0	13	1	14	22	14	20
02/03	2	10	2	14	22	14	20	2	10	2	14	22	14	20
04/05	0	13	2	15	23	15	21	0	13	2	15	23	15	21
06	8	4	2	14	22	14	20	8	4	2	14	22	14	20
07	0	0	7	7	11	14	20	0	0	7	7	11	14	20
Sum	10	40	14	64	100	71	100	10	40	14	64	100	71	100

Table 23
The Number of Items and Score Points by Maryland Content Standard for Grade 5

	Forms A, C & E							Forms B & D						
	NRT	Custom		Total				NRT	Custom		Total			
Standards	SR	SR	CR	Items	%	Points	%	SR	SR	CR	Items	%	Points	%
01	2	11	2	15	23	15	20	2	11	2	15	23	15	20
02/03	4	8	2	14	22	14	19	4	8	2	14	22	14	19
04/05	2	9	2	13	20	13	18	2	9	2	13	20	13	18
06	5	8	2	15	23	15	20	5	8	2	15	23	15	20
07	0	0	8	8	12	17	23	0	0	8	8	12	17	23
Sum	13	36	16	65	100	74	100	13	36	16	65	100	74	100

Table 24
The Number of Items and Score Points by Maryland Content Standard for Grade 6

Standards	Forms A, C & E							Forms B & D						
	NRT	Custom		Total				NRT	Custom		Total			
	SR	SR	CR	Items	%	Points	%	SR	SR	CR	Items	%	Points	%
01	1	11	2	14	23	14	20	1	11	2	14	23	14	20
02/03	1	11	2	14	23	14	20	1	11	2	14	23	14	20
04/05	0	12	1	13	21	13	19	0	12	1	13	21	13	19
06	3	9	2	14	23	14	20	3	9	2	14	23	14	20
07	0	0	7	7	11	15	21	0	0	7	7	11	15	21
Sum	5	43	14	62	100	70	100	5	43	14	62	100	70	100

Table 25
The Number of Items and Score Points by Maryland Content Standard for Grade 7

Standards	Forms A, C & E								Forms B & D							
	NRT	Custom			Total				NRT	Custom			Total			
	SR	SR	CR	GR	Items	%	Points	%	SR	SR	CR	GR	Items	%	Points	%
01	0	9	2	3	14	23	14	19	0	9	2	3	14	23	14	19
02/03	1	7	2	3	13	21	13	18	1	7	2	3	13	21	13	18
04/05	0	8	3	3	14	23	14	19	0	8	3	3	14	23	14	19
06	5	6	0	3	14	23	14	19	5	6	0	3	14	23	14	19
07	0	0	7	0	7	11	17	24	0	0	7	0	7	11	17	24
Sum	6	30	14	12	62	100	72	100	6	30	14	12	62	100	72	100

Table 26
The Number of Items and Score Points by Maryland Content Standard for Grade 8

Standards	Form A, C & E								Form B & D							
	NRT	Custom			Total				NRT	Custom			Total			
	SR	SR	CR	GR	Items	%	Points	%	SR	SR	CR	GR	Items	%	Points	%
01	2	5	3	4	14	22	14	18	2	6	3	4	15	23	15	20
02/03	2	6	2	2	12	19	12	16	2	5	2	3	12	19	12	16
04/05	1	7	3	4	15	23	15	20	1	8	3	3	15	23	15	20
06	6	7	0	2	15	23	15	20	6	6	0	2	14	22	14	18
07	0	0	8	0	8	13	20	26	0	0	8	0	8	13	20	26
Sum	11	25	16	12	64	100	76	100	11	25	16	12	64	100	76	100

Table 27
The Number of Items and Score Points by Maryland Content Standard for Grade 10

Standards	Form A						
	NRT	Custom		Total			
	SR	SR	CR	Items	%	Points	%
01	13	3	0	16	30	16	26
02	10	6	2	18	34	22	36
03	11	6	2	19	36	23	38
Sum	34	15	4	53	100	61	100

Classical Item Analysis

Tables A1- A30 of Appendix A present item-level descriptive statistics for each of the test forms. These tables contain the following information: item function (common or unique), item type (SR, CR, or SPR), item *p*-value (P_VAL), item correlation with the total test score (R_ITT), and correlation between each item choice and the total test score (P_BIS1, etc.). The *p*-value for an SR item represents the proportion of students who answered the item correctly. The *p*-value for a CR item represents the mean raw score for the item divided by the number of points possible for the item. A point-biserial correlation between the item score and the total score on the test was also computed for the SR items. For the CR items, a Pearson product-moment correlation between the item score and the total score on the test was computed. For the item analysis, the studied item was excluded from the computation of the total score so as to not inflate the correlation artificially. This effect would be most noticeable for CR items worth several points. For the correct answer choice, the correlation between item choice and total score is the same as the point-biserial correlation of the item. A similar formula was applied to compute the correlation between each distracter and the total score. In general, negative correlations are expected for all distracters when an item is good.

Note that items were evaluated using the following criteria: a *p*-value below 0.30 for SR items and 0.20 for CR and SPR items, and a point-biserial below 0.15. Items flagged for any of these criteria were referred to CTB's content specialists for further review to ensure that each item was measuring the intended construct(s), that the scoring key or scoring rubric was correct, and (for multiple-choice items) that there was one and only one correct answer to the item.

Rater Agreement

All CR items were scored by at least two raters. If the scores assigned by the raters differed by one point, the student received the higher of the two scores. Discrepancies of more than one point were resolved by a third expert rater.

Rater agreement was assessed using only the scores assigned by the first two raters. Indices of rater agreement and consistency were obtained using the scores from the first two raters. Appendix tables B1-B7 present rater agreement statistics for the CR items across all grades. These tables provide the percentages of pairs of raters' scores that did not differ (i.e., perfect agreement) and the percentages of pairs of raters' scores that differed by one point (i.e., adjacent agreement) for all CR items over all test forms.

When rater agreement was defined as the percentage of same scores plus adjacent scores, rater agreement across all grade levels ranged from 97.7% to 100% for Mathematics items and from 98.9% to 99.3% for Reading items. The percentage of perfect agreement (i.e., identical scores assigned by rater 1 and rater 2) ranged from 74.2% to 99.7% in Grade 3, from 74.5% to 99.2% in Grade 4, from 77.6% to 99.7% in Grade 5, from 76.5% to 99.6% in Grade 6, from 74.8% to 99.7% in Grade 7, from 82.5% to 99.5% in Grade 8, and from 63.5% to 70.9% in Grade 10.

Note that each CR item for Mathematics consists of two parts, A and B. Because Part A is dichotomously scored (1 point for a correct response), the percentage of perfect agreement for part A was usually higher than for part B, ranging from 94.7% to 99.7% in Grade 3, 94.0% to 99.2% in Grade 4, 93.4% to 99.7% in Grade 5, 97.2% to 99.6% in Grade 6, 93.9% to 99.7% in Grade 7 and 86.8 to 99.5% in Grade 8.

In addition to the percentage of agreement, the tables present the mean item score and item standard deviation of the item scores assigned by each rater group. The mean score points awarded by the two rater groups are very close. The product moment correlations between first and second ratings are also included in these tables.

Appendix Tables B8-B16 show the distributions of scores on the CR items. In these tables, ITEMNO represents item number in test book. "Omit" denotes the number of student cases that did not respond to the item. Code B is an answer that cannot be scored. Each number, 0, 1, 2, 3, represents a score of 0, 1, 2, and 3, respectively. "%_omit" represents the percent of omits. Note that parts A and B of the Mathematics items were treated as independent items and were separately scored.

Differential Item Functioning (DIF)

An item flagged for differential item functioning (DIF) is more difficult for a particular group of students than would be expected based on their total test scores, compared to the performance of the other group. The groups compared in the DIF analyses were female and male students, and African–American, Hispanic, and white students. Male and white were reference groups.

The statistical procedures used by CTB to identify items thought to exhibit substantial DIF are the same procedures used by the Educational Testing Service (ETS) and the National Assessment of Educational Progress (NAEP). For SR items, the Mantel-Haenszel (χ^2_{MH}) statistic was used to evaluate potential DIF items. In this procedure, the "C" - level DIF items are flagged, where a "C" item indicates a large amount of DIF and has an absolute value of the Mantel-Haenszel (Δ_{MH}) that is significantly greater than zero (at the .05 level) and $|\Delta_{MH}|$ exceeds 1.5. Also, the "B" - level DIF items are flagged, where a "B" item indicates DIF and has an absolute value of the Mantel-Haenszel (Δ_{MH}) that is significantly greater than zero (at the .05 level) and $-1.5 \le \Delta_{MH} \le -1$ or $1 \le \Delta_{MH} \le 1.5$ (Zwick, Donoghue, & Grima, 1993).

For the CR items, an effect size (ES) statistic based on Mantel χ^2 was used. ES is obtained by dividing the standardized mean difference (SMD) statistics by the standard deviation of the item. A detailed description of these procedures can be found in Zwick, et al., (1993).

Tentative flagging criteria followed the same rules as are used in NAEP:
BB: If the Mantel statistic is significant ($p < .05$) and the |ES| is between 0.17 and 0.25
CC: If the Mantel statistic is significant ($p < .05$) and the $|ES| \ge 0.25$

Appendix tables C1-C7 show items flagged based on the above criteria. In the column "Focal", for those items flagged for ethnicity, the number 2 represents African American and the number 4 represents Hispanic. Positive values in the "DIF" column mean that the item favors the focal group, while negative values imply that the item disadvantages the focal group.

