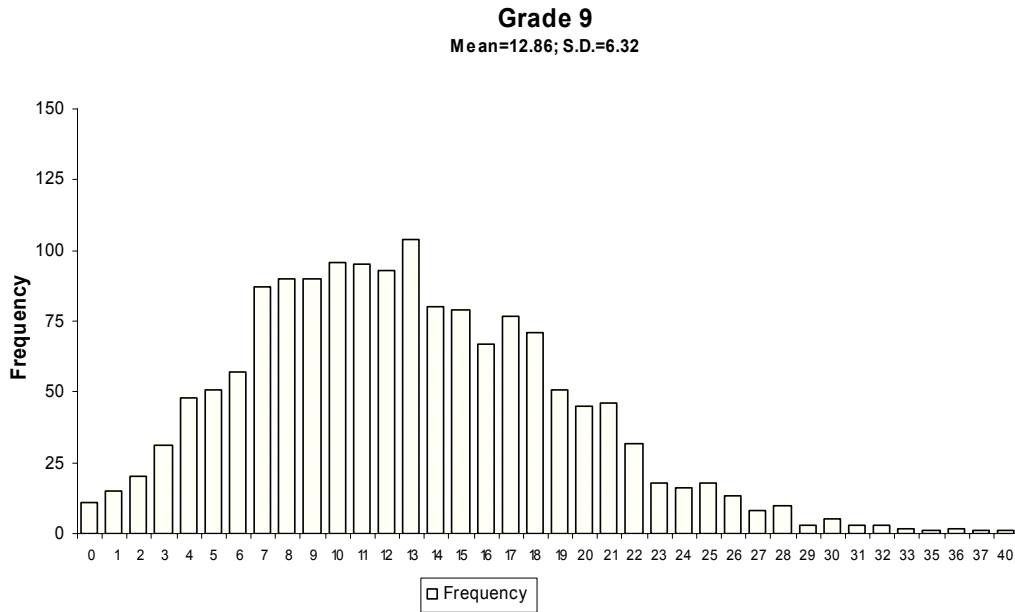


Overall Frequency Distribution by Total Score



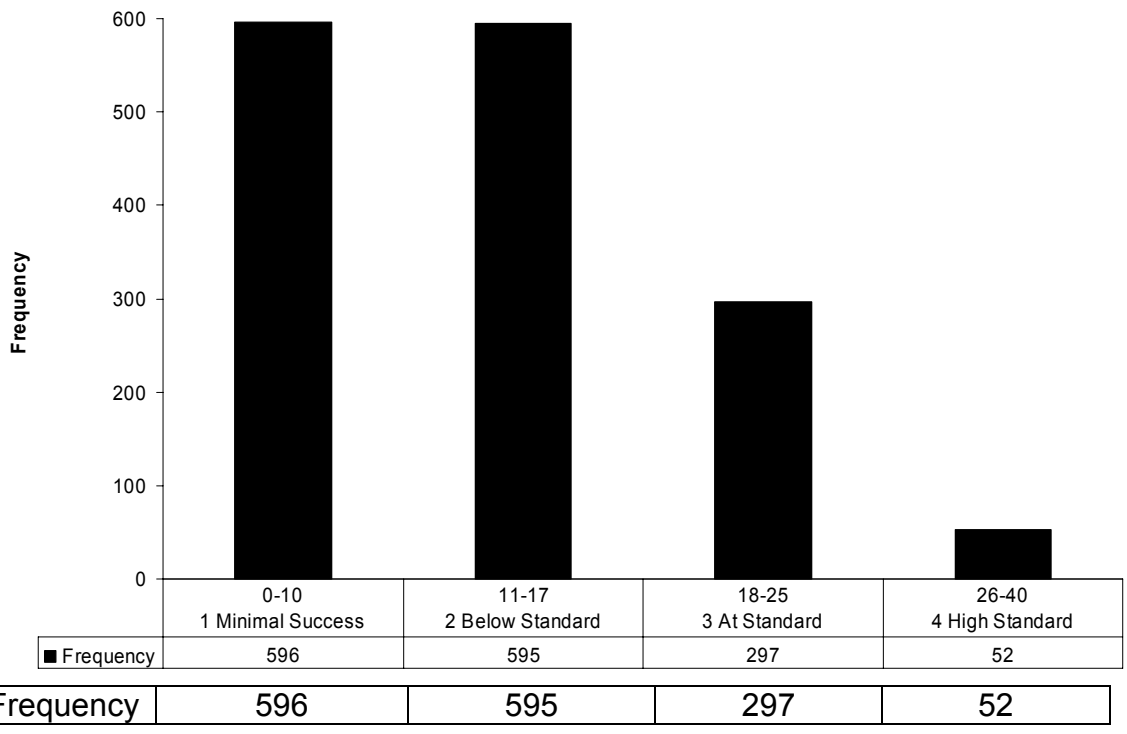
Level Frequency Distribution Chart and Frequency Distribution

2004 - Numbers of students tested in Grade 9: 1540  
Grade 9 1999 and 2001

Level	% at ('99)	% at least ('99)	% at ('01)	% at least ('01)
1	37%	100%	22%	100%
2	43%	63%	62%	78%
3	13%	20%	15%	16%
4	7%	7%	1%	1%

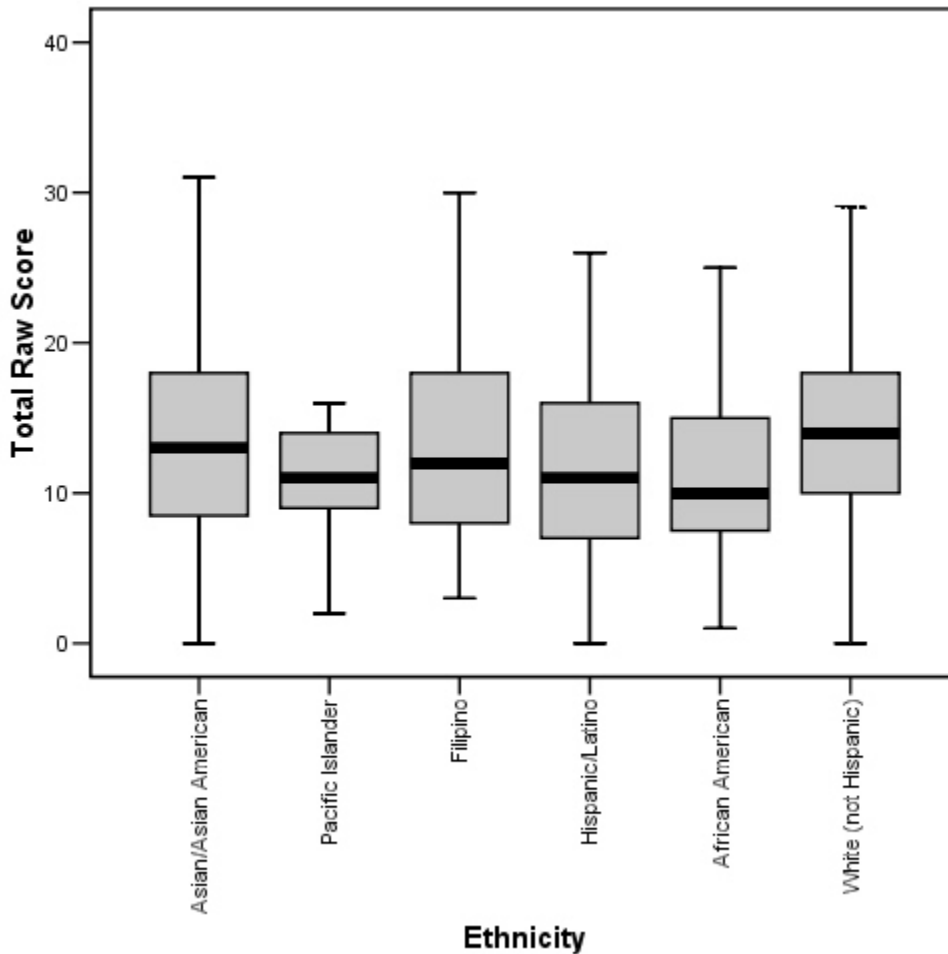
Grade 9 2002 - 2004

Level	% at ('02)	% at least ('02)	% at ('03)	% at least ('03)	% at ('04)	% at least ('04)
1	18%	100%	66%	100%	39%	100%
2	61%	82%	29%	34%	39%	61%
3	20%	22%	5%	6%	19%	23%
4	2%	2%	1%	1%	3%	3%



Grade 9  
Ethnicity

The following figures show the distribution of raw scores with the median represented as a horizontal bar in the center of the box, the interquartile range (25 percentile to 75 percentile) represented by the box, and the extreme values\* within a category lie between the highest and lowest horizontal bars. Ns of less than 5 students are not reported.



Ethnicity	N
Asian/Asian American	207
Pacific Islander	11
Filipino	84
Hispanic/Latino	504
African American	59
White (not Hispanic)	563

\*extremes are cases with values more than 3 box lengths from the upper or lower edge of the box.

## Grade 9 Ethnicity

In this section, test scores are compared across different ethnic groups<sup>31</sup>. One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

The scores of Asian/Asian American students are significantly higher than those of Hispanic/Latino students. There are no significant differences between Asian/Asian American students and any other ethnic groups.

There are no significant differences between Pacific Islander students and any other group.

There are no significant differences between Filipino students and any other group.

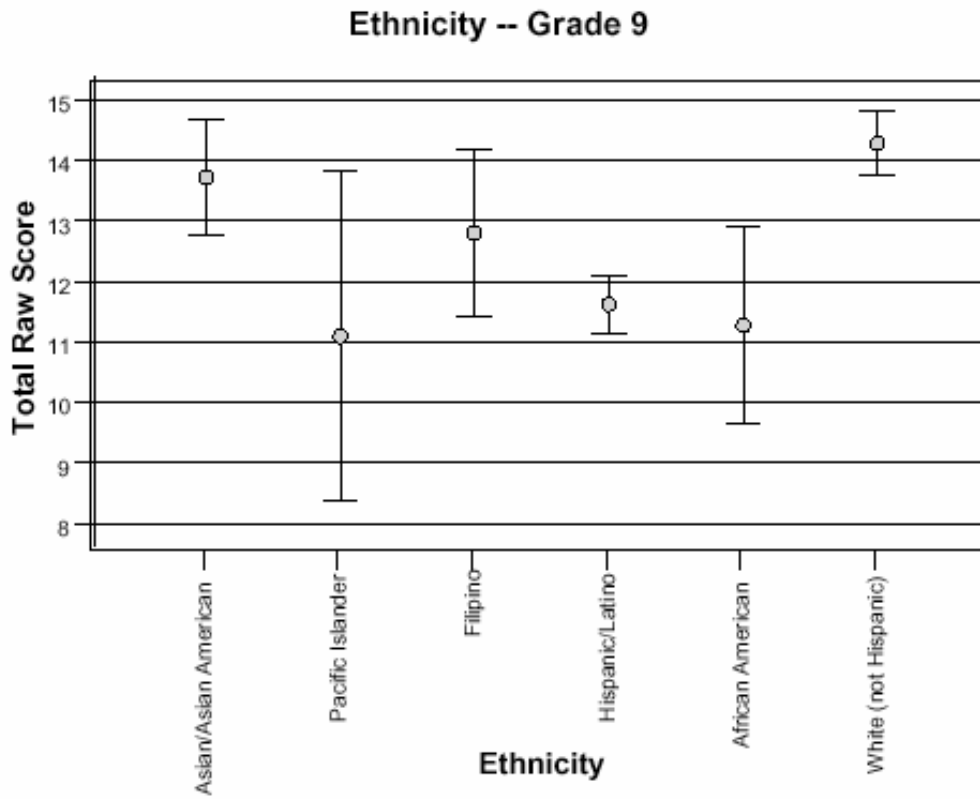
The scores of Hispanic/Latino students are significantly lower than those of Asian/Asian American and White students. There are no significant differences between Hispanic/Latino students and any other ethnic group.

The scores of African American students are significantly lower than those of White students. There are no significant differences between African American students and any other ethnic group.

The scores of White students are significantly higher than those of Hispanic/Latino and African American students. There are no significant differences between White students and any other ethnic group.

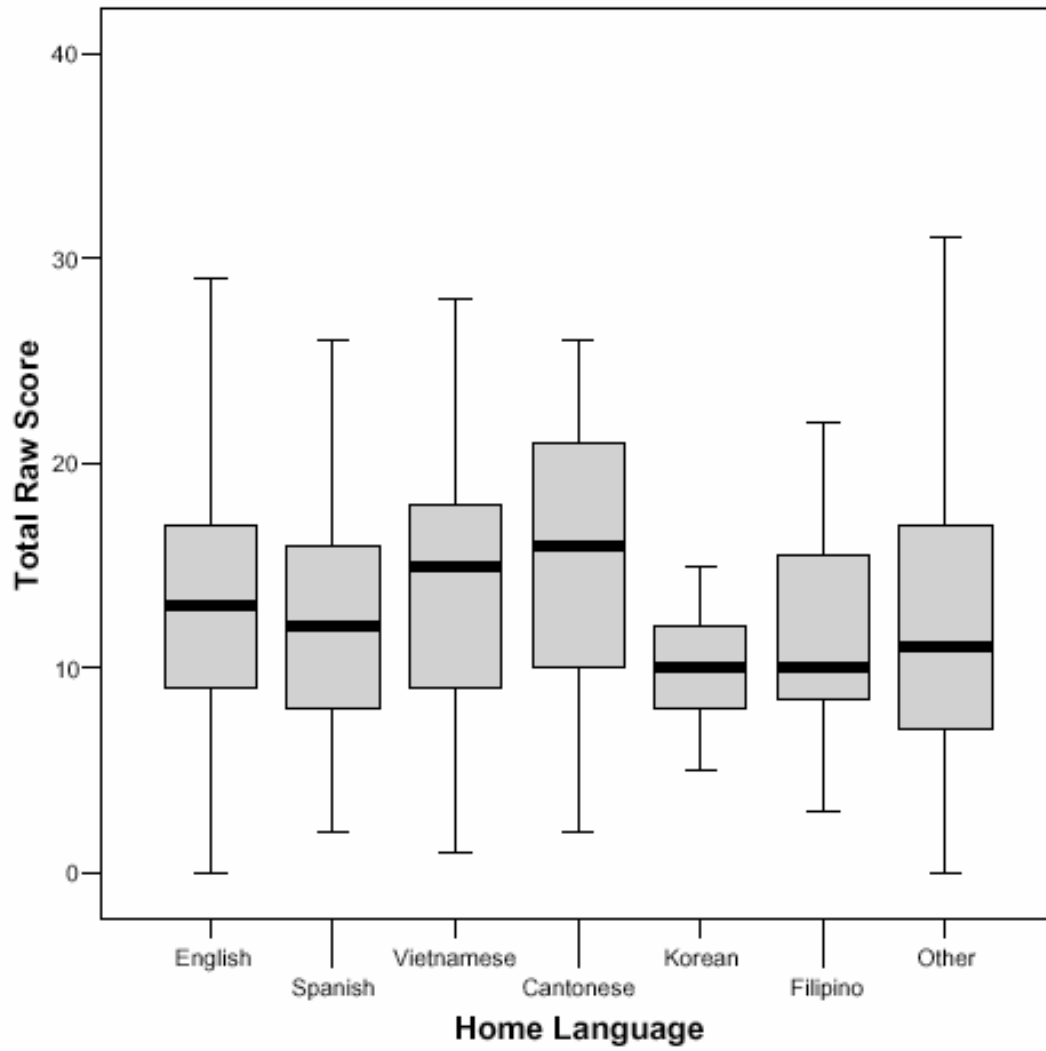
<sup>31</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons between the groups were made using Tukey's honestly significant difference comparison. All differences were significant at the .05 level.

Distribution of sampling means  
 Grade 9  
 Ethnicity



Ethnicity	N
Indian/AlaskanNative	0
Asian/Asian American	207
Pacific Islander	11
Filipino	84
Hispanic/Latino	504
African American	59
White (not Hispanic)	563

Grade 9  
Home Language



Home Language	N
English	950
Spanish	265
Vietnamese	46
Cantonese	17
Korean	10
Filipino	23
Other	121

## Grade 9

### Home Language

In this section, test scores are compared across groups of students who speak different languages at home<sup>32</sup>. One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

The scores of students with English as a home language are not significantly different of students of any other home language group.

The scores of students with Spanish as a home language are not significantly different of those students of any other home language group.

The scores of students with Vietnamese as a home language are significantly higher than those of students with Spanish as a home language. There are no significant differences between students with Vietnamese as a home language and any other home language group.

The scores of students with Cantonese as a home language are significantly higher than those of students with English, Spanish, and Khmer as a home language. There are no significant differences between students with Cantonese as a home language and any other home language group.

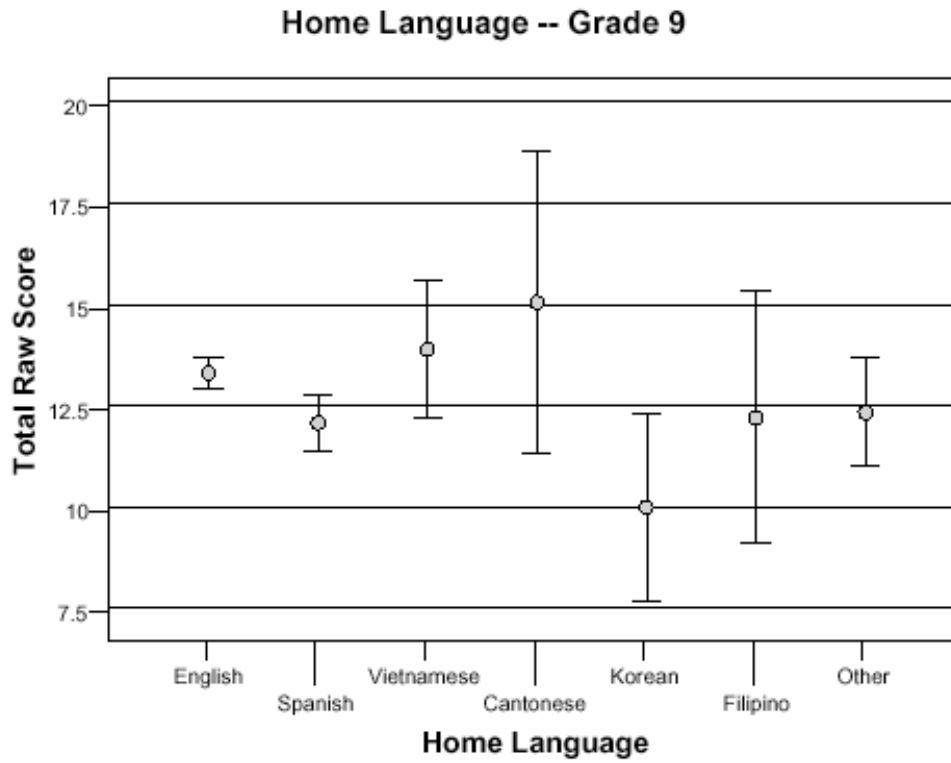
There are no significant differences between students with Korean as a home language and any other home language group.

There are no significant differences between students with Filipino as a home language and any other home language group.

The scores of students with "Other" as a home language are significantly higher than those of students with Spanish as a home language. There are no significant differences between students with "Other" as a home language and any other home language group.

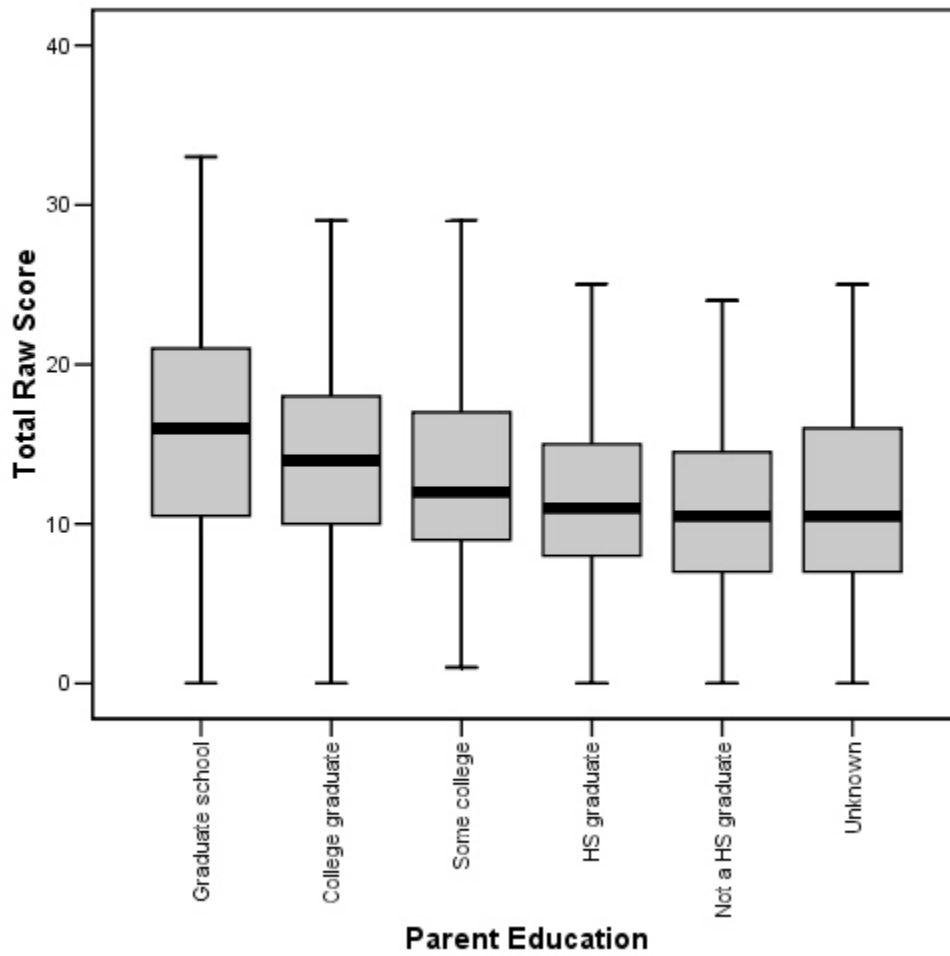
<sup>32</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons between the groups were made using Tukey's honestly significant difference comparison. All differences were significant at the .05 level.

Distribution of sampling means  
 Grade 9  
 Home Language



Home Language	N
English	950
Spanish	265
Vietnamese	46
Cantonese	17
Korean	10
Filipino	23
Other	121

Grade 9  
Parent Education



Parent Education	N
Graduate school	127
College graduate	352
Some college	361
HS graduate	270
Not a HS graduate	176
Unknown	200

## Grade 9 - Parent Education

In this section, test scores are compared across groups of different levels of parent education.<sup>33</sup> One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

The scores of students whose parents have a graduate degree are significantly higher than those of students in all other Parent Education categories except college graduate. There are no significant differences between students whose parents have a college education and any other group.

The scores of students whose parents have a college education are significantly higher than those whose parents are or are not high school graduates and those whose parents' education is unknown. There are no significant differences between students whose parents have a college education and any other group.

The scores of students whose parents have some college education are significantly lower than those of students whose parents have a graduate education and significantly higher than those whose parents are not high school graduates or education level is unknown. There are no significant differences from scores of students whose parents are college graduates or high school graduates.

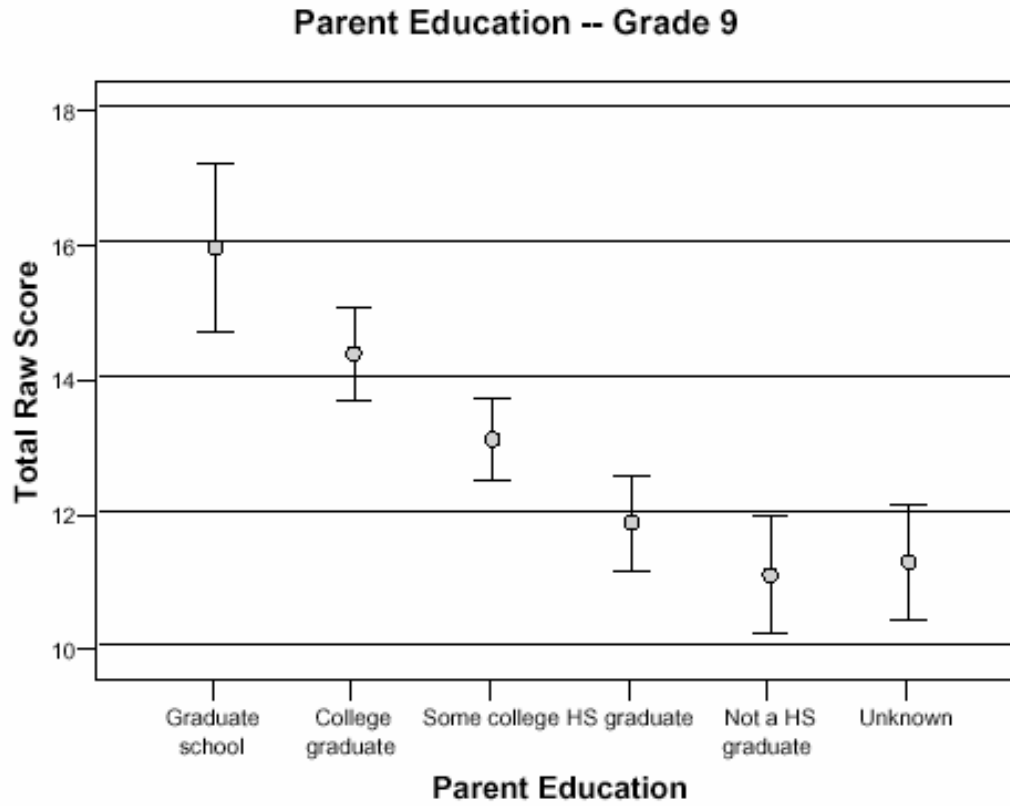
The scores of students whose parents have a high school education are significantly lower than those of students whose parents have a college education and significantly higher than those whose parents are not a high school graduate or education level is unknown. There are no significant differences between students whose parents are a high school graduate and any other Parent Education level.

The scores of students whose parents are not high school graduates are significantly lower than those whose parents had some college education, a college education or a graduate degree. There are no significant differences between students whose parents are not high school graduates and any other group.

The scores of students whose parents' education is "unknown" are significantly lower than those whose parents had some college education or college graduates and have a graduate degree. There are no significant differences between "unknown" students and any other group.

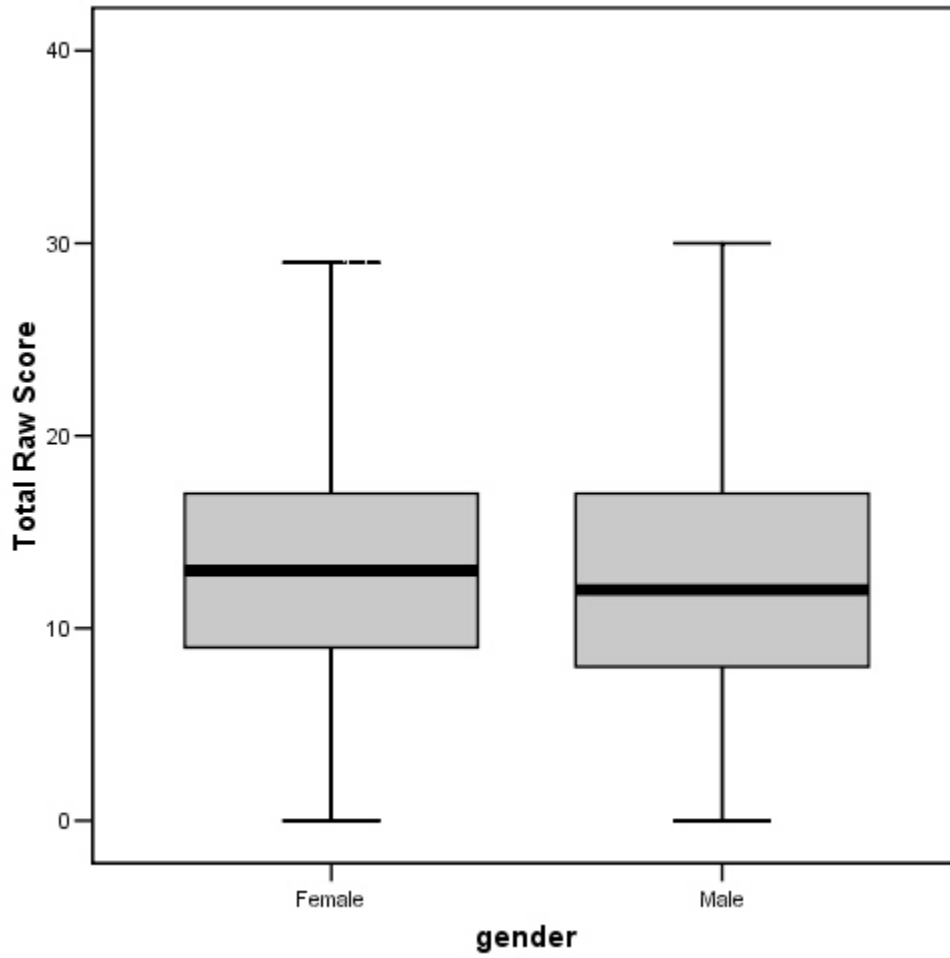
<sup>33</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons between the groups were made using Tukey's honestly significant difference comparison. All differences were significant at the .05 level.

Distribution of sampling means  
 Grade 9  
 Parent Education



Parent Education	N
Graduate school	127
College graduate	352
Some college	361
HS graduate	270
Not a HS graduate	176
Unknown	200

Grade 9  
Gender

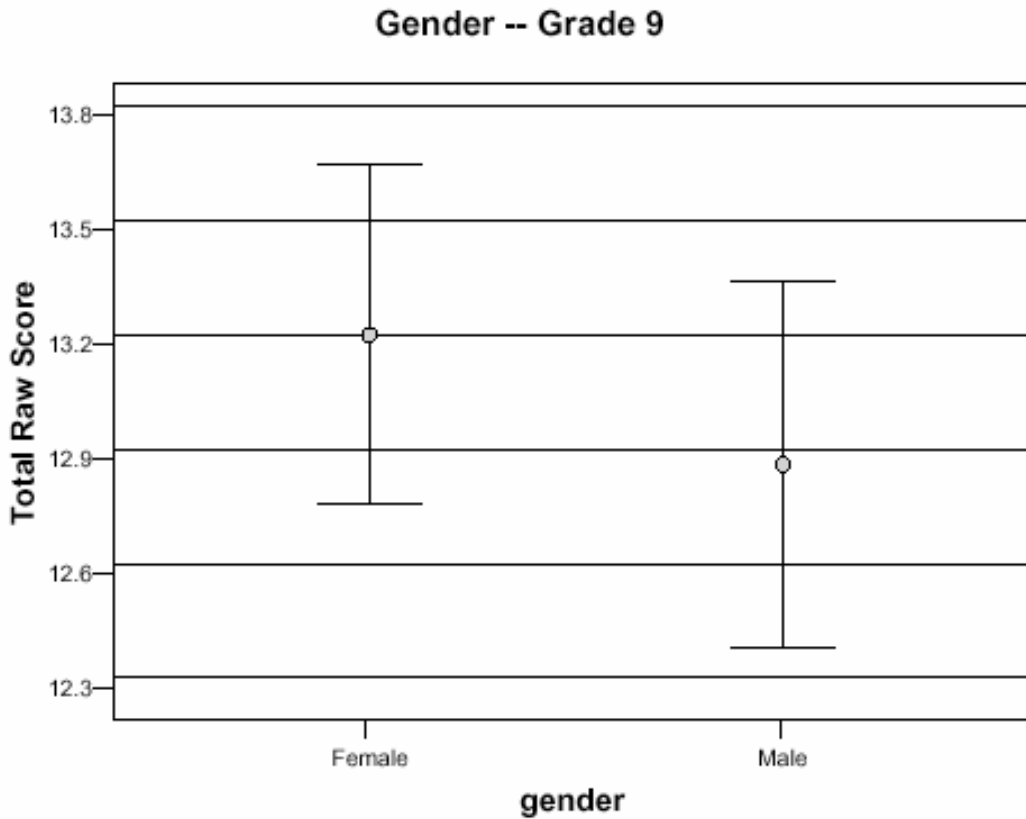


Gender	N
Female	697
Male	745

Distribution of sampling means  
 Grade 9  
 Gender

In this section, test scores are compared across gender.<sup>34</sup> One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

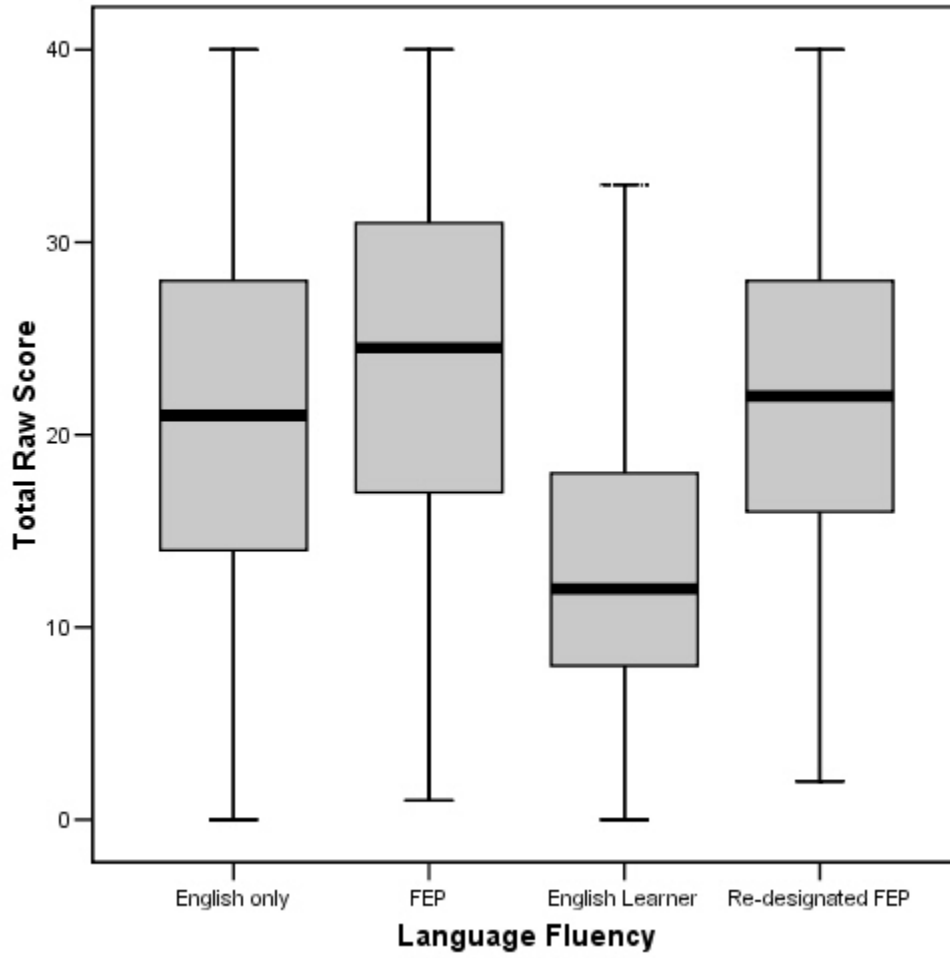
There is no significant difference between the scores of females and males.



Gender	N
Female	697
Male	745

<sup>34</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons between the groups were made using Tukey's honestly significant difference comparison. All differences were significant at the .05 level.

Grade 9  
Language Fluency



Language Fluency	N
English only	946
FEP	123
English Learner	230
Re-designated FEP	139

Language Fluency  
Grade 9

In this section, test scores are compared across groups of different language fluency.<sup>35</sup> One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

The scores of students with English Only are significantly higher than those students described as English Learners. There are no significant differences between students described as English Only and any other group.

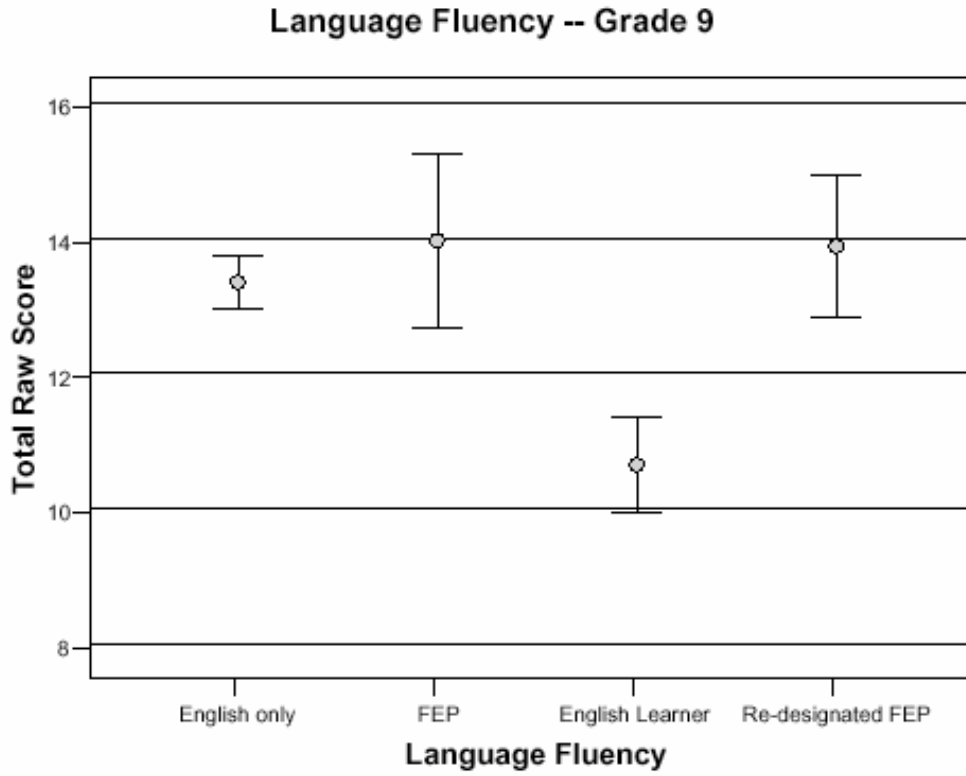
The scores of students in the FEP category are significantly higher than those of students in the English Learner category. There is no significant difference between the scores of students in the FEP category and any other group.

The scores of students in the English Learner category are significantly lower than all other groups.

The scores of students in the Re-designated FEP category are significantly higher than those of students in the English Learner category. There is no significant difference between the scores of students in the Re-designated FEP category and any other group.

<sup>35</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons between the groups were made using Tukey's honestly significant difference comparison. All differences were significant at the .05 level.

Distribution of sampling means  
 Grade 9  
 Language Fluency



Language Fluency	N
English only	946
FEP	123
English Learner	230
Re-designated FEP	139

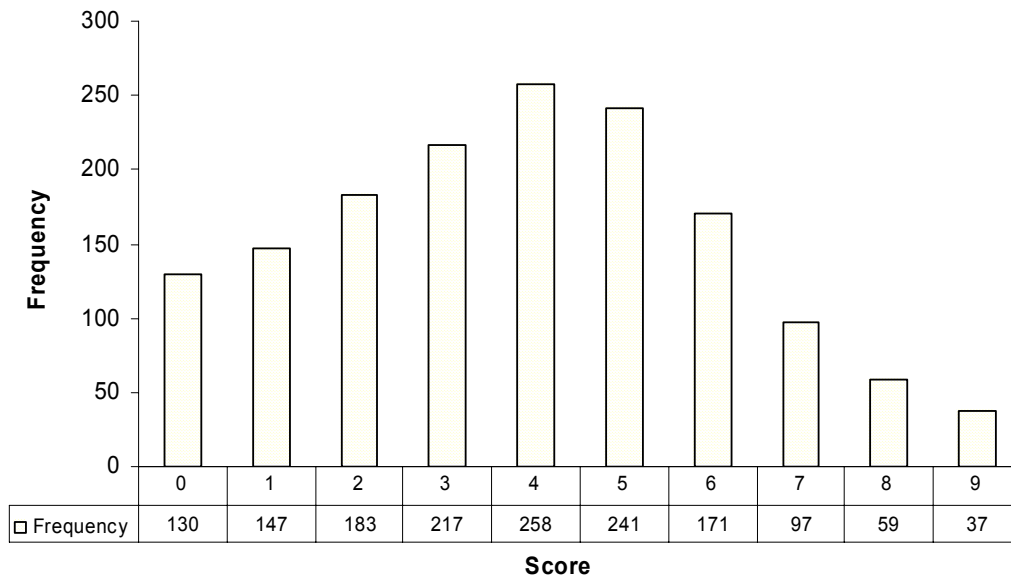
**Course One Task 1****Square Patterns**

<b>Student Task</b>	Find and extend number patterns in a geometric context. Find and use rules or formulas to solve problems.
<b>Core Idea 1 Functions and Relations</b>	<b>Understand patterns, relations, and functions.</b> <ul style="list-style-type: none"><li>• Generalize patterns using explicitly defined functions.</li></ul>
<b>Core Idea 3 Algebraic Properties and Representations</b>	<b>Represent and analyze mathematical situations and structures using algebraic symbols.</b> <ul style="list-style-type: none"><li>• Use symbolic algebra to represent and explain mathematical relationships.</li><li>• Use symbolic expressions to represent relationships arising from various contexts.</li></ul>

Frequency Distribution for each Task – Grade 9  
Grade 9– Square Patterns

**Square Patterns**

Mean: 3.84, S.D.: 2.28



The maximum score available for this task is 9 points.  
The cut score for a level 3 response is 5 points.

Most students (93%) could extend the first pattern from picture 4 to picture 5 and find the total number of gray tiles. Many students (about 71%) could extend the pattern to 6 and find the total tiles. About 38% of the students could extend the first pattern, work back from the total tiles to the pattern number. Only about 10% of the students could use symbolic notation to make pattern generalization. 7% of all students scored no points on this task. All students in the sample who scored zero attempted the problem.

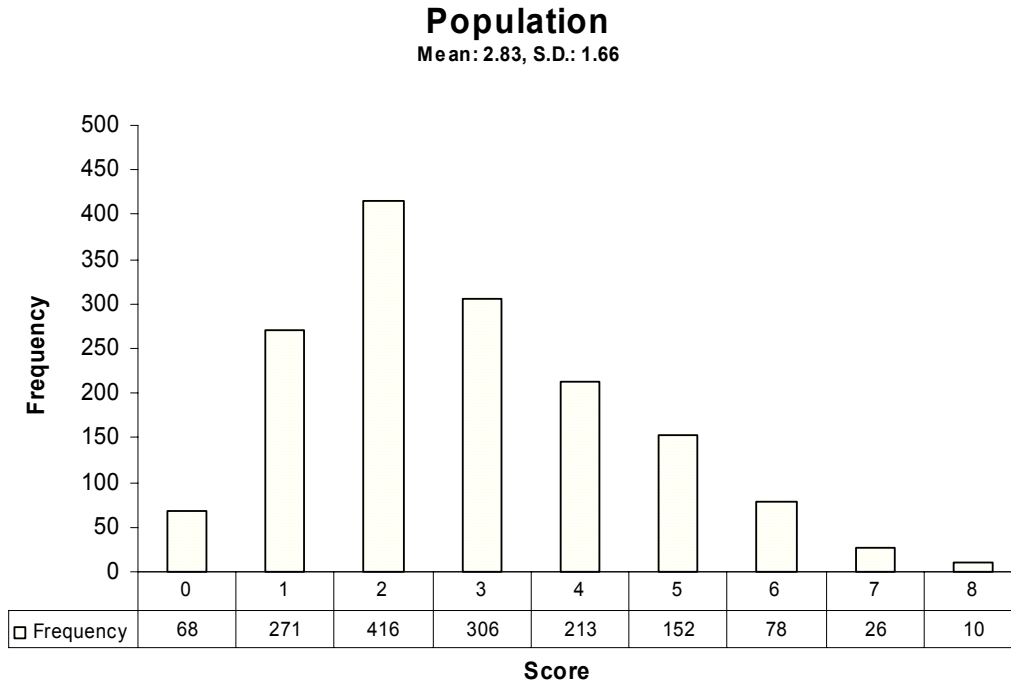
**Implications for Instruction:**

Students at this grade level should have frequent opportunities to use symbolic notation to write or formulas for patterns or to describe a procedure for solving a problem in context. Without the benefit of struggling with context, students often do not grasp the finer points of variables, like thinking about the relationship between independent and dependent variables and understanding that equations are often written in terms of doing calculations to one variable to find the value of the other. By working in context, especially in a rich geometric context, students can see how the different parts of their expressions relate to specific parts of the physical pattern. Questions by the teacher, like what stays the same and what changes, help students to identify and then to quantify the various parts of the patterns. Transference of algebraic skills to useful applications cannot take place without dealing with situations in context.

**Population**

<b>Student Task</b>	Analyze a scatterplot for trend, graph a line represent average density, graph specific point for a given piece of data, locate points on a graph to meet criteria for largest population or lowest density, and calculate density relationships.
<b>Core Idea 5 Data Analysis</b>	<ul style="list-style-type: none"> <li>• Understand the relationship between two sets of data, display such data in a scatterplot, and describe trends and shape of the plot including correlations.</li> <li>• Make inferences based on the data and evaluate the validity of conclusions drawn.</li> </ul>
<b>Core Idea 3 Algebraic Properties and Representations</b>	<ul style="list-style-type: none"> <li>• Approximate and interpret rates of change from graphic and numeric data.</li> </ul>

## Frequency Distribution for Population



Score:	0	1	2	3	4	5	6	7	8
% ≤	4.4%	22.0%	49.0%	68.9%	82.7%	92.6%	97.7%	99.4%	100.0%
% ≥	100.0%	95.6%	78.0%	51.0%	31.1%	17.3%	7.4%	2.3%	0.6%

The maximum score available for this task is 8 points.

The cut score for a level 3 response, meeting standards, is 4 points.

Most students (96%) could identify the point on the scatterplot representing the largest population. About half the students could find the largest population, describe the trend in the data, and explain which variable, population or area, would change and which would stay the same. About 30% of the students could find largest population, describe data trends, discuss which variables would change, and calculate the population density for Michigan. Less than 3% of the students could meet most of the demands of the tasks. Drawing a line to represent a density of 70 people per square mile and identifying trends in the data caused students at the top end the most difficulty. About 4% of the students scored no points on the task. About half of them attempted the problem.

**Implications for Instruction:**

Students need to think about using graphs in context as a tool for making sense of or describing the world, for communicating information to an audience, and for making predictions and decisions. By this grade level, students should be frequently moved from the level of locating and identifying information on a graph, to finding relationships in the data, and interpreting those relationships to draw inferences. At this grade level, the expectation should be for students to synthesize information from the graphs and be able to describe trends or highlight important ideas gained from viewing data. Students at this grade level should also be comfortable with more complex data sets, which show greater spread and variation or which deal with scaled intervals as well as scaled frequencies.

**Course One**

**Task 3**

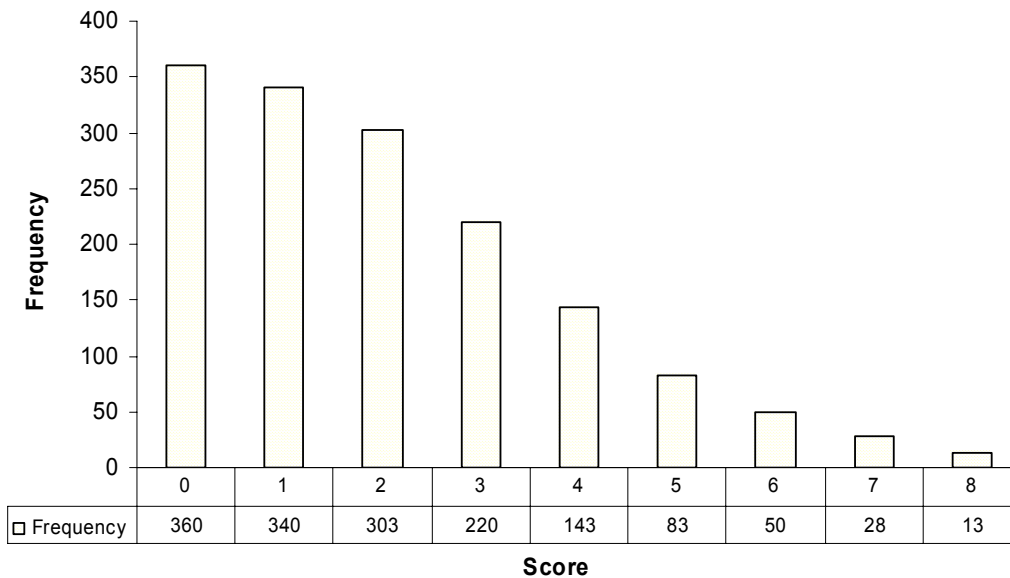
**From 2 to 3 Dimensions**

<b>Student Task</b>	Reason about a net and how it would fold into a 3-dimensional prism. Find the number of faces, edges, and vertices. Calculate perimeter and area of net and volume of prism. Understand how features in the net relate to features in the 3-dimensional object, deciding which will remain and which will combine when folded.
<b>Core Idea 4 Geometry and Measurement</b>	<b>Describe spatial relationships; develop mathematical arguments about geometric relationships; understand measurable attributes of objects; and understand the units, systems, and process of measurement.</b>

Frequency Distribution for each Task – Grade 9  
Grade 9– From 2 to 3 Dimensions

**From 2 to 3 Dimensions**

Mean: 2.07, S.D.: 1.85



Score:	0	1	2	3	4	5	6	7	8
% <=	23.4%	45.5%	65.1%	79.4%	88.7%	94.1%	97.3%	99.2%	100.0%
% >=	100.0%	76.6%	54.5%	34.9%	20.6%	11.3%	5.9%	2.7%	0.8%

The maximum score available for this task is 8 points.

The cut score for a level 3 response, meeting standards, is 4 points.

Many students (about 77%) could find the number of faces and the number of corners in the 3-dimensional shape. About half the students could also find the number of edges. About 21% of the students could find the number of faces and vertices, think about how the net folds and explain why a student might miscount to get 14 corners and why the surface area of the net and shape are the same, and find the volume. Less than 1% of the students could meet all the demands of the task. More than 23% of the students scored no points on this task. About 73% of those students attempted the task.

**Implications for Instruction:**

Students at this grade level have been working on area, perimeter, edges and faces since fourth and fifth grade. Students start working with 3-dimensional shapes around fifth grade and volume as filling a shape, these ideas deepen in middle school to include finding volume and surface area. At this grade level they should be comfortable and fluent with simple geometric terms and be able to start making convincing mathematical arguments. Frequent classroom discourse is an important part to learning strategies for making mathematical arguments and being able to judge the level of completeness necessary to make it convincing and to know if its will hold for all cases. While geometry is not the main focus of mathematics at this grade level, it provides a nice context for deepening students reasoning skills and developing their logical thinking skills.