Item Fit Assessment

Item fit was assessed using the *Q1* statistic described by Yen (1984). *Q1* is a Pearson chi-square statistic,

$$Q1_j = \sum_{i=1}^{I} \frac{N_{ji}(O_{ji} - E_{ji})^2}{E_{ji}} + \sum_{i=1}^{I} \frac{N_{ji}[(1 - O_{ji}) - (1 - E_{ji})]^2}{1 - E_{ji}}$$

where N_{ji} is the number of examinees in cell *i* for item *j*, and O_{ji} and E_{ji} are the observed and expected proportion of examinees in in cell *i* obtaining the maximum possible score on item *j*.

Because *Q1* is influenced by sample size and by the number of possible score points for an item, this statistic was transformed to a Z-statistic,

$$Z_j = \frac{(Q_{1j} - DF_j)}{\sqrt{2DF_j}}$$

where Q_{1j} is the item chi-square statistic defined above,

j is an item, and

DF is the degrees of freedom for a given item *j*.

The *Z*-statistic is an index of the degree to which obtained proportions of students with each item score are close to the proportions that would be predicted by the estimated student ability and item parameters. These values, along with the associated chi-squares (Q_1) are computed for ten intervals corresponding to deciles of the ability distribution. Because the expected value of Z increases as the sample size increases, critical values for *Z* were established using the following equation (Yen, 1991a):

$$Z_{crit,j} = \frac{4N_j}{1500}$$

where $Z_{crit,j}$ is critical value of *Z* for item *j* and

N_j is the number of students who responded to item *j*.

In the 2005 calibration of the Mathematics items, several items exhibited moderate misfit. Across all operational test forms, one misfitting item was identified at Grade 3, three items at Grade 4, two at Grade 5, two at Grade 6, six at Grade 7, and seven at Grade 8. The figures in Appendix D show the estimated and observed item characteristic curves (ICC's) of these items. No items were dropped from scoring because of model misfit.

Calibration and Equating

IRT Model

Student item responses were calibrated using the combination of two IRT models. The three-parameter logistic model (3PL) was used to scale the SR items, and the two-parameter partial credit (2PPC) model was employed to scale the CR items. A brief explanation of the models is provided below.

Two types of IRT models have most commonly been used to scale large-scale education assessments containing mixed item types or formats. For SR items, the 3PL model has been employed. The 3PL model (Lord & Novick, 1968; Lord, 1980) defines a SR item in terms of three item parameters: item difficulty or location, item discrimination, and probability of a student with very low ability answering the item correctly (guessing parameter). In this model, the probability that a student with scale score θ responds correctly to item j is

$$p_j(\theta) = c_j + \frac{(1 - c_j)}{1 + \exp[-1.7a_j(\theta - b_j)]},$$

where a_j is the item discrimination, b_j is the item difficulty, and c_j is the probability of a correct response by a very low-scoring student.

The 2PPC model defines a CR item in terms of item discrimination as well as location parameter for each score point. The 2PPC model is a special case of Bock's (1972) nominal model. Bock's model states that the probability of an examinee with ability θ having a score at the kth level of the jth item is

$$P_{jk}(\theta) = P(x_j = k - 1|\theta) = \frac{\exp Z_{jk}}{\sum_{i=1}^{m_j} \exp Z_{ji}}, k = 1,..., m_{j,}$$

where m_j is the number of score levels, and

$Z_{jk} = A_{jk}\theta + C_{jk}$,

$A_{jk} = \alpha_j(k-1)$, $k = 1, 2, \ldots m_j$, and

$C_{jk} = -\sum_{i=0}^{k-1} \gamma_{ji}$, where $\gamma_{j0} = 0$,

where A_{jk} is the discrimination parameter of the kth category of item j, C_{jk} is the intercept parameter of the nonlinear response function associated with the kth category of item j, α_j and γ_{ji} are the parameters to be estimated from the data.

For each item there are $m_j - 1$ independent γ_{ji} parameters and one α_j parameter; a total of m_j independent item parameters are estimated.

Calibration and Equating Procedure

In this report, **common items** indicate items that appear across all alternate forms and are used for Form-to-Form equating. **Anchor items** indicate items used for Year-to-Year equating. Most anchor items are common items. No constructed response (CR) items or student-produced response (SPR) items were used as anchor items. As in previous years, each Mathematics CR item is composed of two parts, A and B. Each part is considered one item.

The following procedures were applied to calibrate and equate the 2005 MSA CRT items:

Calibration and Form-to-Form equating

Only items that contribute to the CRT score were calibrated. The following two steps were applied for Form-to-Form equating.

Step 1: Stability of equating items was checked using following the procedure.

(1) Each of the two operational forms for each grade was separately calibrated. Plots of the Form 1 vs. Form 2 item parameters (*a* parameters (using log of *a*) and *b* parameters) were produced. These plots were examined to identify items that were not behaving consistently across forms. For the 2005 assessments, there were no items with inconsistent parameters across the two forms.

Step 2: Thus, all of the shared items were treated as common items for purposes of calibration and equating, and the two alternate Forms 1 and 2 at each grade level were calibrated together.

Year-to-Year Equating

The following two steps were applied for Year-to-Year equating.

Step 1: Stability of anchor items was checked using the following procedure.

(1) Item parameters for the 2005 test forms were transformed to the MSA CRT reporting scale using the test characteristic curve procedure suggested by Stocking and Lord (1983).
(2) The original *a* and *b* parameters of the anchor items were plotted against the recalibrated parameters from the 2005 calibration. Item p-values were also plotted.

Step 2: Results were evaluated to determine whether or not all of the anchor items were stable enough across years to use for year-to-year equating. For the 2005 tests, all of the anchor items were judged to be sufficiently stable, an all were used as equating anchors. Item parameters for the 2005 tests were transformed to the MSA CRT reporting scale using these anchor items and Stocking and Lord's transformation procedure.

Calibration and Equating Results

Stability of common items was checked using the method described above in Step 1 of the Form-to-Form equating procedures. Figures F1-F6 in Appendix F show the alignment of "a" parameters (using the log of a) and the alignment of "b" parameters. Note that only selected response (SR) items were used for common items. Based on these plots, all items were judged to be sufficiently stable to serve as common items for calibration and equating purposes.

Figures F7-F24 show the item parameters and p-values by grade and test form. Figures F25-F30 show test characteristic curves (TCC) and standard errors of measurement (SEM) curves based on the final item parameters. TCCs and SEMs for alternate forms were similar across all grades.

Distribution of the Maryland Score Scale

Table 28 presents the lowest obtainable scale scores (LOSS) and the highest obtainable scale scores (HOSS). For the 2005 assessments, MSDE requested that the previous grade-specific LOSS and HOSS values be reset to a common LOSS of 240 and HOSS of 650 across all grades.

Table 28
LOSS and HOSS

Grade	LOSS	HOSS
MA3	240	650
MA4	240	650
MA5	240	650
MA6	240	650
MA7	240	650
MA8	240	650
RD10	240	650

The 2005 item parameters were placed on the MSA CRT reporting scale using previously calibrated items from the 2003 and 2004 tests as anchors in a Stocking and Lord test-characteristic curve equating procedure (Stocking & Lord, 1983). Student scores were computed using IRT pattern scoring with the transformed parameters. As shown in Table 29, and 30, distributions of raw scores and scale scores were similar across forms, except at Grade 7, where raw scores were more than 4 points higher on Form 2 than on Form 1. Due to relatively long test lengths for every grade, reliability (Cronbach's alpha) was high for all grades. Reliability coefficients ranged from 0.92 to 0.96 across grades.

Tables 31 and 32 show the scale score statistics (means and standard deviations) for ethnic and gender subgroups on each test form. Across grades, white students generally performed better than African American and Hispanic students. The scale score differences ranged from about 30 to 40 scale score points. Female students performed slightly better than male students across all grades. The largest difference between male and female students was on the Grade 10 Reading test, with female students scoring more than 14 points higher than male students.

Figures G1-G21 in Appendix G show histograms for the distribution of scale scores for the total population and for subgroups defined by ethnicity and gender.