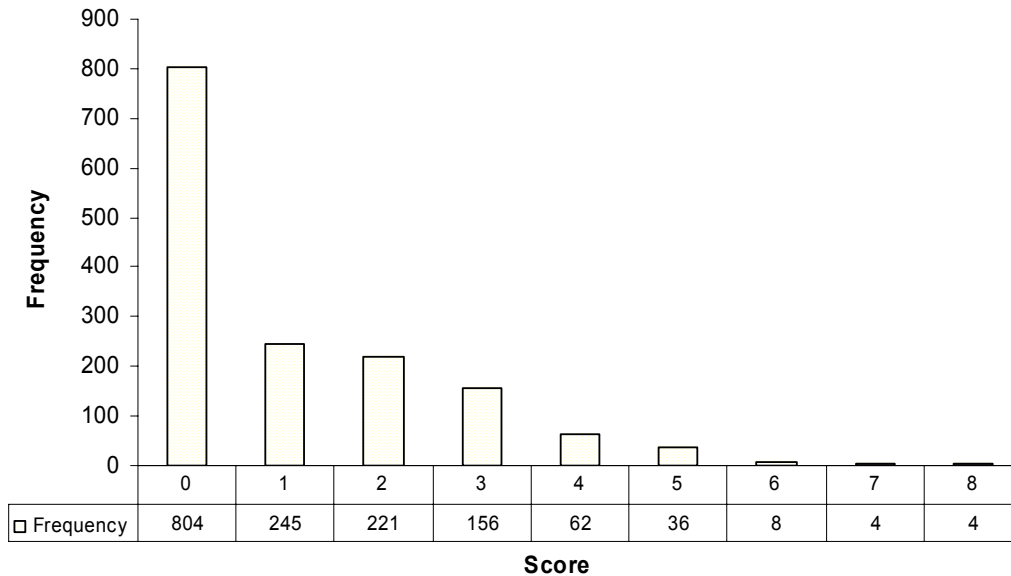
**Graphs**

<b>Student Task</b>	Convert description of a function from a context to equation and graph. Match function descriptions and equations to their graphical representation.
<b>Core Idea 1 Functions and Relations</b>	<b>Understand patterns, relations, and functions.</b> <ul style="list-style-type: none"> <li>Understand relations and functions and select, convert flexibly among, and use various representations for them.</li> </ul>

Frequency Distribution for each Task – Grade 9  
Grade 9– Graphs

**Graphs**

Mean: 1.10, S.D.: 1.47



Score:	0	1	2	3	4	5	6	7	8
% < =	52.2%	68.1%	82.5%	92.6%	96.6%	99.0%	99.5%	99.7%	100.0%
% > =	100.0%	47.8%	31.9%	17.5%	7.4%	31.9%	1.0%	0.5%	0.3%

The maximum score available for this task is 8 points.

The cut score for a level 3 response, meeting standards, is 3 points.

About half the students could give a description for either graph A or C or give an equation for B or C. A little less than 20% of the students could correctly identify a couple of the descriptions and at least one equation. Less than 1% could match all the descriptions and equations. Over 52% of the students scored no points on this task. 32% of them attempted the task. 46% did not attempt this task, but were willing to attempt the task following graphs. 22% did not attempt this task or the final task of the exam.

**Implications for Instruction:**

Students need to be able to make connections between multiple representations of the same idea. They should have frequent opportunities to work with situations, turn those situations into equations, and make graphs from the equations. In reading the sample, students did not show evidence of trying to turn the words in the descriptions into equations. No student in the sample attempted to make a t-chart of values for any of the equations to help them match the equation to a graphic representation. Learning skills without being able to make connections is not helpful in transferring knowledge to any application outside the classroom. Students working in elementary algebra should be quite fluid with this level of making connections.

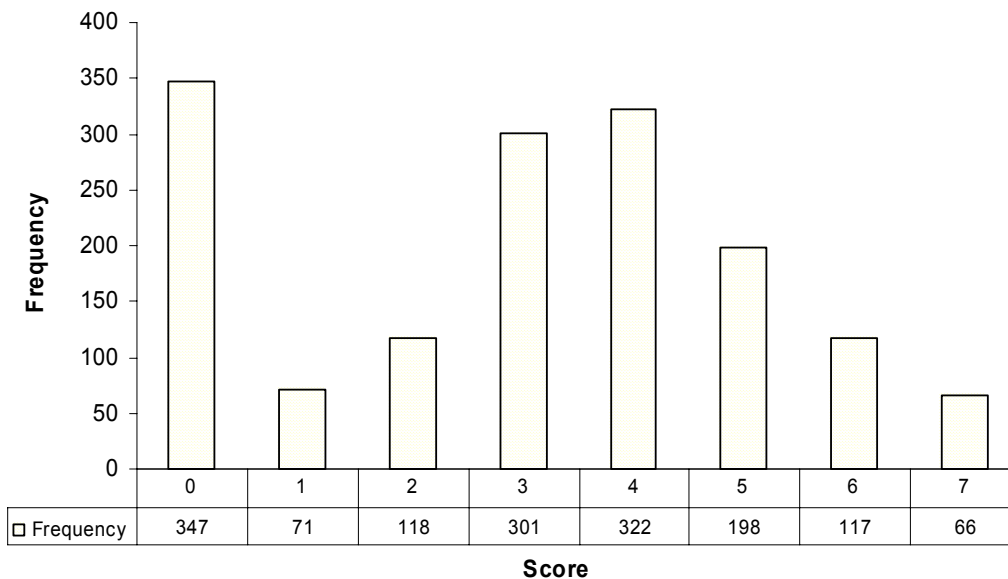
**Fibonacci Sequences**

<b>Student Task</b>	Extend a pattern, work a pattern backwards, and generate a sequence using a given pattern. Add and divide algebraic terms with two variables, solve simultaneous equations and use substitution to find missing expressions.
<b>Core Idea 1 Functions and Relations</b>	<b>Understand patterns, relations, and functions.</b>
<b>Core Idea 3 Algebraic Properties and Representations</b>	<b>Represent and analyze mathematical situations and structures using algebraic symbols.</b>

## Frequency Distribution for each Task – Grade 9– Fibonacci Sequences

### Fibonacci Sequences

Mean: 3.02, S.D.: 2.09



Score:	0	1	2	3	4	5	6	7
% <=	22.5%	27.1%	34.8%	54.4%	75.3%	88.1%	95.7%	100.0%
% >=	100.0%	77.5%	72.9%	65.2%	45.6%	24.7%	11.9%	65.2%

The maximum score available for this task is 7 points.

The cut score for a level 3 response, meeting standards, is 3 points.

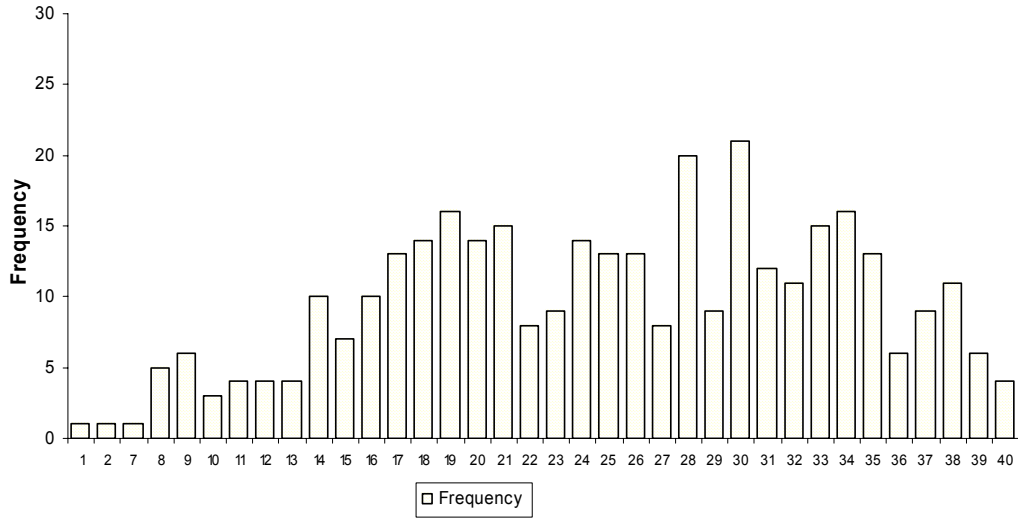
Many students (about 78%) could solve the 2<sup>nd</sup> sequence in part one or combine like terms in part 3. Many students (about 73%) could fill in both sequences in part 1. More than half the students (65%) could fill in the sequence in part 1 and part 2 or in part 1 and part 4. A little less than half the students (45%) could fill in all the sequences in part 1, 2 and 4. About 6.5% of the students could meet all the demands of the task, including using guess and check, substitution, or solving simultaneous equations to find a value for  $x$  and  $y$  in part 4. Almost 23% of the students scored no points on this task. 41% of the students with this score attempted the task.

#### Implications for Instruction:

Students at this grade level should be comfortable solving simple equations with two unknowns. They should have some basic sense-making around the equations that allows them to use strategies like guess and check. But, at this point they should start to be able to use other strategies for solving two equations with two unknowns. They should begin to demonstrate transference from algebraic skills and symbol manipulation into problem-solving tools. Students should also develop a norm around solving equations of substituting values back into the original equations to see if the values are correct or meet the constraints of the problem.

### Overall Frequency Distribution by Total Score

**Grade 10**  
Mean=25.10; S.D.=8.34



## Level Frequency Distribution Chart and Frequency Distribution

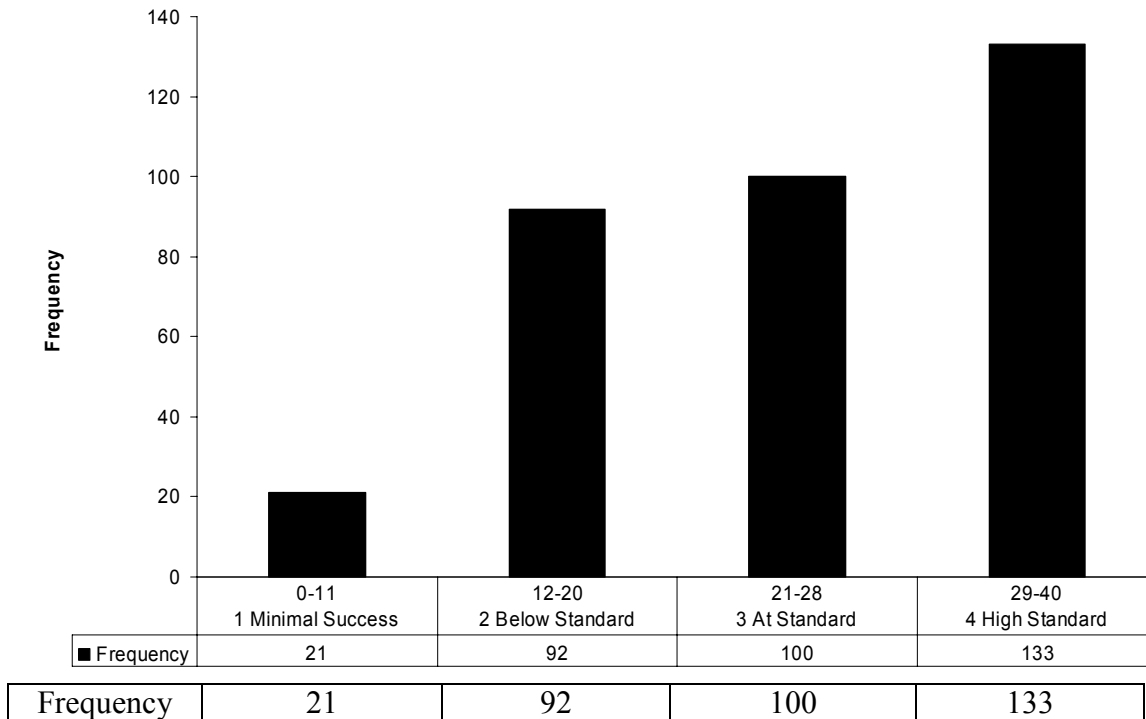
2004 - Numbers of students tested in Grade 10: 346

### Grade 10 2000 - 2001

Level	% at ('00)	% at least ('00)	% at ('01)	% at least ('01)
1	33%	100%	32%	100%
2	45%	67%	52%	68%
3	18%	22%	14%	16%
4	4%	4%	2%	2%

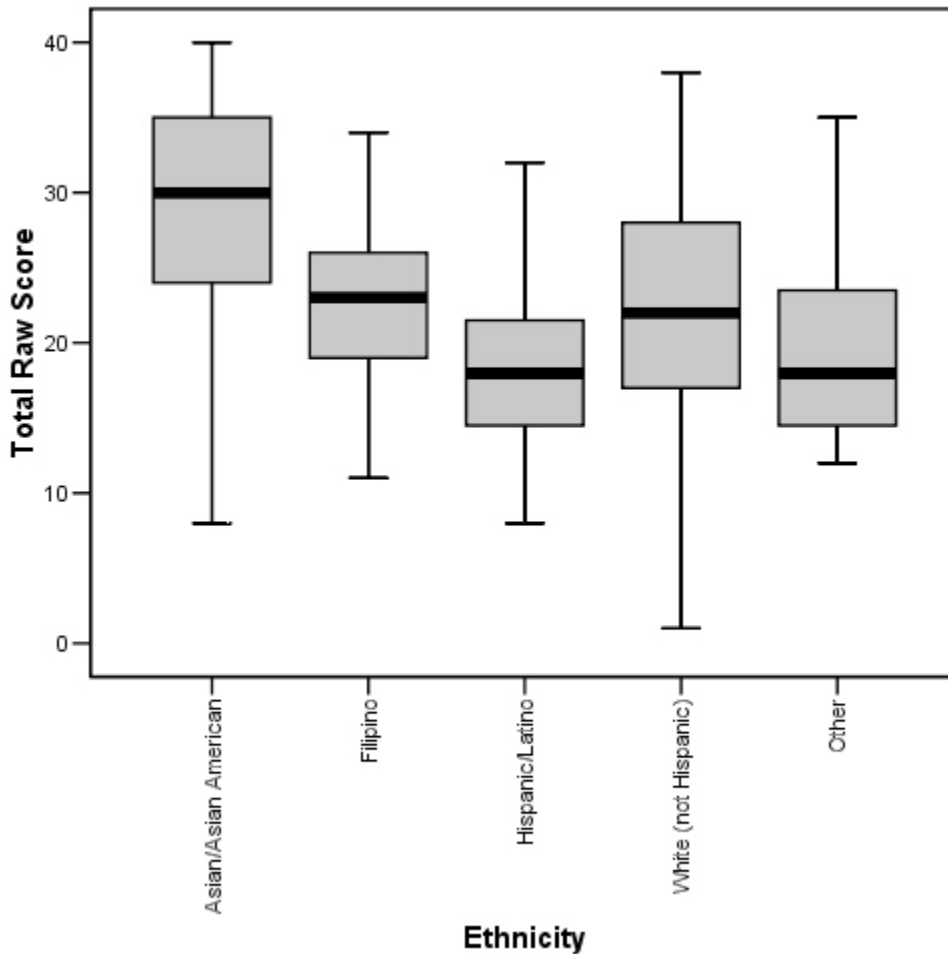
### Grade 10 2002 - 2004

Level	% at ('02)	% at least ('02)	% at ('03)	% at least ('03)	% at ('04)	% at least ('04)
1	44%	100%	25%	100%	6%	100%
2	40%	56%	39%	75%	27%	94%
3	9%	16%	23%	37%	29%	67%
4	6%	6%	14%	14%	38%	38%



Grade 10  
Ethnicity

The following figures show the distribution of raw scores with the median represented as a horizontal bar in the center of the box, the interquartile range (25 percentile to 75 percentile) represented by the box, and the extreme values\* within a category lie between the highest and lowest horizontal bars. Ns of less than 5 students are not reported.



Ethnicity	N
Asian/Asian American	170
Filipino	13
Hispanic/Latino	27
White (not Hispanic)	112
Other	15

\*extremes are cases with values more than 3 box lengths from the upper or lower edge of the box.

## Grade 10 Ethnicity

In this section, test scores are compared across different ethnic groups<sup>36</sup>. One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

The scores of Asian/Asian American students are significantly higher than all other groups.

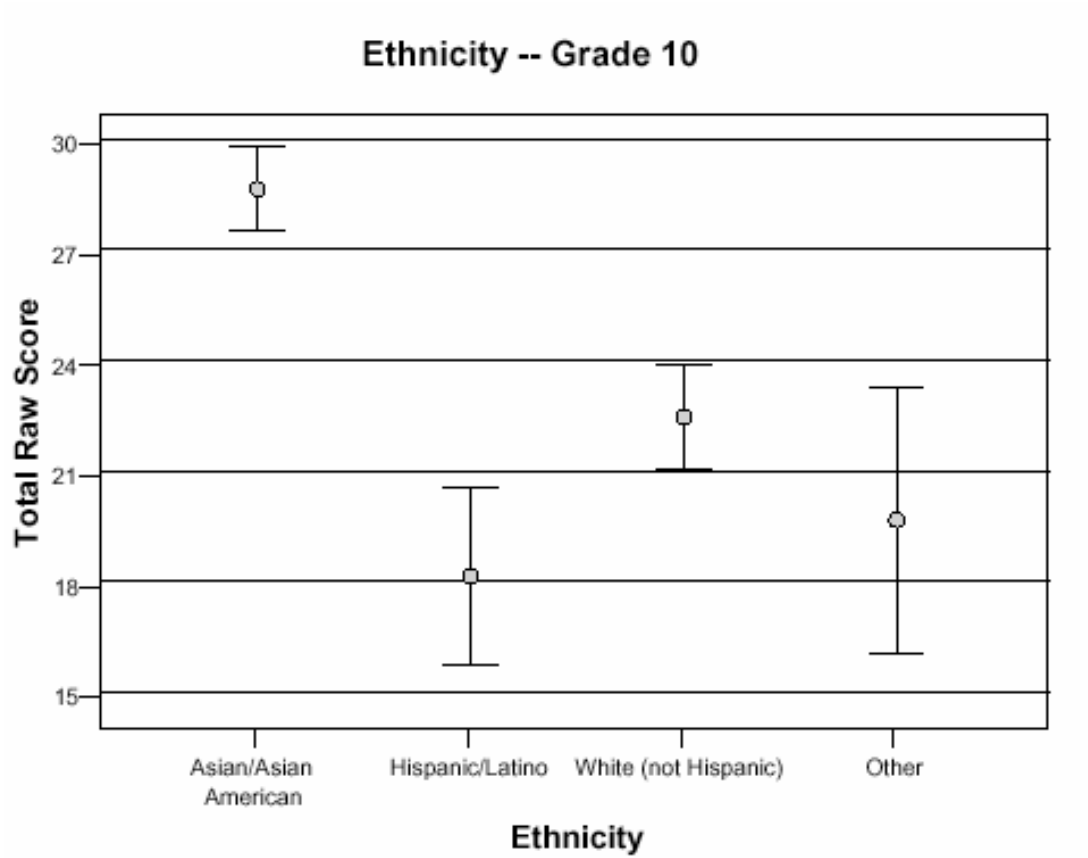
The scores of Hispanic/Latino students are significantly lower than those of Asian/Asian American and White students. There are no significant differences between Hispanic/Latino students and any other ethnic group.

The scores of White students are significantly lower than those of Asian/Asian American students and significantly higher than Hispanic students. There are no significant differences between White students and any other ethnic group.

The scores of “Other” students are significantly lower than those of Asian/Asian American students. There are no significant differences between “Other” students and any other ethnic group.

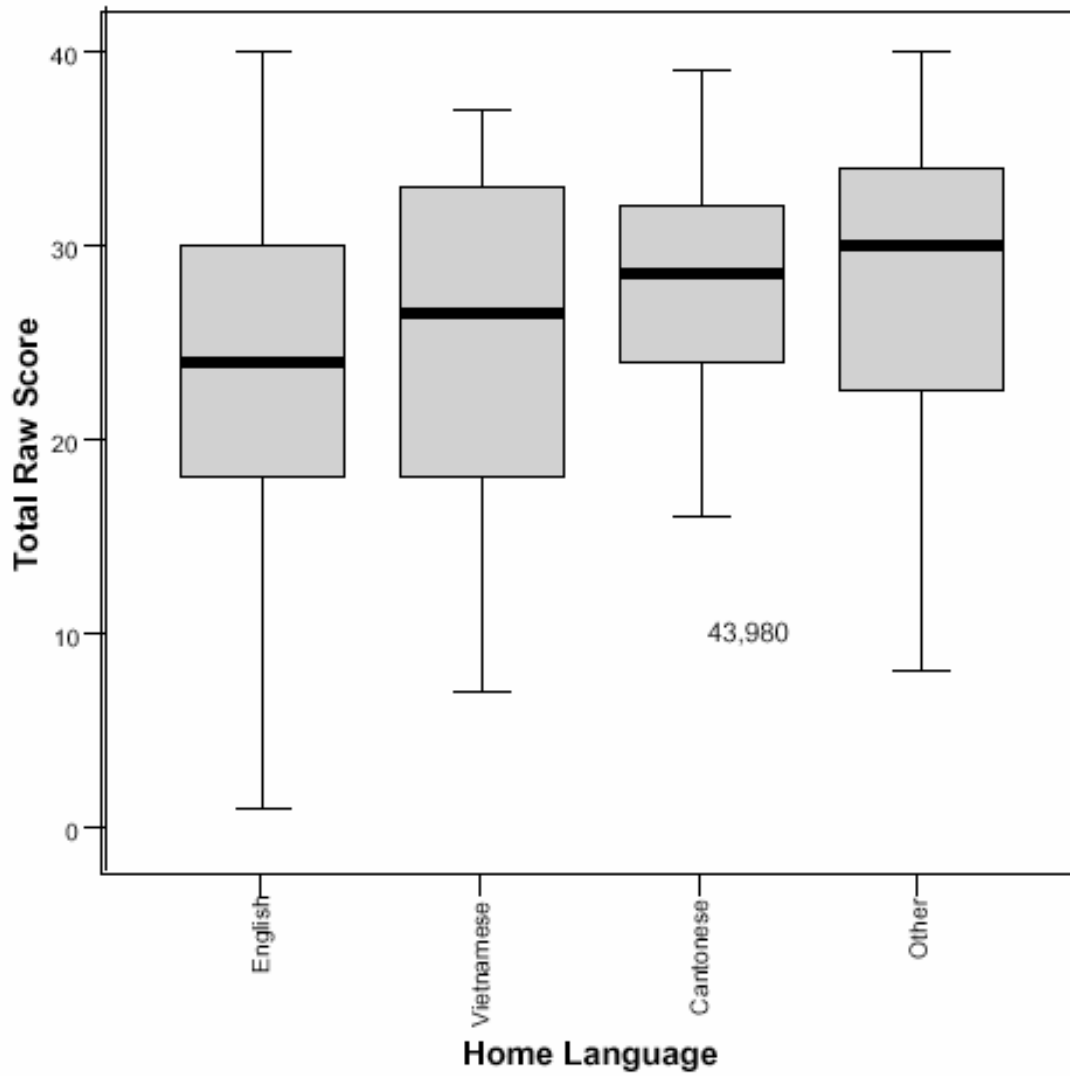
<sup>36</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons across the groups were made using Tukey’s honestly significant difference comparison. All differences were significant at the .05 level.

Distribution of sampling means  
 Grade 10  
 Ethnicity



Ethnicity	N
Asian/Asian American	170
Filipino	13
Hispanic/Latino	27
White (not Hispanic)	112
Other	15

Grade 10  
Home Language



Home Language	N
English	216
Vietnamese	14
Cantonese	22
Other	87

Distribution of sampling means  
Grade 10  
Home Language

In this section, test scores are compared across groups of students who speak different languages at home<sup>37</sup>. One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

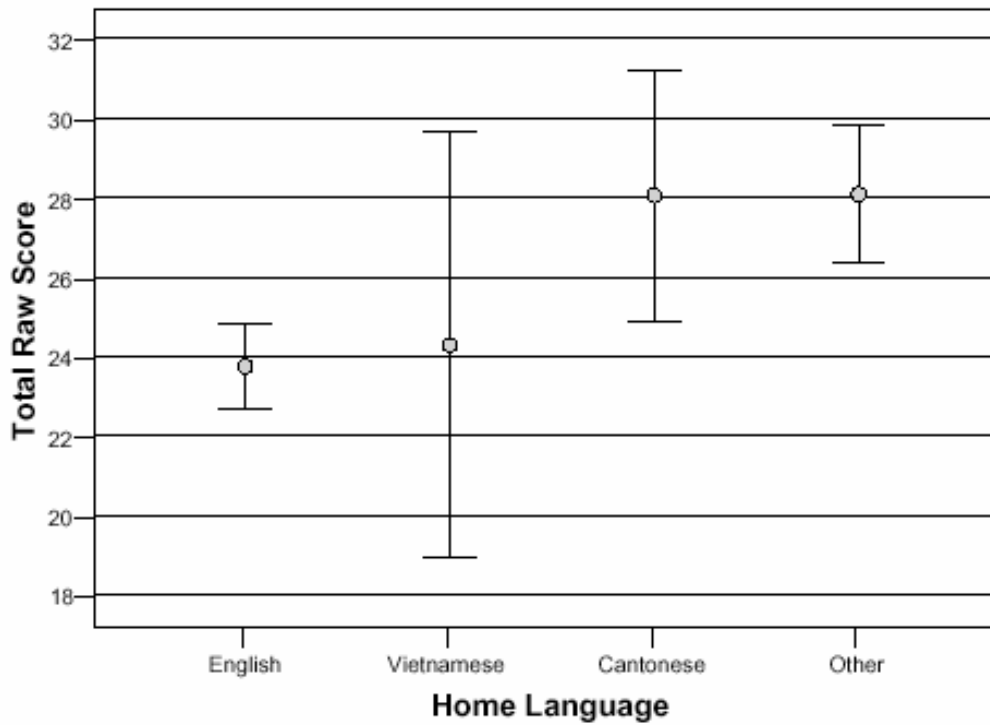
The scores of students with English as a home language is significantly lower than those of students with a home language of “Other”. There is no significant difference between scores of students with a home language of English and those with any other home language group.

There are no significant differences between students with Vietnamese as a home language and any other home language group.

There are no significant differences between students with Cantonese as a home language and any other home language group.

The scores of students with “Other” as a home language are significantly higher than those of students with a home language of English. There is no significant difference between scores of students with a home language of “Other” and those with any other home language group.