Table 29
CRT Raw Score Descriptive Statistics

Grade Content	Form	N Count	Mean	Mean P-Value	SD	Min	Max	Alpha	SEM
MA3	1	36935	54.03	0.75	11.96	0	72	0.93	3.20
	2	24574	52.93	0.74	11.32	0	72	0.92	3.20
	Total	61509	53.59	0.74	11.72	0	72	.	.
MA4	1	38004	43.63	0.61	14.22	0	71	0.94	3.51
	2	25326	43.88	0.62	14.06	0	71	0.94	3.45
	Total	63330	43.73	0.62	14.16	0	71	.	.
MA5	1	39109	43.83	0.59	15.49	0	74	0.94	3.68
	2	26014	45.23	0.61	15.03	0	74	0.94	3.76
	Total	65123	44.39	0.60	15.32	0	74	.	.
MA6	1	39509	37.12	0.53	15.27	0	70	0.94	3.63
	2	26337	37.07	0.53	14.73	0	70	0.94	3.62
	Total	65846	37.10	0.53	15.05	0	70	.	.
MA7	1	40930	32.95	0.46	16.44	0	71	0.96	3.43
	2	27200	37.09	0.52	17.89	0	72	0.96	3.59
	Total	68130	34.60	0.48	17.16	0	72	.	.
MA8	1	34478	35.42	0.47	17.20	0	76	0.95	3.78
	2	34218	33.91	0.45	16.66	0	76	0.95	3.75
	Total	68696	34.67	0.46	16.95	0	76	.	.
RD10	A	6934	36.05	0.59	12.50	0	60	0.93	3.41

Table 30
CRT Scale Score Descriptive Statistics

Grade Content	Form	N Count	Mean	SD	MIN	MAX
MA3	1	36935	411.05	48.39	240	650
	2	24574	410.89	46.59	240	650
	Total	61509	410.99	47.68	240	650
MA4	1	38004	403.75	46.33	240	650
	2	25326	404.19	44.07	240	650
	Total	63330	403.93	45.44	240	650
MA5	1	39109	411.25	45.68	240	650
	2	26014	411.16	45.38	240	650
	Total	65123	411.22	45.56	240	650
MA6	1	39509	402.62	46.97	240	650
	2	26337	401.20	46.44	240	650
	Total	65846	402.05	46.76	240	650
MA7	1	40930	397.54	51.67	240	564
	2	27200	398.10	50.10	240	650
	Total	68130	397.76	51.05	240	650
MA8	1	34478	404.99	46.65	240	650
	2	34218	405.23	45.94	240	650
	Total	68696	405.11	46.30	240	650
RD10	A	6934	387.49	49.08	240	561

Table 31
CRT Scale Score Descriptive Statistics by Ethnicity

Grade Content	Test Form	White					African American					Hispanic				
		N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
MA3	1	18262	425.12	45.88	240	650	13765	391.30	43.61	240	650	2847	397.47	42.77	240	650
	2	11959	424.78	43.80	240	650	9198	392.42	43.47	240	650	1995	396.71	41.47	240	650
	Total	30221	424.99	45.06	240	650	22963	391.75	43.56	240	650	4842	397.16	42.23	240	650
MA4	1	18709	418.35	42.04	240	650	14397	383.16	43.41	240	650	2770	391.84	43.47	240	540
	2	12421	417.90	38.56	240	650	9633	385.70	42.84	240	531	1890	391.27	45.06	240	534
	Total	31130	418.17	40.69	240	650	24030	384.18	43.20	240	650	4660	391.61	44.11	240	540
MA5	1	18956	426.37	41.40	240	650	15306	390.88	41.83	240	650	2717	397.84	44.30	240	650
	2	12680	425.29	41.66	240	650	10099	392.79	41.43	240	535	1884	394.47	45.92	240	541
	Total	31636	425.94	41.51	240	650	25405	391.64	41.68	240	650	4601	396.46	45.00	240	650
MA6	1	19201	417.26	41.42	240	650	15665	383.36	45.74	240	650	2602	389.47	44.51	240	509
	2	12709	415.31	40.77	240	650	10486	382.53	45.97	240	650	1763	389.56	43.94	240	497
	Total	31910	416.48	41.17	240	650	26151	383.03	45.84	240	650	4365	389.51	44.27	240	509
MA7	1	20220	415.60	44.53	240	564	16096	372.60	49.66	240	523	2552	385.14	46.86	240	510
	2	13308	417.02	42.23	240	650	10735	372.63	47.48	240	518	1752	386.08	48.65	240	543
	Total	33528	416.16	43.63	240	650	26831	372.61	48.80	240	523	4304	385.52	47.60	240	543
MA8	1	17261	420.00	40.34	240	650	13337	383.01	45.60	240	510	2162	395.56	41.10	240	536
	2	17228	420.36	39.21	240	650	13144	383.91	45.03	240	526	2091	391.25	45.19	240	542
	Total	34489	420.18	39.78	240	650	26481	383.46	45.32	240	526	4253	393.44	43.21	240	542
RD10	A	5248	396.28	45.85	240	561	1420	355.15	47.14	240	480	158	377.30	47.02	240	469

Table 32
CRT Scale Score Descriptive Statistics by Gender

Grade Content	Test Form	Male					Female				
		N	Mean	SD	MIN	MAX	N	Mean	SD	MIN	MAX
MA3	1	18938	409.82	49.46	240	650	17992	412.38	47.15	240	650
	2	12449	409.88	47.85	240	650	12123	411.92	45.25	240	650
	Total	31387	409.84	48.83	240	650	30115	412.20	46.40	240	650
MA4	1	19480	402.51	47.68	240	650	18520	405.06	44.81	240	650
	2	12969	403.07	45.62	240	650	12353	405.40	42.33	240	650
	Total	32449	402.73	46.87	240	650	30873	405.20	43.84	240	650
MA5	1	20293	410.35	47.87	240	650	18813	412.23	43.16	240	650
	2	13323	410.91	47.13	240	650	12688	411.42	43.47	240	650
	Total	33616	410.57	47.58	240	650	31501	411.90	43.29	240	650
MA6	1	20329	400.67	49.48	240	650	19164	404.80	43.87	240	650
	2	13526	398.72	49.38	240	650	12805	403.88	42.85	240	650
	Total	33855	399.89	49.45	240	650	31969	404.43	43.47	240	650
MA7	1	21118	394.22	54.90	240	562	19798	401.18	47.61	240	564
	2	14008	395.93	53.54	240	650	13185	400.46	45.97	240	650
	Total	35126	394.90	54.37	240	650	32983	400.89	46.96	240	650
MA8	1	17605	401.72	50.04	240	650	16872	408.41	42.56	240	650
	2	17458	402.17	49.11	240	650	16754	408.44	42.12	240	549
	Total	35063	401.95	49.58	240	650	33626	408.42	42.34	240	650
RD10	A	3526	380.56	51.11	240	537	3408	394.66	45.80	240	561

The Relationship between NRT and CRT

Each of the 2005 MSA tests included both NRT and CRT items. Even though the specific content standards for the NRT and CRT assessments are somewhat different, the two tests are designed to measure similar knowledge, skills, and abilities. To examine how much these two tests measure the same performance, the correlation between scale scores on the NRT and scale scores on the CRT were produced and are presented in Table 33. The correlation was relatively high and similar across alternate forms within grade. The correlations ranged from 0.80 to 0.86 in Mathematics. Reading NRT scores were not computed in 2005.

Table 33
Correlation between NRT and CRT

CRT Form	Content/Grade					
	MA3	MA4	MA5	MA6	MA7	MA8
Total	0.81	0.84	0.86	0.82	0.82	0.83
1	0.80	0.84	0.86	0.82	0.81	0.83
2	0.81	0.83	0.86	0.82	0.82	0.82

The Score Distributions and Correlations of Content Standards

Scale scores based on total test performance were reported to students, schools, and LEAs. Scale scores based on content standards were reported only to MSDE. These content-standard scale scores were estimated using a maximum-likelihood IRT pattern scoring procedure with item parameters estimated from performance on the total test form. Tables 34 and 35 show the raw score and scale score results for each content standard.

Tables 36 and 37 show the raw score Pearson product-moment and Spearman Rho correlations among the content standards at each grade level. Tables 38 and 39 show the scale score Pearson product-moment and Spearman Rho correlations among the content standards at each grade level. At every grade level, the Pearson raw score correlations are higher than the scale score correlations. This result is to be expected, given the differences between the raw score and scale score distributions.[4] Because of the properties of the scale score distributions, a nonparametric correlation procedure such as the Spearman Rho is more appropriate than the Pearson product-moment correlation. Indeed, when the Spearman Rho scale score correlations are compared with either the Pearson or Spearman Rho raw score correlations, the differences are negligible.

[4] Because a perfect raw score on any of the content standards is assigned the highest obtainable scale score on the total test, regardless of the difficulty or number of items included in the content standard, there tend to be very large gaps between the HOSS and the penultimate scale score. In addition, the scale score distributions differ substantially from one content standard to another. Given these distributions, a nonparametric correlation procedure such as the Spearman Rho seems more appropriate than the Pearson product-moment correlation.