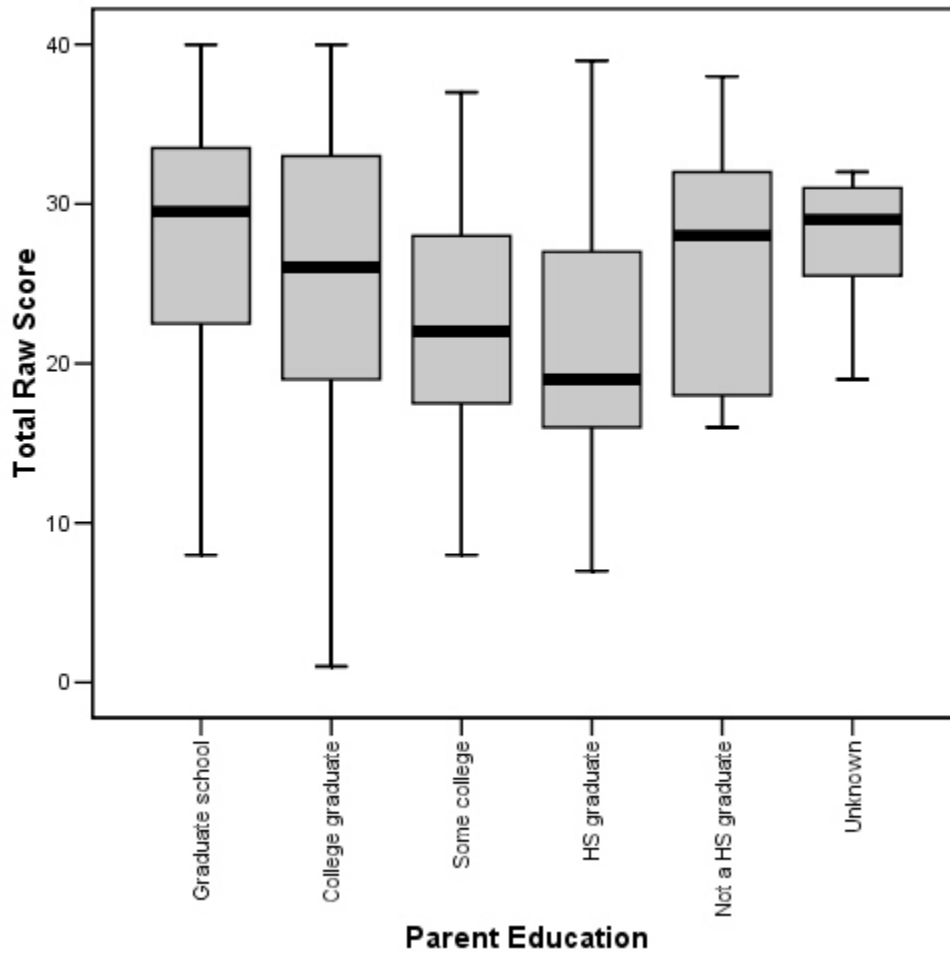
### Home Language -- Grade 10



Home Language	N
English	216
Vietnamese	14
Cantonese	22
Other	87

<sup>37</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons across the groups were made using Tukey's honestly significant difference comparison. All differences were significant at the .05 level.

Grade 10  
Parent Education



Parent Education	N
Graduate school	92
College graduate	133
Some college	56
HS graduate	41
Not a HS graduate	10
Unknown	7

## Grade 10 Parent Education

In this section, test scores are compared across groups of different levels of parent education.<sup>38</sup> One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

The scores of students whose parents have a graduate degree are significantly higher than those whose parents had some college education or are high school graduates. There are no significant differences between students whose parents have a graduate degree and any other Parent Education categories.

The scores of students whose parents have a college education are significantly higher than those whose parents are high school graduates. There are no significant differences between students whose parents have a college education and any other Parent Education categories.

The scores of students whose parents have some college education are significantly lower than those whose parents have a graduate education. There are no significant differences between students whose parents have some college education and any other Parent Education categories.

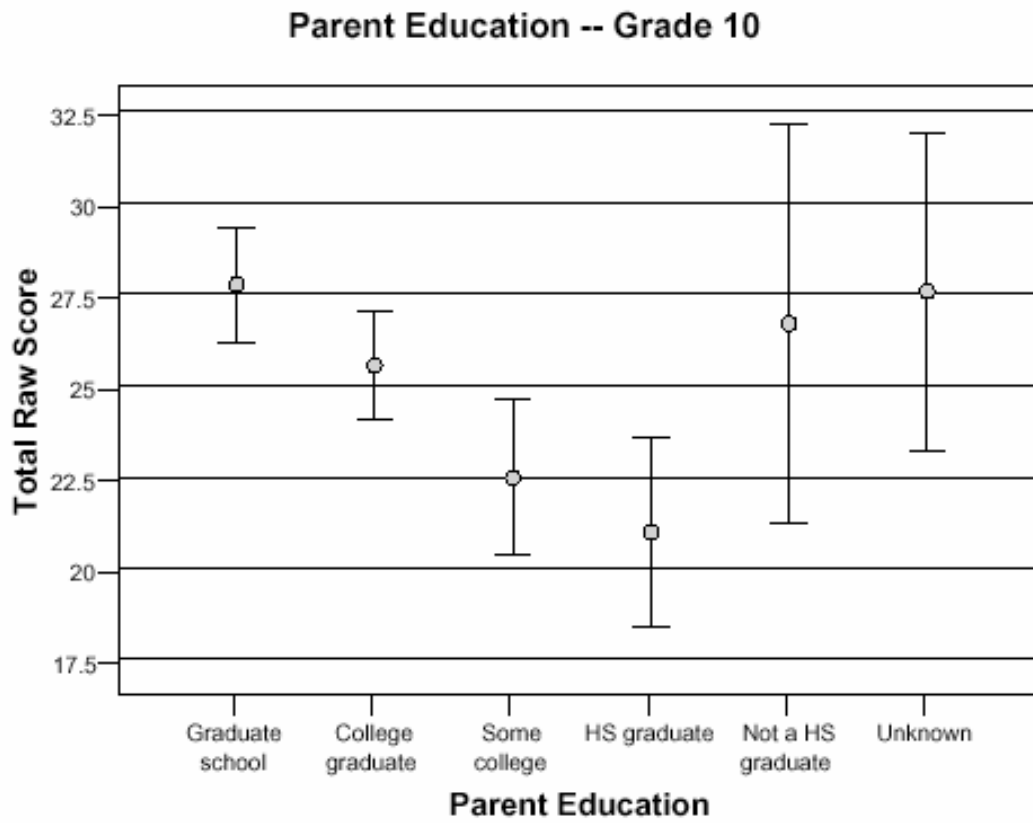
The scores of students whose parents are high school graduates are significantly lower than those whose parents have a college education, and a graduate degree. There are no significant differences between students whose parents are high school graduates and any other Parent Education categories.

There are no significant differences between students whose parents are not high school graduates and any other Parent Education categories.

There are no significant differences between “Unknown” students and any other Parent Education categories.

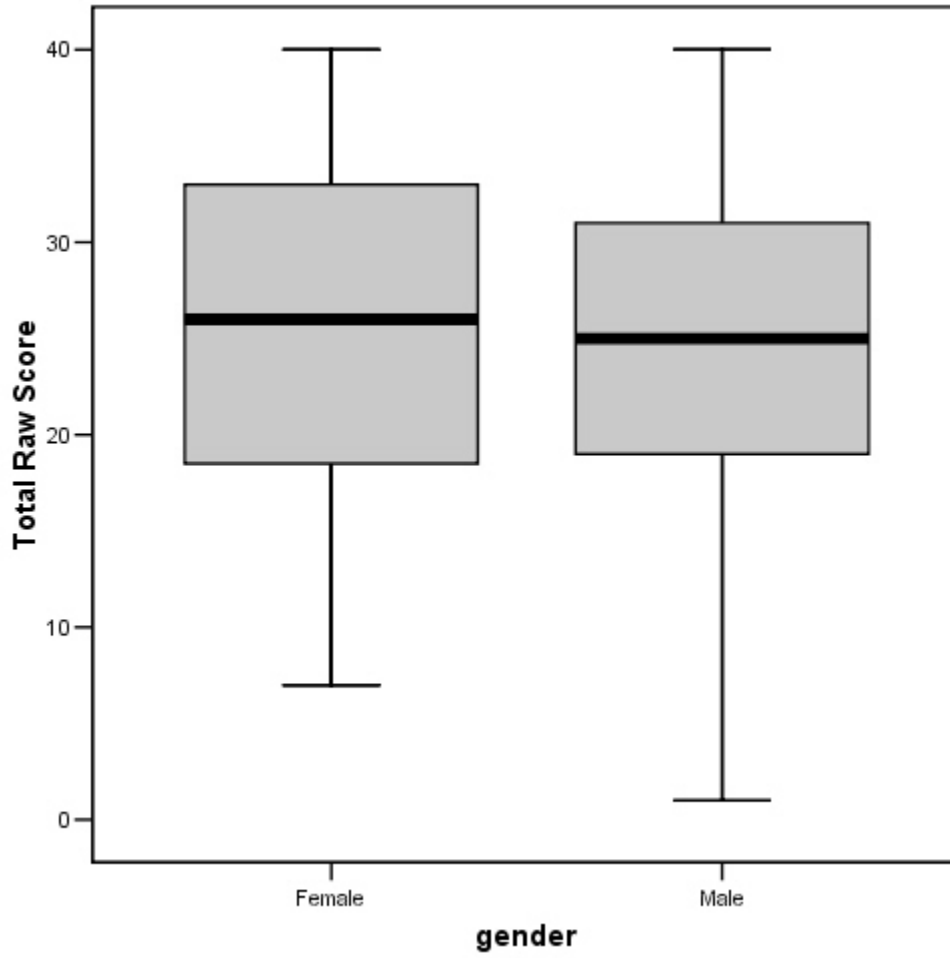
<sup>38</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons between the groups were made using Tukey’s honestly significant difference comparison. All differences were significant at the .05 level.

Distribution of sampling means  
 Grade 10  
 Parent Education



Parent Education	N
Graduate school	92
College graduate	133
Some college	56
HS graduate	41
Not a HS graduate	10
Unknown	7

Grade 10  
Gender

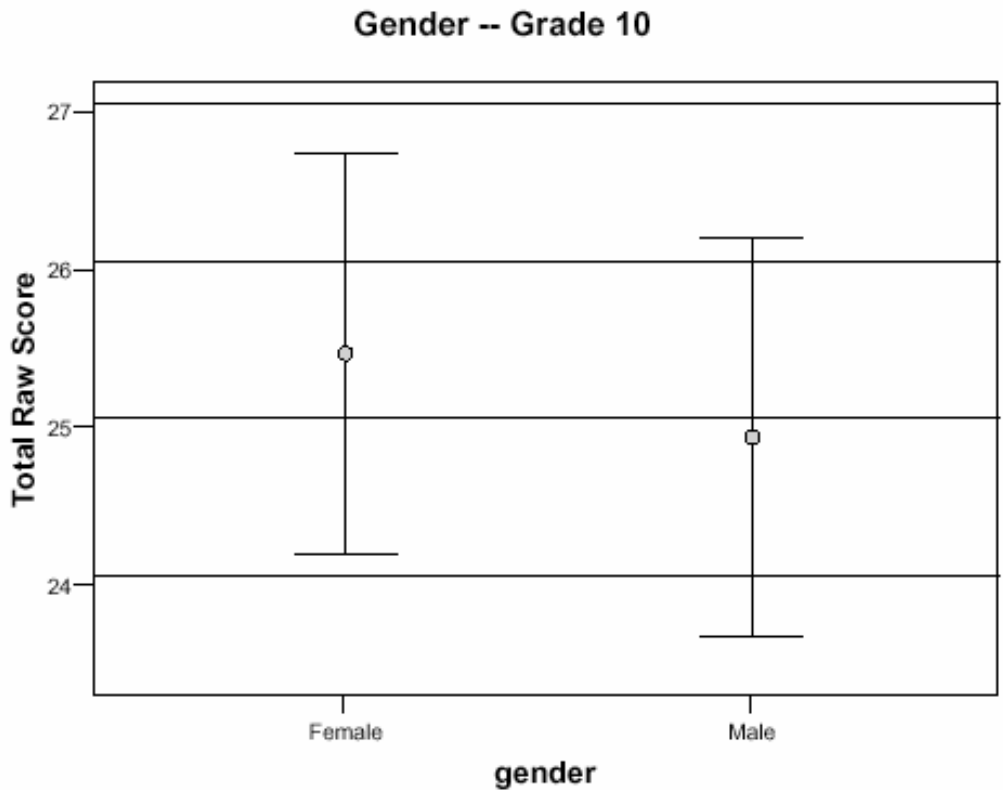


Gender	N
Female	180
Male	159

Distribution of sampling means  
 Grade 10  
 Gender

In this section, test scores are compared across gender.<sup>39</sup> One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

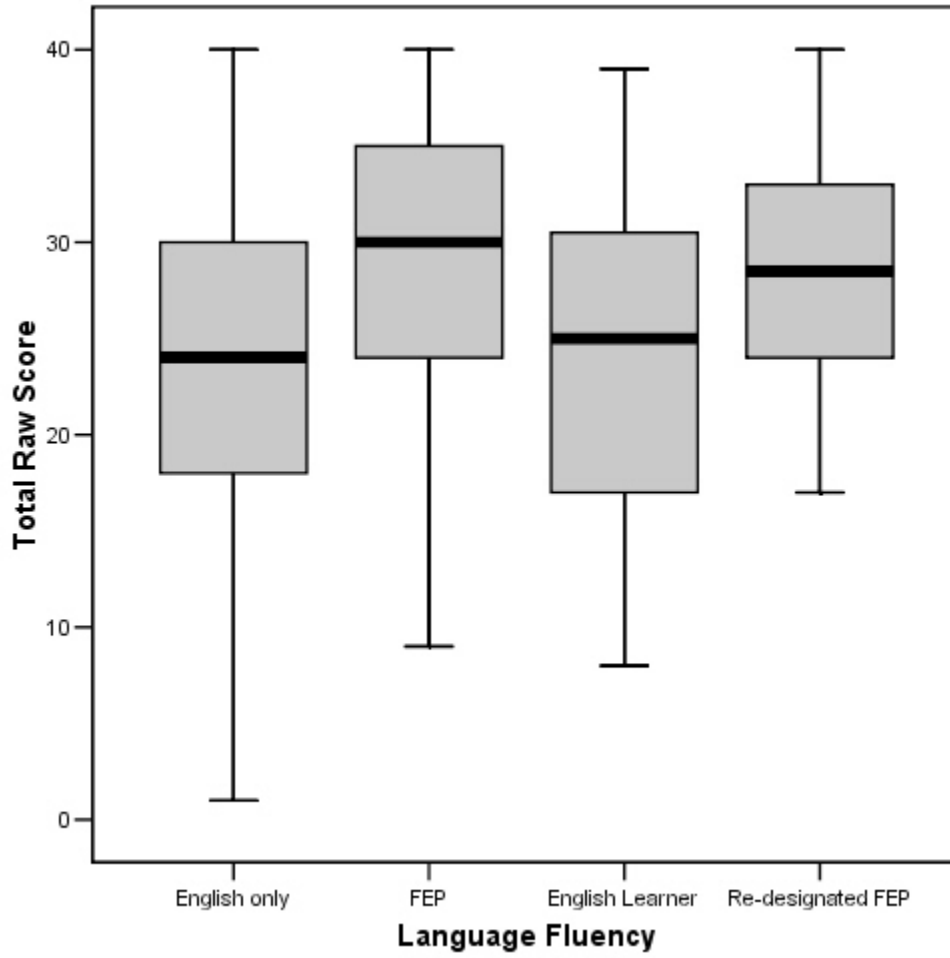
There is no significant difference between the scores of females and males.



Gender	N
Female	180
Male	159

<sup>39</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons between the groups were made using Tukey's honestly significant difference comparison. All differences were significant at the .05 level.

Grade 10  
Language Fluency



Language Fluency	N
English only	221
FEP	57
English Learner	19
Re-designated FEP	42

Distribution of sampling means  
Language Fluency  
Grade 10

In this section, test scores are compared across groups of different language fluency.<sup>40</sup> One way to look at the group differences is to study the graphs. If scores from group A are above and do not overlap the scores from group B then group A is significantly higher than group B. Conversely, if scores from group A are below and do not overlap the scores from group B then group A is significantly lower than B. When two scores overlap, then there is no significant difference between the groups.

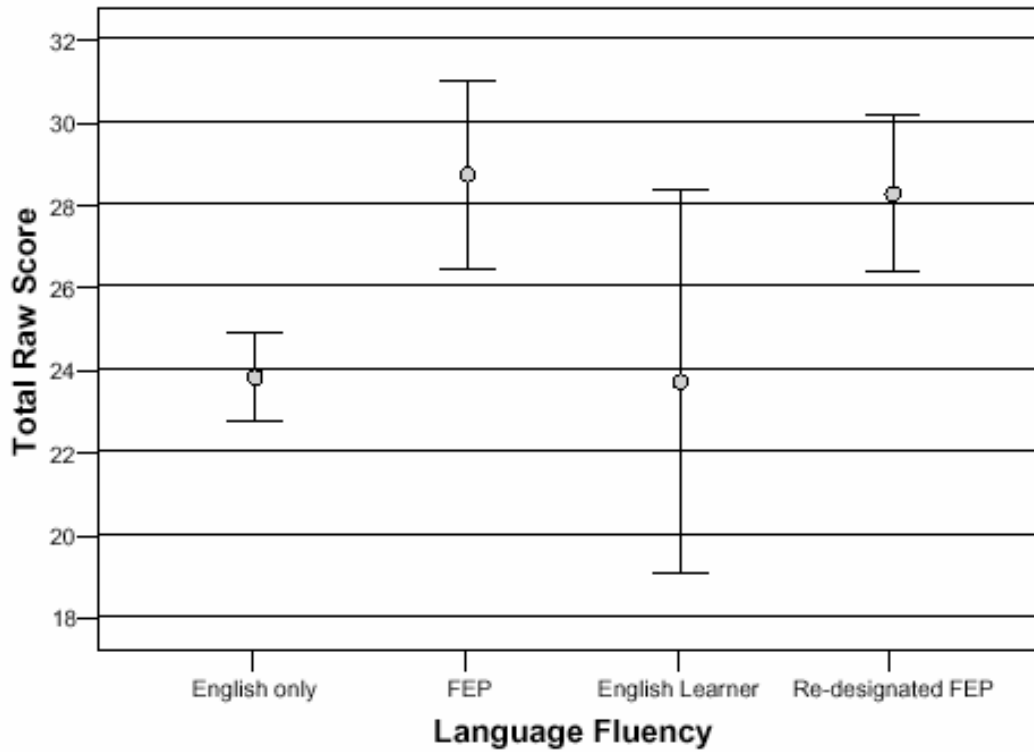
The scores of students with English Only are significantly lower than those students described as Full English Proficiency (FEP) and Re-designated FEP. There is no significant difference between the scores of students as English Only and any other group.

The scores of students with Full English Proficiency (FEP) are significantly higher than those students described as English Only. There is no significant difference between the scores of students as Full English Proficiency (FEP) and any other group.

The scores of students in English Learner category are not significantly different between the scores of students as described in any other group.

The scores of students in Re-designated FEP are significantly higher than those students described as English Only. There is no significant difference between the scores of students as Re-designated FEP and any other group.

### Language Fluency -- Grade 10



Language Fluency	N
English only	221
FEP	57
English Learner	19
Re-designated FEP	42

<sup>40</sup> Overall comparisons were made using an Analysis of Variance (ANOVA) test. Comparisons between the groups were made using Tukey's honestly significant difference comparison. All differences were significant at the .05 level.

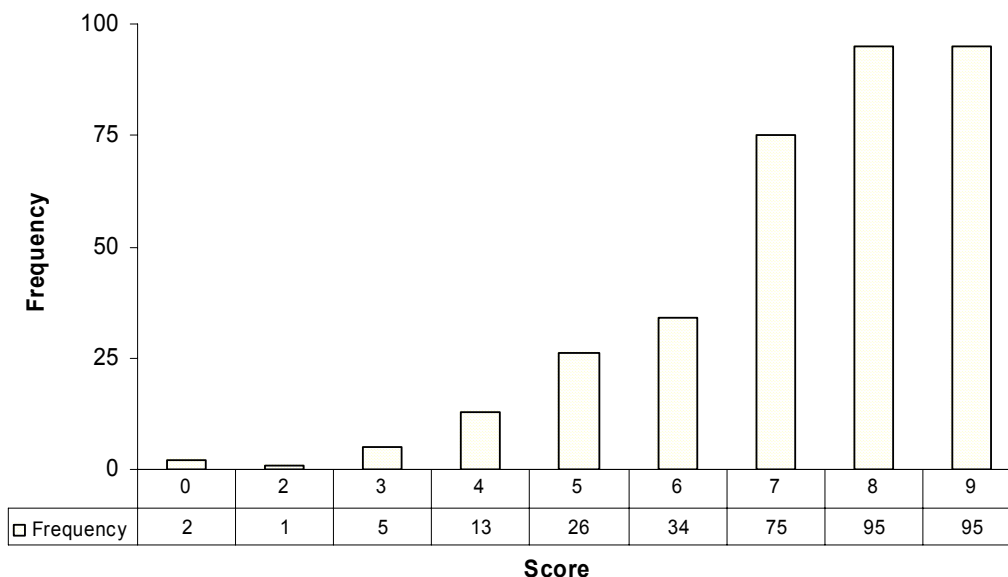
### Rectangles with Fixed Area

<b>Student Task</b>	Read and interpret tables about area, length, and height. Use table to plot graph and answer questions about non-linear functions and limits.
<b>Core Idea 4: Geometry and Measurement</b>	<b>Develop mathematical arguments about geometric relationships; and apply appropriate techniques, tools, and formulas to determine measurements.</b> Understand and use formulas for area.
<b>Core Idea 3: Algebraic Properties and Representations</b>	<b>Represent and analyze mathematical situations and structures using algebraic symbols.</b> Recognize and use equivalent graphical and algebraic representations of functions with their geometric characteristics such as intercepts.

Frequency Distribution for each Task – Grade 10  
Grade 10– Rectangle with Fixed Area

**Rectangle with Fixed Area**

Mean: 7.35, S.D.: 1.61



Score:	0	1	2	3	4	5	6	7	8
% < =	0.6%	0.9%	2.3%	6.1%	13.6%	23.4%	45.1%	72.5%	100.0%
% > =	100.0%	99.4%	99.1%	97.7%	93.9%	86.4%	76.6%	54.9%	27.5%

The maximum score available for this task is 9 points.

The cut score for a level 3 response, meeting standards, is 5 points.

86% of the students met standards on this task, they could fill in the table with correct values of length and height to make an area of  $24 \text{ cm}^2$ . Students with this score could also write a formula for area of a rectangle and fill in values in the table for height using the formula  $h=24/l$ . Many students, approximately 76% could also find plot the graph, but may have forgotten to connect the points to make a curve and could explain either why the graph was not linear or why the graph could not cross the h-axis. Almost 27% of the students could meet all the demands of the task. Less than 1% of the students scored no points on this task.

**Implications for Instruction:**

Students need frequent opportunities to work with functions in context. At this grade level, the reasoning skills need to be expanded to consider how parts of equations relate to the shape of graphs and students should start to develop ideas about limits and why those limits might exist or make sense. Graphs need to be viewed from the perspective of conveying information. What does a curved line say about the situation? How is this different from the information conveyed by a straight line? Students need to continually be pushed to think about meaning as well as procedure, to view mathematics as a way of describing events, making predictions, and tools for making decisions.

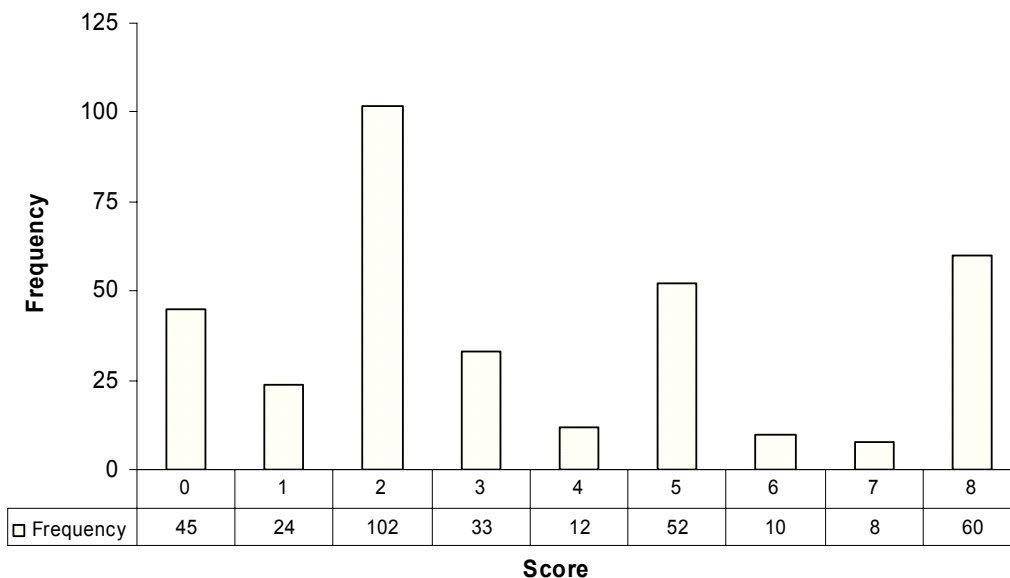
**At the Gym**

<b>Student Task</b>	Work with radius, area and volume of a set of solid circular discs. Apply and reason about volume in an unfamiliar setting.
<b>Core Idea 4: Geometry and Measurement</b>	<b>Apply appropriate techniques, tools, and formulas to determine measurements.</b> Understand and use formulas for the area, surface area, and volume of geometric figures, including cylinders.

Frequency Distribution for each Task – Grade 10  
Grade 10– At the Gym

**At the Gym**

Mean: 3.56, S.D.: 2.66



Score:	0	1	2	3	4	5	6	7	8
% <=	13.0%	19.9%	49.4%	59.0%	62.4%	77.5%	80.3%	82.7%	100.0%
% >=	100.0%	87.0%	80.1%	50.6%	41.0%	37.6%	22.5%	19.7%	17.3%

The maximum score available for this task is 8 points.

The cut score for a level 3 response, meeting standards, is 4 points.

Most students, approximately 80%, could find the volume of the small weight given the area of the base and the height. About half the students could also do some of the steps for finding the radius of the large weight in part 3 of the task. Only 22% could do some successful work for finding the surface area of the middle weight when given a radius and a diameter. About 17% met all the demands of the task. About 13% of the students scored no points on the task. Most of those attempted the task.