Table 34
Distribution of Raw Scores on Content Standards

Grade	Form	Content Standard	N	Maximum Possible	Mean	SD	Minimum	Maximum
3	1	1	36935	13	9.73	2.38	0	13
		2&3	36935	15	12.00	2.59	0	15
		4&5	36935	14	10.72	2.59	0	14
		6	36935	16	12.95	2.91	0	16
		7	36935	14	8.63	3.27	0	14
	2	1	24574	13	9.81	2.29	0	13
		2&3	24574	15	11.80	2.50	0	15
		4&5	24574	14	10.75	2.55	0	14
		6	24574	16	12.76	2.83	0	16
		7	24574	14	7.81	3.03	0	14
4	1	1	38004	14	10.11	2.94	0	14
		2&3	38004	14	8.54	3.14	0	14
		4&5	38004	15	8.95	3.79	0	15
		6	38004	14	10.14	2.82	0	14
		7	38004	14	5.89	3.51	0	14
	2	1	25326	14	9.95	2.91	0	14
		2&3	25326	14	8.18	3.12	0	14
		4&5	25326	15	9.66	3.82	0	15
		6	25326	14	10.57	2.69	0	14
		7	25326	14	5.53	3.39	0	14
5	1	1	39109	15	9.31	3.29	0	15
		2&3	39109	14	7.50	3.15	0	14
		4&5	39109	13	8.93	3.08	0	13
		6	39109	15	9.49	3.50	0	15
		7	39109	17	8.61	4.22	0	17
	2	1	26014	15	9.29	3.34	0	15
		2&3	26014	14	7.98	2.97	0	14
		4&5	26014	13	8.86	2.99	0	13
		6	26014	15	9.91	3.25	0	15
		7	26014	17	9.19	4.39	0	17

Table 34 (cont.)
Distribution of Raw Scores on Content Standards

Grade	Form	Content Standard	N	Maximum Possible	Mean	SD	Minimum	Maximum
6	1	1	39509	14	7.84	3.41	0	14
		2&3	39509	14	7.37	3.35	0	14
		4&5	39509	13	7.84	3.07	0	13
		6	39509	14	7.27	3.36	0	14
		7	39509	15	6.78	3.85	0	15
	2	1	26337	14	7.66	3.21	0	14
		2&3	26337	14	7.48	3.14	0	14
		4&5	26337	13	7.25	3.01	0	13
		6	26337	14	7.67	3.48	0	14
		7	26337	15	7.01	3.78	0	15
7	1	1	40930	14	6.48	3.66	0	14
		2&3	40930	13	5.55	3.50	0	13
		4&5	40930	14	7.32	3.75	0	14
		6	40930	14	7.13	3.67	0	14
		7	40930	17	6.46	3.46	0	17
	2	1	27200	14	6.90	3.78	0	14
		2&3	27200	13	6.56	3.78	0	13
		4&5	27200	14	7.80	3.79	0	14
		6	27200	14	8.30	3.74	0	14
		7	27200	17	7.52	4.37	0	17
8	1	1	34478	14	7.02	3.67	0	14
		2&3	34478	12	5.97	3.08	0	12
		4&5	34478	15	7.39	3.41	0	15
		6	34478	15	6.91	3.62	0	15
		7	34478	20	8.14	5.16	0	20
	2	1	34218	15	7.08	3.85	0	15
		2&3	34218	12	5.00	2.92	0	12
		4&5	34218	15	7.86	3.32	0	15
		6	34218	14	6.46	3.49	0	14
		7	34218	20	7.51	4.85	0	20
10	1	1	6934	16	10.51	3.56	0	16
		2	6934	22	12.64	4.94	0	22
		3	6934	23	12.90	4.93	0	23

Table 35
Distribution of Scale Scores on Content Standards

Grade	Form	Content Standard	N	Maximum Possible	Mean	SD	Minimum	Maximum
3	1	1	36935	650	427.80	86.58	240	650
		2&3	36935	650	438.93	102.67	240	650
		4&5	36935	650	430.75	90.23	240	650
		6	36935	650	444.01	106.32	240	650
		7	36935	650	414.75	68.49	240	650
	2	1	24574	650	427.18	86.31	240	650
		2&3	24574	650	434.71	94.77	240	650
		4&5	24574	650	430.57	89.03	240	650
		6	24574	650	435.84	95.44	240	650
		7	24574	650	411.29	60.39	240	650
4	1	1	38004	650	421.35	87.48	240	650
		2&3	38004	650	408.69	72.80	240	650
		4&5	38004	650	409.66	75.62	240	650
		6	38004	650	421.49	89.67	240	650
		7	38004	650	400.46	62.21	240	650
	2	1	25326	650	422.29	85.58	240	650
		2&3	25326	650	407.44	64.50	240	650
		4&5	25326	650	416.43	82.30	240	650
		6	25326	650	426.62	93.30	240	650
		7	25326	650	397.59	58.04	240	650
5	1	1	39109	650	413.95	65.81	240	650
		2&3	39109	650	408.29	70.99	240	650
		4&5	39109	650	428.10	90.83	240	650
		6	39109	650	416.65	70.74	240	650
		7	39109	650	411.22	52.32	240	650
	2	1	26014	650	414.01	65.44	240	650
		2&3	26014	650	411.91	65.93	240	650
		4&5	26014	650	425.00	85.29	240	650
		6	26014	650	418.09	70.84	240	650
		7	26014	650	412.33	59.39	240	650

Table 35 (cont.)
Distribution of Scale Scores on Content Standards

Grade	Form	Content Standard	N	Maximum Possible	Mean	SD	Minimum	Maximum
6	1	1	39509	650	405.75	70.92	240	650
		2&3	39509	650	399.10	76.60	240	650
		4&5	39509	650	408.60	73.34	240	650
		6	39509	650	396.27	77.74	240	650
		7	39509	650	401.49	58.33	240	650
	2	1	26337	650	401.41	63.80	240	650
		2&3	26337	650	402.80	68.95	240	650
		4&5	26337	650	400.41	69.95	240	650
		6	26337	650	400.88	76.50	240	650
		7	26337	650	399.02	57.12	240	650
7	1	1	40930	650	390.51	81.31	240	650
		2&3	40930	650	389.46	82.66	240	650
		4&5	40930	650	398.29	72.94	240	650
		6	40930	650	402.81	77.97	240	650
		7	40930	650	395.01	54.70	240	650
	2	1	27200	650	395.47	83.12	240	650
		2&3	27200	650	398.49	87.99	240	650
		4&5	27200	650	402.42	76.97	240	650
		6	27200	650	411.44	87.72	240	650
		7	27200	650	393.70	57.18	240	650
8	1	1	34478	650	408.79	73.08	240	650
		2&3	34478	650	408.89	75.23	240	650
		4&5	34478	650	403.61	59.61	240	650
		6	34478	650	391.12	82.44	240	650
		7	34478	650	401.52	53.71	240	650
	2	1	34218	650	405.32	66.52	240	650
		2&3	34218	650	402.22	68.22	240	650
		4&5	34218	650	404.95	57.56	240	650
		6	34218	650	393.64	84.93	240	650
		7	34218	650	400.18	54.94	240	650
10	1	1	6934	650	398.31	70.85	240	650
		2	6934	650	385.88	58.81	240	650
		3	6934	650	387.22	57.35	240	650

Table 36
Raw Score Correlations (Pearson Product-Moment) between Content Standards

Mathematics

Grade	Content Standard	Mean	SD	1	2&3	4&5	6	7
3	1	9.76	2.34	1.00	0.68	0.71	0.72	0.62
	2&3	11.92	2.56		1.00	0.70	0.71	0.64
	4&5	10.73	2.57			1.00	0.74	0.66
	6	12.88	2.88				1.00	0.67
	7	8.30	3.20					1.00
4	1	10.04	2.93	1.00	0.70	0.73	0.71	0.71
	2&3	8.40	3.14		1.00	0.72	0.67	0.72
	4&5	9.23	3.82			1.00	0.71	0.74
	6	10.31	2.77				1.00	0.68
	7	5.75	3.47					1.00
5	1	9.30	3.31	1.00	0.71	0.74	0.76	0.79
	2&3	7.69	3.09		1.00	0.70	0.70	0.73
	4&5	8.90	3.05			1.00	0.75	0.76
	6	9.66	3.41				1.00	0.78
	7	8.84	4.30					1.00
6	1	7.77	3.33	1.00	0.73	0.73	0.75	0.80
	2&3	7.41	3.27		1.00	0.68	0.73	0.77
	4&5	7.61	3.06			1.00	0.71	0.72
	6	7.43	3.41				1.00	0.77
	7	6.87	3.83					1.00
7	1	6.65	3.71	1.00	0.78	0.78	0.81	0.80
	2&3	5.96	3.65		1.00	0.76	0.79	0.81
	4&5	7.51	3.77			1.00	0.79	0.83
	6	7.60	3.74				1.00	0.79
	7	6.88	3.89					1.00
8	1	7.05	3.76	1.00	0.73	0.76	0.78	0.85
	2&3	5.49	3.04		1.00	0.69	0.72	0.79
	4&5	7.62	3.38			1.00	0.72	0.79
	6	6.69	3.56				1.00	0.77
	7	7.82	5.02					1.00

Reading

Grade	Content Standard	Mean	SD	1	2	3
10	1	10.51	3.56	1.00	0.78	0.79
	2	12.64	4.94	0.78	1.00	0.82
	3	12.90	4.93	0.79	0.82	1.00

Table 37
Raw Score Correlations (Spearman Rho) between Content Standards

Mathematics

Grade	Content Standard	Mean	SD	1	2&3	4&5	6	7
3	1	9.76	2.34	1.00	0.64	0.67	0.67	0.60
	2&3	11.92	2.56		1.00	0.66	0.66	0.62
	4&5	10.73	2.57			1.00	0.69	0.64
	6	12.88	2.88				1.00	0.65
	7	8.30	3.20					1.00
4	1	10.04	2.93	1.00	0.70	0.73	0.70	0.73
	2&3	8.40	3.14		1.00	0.72	0.67	0.73
	4&5	9.23	3.82			1.00	0.71	0.75
	6	10.31	2.77				1.00	0.70
	7	5.75	3.47					1.00
5	1	9.30	3.31	1.00	0.72	0.75	0.76	0.79
	2&3	7.69	3.09		1.00	0.71	0.71	0.74
	4&5	8.90	3.05			1.00	0.74	0.76
	6	9.66	3.41				1.00	0.79
	7	8.84	4.30					1.00
6	1	7.77	3.33	1.00	0.73	0.73	0.75	0.80
	2&3	7.41	3.27		1.00	0.68	0.72	0.77
	4&5	7.61	3.06			1.00	0.71	0.72
	6	7.43	3.41				1.00	0.77
	7	6.87	3.83					1.00
7	1	6.65	3.71	1.00	0.77	0.79	0.80	0.80
	2&3	5.96	3.65		1.00	0.77	0.79	0.81
	4&5	7.51	3.77			1.00	0.79	0.84
	6	7.60	3.74				1.00	0.79
	7	6.88	3.89					1.00
8	1	7.05	3.76	1.00	0.71	0.76	0.76	0.85
	2&3	5.49	3.04		1.00	0.68	0.70	0.77
	4&5	7.62	3.38			1.00	0.71	0.79
	6	6.69	3.56				1.00	0.76
	7	7.82	5.02					1.00

Reading

Grade	Content Standard	Mean	SD	1	2	3
10	1	10.51	3.56	1.000	0.768	0.778
	2	12.64	4.94		1.000	0.815
	3	12.90	4.93			1.000

Table 38
Scale Score Correlations (Pearson Product-Moment) between Content Standards

Mathematics

Grade	Content Standard	Mean	SD	1	2&3	4&5	6	7
3	1	427.55	86.48	1.00	0.54	0.55	0.52	0.53
	2&3	437.25	99.61		1.00	0.52	0.51	0.52
	4&5	430.68	89.75			1.00	0.52	0.53
	6	440.75	102.19				1.00	0.53
	7	413.36	65.40					1.00
4	1	421.73	86.73	1.00	0.57	0.56	0.55	0.60
	2&3	408.19	69.60		1.00	0.59	0.57	0.65
	4&5	412.37	78.43			1.00	0.55	0.64
	6	423.54	91.18				1.00	0.60
	7	399.32	60.59					1.00
5	1	413.98	65.66	1.00	0.64	0.62	0.65	0.71
	2&3	409.74	69.04		1.00	0.59	0.61	0.67
	4&5	426.86	88.67			1.00	0.60	0.64
	6	417.22	70.79				1.00	0.68
	7	411.66	55.26					1.00
6	1	404.02	68.19	1.00	0.61	0.64	0.62	0.70
	2&3	400.58	73.66		1.00	0.60	0.59	0.67
	4&5	405.32	72.12			1.00	0.60	0.66
	6	398.11	77.28				1.00	0.65
	7	400.50	57.86					1.00
7	1	392.49	82.07	1.00	0.66	0.67	0.66	0.71
	2&3	393.07	84.95		1.00	0.66	0.64	0.72
	4&5	399.94	74.60			1.00	0.66	0.76
	6	406.26	82.11				1.00	0.67
	7	394.49	55.71					1.00
8	1	407.06	69.91	1.00	0.65	0.69	0.61	0.73
	2&3	405.57	71.90		1.00	0.65	0.58	0.67
	4&5	404.28	58.61			1.00	0.61	0.76
	6	392.38	83.70				1.00	0.61
	7	400.85	54.33					1.00

Reading

Grade	Content Standard	Mean	SD	1	2	3
10	1	398.31	70.85	1.00	0.65	0.66
	2	385.88	58.81		1.00	0.78
	3	387.22	57.35			1.00

Table 39
Scale Score Correlations (Spearman Rho) between Content Standards

Mathematics

Grade	Content Standard	Mean	SD	1	2&3	4&5	6	7
3	1	427.55	86.48	1.00	0.65	0.69	0.68	0.62
	2&3	437.25	99.61		1.00	0.68	0.67	0.62
	4&5	430.68	89.75			1.00	0.71	0.66
	6	440.75	102.19				1.00	0.66
	7	413.36	65.40					1.00
4	1	421.73	86.73	1.00	0.72	0.75	0.72	0.74
	2&3	408.19	69.60		1.00	0.74	0.70	0.74
	4&5	412.37	78.43			1.00	0.72	0.77
	6	423.54	91.18				1.00	0.72
	7	399.32	60.59					1.00
5	1	413.98	65.66	1.00	0.75	0.76	0.78	0.82
	2&3	409.74	69.04		1.00	0.74	0.74	0.76
	4&5	426.86	88.67			1.00	0.76	0.78
	6	417.22	70.79				1.00	0.80
	7	411.66	55.26					1.00
6	1	404.02	68.19	1.00	0.75	0.75	0.78	0.83
	2&3	400.58	73.66		1.00	0.70	0.74	0.79
	4&5	405.32	72.12			1.00	0.74	0.75
	6	398.11	77.28				1.00	0.79
	7	400.50	57.86					1.00
7	1	392.49	82.07	1.00	0.80	0.81	0.82	0.83
	2&3	393.07	84.95		1.00	0.79	0.80	0.82
	4&5	399.94	74.60			1.00	0.81	0.85
	6	406.26	82.11				1.00	0.80
	7	394.49	55.71					1.00
8	1	407.06	69.91	1.00	0.76	0.79	0.78	0.88
	2&3	405.57	71.90		1.00	0.74	0.72	0.81
	4&5	404.28	58.61			1.00	0.73	0.82
	6	392.38	83.70				1.00	0.77
	7	400.85	54.33					1.00

Reading

Grade	Content Standard	Mean	SD	1	2	3
10	1	398.31	70.85	1.00	0.79	0.79
	2	385.88	58.81	0.79	1.00	0.83
	3	387.22	57.35	0.79	0.83	1.00

Factor analysis of the MSA Assessments

Exploratory factor analysis was used to examine the structure of the 2005 MSA assessments. At each grade, principal axis factor analysis was applied to extract factor(s) from each of the two operational forms (Form 1 and Form 2), with varimax rotation of the extracted factors. For each test, the number of factors extracted was equal to the number of reported content standards (i.e., 5 factors for each of the Mathematics assessments and 3 factors for the Grade 10 Reading test). Squared multiple correlations (SMC) were used as prior communality estimates (Harman, 1976). The results of these analyses are shown in Appendix H, Tables H1 to H26.

Each test form had between 8 and 10 initial eigenvalues greater than 1.0, with one dominant factor accounting for approximately 18 to 30 percent of the variance, with each additional factor accounting for less than 4 percent of the total variance. After extraction and rotation of 5 factors for each of the Mathematics tests, the variance explained by the factors ranged from 6.9 to 12.3 percent for the first factor, 5.9 to 12.2 percent for the second factor, 2.5 to 8.5 percent for the third factor, and 1.3 to 4.7 percent for the fourth and fifth factors. After extraction and rotation of 3 factors for the Grade 10 Reading test, 8.9 percent of the variance was explained by the first factor, 7.8 percent by the second factor, and 6.3 percent by the third factor.

While these analyses did yield multifactorial solutions for all of the tests, there was generally no clear relationship between the content standards and the loadings on the extracted factors. The one notable exception was in Grade 3, where a weak but fairly distinct factor did emerge on both test forms for Content Standard 7 (Process of Mathematics), accounting for approximately 2.5 percent of the variance on Form 1 (Factor 3) and 2.2 percent of the variance on Form 2 (Factor 4).

Percent At or Above Cut (PAC)

At the Bookmark standard-setting workshops in 2003 and 2004, performance level cut scores were established for three proficiency levels: Basic, Proficient, and Advanced. Table 40 shows the resulting scale score ranges for each performance level. Note that the Maryland scale was not constructed as a vertical scale, so meaningful comparisons can not be made between performance cut scores at different grades.

Table 41 shows the percentages of students at each performance level on the 2005 MSA assessments. The last column "Proficient + Advanced" represents the percent at or above the cut (PAC) that will be reported for the NCLB act. The 2005 PAC for Mathematics showed a steady decline from grade to grade, dropping from approximately 77 percent in Grade 3 to approximately 52 percent in Grade 8. Tables 42 and 43 show the PAC classified by ethnicity and gender group. Tables 44 to 50 present the PAC by local education agencies (LEA) for each grade. Figures 2 to 8 show changes in the PAC between 2004 and 2005 for each LEA.