**Implications for Instruction:**

Students need to learn formulas in a way of making sense of the world. Learning to generalize from specific formulas to a generalization that works for many shapes, eliminates some need for memorization and empowers students to solve problems for unfamiliar shapes. If students explore the idea of volume, it is important for them to understand the elements that compose that formula. In the case of volume, students should come to realize that volume is made of a base (which can take on many different looks depending on the shape) times a height. Students need to be preparing not just for the specific problems in the book, but also for the ability to think about mathematics when confronted with new shapes or problems.

Just as students should be able to decompose formulas, students should be able to decompose shapes into individual components and see how they relate to effect the whole. Students had difficulty thinking about the relationship of the hole to the weight. How does the hole effect the area of the base? The volume of the weight? Students need to learn to reflect on the relationships. At this grade level, composing and decomposing shapes should be a very natural part of their mathematical thinking.

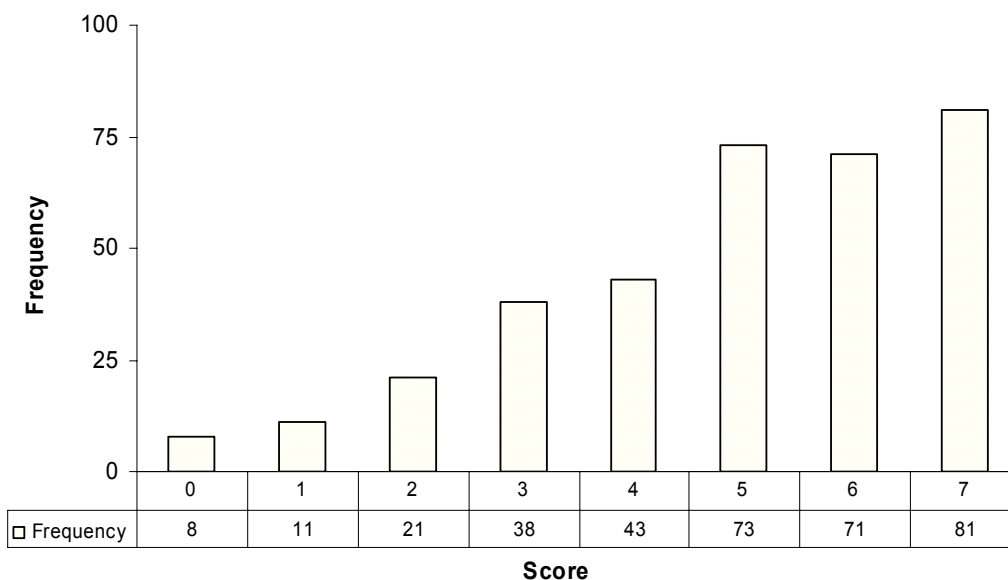
**Birds' Eggs**

<b>Student Task</b>	Read and interpret scatterplot about length and width of birds' eggs. Understand, use and compare ratios of length to width of different eggs.
<b>Core Idea 5: Data Analysis</b>	For bivariate measurement data, be able to display a scatterplot and describe its shape.
<b>Core Idea 3: Algebraic Properties and Representations</b>	Recognize and use equivalent graphical and algebraic representations of lines with their geometric characteristics, such as slope and intercepts. Develop, analyze and explain methods for solving problems involving proportional reasoning, such as scaling and including equivalent ratios. Approximate and interpret rates of change, from graphic and numeric data.

Frequency Distribution for each Task – Grade 10  
Grade 10– Bird's Eggs

**Bird's Eggs**

Mean: 4.90, S.D.: 1.83



Score:	0	1	2	3	4	5	6	7
% <=	2.3%	5.5%	11.6%	22.5%	35.0%	56.1%	76.6%	100.0%
% >=	100.0%	97.7%	94.5%	88.4%	77.5%	65.0%	43.9%	23.4%

The maximum score available for this task is 7 points.

The cut score for a level 3 response, meeting standards, is 4 points.

Most students (89%) could plot a point on the scatter graph, give a description of the trend of the data, and either approximate the length of an egg for a given width or identify the egg with the greatest ratio of length to width. Many students (78%) could plot a point, find the length given the width, and describe the differences between egg D and C or describe the trend of the data and identify the egg with the greatest ratio. About 56% of the students could do the entire problem except find the ratios in part 5. 23% of the students met all the demands of the task. About 3% of the students scored no points on the task.

**Implications for Instruction:**

Students at this grade level need to view graphs as communication tools. When looking at graphs, a routine first question for students should be to think about what is the trend of the data, what is the author trying to convey. Students at this grade level frequently use graphs and do calculations around slope, but they don't often think about the meaning of the ratio or slope in terms of context and what information about the situation is given by this ratio. What types of experiences will help students see slope as a piece of sense-making information to describe some aspect of the situation? Students need to have the reasoning developed and pushed as they develop new mathematical procedures and skills. How is this procedure or skill useful? What is the purpose of slope or of ratios? Included in the reasoning students are developing, is the need for better levels of justifications or proofs for their choices or decisions. It should be a routine practice to use mathematical computations to back up their ideas.

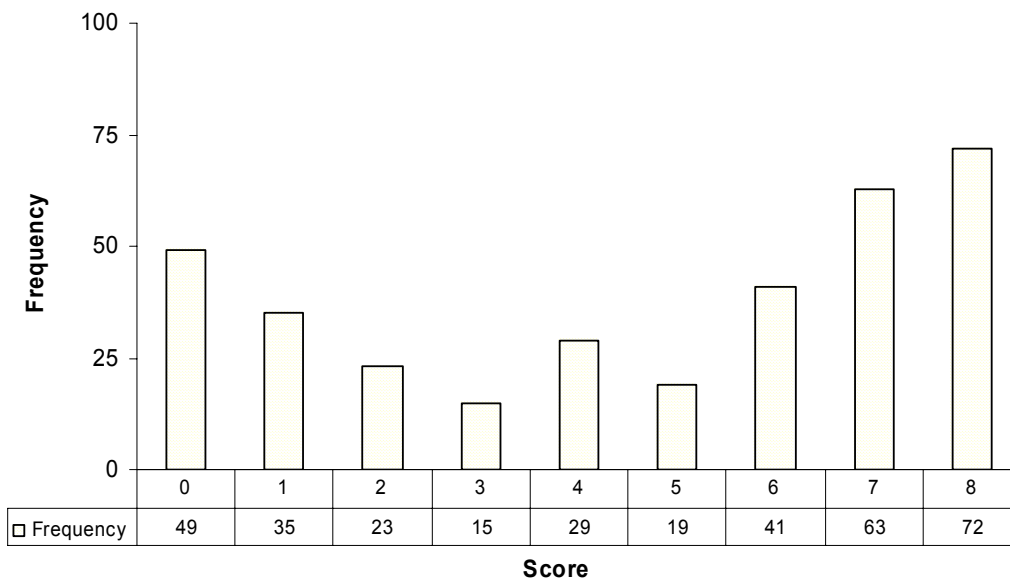
**Pentagons**

<b>Student Task</b>	Solve equations to find interior and exterior angles in pentagons and tiled pentagons.
<b>Core Idea 3: Geometry and Measurement</b>	<b>Analyze characteristics and properties of two-dimensional geometric shapes, develop mathematical arguments about geometric relationships, and apply appropriate techniques, tools, and formulas to determine measurements.</b>

Frequency Distribution for each Task – Grade 10  
Grade 10– Pentagons

**Pentagons**

Mean: 4.62, S.D.: 2.94



Score:	0	1	2	3	4	5	6	7	8
% <=	14.2%	24.3%	30.9%	35.3%	43.6%	49.1%	61.0%	79.2%	100.0%
% >=	100.0%	85.8%	75.7%	69.1%	64.7%	56.4%	50.9%	39.0%	39.0%

The maximum score available for this task is 8 points.

The cut score for a level 3 response, meeting standards, is 4 points.

Most students (86%) could use the diagram to reason the size of the angle for a regular pentagon. Many students (65%) could find the angle size for a regular pentagon, find the size of its exterior angle, and find the angle formed by two adjoining pentagons in part 3 of the task. 39% of the students could find all the missing angle measurements, but a little less than half of them could not explain how they found the final angle in part 5 of the task. 14% of the students scored no points on this task. Of that group, 85% attempted one or more parts of the task.

**Implications for Instruction:**

Students at this grade level should develop and be fluent with interior and exterior angles and their properties. They should be developing the reasoning power to use these relationships to find and quantify unknown angles. They should also be able to justify their angles. It is important that students not rely on the way things look in diagrams, but through deduction and calculation find the exact size of unknown angles.

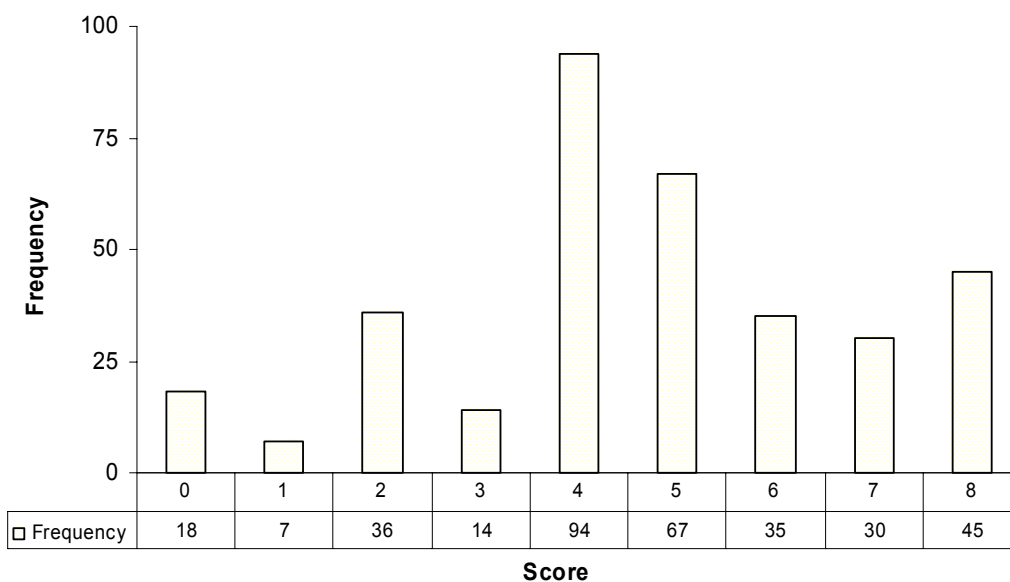
**Differences**

<b>Student Task</b>	Use algebra to explore and explain a number sequence and its differences. Use algebra to solve equations for missing terms.
<b>Core Idea 1: Algebraic Properties and Representations</b>	<b>Represent and analyze mathematical situations and structures using algebraic symbols and solve equations.</b>
<b>Core Idea 2: Mathematical Reasoning and Proof</b>	Identify, formulate and confirm conjectures. Explain the logic inherent in a solution process.

## Frequency Distribution for each Task – Grade 10– Differences

### Differences

Mean: 4.66, S.D.: 2.12



Score:	0	1	2	3	4	5	6	7	8
% ≤	5.2%	7.2%	17.6%	21.7%	48.8%	68.2%	78.3%	87.0%	100.0%
% ≥	100.0%	94.8%	92.8%	82.4%	78.3%	51.2%	51.2%	21.7%	13.0%

The maximum score available for this task was 8 points.

The cut score for a level 3 response, meets standards, was 4 points.

Most students (93%) could fill in the values for the first differences in the first table. Many students (79%) could fill in both the 1<sup>st</sup> and 2<sup>nd</sup> differences in the table. A little more than half could also fill in the values using algebraic notation in part 4. 22% could fill in both tables and find the values for a, b, and c in the formula  $an^2+bn+c$ . 13% of the students met all the demands of the task. 5% of the students scored no points on this task. About half of this group attempted the task.

**Implications for Instruction:**

Students need to see the usefulness of using their algebraic skills as tools for solving problems. Students need to have explicit experiences that help them transition from guess and check to using equations. They need to have discussions about when and why equations are more efficient than using guess and check as a strategy. Students should frequently have problems that challenge their level of thinking and push them to make mathematical justifications. Students need to see themselves as capable of tackling unknown situations, as having a variety of tools to help them figure out things they have not previously encountered. Students should be given frequent opportunities to solve rich tasks that allow for a variety of solutions and to justify their solutions. At this grade level, this self-image of being able to meet challenges is critical to their interest in mathematics and in their choices about pursuing further mathematics.

# **Appendix 1**

## **Star Data Comparisons**

**Comparison of CAT/6 Math Percentile ranks to MARS levels**

**Comparison of CST Math Performance Levels to MARS levels**

**Correlations of STAR scores with MARS Scores**

**CST Cluster Level Comparison on MAC tasks**

**CST Math Scale Score on Transformed MAC Score**

Comparison of CAT/6 Math percentile ranks to MARS levels

**Grade 2**

		<b>MARS LEVEL</b>			
		1	2	3	4
CAT/6 Math Percentile Rank	Bottom (1st quartile)	4.8%	4.7%	3.9%	0.7%
	Below Average (2nd)	1.5%	4.2%	7.4%	2.1%
	Above Average (3rd)	0.8%	3.2%	9.8%	5.8%
	Top (4th)	0.3%	2.6%	15.5%	32.6%

**Grade 3**

		<b>MARS LEVEL</b>			
		1	2	3	4
CAT/6 Math Percentile Rank	Bottom (1st quartile)	6.7%	3.7%	2.6%	0.5%
	Below Average (2nd)	4.0%	5.6%	6.8%	2.1%
	Above Average (3rd)	1.7%	4.4%	10.8%	7.4%
	Top (4th)	0.4%	2.1%	10.8%	30.4%

**Grade 4**

		<b>MARS LEVEL</b>			
		1	2	3	4
CAT/6 Math Percentile Rank	Bottom (1st quartile)	4.8%	6.5%	3.9%	0.9%
	Below Average (2nd)	0.9%	5.7%	9.1%	3.2%
	Above Average (3rd)	0.2%	2.2%	9.8%	7.1%
	Top (4th)	0.1%	1.1%	10.7%	33.8%

**Grade 5**

		<b>MARS LEVEL</b>			
		1	2	3	4
CAT/6 Math Percentile Rank	Bottom (1st quartile)	9.3%	4.5%	2.1%	0.4%
	Below Average (2nd)	4.0%	6.7%	5.0%	1.6%
	Above Average (3rd)	1.5%	6.7%	12.3%	12.0%
	Top (4th)	0.1%	1.1%	5.6%	26.8%

**Grade 6**

		<b>MARS LEVEL</b>			
		1	2	3	4
CAT/6 Math Percentile Rank	Bottom (1st quartile)	8.7%	5.4%	1.4%	0.1%
	Below Average (2nd)	4.0%	7.3%	3.8%	0.5%
	Above Average (3rd)	2.2%	8.9%	10.9%	3.7%
	Top (4th)	0.4%	4.0%	14.9%	24.0%

**Grade 7**

		<b>MARS LEVEL</b>			
		1	2	3	4
CAT/6 Math Percentile Rank	Bottom (1st quartile)	12.7%	2.3%	0.2%	0.0%
	Below Average (2nd)	13.8%	8.3%	2.2%	0.3%
	Above Average (3rd)	4.6%	9.1%	6.9%	2.6%
	Top (4th)	1.3%	4.6%	12.2%	18.8%

**Grade 8**

		<b>MARS LEVEL</b>			
		1	2	3	4
CAT/6 Math Percentile Rank	Bottom (1st quartile)	11.5%	3.5%	0.9%	0.0%
	Below Average (2nd)	6.5%	6.8%	3.2%	0.2%
	Above Average (3rd)	3.1%	10.2%	11.8%	2.1%
	Top (4th)	0.7%	3.8%	17.3%	18.4%

**Grade 9**

		<b>MARS LEVEL</b>			
		1	2	3	4
CAT/6 Math Percentile Rank	Bottom (1st quartile)	13.9%	6.6%	0.8%	0.1%
	Below Average (2nd)	13.9%	10.7%	3.8%	0.0%
	Above Average (3rd)	7.6%	12.7%	6.7%	0.3%
	Top (4th)	2.0%	8.8%	8.8%	3.3%

**Grade 10**

		<b>MARS LEVEL</b>			
		1	2	3	4
CAT/6 Math Percentile Rank	Bottom (1st quartile)	0.6%	3.9%	0.9%	0.9%
	Below Average (2nd)	2.4%	6.3%	3.0%	0.6%
	Above Average (3rd)	1.5%	8.4%	7.2%	1.8%
	Top (4th)	1.2%	7.2%	18.0%	36.2%

Comparison of CST Math performance levels to MARS levels.

**Grade 2**

		<b>MARS LEVEL</b>			
		1	2	3	4
CST Math Performance Levels	Far Below Basic	1.3%	0.6%	0.2%	0.1%
	Below Basic	3.7%	4.7%	4.2%	0.7%
	Basic	1.7%	5.4%	10.4%	2.8%
	Proficient	0.7%	3.1%	15.2%	10.7%
	Advanced	0.1%	0.7%	6.6%	27.0%

**Grade 3**

		<b>MARS LEVEL</b>			
		1	2	3	4
CST Math Performance Levels	Far Below Basic	1.1%	0.2%	0.1%	0.0%
	Below Basic	7.0%	4.3%	2.5%	0.4%
	Basic	3.6%	6.6%	8.5%	2.1%
	Proficient	0.9%	4.1%	13.6%	10.5%
	Advanced	0.2%	0.7%	6.1%	27.3%

**Grade 4**

		<b>MARS LEVEL</b>			
		1	2	3	4
CST Math Performance Levels	Far Below Basic	0.7%	0.4%	0.3%	0.0%
	Below Basic	4.1%	6.6%	4.2%	0.6%
	Basic	1.1%	6.3%	12.2%	4.1%
	Proficient	0.1%	2.0%	12.6%	15.0%
	Advanced	0.0%	0.2%	4.3%	25.2%

**Grade 5**

		<b>MARS LEVEL</b>			
		1	2	3	4
CST Math Performance Levels	Far Below Basic	3.8%	1.1%	0.4%	0.1%
	Below Basic	7.5%	6.7%	4.0%	0.7%
	Basic	3.2%	7.8%	9.5%	4.7%
	Proficient	0.5%	3.1%	9.7%	17.4%
	Advanced	0.0%	0.2%	1.6%	18.0%

**Grade 6**

		<b>MARS LEVEL</b>			
		1	2	3	4
CST Math Performance Levels	Far Below Basic	2.1%	0.7%	0.2%	0.0%
	Below Basic	8.5%	7.7%	2.1%	0.2%
	Basic	4.1%	11.9%	9.4%	1.6%
	Proficient	0.6%	4.9%	14.4%	9.1%
	Advanced	0.0%	0.4%	4.8%	17.4%

**Grade 7**

		<b>MARS LEVEL</b>			
		1	2	3	4
CST Math Performance Levels	Far Below Basic	4.2%	0.6%	0.0%	0.0%
	Below Basic	14.6%	3.7%	0.7%	0.0%
	Basic	11.4%	11.5%	4.5%	1.0%
	Proficient	2.2%	8.0%	12.1%	7.5%
	Advanced	0.1%	0.5%	4.2%	13.0%

**Grade 8****MARS LEVEL**

		1	2	3	4
CST Math Performance Levels	Far Below Basic	4.4%	1.2%	0.4%	0.0%
	Below Basic	9.8%	6.0%	3.0%	0.3%
	Basic	5.9%	9.8%	9.9%	2.1%
	Proficient	1.4%	6.5%	15.6%	8.9%
	Advanced	0.0%	0.7%	4.4%	9.6%

**Grade 9****MARS LEVEL**

		1	2	3	4
CST Math Performance Levels	Far Below Basic	5.4%	2.6%	0.6%	0.1%
	Below Basic	21.3%	16.5%	4.6%	0.1%
	Basic	8.6%	13.5%	7.6%	0.6%
	Proficient	1.6%	5.4%	6.0%	2.1%
	Advanced	0.0%	0.9%	1.5%	0.9%

**Grade 10****MARS LEVEL**

		1	2	3	4
CST Math Performance Levels	Far Below Basic	0.9%	1.8%	0.6%	0.3%
	Below Basic	3.9%	13.1%	5.4%	0.3%
	Basic	0.9%	8.7%	14.0%	4.5%
	Proficient	0.3%	2.4%	7.8%	16.7%
	Advanced	0.0%	0.0%	1.2%	17.3%

Grade 2 Correlations of STAR scores with MARS scores

		CAT/6 Math raw score	CAT/6 Reading raw score	CAT/6 Math percentile rank	CAT/6 Reading percentile rank	CST Math raw score	CST English Language raw score	CST Math Performance Standards	CST English Performance Standards	MARS raw score	MARS performance level
CAT/6 Math raw score	Spearman's rho Correlation	1.000	0.613	1.000	0.613	0.819	0.705	0.794	0.683	0.648	0.604
	N	3666	3661	3666	3661	3660	3662	3660	3662	3666	3666
CAT/6 Reading raw score	Spearman's rho Correlation	0.613	1.000	0.613	1.000	0.670	0.813	0.643	0.785	0.567	0.533
	N	3661	3668	3661	3668	3662	3665	3662	3665	3668	3668
CAT/6 Math percentile rank	Spearman's rho Correlation	1.000	0.613	1.000	0.613	0.819	0.705	0.794	0.683	0.648	0.604
	N	3666	3661	3666	3661	3660	3662	3660	3662	3666	3666
CAT/6 Reading percentile rank	Spearman's rho Correlation	0.613	1.000	0.613	1.000	0.670	0.813	0.643	0.785	0.567	0.533
	N	3661	3668	3661	3668	3662	3665	3662	3665	3668	3668
CST Math raw score	Spearman's rho Correlation	0.819	0.670	0.819	0.670	1.000	0.784	0.961	0.761	0.721	0.671
	N	3660	3662	3660	3662	3672	3668	3672	3668	3672	3672
CST English Language raw score	Spearman's rho Correlation	0.705	0.813	0.705	0.813	0.784	1.000	0.753	0.970	0.667	0.621
	N	3662	3665	3662	3665	3668	3674	3668	3674	3674	3674
CST Math Performance Standards	Spearman's rho Correlation	0.794	0.643	0.794	0.643	0.961	0.753	1.000	0.733	0.693	0.651
	N	3660	3662	3660	3662	3672	3668	3672	3668	3672	3672
CST English Performance Standards	Spearman's rho Correlation	0.683	0.785	0.683	0.785	0.761	0.970	0.733	1.000	0.645	0.601
	N	3662	3665	3662	3665	3668	3674	3668	3674	3674	3674
MARS raw score	Spearman's rho Correlation	0.648	0.567	0.648	0.567	0.721	0.667	0.693	0.645	1.000	0.938
	N	3666	3668	3666	3668	3672	3674	3672	3674	3755	3755
MARS performance level	Spearman's rho Correlation	0.604	0.533	0.604	0.533	0.671	0.621	0.651	0.601	0.938	1.000
	N	3666	3668	3666	3668	3672	3674	3672	3674	3755	3755

Grade 3 Correlations of STAR scores with MARS scores

		CAT/6 Math raw score	CAT/6 Reading raw score	CAT/6 Math percentile rank	CAT/6 Reading percentile rank	CST Math raw score	CST English Language raw score	CST Math Performance Standards	CST English Performance Standards	MARS raw score	MARS performance level
CAT/6 Math raw score	Spearman's rho Correlation	1.000	0.676	1.000	0.676	0.830	0.759	0.803	0.738	0.696	0.663
	N	12087	12073	12087	12073	12063	12049	12063	12049	12087	12087
CAT/6 Reading raw score	Spearman's rho Correlation	0.676	1.000	0.676	1.000	0.702	0.828	0.676	0.804	0.621	0.594
	N	12073	12084	12073	12084	12063	12056	12063	12056	12084	12084
CAT/6 Math percentile rank	Spearman's rho Correlation	1.000	0.676	1.000	0.676	0.830	0.759	0.803	0.738	0.696	0.663
	N	12087	12073	12087	12073	12063	12049	12063	12049	12087	12087
CAT/6 Reading percentile rank	Spearman's rho Correlation	0.676	1.000	0.676	1.000	0.702	0.828	0.676	0.804	0.621	0.594
	N	12073	12084	12073	12084	12063	12056	12063	12056	12084	12084
CST Math raw score	Spearman's rho Correlation	0.830	0.702	0.830	0.702	1.000	0.817	0.961	0.793	0.763	0.726
	N	12063	12063	12063	12063	12093	12066	12093	12066	12093	12093
CST English Language raw score	Spearman's rho Correlation	0.759	0.828	0.759	0.828	0.817	1.000	0.785	0.971	0.710	0.677
	N	12049	12056	12049	12056	12066	12086	12066	12086	12086	12086
CST Math Performance Standards	Spearman's rho Correlation	0.803	0.676	0.803	0.676	0.961	0.785	1.000	0.764	0.733	0.705
	N	12063	12063	12063	12063	12093	12066	12093	12066	12093	12093
CST English Performance Standards	Spearman's rho Correlation	0.738	0.804	0.738	0.804	0.793	0.971	0.764	1.000	0.688	0.657
	N	12049	12056	12049	12056	12066	12086	12066	12086	12086	12086
MARS raw score	Spearman's rho Correlation	0.696	0.621	0.696	0.621	0.763	0.710	0.733	0.688	1.000	0.948
	N	12087	12084	12087	12084	12093	12086	12093	12086	12233	12233
MARS performance level	Spearman's rho Correlation	0.663	0.594	0.663	0.594	0.726	0.677	0.705	0.657	0.948	1.000
	N	12087	12084	12087	12084	12093	12086	12093	12086	12233	12233