Table 40
Scale Score Ranges for Each Performance Level
Based on 2003 and 2004 Standard Setting

Grade	Basic	Proficient	Advanced
3	240-378	379-440	441-650
4	240-373	374-432	433-650
5	240-391	392-452	453-650
6	240-395	396-446	447-650
7	240-395	396-450	451-650
8	240-406	407-443	444-650
10	240-373	374-414	415-650

Table 41
Percentages of Students at Each Performance Level

Grade Content	Form	N	Basic	Proficient	Advanced	Proficient +Advanced
MA3	1	36935	23.17	51.04	25.79	76.83
	2	24574	22.78	51.80	25.42	77.22
	Total	61509	23.01	51.35	25.64	76.99
MA4	1	38004	24.11	48.85	27.04	75.89
	2	25326	22.54	50.66	26.80	77.46
	Total	63330	23.48	49.57	26.95	76.52
MA5	1	39109	31.04	51.36	17.60	68.96
	2	26014	30.37	52.93	16.70	69.63
	Total	65123	30.77	51.99	17.24	69.23
MA6	1	39509	39.45	45.12	15.43	60.55
	2	26337	40.05	45.59	14.36	59.95
	Total	65846	39.69	45.31	15.00	60.31
MA7	1	40930	44.19	41.86	13.95	55.81
	2	27200	44.58	41.64	13.78	55.42
	Total	68130	44.35	41.77	13.88	55.65
MA8	1	34478	48.29	32.27	19.44	51.71
	2	34218	47.34	34.11	18.55	52.66
	Total	68696	47.82	33.19	18.99	52.18
RD10	A	6934	32.68	38.04	29.28	67.32

Table 42
Percentages of Students at Each Performance Level by Ethnicity

Grade Content	Ethnicity	N	Basic	Proficient	Advanced	Proficient +Advanced
MA3	White	30221	13.15	51.24	35.61	86.85
	African American	22963	36.17	52.06	11.77	63.83
	Hispanic	4842	30.94	54.96	14.11	69.06
	Others	3483	10.85	42.55	46.60	89.15
MA4	White	31130	12.68	50.13	37.20	87.32
	African American	24030	37.90	50.07	12.03	62.10
	Hispanic	4660	31.70	51.37	16.93	68.30
	Others	3510	9.66	38.89	51.45	90.34
MA5	White	31636	18.07	56.55	25.38	81.93
	African American	25405	47.05	47.46	5.49	52.95
	Hispanic	4601	42.21	49.16	8.63	57.79
	Others	3481	12.24	47.37	40.39	87.76
MA6	White	31910	25.99	51.72	22.29	74.01
	African American	26151	57.29	38.03	4.68	42.71
	Hispanic	4365	51.09	42.20	6.71	48.91
	Others	3420	18.30	45.12	36.58	81.70
MA7	White	33528	27.61	51.12	21.28	72.39
	African American	26831	66.69	30.25	3.06	33.31
	Hispanic	4304	55.65	38.52	5.83	44.35
	Others	3467	19.30	44.62	36.08	80.70
MA8	White	34489	32.56	39.46	27.98	67.44
	African American	26481	69.13	25.35	5.51	30.87
	Hispanic	4253	59.77	31.72	8.51	40.23
	Others	3473	22.23	32.39	45.38	77.77
RD10	White	5248	24.71	39.71	35.58	75.29
	African American	1420	61.48	32.32	6.20	38.52
	Hispanic	158	43.04	34.18	22.78	56.96
	Others	108	25.93	37.96	36.11	74.07

Table 43
Percentages of Students at Each Performance Level by Gender

Grade Content	Gender	N	Basic	Proficient	Advanced	Proficient +Advanced
MA3	Male	31387	24.10	50.29	25.62	75.90
	Female	30115	21.88	52.46	25.67	78.12
MA4	Male	32449	24.95	47.71	27.34	75.05
	Female	30873	21.94	51.52	26.54	78.07
MA5	Male	33616	31.73	50.18	18.08	68.27
	Female	31501	29.74	53.92	16.34	70.26
MA6	Male	33855	41.85	42.70	15.45	58.15
	Female	31969	37.36	48.09	14.55	62.64
MA7	Male	35126	46.14	39.58	14.28	53.86
	Female	32983	42.40	44.13	13.46	57.60
MA8	Male	35063	50.31	30.84	18.85	49.69
	Female	33626	45.22	35.64	19.15	54.79
RD10	Male	3526	37.78	36.67	25.55	62.22
	Female	3408	27.41	39.47	33.13	72.59

Table 44
Percentages of Students at Grade 3 Performance Levels by LEA

LEA #	N	Basic	Proficient	Advanced	Proficient +Advanced
1	662	28.55	52.72	18.73	71.45
2	5270	14.36	52.79	32.85	85.64
3	7570	21.70	54.45	23.84	78.30
4	1236	11.49	49.27	39.24	88.51
5	348	26.72	53.16	20.11	73.28
6	2062	13.43	53.69	32.88	86.57
7	1147	20.49	61.73	17.79	79.51
8	1801	22.99	50.53	26.49	77.01
9	307	33.55	56.68	9.77	66.45
10	2946	18.57	55.60	25.83	81.43
11	330	18.79	60.91	20.30	81.21
12	2946	16.23	55.50	28.28	83.77
13	3560	13.37	45.59	41.04	86.63
14	151	8.61	44.37	47.02	91.39
15	9986	16.69	45.77	37.53	83.31
16	9608	34.72	51.24	14.04	65.28
17	567	21.34	55.03	23.63	78.66
18	1152	20.92	52.60	26.48	79.08
19	209	26.79	60.77	12.44	73.21
20	297	20.88	56.90	22.22	79.12
21	1535	18.70	54.14	27.17	81.30
22	1058	19.94	57.37	22.68	80.06
23	427	15.46	46.84	37.70	84.54
30	5971	42.92	48.99	8.09	57.08
31	310	33.23	54.84	11.94	66.77
55	51	23.53	60.78	15.69	76.47

Table 45
Percentages of Students at Grade 4 Performance Levels by LEA

LEA #	N	Basic	Proficient	Advanced	Proficient +Advanced
1	657	23.29	54.19	22.53	76.71
2	5463	13.84	49.51	36.65	86.16
3	7887	22.72	52.99	24.29	77.28
4	1287	13.13	48.72	38.15	86.87
5	374	20.32	52.67	27.01	79.68
6	2101	12.57	54.88	32.56	87.43
7	1184	21.88	58.28	19.85	78.13
8	1831	23.38	52.43	24.19	76.62
9	300	40.33	44.00	15.67	59.67
10	3008	17.32	53.89	28.79	82.68
11	360	26.11	53.89	20.00	73.89
12	3000	16.60	55.37	28.03	83.40
13	3808	11.56	43.70	44.75	88.45
14	160	17.50	45.00	37.50	82.50
15	10174	16.45	45.38	38.17	83.55
16	9860	35.92	49.03	15.05	64.08
17	523	17.59	56.02	26.39	82.41
18	1168	22.43	51.63	25.94	77.57
19	192	29.69	54.17	16.15	70.31
20	323	24.46	49.23	26.32	75.54
21	1487	15.06	51.38	33.56	84.94
22	1042	19.77	50.77	29.46	80.23
23	428	14.95	48.13	36.92	85.05
30	6323	45.94	45.67	8.38	54.06
31	327	42.81	48.01	9.17	57.19
55	57	38.60	49.12	12.28	61.40

Table 46
Percentages of Students at Grade 5 Performance Levels by LEA

LEA #	N	Basic	Proficient	Advanced	Proficient +Advanced
1	681	34.36	52.28	13.36	65.64
2	5528	19.10	58.16	22.74	80.90
3	7822	29.88	53.75	16.38	70.12
4	1297	22.21	56.28	21.51	77.79
5	392	27.30	62.76	9.95	72.70
6	2186	18.30	62.26	19.44	81.70
7	1237	24.01	62.41	13.58	75.99
8	1946	31.55	52.98	15.47	68.45
9	335	42.09	52.54	5.37	57.91
10	2985	22.21	56.88	20.90	77.79
11	349	32.09	57.02	10.89	67.91
12	3140	24.33	58.25	17.42	75.67
13	3706	14.52	54.43	31.06	85.48
14	176	38.07	53.41	8.52	61.93
15	10122	21.44	47.85	30.72	78.56
16	10611	48.57	45.36	6.07	51.43
17	565	18.76	59.12	22.12	81.24
18	1272	25.31	56.76	17.92	74.69
19	245	39.18	50.61	10.20	60.82
20	311	23.15	61.41	15.43	76.85
21	1525	27.15	55.74	17.11	72.85
22	1141	33.30	52.23	14.46	66.70
23	484	20.87	59.50	19.63	79.13
30	6666	51.20	44.64	4.16	48.80
31	327	46.48	49.85	3.67	53.52
55	66	50.00	43.94	6.06	50.00

Table 47
Percentages of Students at Grade 6 Performance Levels by LEA

LEA #	N	Basic	Proficient	Advanced	Proficient +Advanced
1	744	46.24	45.70	8.06	53.76
2	5500	31.67	45.67	22.65	68.33
3	8123	41.16	45.13	13.71	58.85
4	1372	33.89	53.43	12.68	66.11
5	390	34.10	52.56	13.33	65.90
6	2253	28.98	51.71	19.31	71.02
7	1342	37.03	49.25	13.71	62.97
8	2005	37.46	50.32	12.22	62.54
9	343	63.27	33.53	3.21	36.73
10	3030	26.67	53.10	20.23	73.33
11	420	39.52	50.95	9.52	60.48
12	2974	35.74	51.35	12.91	64.26
13	3882	20.09	51.31	28.59	79.91
14	187	51.34	35.29	13.37	48.66
15	10145	32.12	45.13	22.75	67.88
16	10610	46.85	45.25	7.90	53.15
17	578	28.03	57.61	14.36	71.97
18	1181	36.16	46.91	16.93	63.84
19	239	48.54	44.77	6.69	51.46
20	369	39.30	46.07	14.63	60.70
21	1547	26.63	53.72	19.65	73.37
22	1070	48.60	40.75	10.65	51.40
23	480	25.00	49.17	25.83	75.00
30	6753	71.07	27.08	1.85	28.94
31	248	42.34	50.40	7.26	57.66
55	53	62.26	32.08	5.66	37.74

Table 48
Percentages of Students at Grade 7 Performance Levels by LEA

LEA #	N	Basic	Proficient	Advanced	Proficient +Advanced
1	743	42.93	46.16	10.90	57.07
2	5871	32.24	47.06	20.69	67.76
3	8440	41.87	44.00	14.12	58.13
4	1381	38.52	49.89	11.59	61.48
5	422	49.05	43.13	7.82	50.95
6	2323	34.70	50.71	14.59	65.30
7	1316	34.80	50.84	14.36	65.20
8	2016	47.37	42.51	10.12	52.63
9	366	67.49	28.14	4.37	32.51
10	3138	28.59	51.47	19.95	71.41
11	361	32.96	57.34	9.70	67.04
12	3140	40.92	46.69	12.39	59.08
13	3852	21.31	50.42	28.27	78.69
14	195	55.90	36.41	7.69	44.10
15	10515	32.25	44.53	23.22	67.75
16	11064	60.01	34.99	5.00	39.99
17	602	30.23	55.32	14.45	69.77
18	1247	44.43	44.59	10.99	55.57
19	259	56.37	39.38	4.25	43.63
20	346	44.51	47.40	8.09	55.49
21	1628	25.68	52.95	21.38	74.32
22	1116	48.12	44.27	7.62	51.88
23	536	26.87	55.04	18.10	73.13
30	7160	80.98	17.88	1.15	19.02
31	1	100.00	.	.	.
55	77	67.53	27.27	5.19	32.47

Table 49
Percentages of Students at Grade 8 Performance Levels by LEA

LEA #	N	Basic	Proficient	Advanced	Proficient +Advanced
1	772	47.93	39.38	12.69	52.07
2	5790	34.28	38.89	26.82	65.72
3	8739	46.70	33.14	20.16	53.30
4	1439	46.84	33.01	20.15	53.16
5	468	48.08	34.19	17.74	51.92
6	2417	37.86	41.95	20.19	62.14
7	1323	39.91	43.16	16.93	60.09
8	2115	53.66	31.73	14.61	46.34
9	362	64.92	30.66	4.42	35.08
10	3163	32.88	40.91	26.21	67.12
11	410	39.51	35.12	25.37	60.49
12	3236	46.29	37.14	16.56	53.71
13	3937	27.08	41.12	31.80	72.92
14	198	47.48	36.36	16.16	52.53
15	10621	35.32	35.08	29.60	64.68
16	11035	64.03	27.74	8.23	35.97
17	653	39.82	38.59	21.59	60.18
18	1241	54.07	32.07	13.86	45.93
19	218	58.72	31.19	10.09	41.28
20	378	60.58	26.72	12.70	39.42
21	1668	27.82	41.43	30.76	72.18
22	1073	60.11	30.57	9.32	39.89
23	534	21.54	36.33	42.13	78.46
30	6789	79.72	17.40	2.89	20.28
55	101	85.15	12.87	1.98	14.85

Table 50
Percentages of Students at Grade 10 Performance Levels by LEA

LEA #	N	Basic	Proficient	Advanced	Proficient +Advanced
2	45	73.33	13.33	13.33	26.67
3	570	30.18	36.49	33.33	69.82
5	274	46.35	36.50	17.15	53.65
6	1051	22.84	38.06	39.11	77.16
7	481	35.14	39.92	24.95	64.86
9	226	40.71	34.96	24.34	59.29
10	1606	28.71	34.99	36.30	71.30
11	93	19.36	52.69	27.96	80.65
12	121	32.23	48.76	19.01	67.77
14	85	43.53	41.18	15.29	56.47
15	10	70.00	20.00	10.00	30.00
17	287	29.62	38.68	31.71	70.38
19	111	35.14	51.35	13.51	64.86
20	193	25.91	46.63	27.46	74.09
21	836	21.89	45.45	32.66	78.11
22	4	100.00	.	.	.
23	266	25.56	36.47	37.97	74.44
30	646	65.02	31.58	3.41	34.98
55	2	50.00	50.00	.	50.00

Figure 2
Percent at or Above Proficiency Cut Score (PAC) by LEA for Mathematics Grade 3

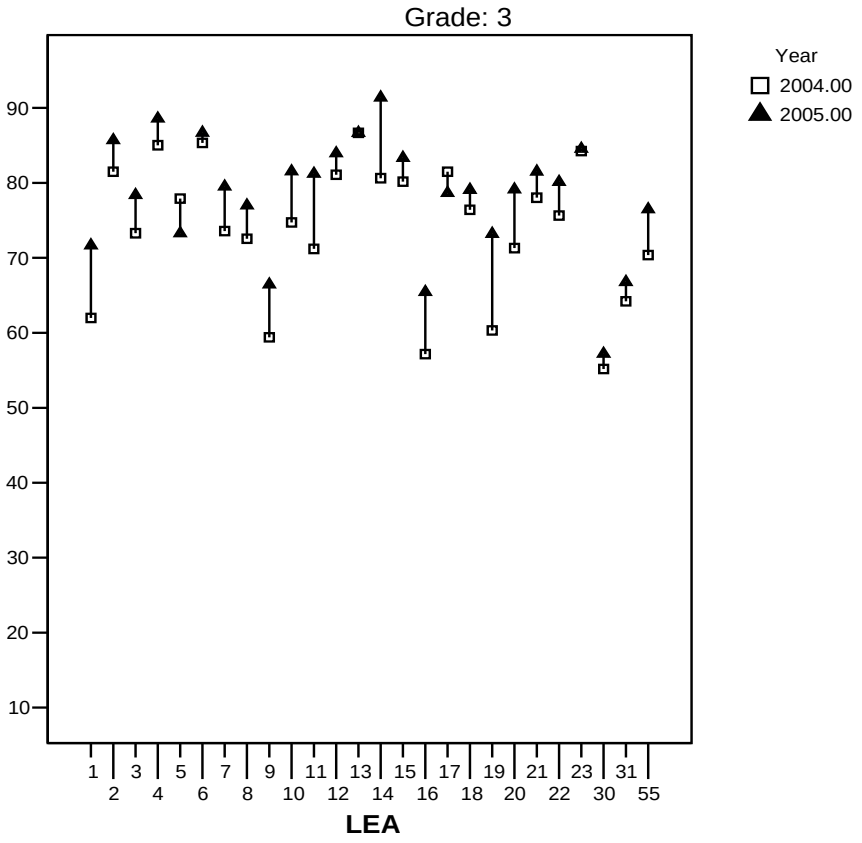

Figure 3
Percent at or Above Proficiency Cut Score (PAC) by LEA for Mathematics Grade 4

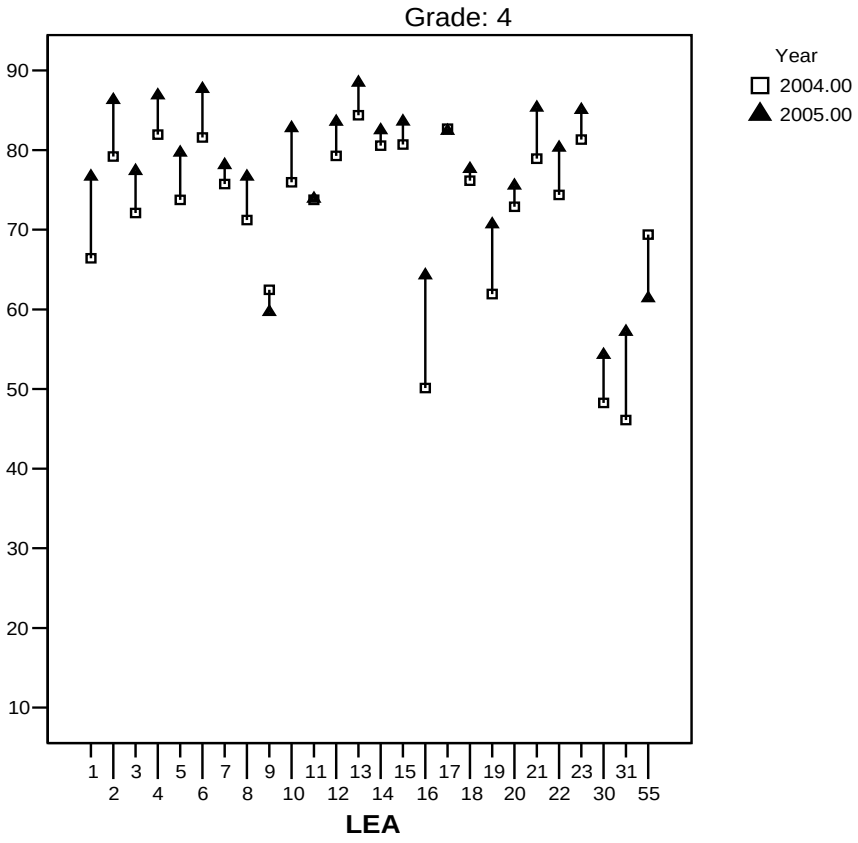

Figure 4
Percent at or Above Proficiency Cut Score (PAC) by LEA for Mathematics Grade 5