Grade 4 Correlations of STAR scores with MARS scores

		CAT/6 Math raw score	CAT/6 Reading raw score	CAT/6 Math percentile rank	CAT/6 Reading percentile rank	CST Math raw score	CST English Language raw score	CST Math Performance Standards	CST English Performance Standards	MARS raw score	MARS performance level
CAT/6 Math raw score	Spearman's rho Correlation	1.000	0.691	1.000	0.691	0.838	0.762	0.810	0.729	0.713	0.670
	N	6839	6831	6839	6831	6829	6830	6829	6830	6839	6839
CAT/6 Reading raw score	Spearman's rho Correlation	0.691	1.000	0.691	1.000	0.728	0.855	0.701	0.822	0.621	0.578
	N	6831	6837	6831	6837	6828	6831	6828	6831	6837	6837
CAT/6 Math percentile rank	Spearman's rho Correlation	1.000	0.691	1.000	0.691	0.838	0.762	0.810	0.730	0.713	0.670
	N	6839	6831	6839	6831	6829	6830	6829	6830	6839	6839
CAT/6 Reading percentile rank	Spearman's rho Correlation	0.691	1.000	0.691	1.000	0.728	0.855	0.701	0.823	0.621	0.578
	N	6831	6837	6831	6837	6828	6831	6828	6831	6837	6837
CST Math raw score	Spearman's rho Correlation	0.838	0.728	0.838	0.728	1.000	0.818	0.965	0.784	0.757	0.704
	N	6829	6828	6829	6828	6841	6837	6837	6833	6841	6841
CST English Language raw score	Spearman's rho Correlation	0.762	0.855	0.762	0.855	0.818	1.000	0.788	0.963	0.691	0.637
	N	6830	6831	6830	6831	6837	6860	6833	6856	6860	6860
CST Math Performance Standards	Spearman's rho Correlation	0.810	0.701	0.810	0.701	0.965	0.788	1.000	0.759	0.731	0.686
	N	6829	6828	6829	6828	6837	6833	6837	6833	6837	6837
CST English Performance Standards	Spearman's rho Correlation	0.729	0.822	0.730	0.823	0.784	0.963	0.759	1.000	0.663	0.618
	N	6830	6831	6830	6831	6833	6856	6833	6856	6856	6856
MARS raw score	Spearman's rho Correlation	0.713	0.621	0.713	0.621	0.757	0.691	0.731	0.663	1.000	0.933
	N	6839	6837	6839	6837	6841	6860	6837	6856	6969	6969
MARS performance level	Spearman's rho Correlation	0.670	0.578	0.670	0.578	0.704	0.637	0.686	0.618	0.933	1.000
	N	6839	6837	6839	6837	6841	6860	6837	6856	6969	6969

Grade 5 Correlations of STAR scores with MARS scores

		CAT/6 Math raw score	CAT/6 Reading raw score	CAT/6 Math percentile rank	CAT/6 Reading percentile rank	CST Math raw score	CST English Language raw score	CST Math Performance Standards	CST English Performance Standards	MARS raw score	MARS performance level
CAT/6 Math raw score	Spearman's rho Correlation	1.000	0.713	1.000	0.713	0.847	0.778	0.822	0.751	0.751	0.720
	N	10932	10917	10932	10917	10923	10923	10923	10923	10932	10932
CAT/6 Reading raw score	Spearman's rho Correlation	0.713	1.000	0.713	0.999	0.719	0.855	0.696	0.829	0.655	0.626
	N	10917	10926	10917	10926	10919	10919	10919	10919	10926	10926
CAT/6 Math percentile rank	Spearman's rho Correlation	1.000	0.713	1.000	0.713	0.847	0.779	0.822	0.751	0.751	0.720
	N	10932	10917	10932	10917	10923	10923	10923	10923	10932	10932
CAT/6 Reading percentile rank	Spearman's rho Correlation	0.713	0.999	0.713	1.000	0.719	0.855	0.695	0.829	0.655	0.626
	N	10917	10926	10917	10926	10919	10919	10919	10919	10926	10926
CST Math raw score	Spearman's rho Correlation	0.847	0.719	0.847	0.719	1.000	0.800	0.970	0.771	0.776	0.740
	N	10923	10919	10923	10919	10944	10939	10944	10939	10944	10944
CST English Language raw score	Spearman's rho Correlation	0.778	0.855	0.779	0.855	0.800	1.000	0.776	0.965	0.724	0.688
	N	10923	10919	10923	10919	10939	10949	10939	10949	10949	10949
CST Math Performance Standards	Spearman's rho Correlation	0.822	0.696	0.822	0.695	0.970	0.776	1.000	0.749	0.753	0.720
	N	10923	10919	10923	10919	10944	10939	10944	10939	10944	10944
CST English Performance Standards	Spearman's rho Correlation	0.751	0.829	0.751	0.829	0.771	0.965	0.749	1.000	0.697	0.667
	N	10923	10919	10923	10919	10939	10949	10939	10949	10949	10949
MARS raw score	Spearman's rho Correlation	0.751	0.655	0.751	0.655	0.776	0.724	0.753	0.697	1.000	0.952
	N	10932	10926	10932	10926	10944	10949	10944	10949	11025	11025
MARS performance level	Spearman's rho Correlation	0.720	0.626	0.720	0.626	0.740	0.688	0.720	0.667	0.952	1.000
	N	10932	10926	10932	10926	10944	10949	10944	10949	11025	11025

Grade 6 Correlations of STAR scores with MARS scores

		CAT/6 Math raw score	CAT/6 Reading raw score	CAT/6 Math percentile rank	CAT/6 Reading percentile rank	CST Math raw score	CST English Language raw score	CST Math Performance Standards	CST English Performance Standards	MARS raw score	MARS performance level
CAT/6 Math raw score	Spearman's rho Correlation	1.000	0.732	1.000	0.732	0.869	0.777	0.843	0.748	0.740	0.713
	N	8582	8567	8582	8567	8570	8556	8570	8556	8582	8582
CAT/6 Reading raw score	Spearman's rho Correlation	0.732	1.000	0.732	1.000	0.765	0.859	0.741	0.829	0.666	0.639
	N	8567	8597	8567	8597	8580	8580	8580	8580	8597	8597
CAT/6 Math percentile rank	Spearman's rho Correlation	1.000	0.732	1.000	0.732	0.869	0.777	0.842	0.747	0.740	0.713
	N	8582	8567	8582	8567	8570	8556	8570	8556	8582	8582
CAT/6 Reading percentile rank	Spearman's rho Correlation	0.732	1.000	0.732	1.000	0.765	0.859	0.741	0.829	0.666	0.639
	N	8567	8597	8567	8597	8580	8580	8580	8580	8597	8597
CST Math raw score	Spearman's rho Correlation	0.869	0.765	0.869	0.765	1.000	0.818	0.969	0.786	0.794	0.762
	N	8570	8580	8570	8580	8602	8575	8602	8575	8602	8602
CST English Language raw score	Spearman's rho Correlation	0.777	0.859	0.777	0.859	0.818	1.000	0.792	0.964	0.713	0.685
	N	8556	8580	8556	8580	8575	8590	8575	8590	8590	8590
CST Math Performance Standards	Spearman's rho Correlation	0.843	0.741	0.842	0.741	0.969	0.792	1.000	0.763	0.769	0.740
	N	8570	8580	8570	8580	8602	8575	8602	8575	8602	8602
CST English Performance Standards	Spearman's rho Correlation	0.748	0.829	0.747	0.829	0.786	0.964	0.763	1.000	0.688	0.663
	N	8556	8580	8556	8580	8575	8590	8575	8590	8590	8590
MARS raw score	Spearman's rho Correlation	0.740	0.666	0.740	0.666	0.794	0.713	0.769	0.688	1.000	0.964
	N	8582	8597	8582	8597	8602	8590	8602	8590	8678	8678
MARS performance level	Spearman's rho Correlation	0.713	0.639	0.713	0.639	0.762	0.685	0.740	0.663	0.964	1.000
	N	8582	8597	8582	8597	8602	8590	8602	8590	8678	8678

Grade 7 Correlations of STAR scores with MARS scores

		CAT/6 Math raw score	CAT/6 Reading raw score	CAT/6 Math percentile rank	CAT/6 Reading percentile rank	CST Math raw score	CST English Language raw score	CST Math Performance Standards	CST English Performance Standards	MARS raw score	MARS performance level
CAT/6 Math raw score	Spearman's rho Correlation	1.000	0.732	1.000	0.732	0.882	0.785	0.856	0.757	0.785	0.758
	N	9219	9177	9219	9177	9200	9201	9200	9201	9219	9219
CAT/6 Reading raw score	Spearman's rho Correlation	0.732	1.000	0.732	1.000	0.729	0.858	0.709	0.832	0.668	0.642
	N	9177	9205	9177	9205	9187	9188	9187	9188	9205	9205
CAT/6 Math percentile rank	Spearman's rho Correlation	1.000	0.732	1.000	0.732	0.882	0.785	0.856	0.757	0.785	0.758
	N	9219	9177	9219	9177	9200	9201	9200	9201	9219	9219
CAT/6 Reading percentile rank	Spearman's rho Correlation	0.732	1.000	0.732	1.000	0.729	0.858	0.709	0.832	0.668	0.642
	N	9177	9205	9177	9205	9187	9188	9187	9188	9205	9205
CST Math raw score	Spearman's rho Correlation	0.882	0.729	0.882	0.729	1.000	0.793	0.969	0.764	0.805	0.779
	N	9200	9187	9200	9187	9244	9226	9244	9226	9244	9244
CST English Language raw score	Spearman's rho Correlation	0.785	0.858	0.785	0.858	0.793	1.000	0.770	0.965	0.723	0.696
	N	9201	9188	9201	9188	9226	9264	9226	9264	9264	9264
CST Math Performance Standards	Spearman's rho Correlation	0.856	0.709	0.856	0.709	0.969	0.770	1.000	0.742	0.781	0.757
	N	9200	9187	9200	9187	9244	9226	9244	9226	9244	9244
CST English Performance Standards	Spearman's rho Correlation	0.757	0.832	0.757	0.832	0.764	0.965	0.742	1.000	0.697	0.671
	N	9201	9188	9201	9188	9226	9264	9226	9264	9264	9264
MARS raw score	Spearman's rho Correlation	0.785	0.668	0.785	0.668	0.805	0.723	0.781	0.697	1.000	0.965
	N	9219	9205	9219	9205	9244	9264	9244	9264	9403	9403
MARS performance level	Spearman's rho Correlation	0.758	0.642	0.758	0.642	0.779	0.696	0.757	0.671	0.965	1.000
	N	9219	9205	9219	9205	9244	9264	9244	9264	9403	9403

Grade 8 Correlations of STAR scores with MARS scores

		CAT/6 Math raw score	CAT/6 Reading raw score	CAT/6 Math percentile rank	CAT/6 Reading percentile rank	CST Math raw score	CST English Language raw score	CST Math Performance Standards	CST English Performance Standards	MARS raw score	MARS performance level
CAT/6 Math raw score	Spearman's rho Correlation	1.000	0.681	1.000	0.683	0.735	0.751	0.766	0.722	0.775	0.748
	N	8244	8227	8244	8227	8089	8226	8089	8226	8244	8244
CAT/6 Reading raw score	Spearman's rho Correlation	0.681	1.000	0.682	1.000	0.563	0.837	0.592	0.804	0.669	0.649
	N	8227	8250	8227	8250	8087	8233	8087	8233	8250	8250
CAT/6 Math percentile rank	Spearman's rho Correlation	1.000	0.682	1.000	0.682	0.735	0.751	0.765	0.722	0.775	0.748
	N	8244	8227	8244	8227	8089	8226	8089	8226	8244	8244
CAT/6 Reading percentile rank	Spearman's rho Correlation	0.683	1.000	0.682	1.000	0.564	0.838	0.593	0.805	0.669	0.649
	N	8227	8250	8227	8250	8087	8233	8087	8233	8250	8250
CST Math raw score	Spearman's rho Correlation	0.735	0.563	0.735	0.564	1.000	0.631	0.957	0.604	0.649	0.623
	N	8089	8087	8089	8087	8112	8096	8112	8096	8112	8112
CST English Language raw score	Spearman's rho Correlation	0.751	0.837	0.751	0.838	0.631	1.000	0.662	0.965	0.745	0.720
	N	8226	8233	8226	8233	8096	8267	8096	8267	8267	8267
CST Math Performance Standards	Spearman's rho Correlation	0.766	0.592	0.765	0.593	0.957	0.662	1.000	0.636	0.684	0.658
	N	8089	8087	8089	8087	8112	8096	8112	8096	8112	8112
CST English Performance Standards	Spearman's rho Correlation	0.722	0.804	0.722	0.805	0.604	0.965	0.636	1.000	0.716	0.692
	N	8226	8233	8226	8233	8096	8267	8096	8267	8267	8267
MARS raw score	Spearman's rho Correlation	0.775	0.669	0.775	0.669	0.649	0.745	0.684	0.716	1.000	0.965
	N	8244	8250	8244	8250	8112	8267	8112	8267	8342	8342
MARS performance level	Spearman's rho Correlation	0.748	0.649	0.748	0.649	0.623	0.720	0.658	0.692	0.965	1.000
	N	8244	8250	8244	8250	8112	8267	8112	8267	8342	8342

Grade 9 Correlations of STAR scores with MARS scores

		CAT/6 Math raw score	CAT/6 Reading raw score	CAT/6 Math percentile rank	CAT/6 Reading percentile rank	CST Math raw score	CST English Language raw score	CST Math Performance Standards	CST English Performance Standards	MARS raw score	MARS performance level
CAT/6 Math raw score	Spearman's rho Correlation	1.000	0.653	0.991	0.633	0.695	0.634	0.676	0.648	0.538	0.512
	N	1384	1382	1384	1382	1344	1377	1344	1377	1384	1384
CAT/6 Reading raw score	Spearman's rho Correlation	0.653	1.000	0.632	0.998	0.564	0.803	0.543	0.799	0.472	0.449
	N	1382	1388	1382	1388	1345	1381	1345	1381	1388	1388
CAT/6 Math percentile rank	Spearman's rho Correlation	0.991	0.632	1.000	0.618	0.693	0.626	0.675	0.629	0.533	0.508
	N	1384	1382	1384	1382	1344	1377	1344	1377	1384	1384
CAT/6 Reading percentile rank	Spearman's rho Correlation	0.633	0.998	0.618	1.000	0.554	0.802	0.535	0.792	0.463	0.440
	N	1382	1388	1382	1388	1345	1381	1345	1381	1388	1388
CST Math raw score	Spearman's rho Correlation	0.695	0.564	0.693	0.554	1.000	0.564	0.944	0.566	0.479	0.454
	N	1344	1345	1344	1345	1360	1353	1360	1353	1360	1360
CST English Language raw score	Spearman's rho Correlation	0.634	0.803	0.626	0.802	0.564	1.000	0.542	0.957	0.482	0.449
	N	1377	1381	1377	1381	1353	1403	1353	1403	1403	1403
CST Math Performance Standards	Spearman's rho Correlation	0.676	0.543	0.675	0.535	0.944	0.542	1.000	0.540	0.469	0.441
	N	1344	1345	1344	1345	1360	1353	1360	1353	1360	1360
CST English Performance Standards	Spearman's rho Correlation	0.648	0.799	0.629	0.792	0.566	0.957	0.540	1.000	0.479	0.444
	N	1377	1381	1377	1381	1353	1403	1353	1403	1403	1403
MARS raw score	Spearman's rho Correlation	0.538	0.472	0.533	0.463	0.479	0.482	0.469	0.479	1.000	0.938
	N	1384	1388	1384	1388	1360	1403	1360	1403	1486	1486
MARS performance level	Spearman's rho Correlation	0.512	0.449	0.508	0.440	0.454	0.449	0.441	0.444	0.938	1.000
	N	1384	1388	1384	1388	1360	1403	1360	1403	1486	1486

Grade 10 Correlations of STAR scores with MARS scores

		CAT/6 Math raw score	CAT/6 Reading raw score	CAT/6 Math percentile rank	CAT/6 Reading percentile rank	CST Math raw score	CST English Language raw score	CST Math Performance Standards	CST English Performance Standards	MARS raw score	MARS performance level
CAT/6 Math raw score	Spearman's rho Correlation	1.000	0.572	0.998	0.567	0.788	0.633	0.765	0.596	0.663	0.611
	N	334	334	334	334	333	330	333	330	334	334
CAT/6 Reading raw score	Spearman's rho Correlation	0.572	1.000	0.576	0.999	0.587	0.809	0.553	0.784	0.455	0.413
	N	334	336	334	336	335	331	335	331	336	336
CAT/6 Math percentile rank	Spearman's rho Correlation	0.998	0.576	1.000	0.573	0.794	0.643	0.771	0.604	0.669	0.617
	N	334	334	334	334	333	330	333	330	334	334
CAT/6 Reading percentile rank	Spearman's rho Correlation	0.567	0.999	0.573	1.000	0.585	0.811	0.551	0.784	0.454	0.412
	N	334	336	334	336	335	331	335	331	336	336
CST Math raw score	Spearman's rho Correlation	0.788	0.587	0.794	0.585	1.000	0.681	0.970	0.646	0.776	0.725
	N	333	335	333	335	335	330	335	330	335	335
CST English Language raw score	Spearman's rho Correlation	0.633	0.809	0.643	0.811	0.681	1.000	0.659	0.953	0.549	0.506
	N	330	331	330	331	330	331	330	331	331	331
CST Math Performance Standards	Spearman's rho Correlation	0.765	0.553	0.771	0.551	0.970	0.659	1.000	0.623	0.777	0.731
	N	333	335	333	335	335	330	335	330	335	335
CST English Performance Standards	Spearman's rho Correlation	0.596	0.784	0.604	0.784	0.646	0.953	0.623	1.000	0.517	0.466
	N	330	331	330	331	330	331	330	331	331	331
MARS raw score	Spearman's rho Correlation	0.663	0.455	0.669	0.454	0.776	0.549	0.777	0.517	1.000	0.949
	N	334	336	334	336	335	331	335	331	339	339
MARS performance level	Spearman's rho Correlation	0.611	0.413	0.617	0.412	0.725	0.506	0.731	0.466	0.949	1.000
	N	334	336	334	336	335	331	335	331	339	339

CST Cluster Levels are compared to MAC data. Each task is correlated with the CST Cluster that more closely corresponds. In some cases the CST Cluster does not correspond to any of the tasks and no correlations are reported in those cases.

Grade 2

Correlations of CST Clusters and MAC tasks.

		<b>TASK1</b>	<b>TASK2</b>	<b>TASK3</b>	<b>TASK4</b>	<b>TASK5</b>
CST Cluster 1 - Place value, addition and subtraction	Spearman's rho correlation N					
CST Cluster 2 - Multiplication, division, and fractions	Spearman's rho correlation N					
CST Cluster 3 - Algebra and Functions	Spearman's rho correlation N				0.392 3672	
CST Cluster 4 -- Measurement and Geometry	Spearman's rho correlation N		0.454 3672	0.299 3672		
CST Cluster 5-- Stats, data analysis & probability	Spearman's rho correlation N	0.358 3672				

Grade 3

Correlations of CST Clusters and MAC tasks.

		TASK1	TASK2	TASK3	TASK4	TASK5
CST Cluster 1 - Place value, fractions and decimals	Spearman's rho correlation N					
CST Cluster 2 - Addition, subtraction, multiplication, and division.	Spearman's rho correlation N					0.497 12093
CST Cluster 3 - Algebra and Functions	Spearman's rho correlation N			0.558 12093		
CST Cluster 4 -- Measurement and Geometry	Spearman's rho correlation N				0.510 12093	
CST Cluster 5-- Stats, data analysis & probability	Spearman's rho correlation N		0.438 12093			

Grade 4

Correlations of CST Clusters and MAC tasks.

		TASK1	TASK2	TASK3	TASK4	TASK5
CST Cluster 1 - Decimals, fractions, and negative numbers	Spearman's rho correlation N					
CST Cluster 2 - Operations and factoring	Spearman's rho correlation N					
CST Cluster 3 - Algebra and Functions	Spearman's rho correlation N			0.474 6837		
CST Cluster 4 -- Measurement and Geometry	Spearman's rho correlation N	0.487 6837			0.433 6837	
CST Cluster 5-- Stats, data analysis & probability	Spearman's rho correlation N		0.354 6837			

Grade 5

Correlations of CST Clusters and MAC tasks.

		<b>TASK1</b>	<b>TASK2</b>	<b>TASK3</b>	<b>TASK4</b>	<b>TASK5</b>
CST Cluster 1 - Estimation, percents, and factoring	Spearman's rho correlation N					
CST Cluster 2 - Operations with fractions and decimals	Spearman's rho correlation N	0.503 10943				
CST Cluster 3 - Algebra and Functions	Spearman's rho correlation N				0.540 10944	
CST Cluster 4 -- Measurement and Geometry	Spearman's rho correlation N		0.500 10944			
CST Cluster 5-- Stats, data analysis & probability	Spearman's rho correlation N			0.362 10944		

Grade 6

Correlations of CST Clusters and MAC tasks

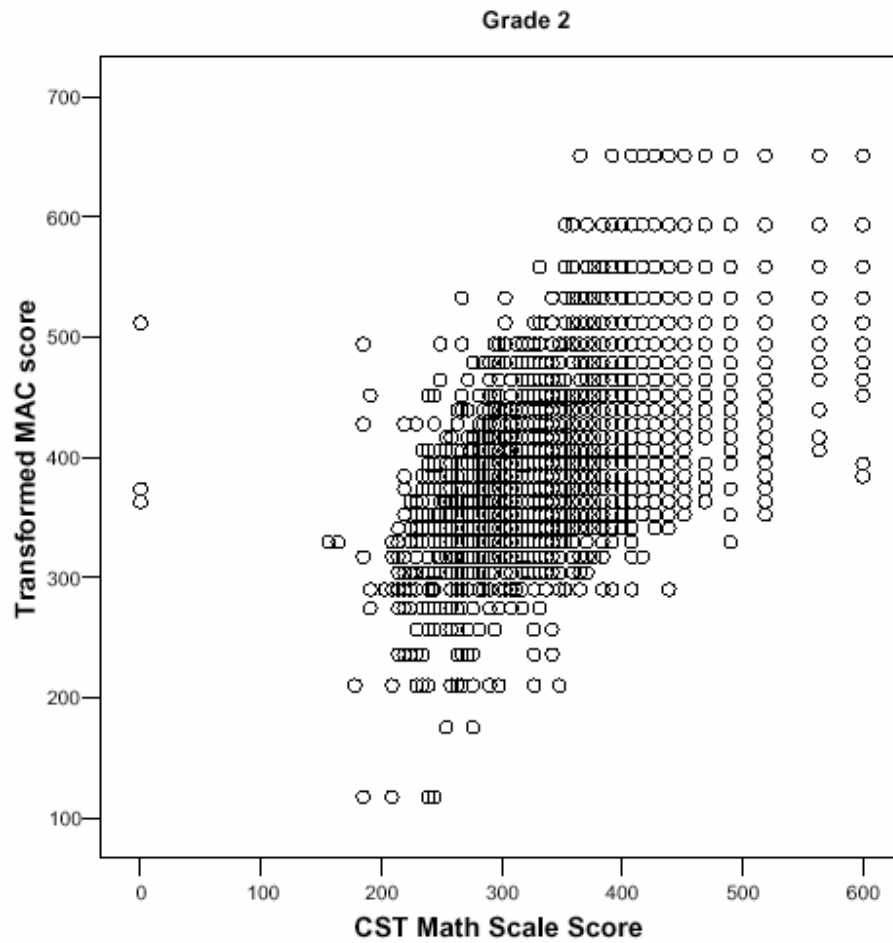
		TASK1	TASK2	TASK3	TASK4	TASK5
CST Cluster 1 - Ratios, proportions, percentages, negative fractions	Spearman's rho correlation N					
CST Cluster 2 - Operations and problems solving with fractions	Spearman's rho correlation N		0.579 8602			
CST Cluster 3 - Algebra and Functions	Spearman's rho correlation N	0.558 8602				
CST Cluster 4 -- Measurement and Geometry	Spearman's rho correlation N				0.398 8602	
CST Cluster 5-- Stats, data analysis & probability	Spearman's rho correlation N			0.489 8600		0.530 8600