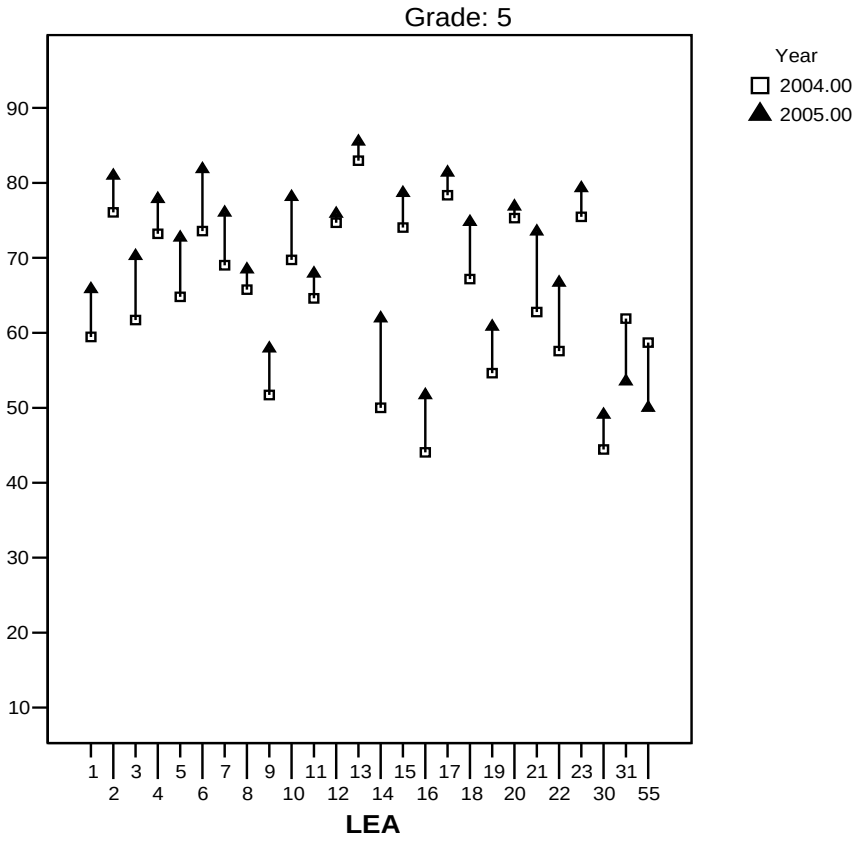

Figure 5
Percent at or Above Proficiency Cut Score (PAC) by LEA for Mathematics Grade 6

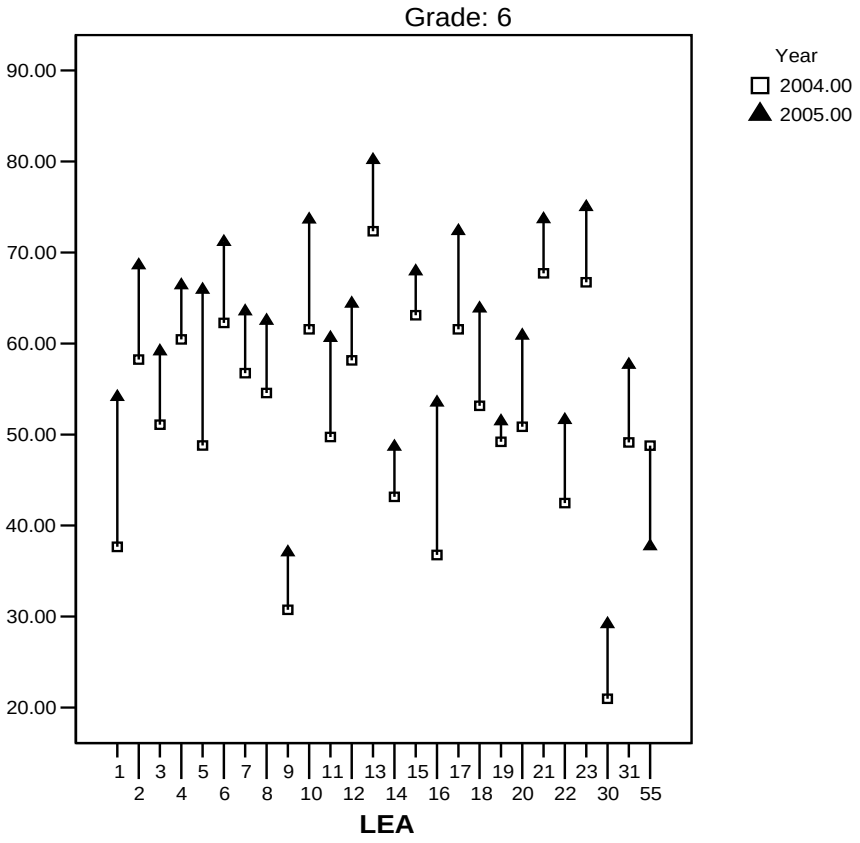

Figure 6
Percent at or Above Proficiency Cut Score (PAC) by LEA for Mathematics Grade 7

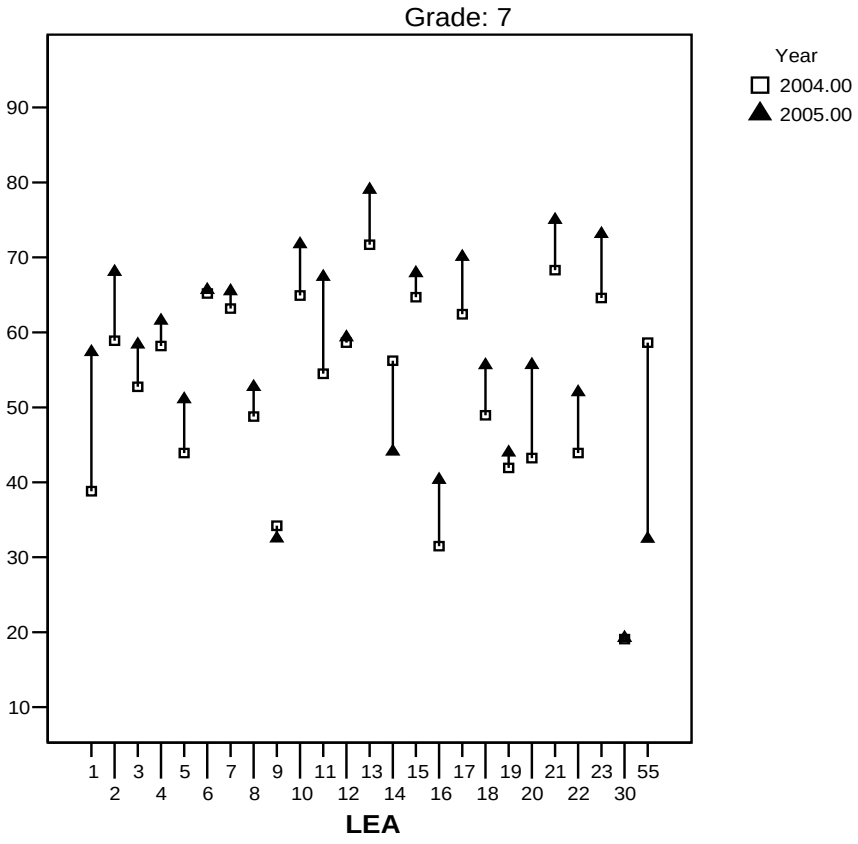

Figure 7
Percent at or Above Proficiency Cut Score (PAC) by LEA for Mathematics Grade 8

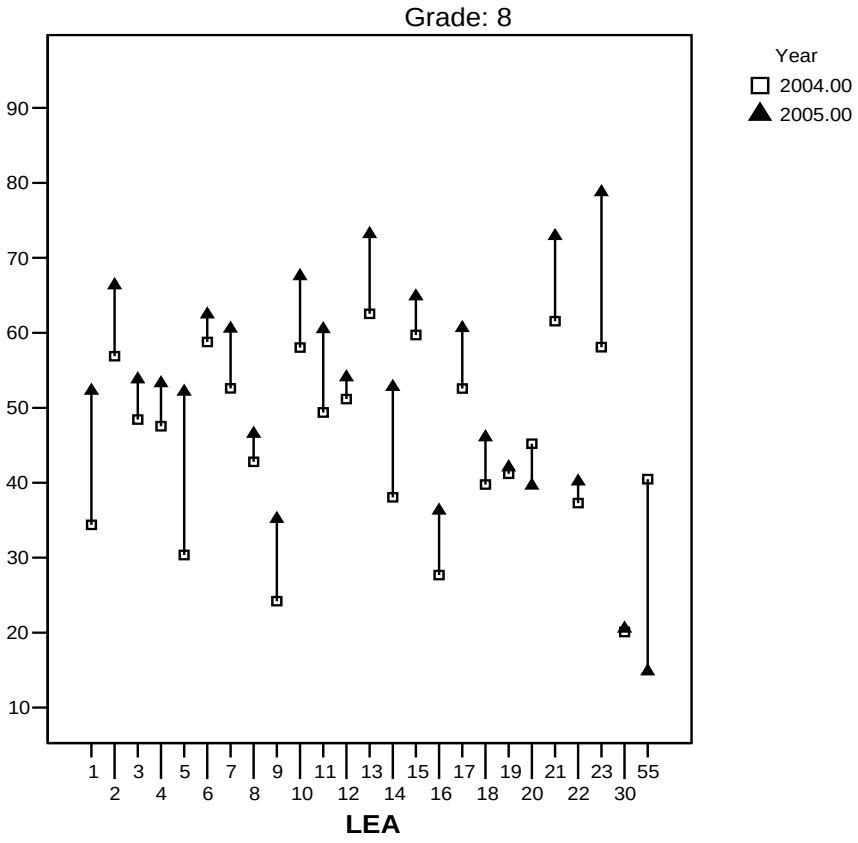

Figure 8
Percent at or Above Proficiency Cut Score (PAC) by LEA for Reading Grade 10