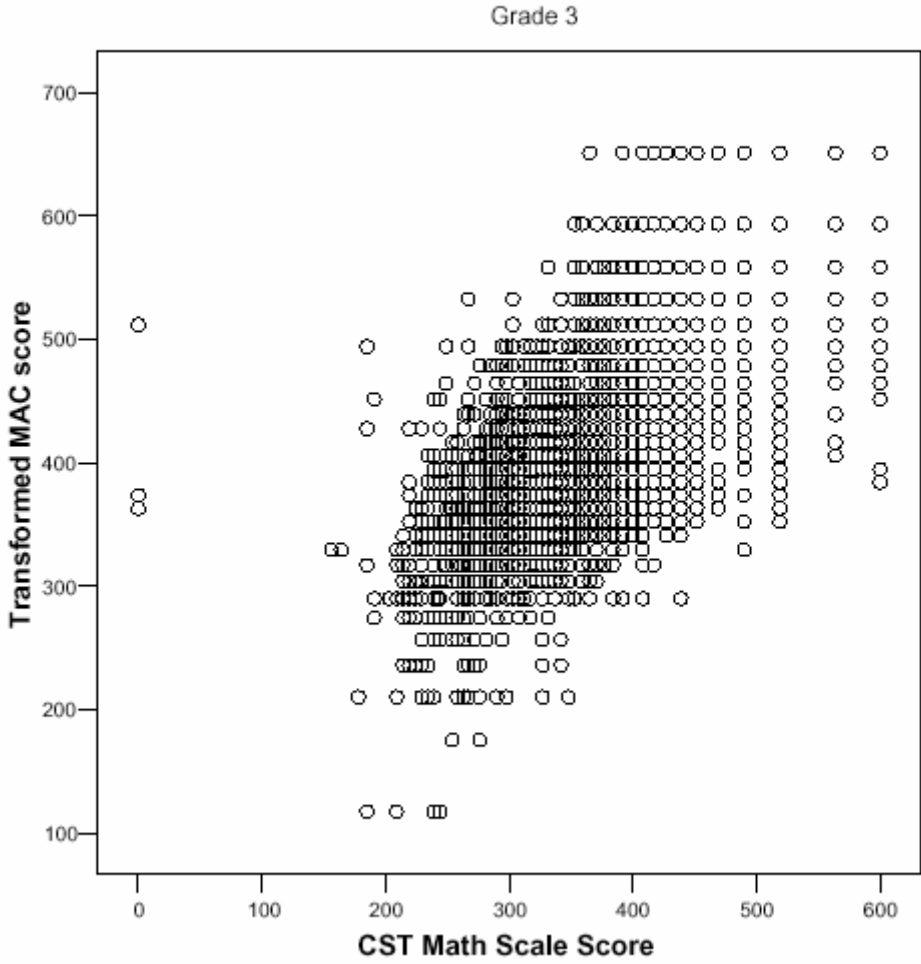
Grade 7

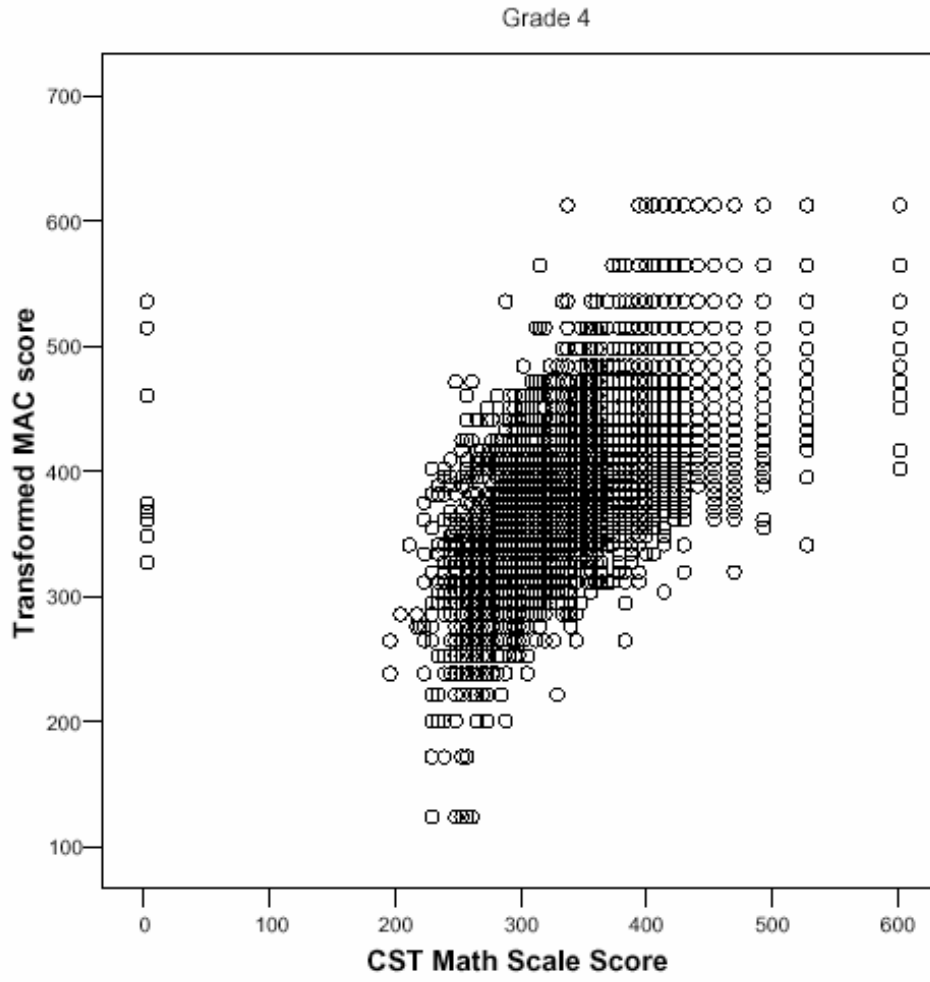
Correlations of CST Clusters and MAC tasks

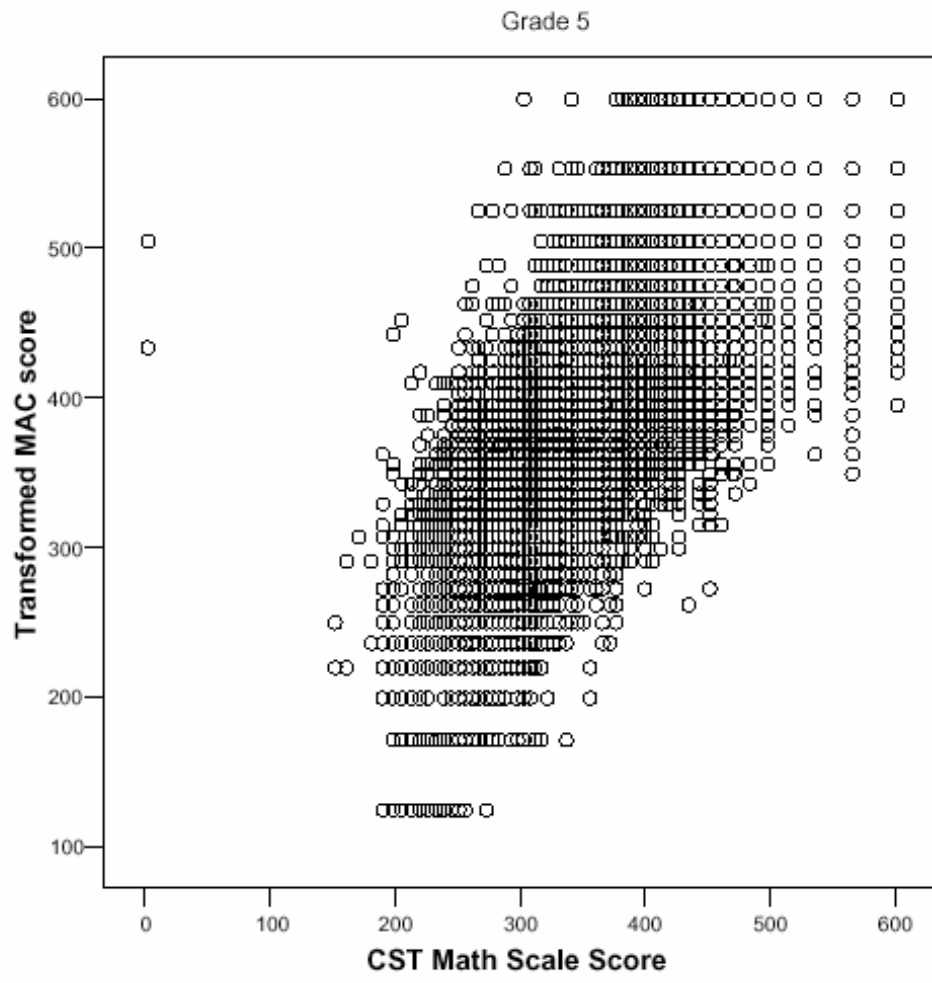
		TASK1	TASK2	TASK3	TASK4	TASK5
CST Cluster 1 - Rational numbers	Spearman's rho correlation N					
CST Cluster 2 - Exponents, powers, and roots	Spearman's rho correlation N					
CST Cluster 3 - Quantitative relationships & evaluating expressions	Spearman's rho correlation N	0.434 9244				
CST Cluster 4 -- Multi-step problems, graphing, and functions	Spearman's rho correlation N					
CST Cluster 5-- Measurement and geometry	Spearman's rho correlation N		0.514 9241			0.539 9241
CST Cluster 5-- Stats, data analysis & probability	Spearman's rho correlation N				0.403 9231	

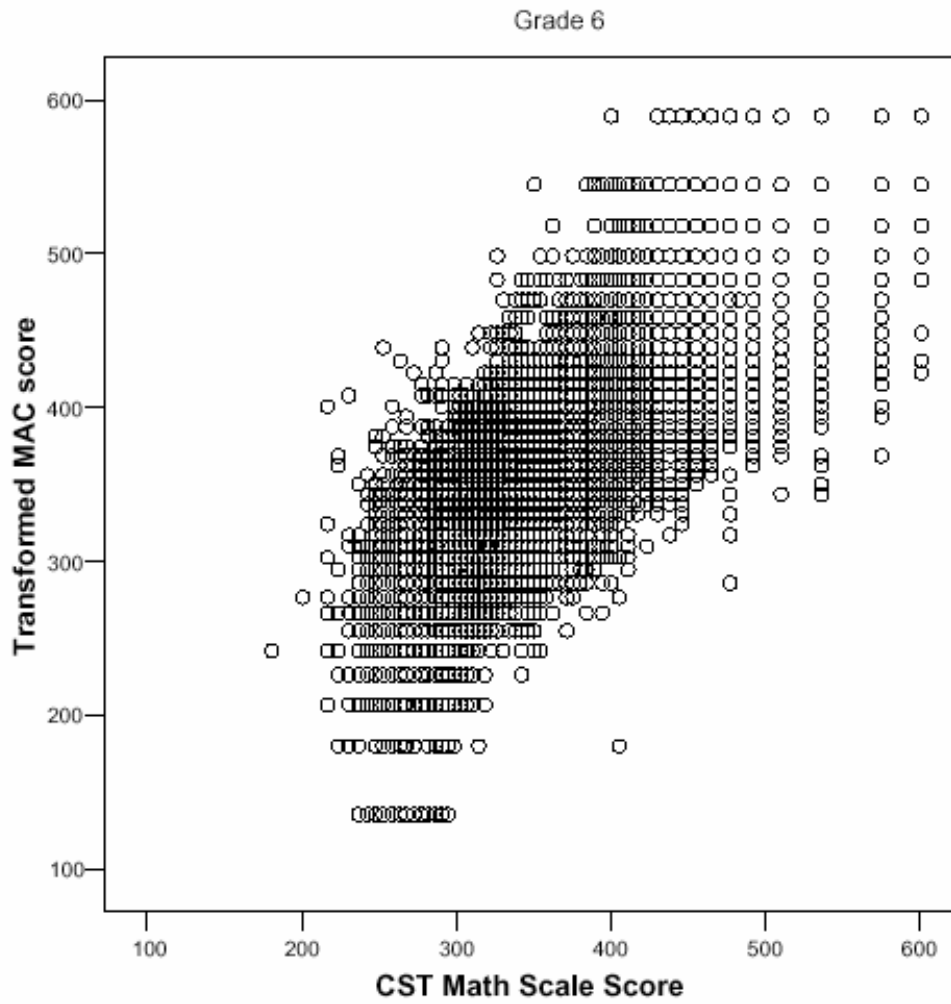
Scatterplots showing the relationship between CST Math scale scores and a transi  
MAC score.

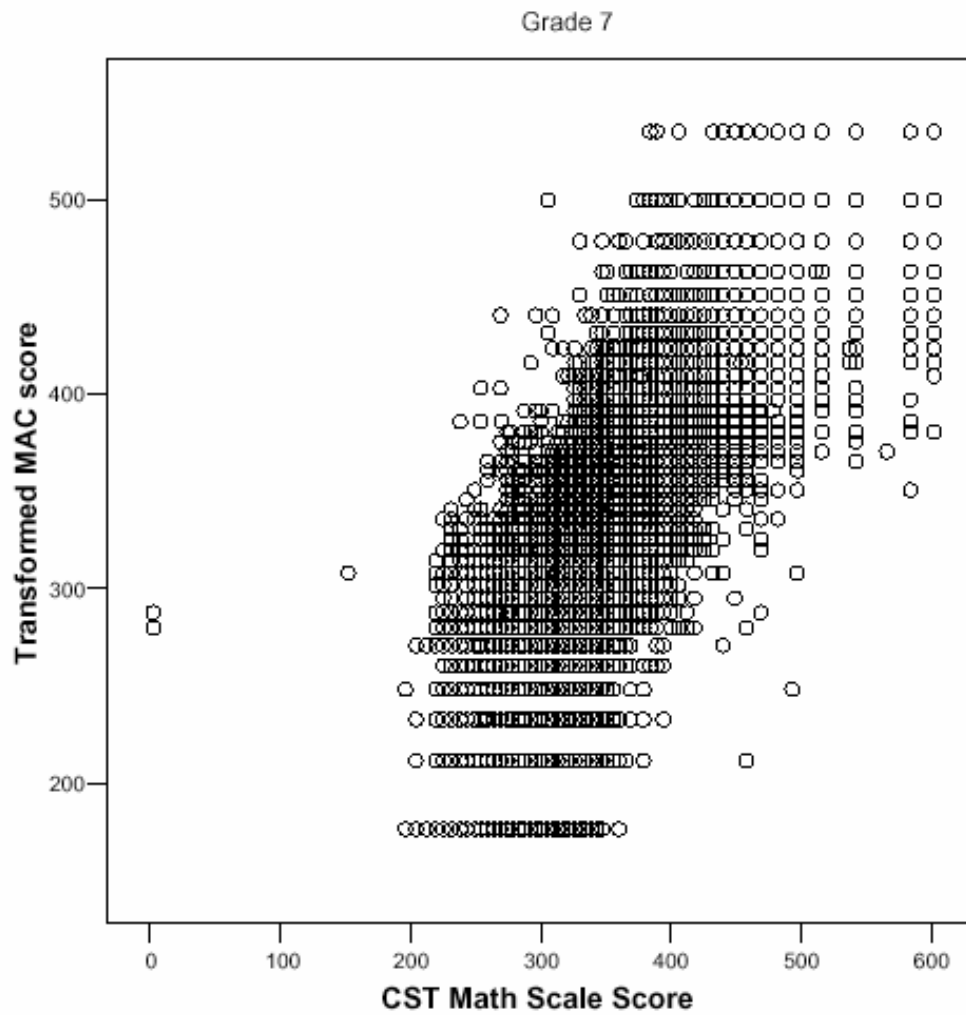


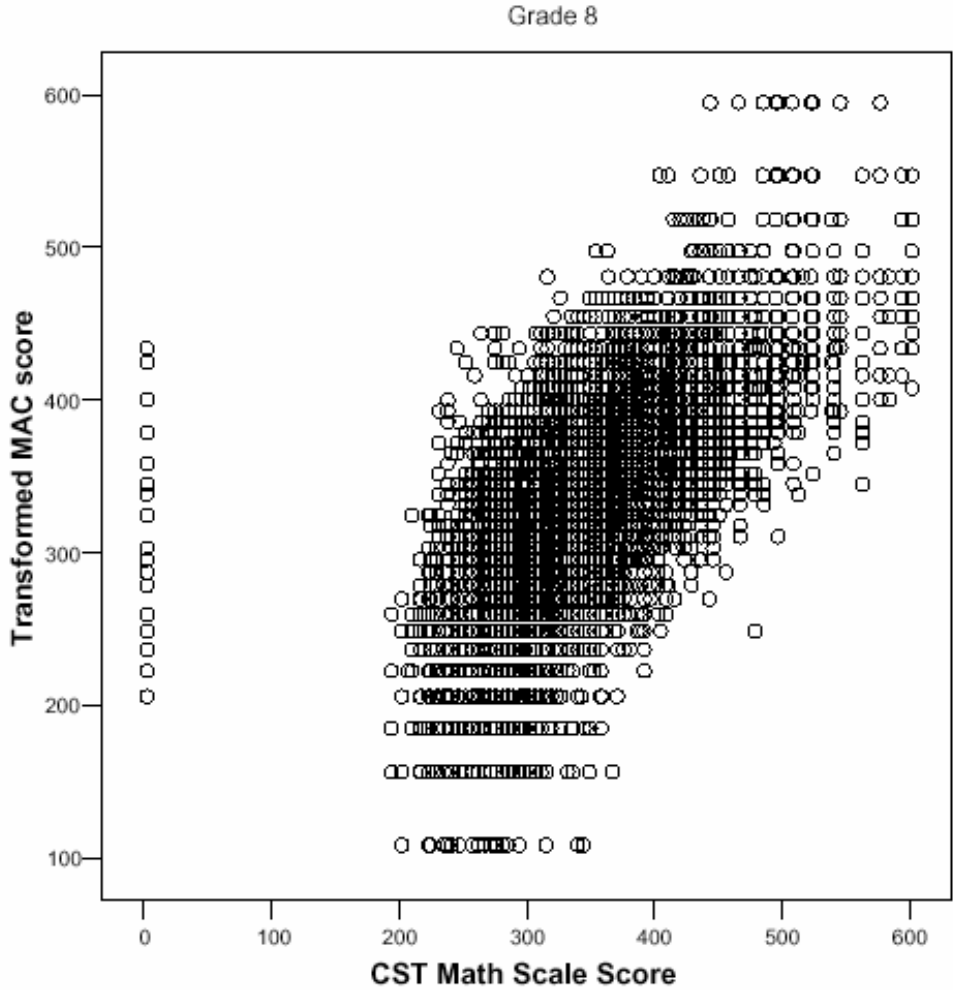


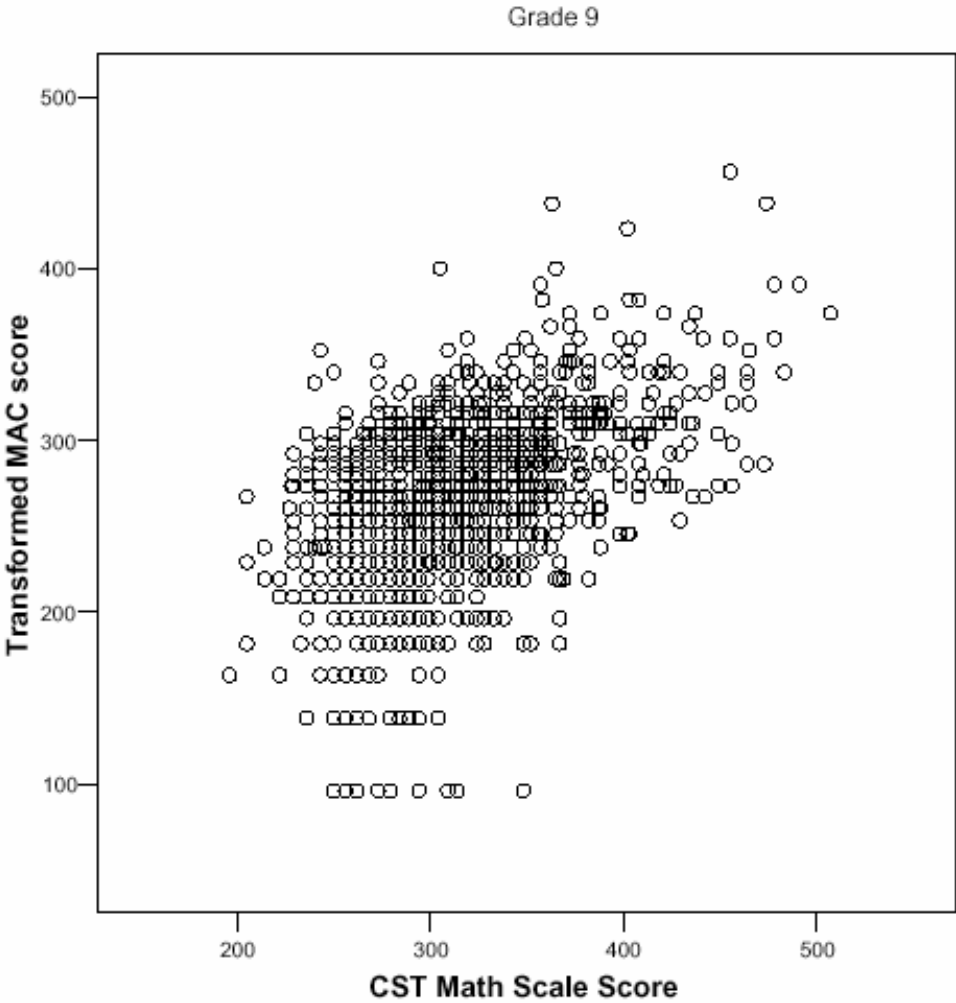


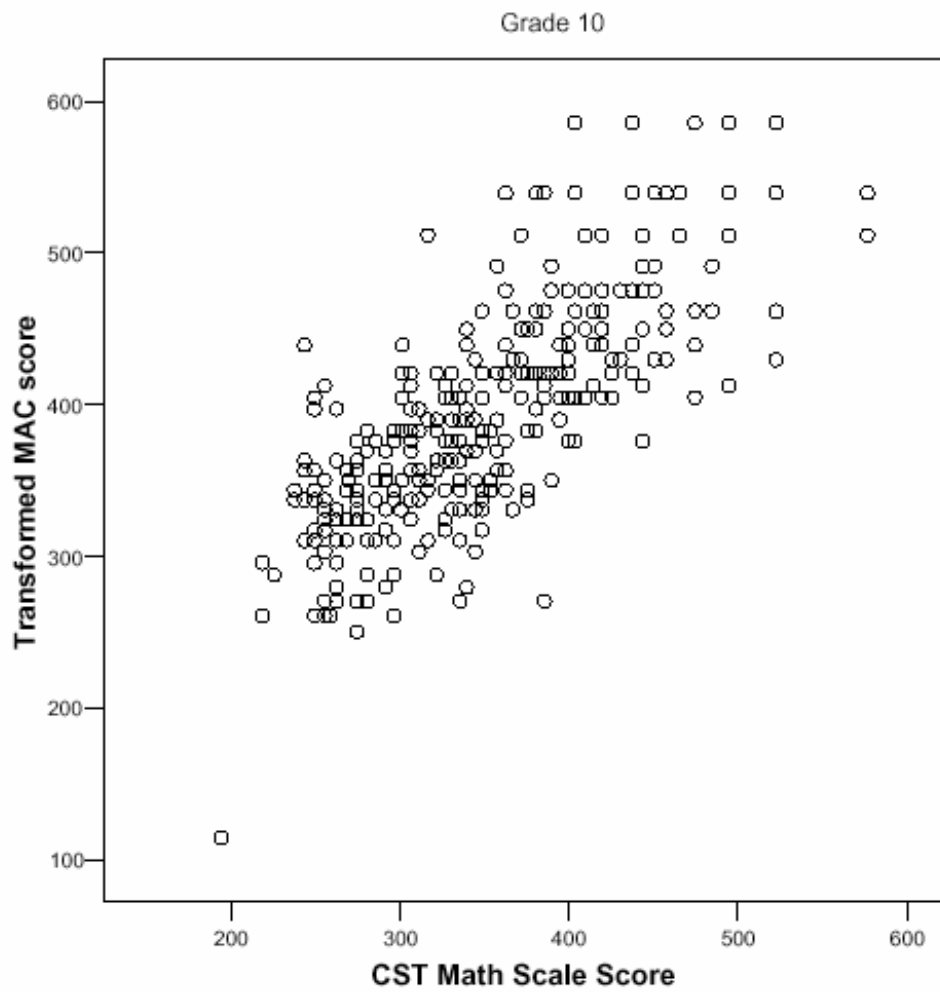












## **Appendix 2**

### **Status of the Data**

Status of the data

		Grade								Total	
		2	3	4	5	6	7	8	9		10
District ID	10		1276				627				1903
	12	59	66	65	69	93	110	122			584
	13		239	237	244	288	266	299			1573
	15	76	695	713	698	742	698	759			4381
	16		292		262	320	279	315			1468
	17	252	118	215	313	405	921	863			3087
	19		1530		1503						3033
	20		317	330	327	338	372	389			2073
	22	238	268	253	260	328	300	322			1969
	24	449	437	479	417	479	448	461			3170
	25		648		599		629				1876
	26	436	456	491	458	444	369	371			3025
	29		729		757						1486
	30		76	73	61	92	51	62			415
	32		266	233	245	226	269				1239
	35	1002	1035	985	1002	995	1015	971	789		7794
	36		477	472	504	475	529	526			2984
	38	39	54	47	49	44	45	34			312
	40		860			753		447	317	339	2716
	41		717		703		658		379		2457
	42	581	673	672	665	744	695	787			4817
	43	503	620	1004	421		345	846			3739
	45		255	268	268	300	276	297			1664
	47				936	905					1841
	50	120	129	114	92	531	501	471			1958
	51			318	172	176					666
<b>Total</b>		<b>3755</b>	<b>12233</b>	<b>6969</b>	<b>11025</b>	<b>8678</b>	<b>9403</b>	<b>8342</b>	<b>1486</b>	<b>339</b>	<b>62230</b>

## **Appendix 3**

### **Scoring Reliability**

### Scoring Reliability by Grade

Grade	N	Point Boundaries			
		0	+/- 1	+/- 2	+/- 3
Grade 3	793	63%	88%	98%	98%
Grade 4	558	60%	91%	97%	100%
Grade 5	790	65%	92%	97%	99%
Grade 6	553	49%	80%	91%	96%
Grade 7	605	51%	74%	88%	93%
Grade 8	516	59%	83%	95%	99%

Grade	Correlation
Grade 3	0.995
Grade 4	0.994
Grade 5	0.995
Grade 6	0.988
Grade 7	0.987
Grade 8	0.992

Grade	Mean Difference
Grade 3	0.08
Grade 4	0.09
Grade 5	0.06
Grade 6	0.15
Grade 7	0.44
Grade 8	0.07

All differences are statistically different.

Scoring Discrepancy by Task  
Grade 3

		Difference between original and audited scores									
		-8	-4	-3	-2	-1	0	1	2	3	Total
Dave's Pocket	Count				7	22	736	19	9		793
Money	% within Dave's Pocket Money				0.9%	2.8%	92.8%	2.4%	1.1%		100.0%
Tropical Fish	Count			1	3	38	719	27	2	3	793
	% within Tropical Fish			0.1%	0.4%	4.8%	90.7%	3.4%	0.3%	0.4%	100.0%
Symbols	Count	1			6	5	761	7	13		793
	% within Symbols	0.1%			0.8%	0.6%	96.0%	0.9%	1.6%		100.0%
Boxing the Pots	Count		1	1	9	60	658	56	7	1	793
	% within Boxing the Pots		0.1%	0.1%	1.1%	7.6%	83.0%	7.1%	0.9%	0.1%	100.0%
A Silly Story	Count		1		22	32	714	19	4	1	793
	% within A Silly Story		0.1%		2.8%	4.0%	90.0%	2.4%	0.5%	0.1%	100.0%

Scoring Discrepancy by Task  
Grade 4

		Difference between original and audited scores								
		<b>-3</b>	<b>-2</b>	<b>-1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>Total</b>
Saturday Afternoon	Count	1	3	34	499	19	2			558
	% within Saturday Afternoon	0.2%	0.5%	6.1%	89.4%	3.4%	0.4%			100.0%
Chips and Soda	Count		3	18	504	30	2		1	558
	% within Chips and Soda		0.5%	3.2%	90.3%	5.4%	0.4%		0.2%	100.0%
Piles of Oranges	Count		4	20	513	19	1		1	558
	% within Piles of Oranges		0.7%	3.6%	91.9%	3.4%	0.2%		0.2%	100.0%
Symmetrical Patterns	Count		4	14	517	19	4			558
	% within Symmetrical Patterns		0.7%	2.5%	92.7%	3.4%	0.7%			100.0%
Counting Feet	Count	1	3	23	453	73	4	1		558
	% within Counting Feet	0.2%	0.5%	4.1%	81.2%	13.1%	0.7%	0.2%		100.0%

Scoring Discrepancy by Task  
Grade 5

		Difference between original and audited scores									
		-6	-4	-3	-2	-1	0	1	2	3	Total
Boats	Count		2	7	3	40	697	33	4	4	790
	% within Boats		0.3%	0.9%	0.4%	5.1%	88.2%	4.2%	0.5%	0.5%	100.0%
How Many Cubes?	Count				1	35	724	28	2		790
	% within How Many Cubes?				0.1%	4.4%	91.6%	3.5%	0.3%		100.0%
Fruits & Vegetables	Count	1		1	6	47	690	36	9		790
	% within Fruits & Vegetables	0.1%		0.1%	0.8%	5.9%	87.3%	4.6%	1.1%		100.0%
Playing Games	Count			2	7	31	701	45	4		790
	% within Playing Games			0.3%	0.9%	3.9%	88.7%	5.7%	0.5%		100.0%
Fractions	Count					18	763	8	1		790
	% within Fractions					2.3%	96.6%	1.0%	0.1%		100.0%

Scoring Discrepancy by Task  
Grade 6

		Difference between original and audited scores										
		<b>-5</b>	<b>-4</b>	<b>-3</b>	<b>-2</b>	<b>-1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Total</b>
Candy Bars	Count			1	3	64	471	12	2			553
	% within Candy Bars			0.2%	0.5%	11.6%	85.2%	2.2%	0.4%			100.0%
Biggest	Count			1	11	28	472	22	13	4	2	553
	% within Biggest			0.2%	2.0%	5.1%	85.4%	4.0%	2.4%	0.7%	0.4%	100.0%
Meals	Count		1	4	19	34	453	28	12	2		553
	% within Meals		0.2%	0.7%	3.4%	6.1%	81.9%	5.1%	2.2%	0.4%		100.0%
Parallelograms	Count	1		7	8	42	446	35	11	3		553
	% within Parallelograms	0.2%		1.3%	1.4%	7.6%	80.7%	6.3%	2.0%	0.5%		100.0%
School Days	Count		1		6	28	478	30	8	1	1	553
	% within School Days		0.2%		1.1%	5.1%	86.4%	5.4%	1.4%	0.2%	0.2%	100.0%

Scoring Discrepancy by Task  
Grade 7

		Difference between original and audited scores														
		-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	5	6	Total
Quiz	Count	1			1	1	2	4	20	545	23	7			1	605
	% within Quiz	0.2%			0.2%	0.2%	0.3%	0.7%	3.3%	90.1%	3.8%	1.2%			0.2%	100.0%
Cereal	Count		1			3	11	21	32	505	8	24				605
	% within Cereal		0.2%			0.5%	1.8%	3.5%	5.3%	83.5%	1.3%	4.0%				100.0%
Special Offer	Count					1		17	16	559	6	6				605
	% within Special Offer					0.2%		2.8%	2.6%	92.4%	1.0%	1.0%				100.0%
Counters	Count					1		8	16	542	27	9	1	1		605
	% within Counters					0.2%		1.3%	2.6%	89.6%	4.5%	1.5%	0.2%	0.2%		100.0%
Which is Bigger?	Count		1	3	1	10	12	31	70	431	36	6	2		2	605
	% within Which is Bigger?		0.2%	0.5%	0.2%	1.7%	2.0%	5.1%	11.6%	71.2%	6.0%	1.0%	0.3%		0.3%	100.0%

Scoring Discrepancy by Task  
Grade 8

		Difference between original and audited scores											
		-6	-4	-3	-2	-1	0	1	2	3	5	6	Total
Merritt Bakery	Count		1	3	26	8	452	13	10	2		1	447
	% within Merritt Bakery		0.2 %	0.6 %	5.0 %	1.6 %	87.6 %	2.5 %	1.9 %	0.4 %		0.2 %	100.0 %
Odd Numbers	Count				7	18	463	16	12				447
	% within Odd Numbers				1.4 %	3.5 %	89.7 %	3.1 %	2.3 %				100.0 %
Party	Count	1			2	35	463	14	1				447
	% within Party	0.2 %			0.4 %	6.8 %	89.7 %	2.7 %	0.2 %				100.0 %
Hexagons	Count		1	2	1	20	467	21	3		1		447
	% within Hexagons		0.2 %	0.4 %	0.2 %	3.9 %	90.5 %	4.1 %	0.6 %		0.2 %		100.0 %
Animals	Count				2	30	450	25	7	2			447
	% within Animals				0.4 %	5.8 %	87.2 %	4.8 %	1.4 %	0.4 %			100.0 %

### Scoring Discrepancy by District

District		Difference between original and audited scores																		Total	
		-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7		8
10	Count			1				2	2	13	41	73	22	6	2	1		1			164
	% within District			0.6%				1.2%	1.2%	7.9%	25.0%	44.5%	13.4%	3.7%	1.2%	0.6%		0.6%			100.0%
12	Count								1		2	24	2	2							31
	% within District								3.2%		6.5%	77.4%	6.5%	6.5%							100.0%
13	Count							2		5	15	48	10	5							85
	% within District							2.4%		5.9%	17.6%	56.5%	11.8%	5.9%							100.0%
15	Count			1			3	3	4	8	34	137	21	11	2	1					225
	% within District			0.4%			1.3%	1.3%	1.8%	3.6%	15.1%	60.9%	9.3%	4.9%	0.9%	0.4%					100.0%
16	Count		1						2	3	13	47	6	5							77
	% within District		1.3%						2.6%	3.9%	16.9%	61.0%	7.8%	6.5%							100.0%
17	Count								3	8	23	83	20	7	1				2		147
	% within District								2.0%	5.4%	15.6%	56.5%	13.6%	4.8%	0.7%				1.4%		100.0%
19	Count							1	1	3	21	99	18	7	2						152
	% within District							0.7%	0.7%	2.0%	13.8%	65.1%	11.8%	4.6%	1.3%						100.0%
20	Count							1	2	6	18	88	15	4							134
	% within District							0.7%	1.5%	4.5%	13.4%	65.7%	11.2%	3.0%							100.0%
22	Count								1	9	9	59	6	5							89
	% within District								1.1%	10.1%	10.1%	66.3%	6.7%	5.6%							100.0%
24	Count								4	8	16	81	13	7	2						131
	% within District								3.1%	6.1%	12.2%	61.8%	9.9%	5.3%	1.5%						100.0%
25	Count				1	1		2	1	6	14	54	7	4	4						94
	% within District				1.1%	1.1%		2.1%	1.1%	6.4%	14.9%	57.4%	7.4%	4.3%	4.3%						100.0%
26	Count							1	5	8	14	88	14	2					1		133
	% within District							0.8%	3.8%	6.0%	10.5%	66.2%	10.5%	1.5%					0.8%		100.0%
29	Count							1		2	6	60	9	1	2						81
	% within District							1.2%		2.5%	7.4%	74.1%	11.1%	1.2%	2.5%						100.0%

Scoring Discrepancy by District (cont.)

District		Difference between original and audited scores																		Total	
		-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7		8
30	Count									3	2	8	6		1		1				21
	% within District									14.3%	9.5%	38.1%	28.6%		4.8%		4.8%				100.0%
32	Count				1			1		2	11	45	8	3	1						72
	% within District				1.4%			1.4%		2.8%	15.3%	62.5%	11.1%	4.2%	1.4%						100.0%
33	Count	1			1	5	4	12	23	60	147	478	122	37	10	2	1	3	1		907
	% within District	0.1%			0.1%	0.6%	0.4%	1.3%	2.5%	6.6%	16.2%	52.7%	13.5%	4.1%	1.1%	0.2%	0.1%	0.3%	0.1%		100.0%
35	Count						1	2	7	16	41	172	38	14	10	2					303
	% within District						0.3%	0.7%	2.3%	5.3%	13.5%	56.8%	12.5%	4.6%	3.3%	0.7%					100.0%
36	Count								3	6	12	107	16	4	3					1	152
	% within District								2.0%	3.9%	7.9%	70.4%	10.5%	2.6%	2.0%					0.7%	100.0%
38	Count									2	3	8	4			2					19
	% within District									10.5%	15.8%	42.1%	21.1%			10.5%					100.0%
41	Count					2				8	15	72	11	1							109
	% within District					1.8%				7.3%	13.8%	66.1%	10.1%	0.9%							100.0%
42	Count								3	12	21	102	21	10	3	1					173
	% within District								1.7%	6.9%	12.1%	59.0%	12.1%	5.8%	1.7%	0.6%					100.0%
43	Count							3	3	9	17	95	24	4	4						159
	% within District							1.9%	1.9%	5.7%	10.7%	59.7%	15.1%	2.5%	2.5%						100.0%
45	Count							2	1	3	14	71	12	1							104
	% within District							1.9%	1.0%	2.9%	13.5%	68.3%	11.5%	1.0%							100.0%
47	Count							2	2	3	17	57	15	2							98
	% within District							2.0%	2.0%	3.1%	17.3%	58.2%	15.3%	2.0%							100.0%
50	Count			1				2	2	3	16	54	18	10		1					107
	% within District			0.9%				1.9%	1.9%	2.8%	15.0%	50.5%	16.8%	9.3%		0.9%					100.0%
51	Count								1	2	7	23	10	4	1						48
	% within District								2.1%	4.2%	14.6%	47.9%	20.8%	8.3%	2.1%						100.0%

Correlations between original and audited scores by district

<b>District</b>	<b>Correlation</b>
10	0.986
12	0.995
13	0.994
15	0.992
16	0.988
17	0.990
19	0.996
20	0.995
22	0.995
24	0.993
25	0.985
26	0.994
29	0.994
30	0.977
32	0.987
33	0.990
35	0.993
36	0.993
38	0.977
41	0.995
42	0.993
43	0.994
45	0.994
47	0.995
50	0.984
51	0.989

## **Appendix 4**

## **Appendix 4**

### **NSLP by**

### **Performance Levels**

Percent of students in the NSLP broken down by Performance Levels 3 and 4 and District.

District Number	Performance Level	NSLP		
		Blank	No	Yes
10	3		41.1%	58.9%
	4	1.6%	47.3%	51.2%
12	3	2.1%	66.2%	31.8%
	4	1.1%	78.7%	20.2%
13	3		96.8%	3.2%
	4		98.8%	1.2%
15	3	0.1%	74.8%	25.2%
	4	0.1%	86.0%	13.9%
16	3	0.2%	83.2%	16.4%
	4	0.2%	88.5%	11.3%
17	3		95.0%	5.0%
	4		97.9%	2.1%
18	3	0.1%	64.6%	35.3%
	4	0.1%	77.8%	22.1%
20	3		83.6%	16.4%
	4	0.1%	87.8%	12.1%
22	3		97.6%	2.4%
	4	0.2%	98.0%	1.8%
24	3	0.1%	77.2%	22.7%
	4	0.1%	88.2%	11.7%
25	3	0.4%	76.7%	23.0%
	4		89.4%	10.6%
26	3	0.1%	58.3%	41.5%
	4		80.1%	19.9%
29	3		88.4%	11.6%
	4	0.2%	96.6%	3.3%

30	3		95.3%	4.7%
	4		99.2%	0.8%
32	3		98.0%	2.0%
	4	0.2%	98.8%	1.0%
35	3	0.2%	65.9%	33.9%
	4	0.3%	79.9%	19.8%
36	3		91.8%	8.2%
	4		94.0%	6.0%
38	3		98.2%	1.8%
	4		97.0%	3.0%
40	3		80.1%	19.9%
	4		91.0%	9.0%
41	3	0.5%	51.3%	48.3%
	4	0.4%	65.6%	34.0%
42	3	0.3%	52.0%	47.8%
	4	0.2%	61.1%	38.7%
43	3		81.1%	18.9%
	4		93.6%	6.4%
45	3		100.0%	
	4		99.5%	0.5%
47	3		71.1%	28.9%
	4		79.6%	20.4%
50	3		63.6%	36.4%
	4		84.0%	16.0%
51	3	99.6%	0.4%	
	4	100.0%		

Percent of students in NSLP by performance level and grade.

Grade	Performance Level	NSLP		
		Blank	N	Y
2	1	1.7%	40.3%	58.0%
	2	0.7%	51.1%	48.2%
	3	0.1%	64.6%	35.4%
	4	0.3%	82.3%	17.4%
3	1	0.8%	40.6%	58.6%
	2	0.3%	52.2%	47.6%
	3	0.2%	66.2%	33.6%
	4	0.2%	84.5%	15.4%
4	1	10.3%	31.4%	58.3%
	2	8.6%	49.4%	42.0%
	3	5.3%	65.4%	29.3%
	4	2.0%	85.2%	12.8%
5	1	2.8%	42.3%	54.9%
	2	2.1%	55.6%	42.3%
	3	1.8%	69.9%	28.2%
	4	1.1%	86.1%	12.8%
6	1	1.9%	49.4%	48.6%
	2	3.1%	60.6%	36.2%
	3	2.2%	75.9%	21.8%
	4	1.0%	88.9%	10.1%
7	1	0.1%	57.9%	42.0%
	2	0.1%	73.0%	26.9%
	3	0.1%	85.8%	14.0%
	4	0.1%	93.3%	6.6%
8	1	0.1%	61.0%	38.9%
	2	0.1%	76.2%	23.6%
	3	0.1%	87.1%	12.8%
	4	0.2%	94.1%	5.8%
9	1	5.2%	64.7%	30.1%
	2	2.3%	69.7%	28.0%
	3	1.4%	76.5%	22.1%
	4		86.5%	13.5%

10				
	1		81.0%	19.0%
	2	1.1%	83.1%	15.7%
	3		94.8%	5.2%
	4		90.2%	9.8%

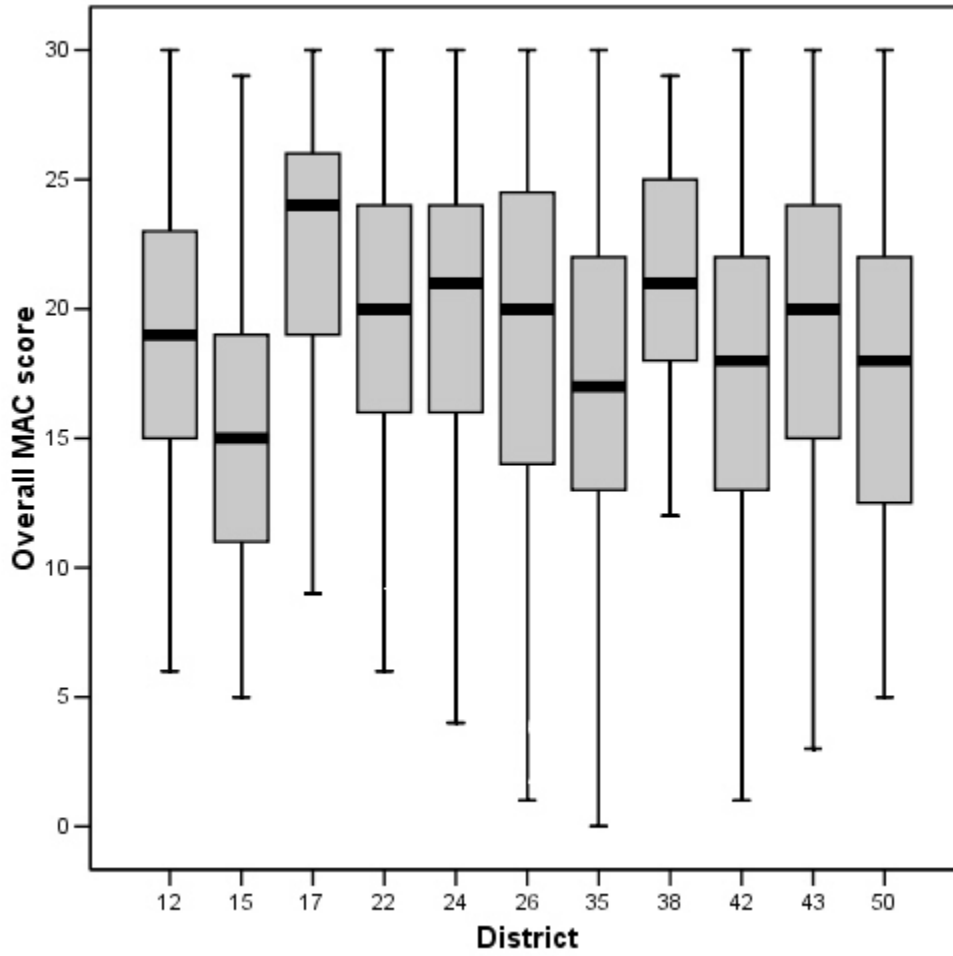
# **Appendix 5**

## **Overall MAC score**

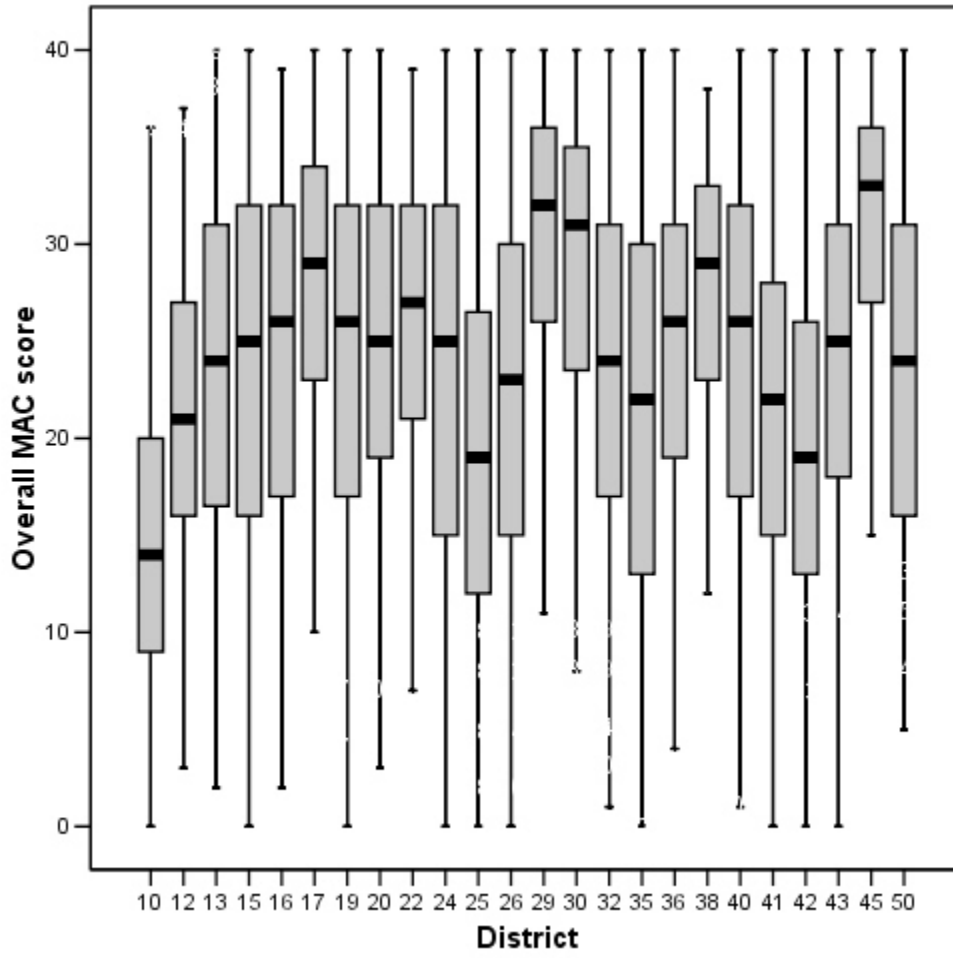
### **Comparison by District**

Box plots by grade level comparing all districts.

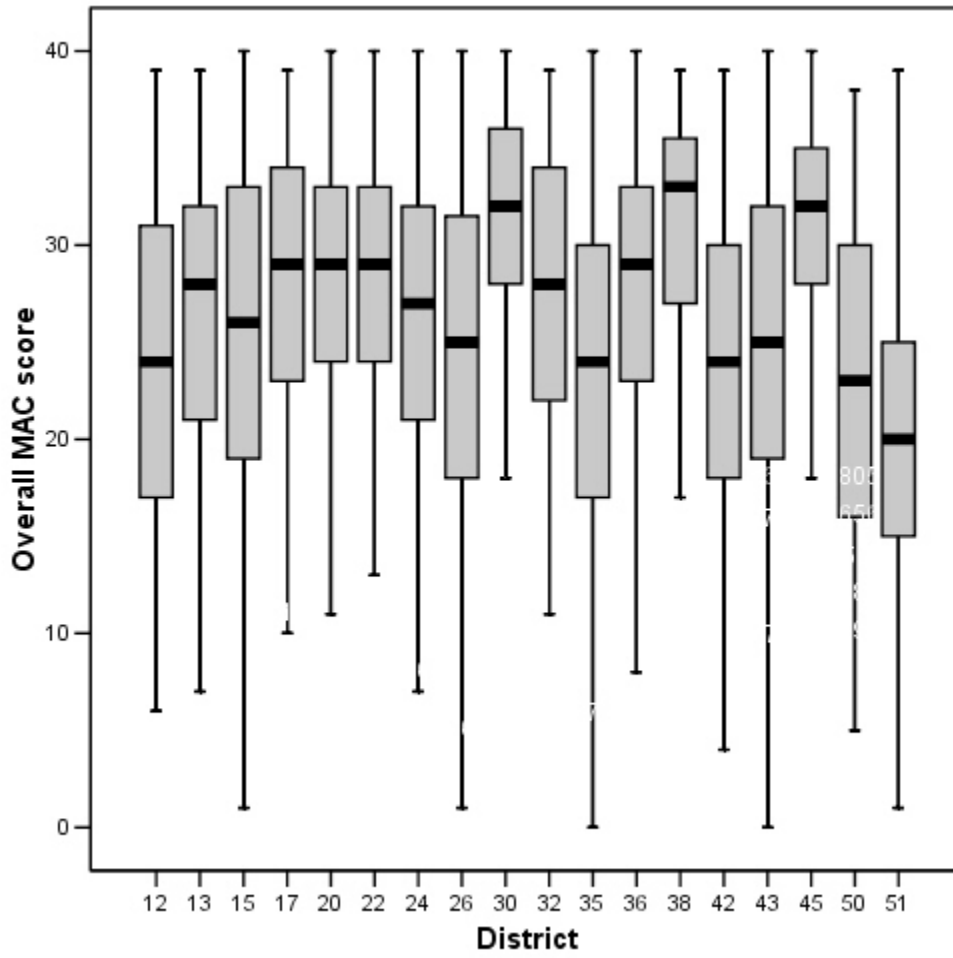
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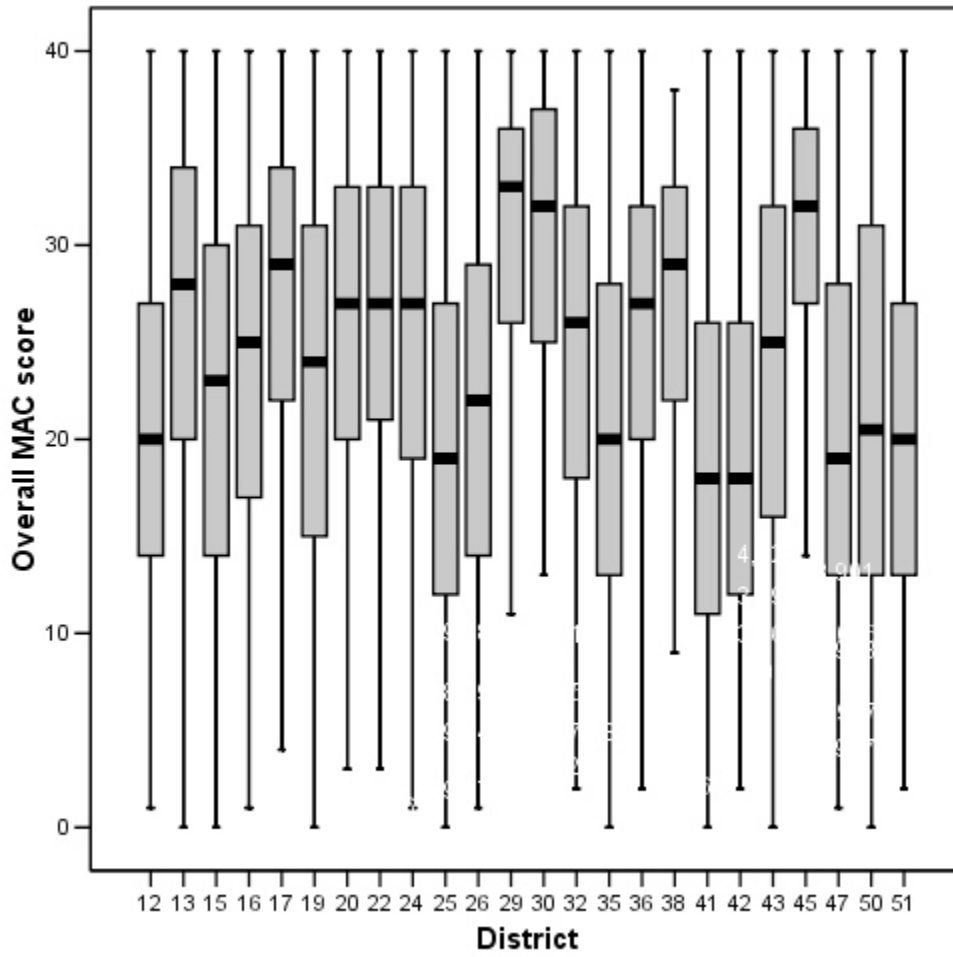
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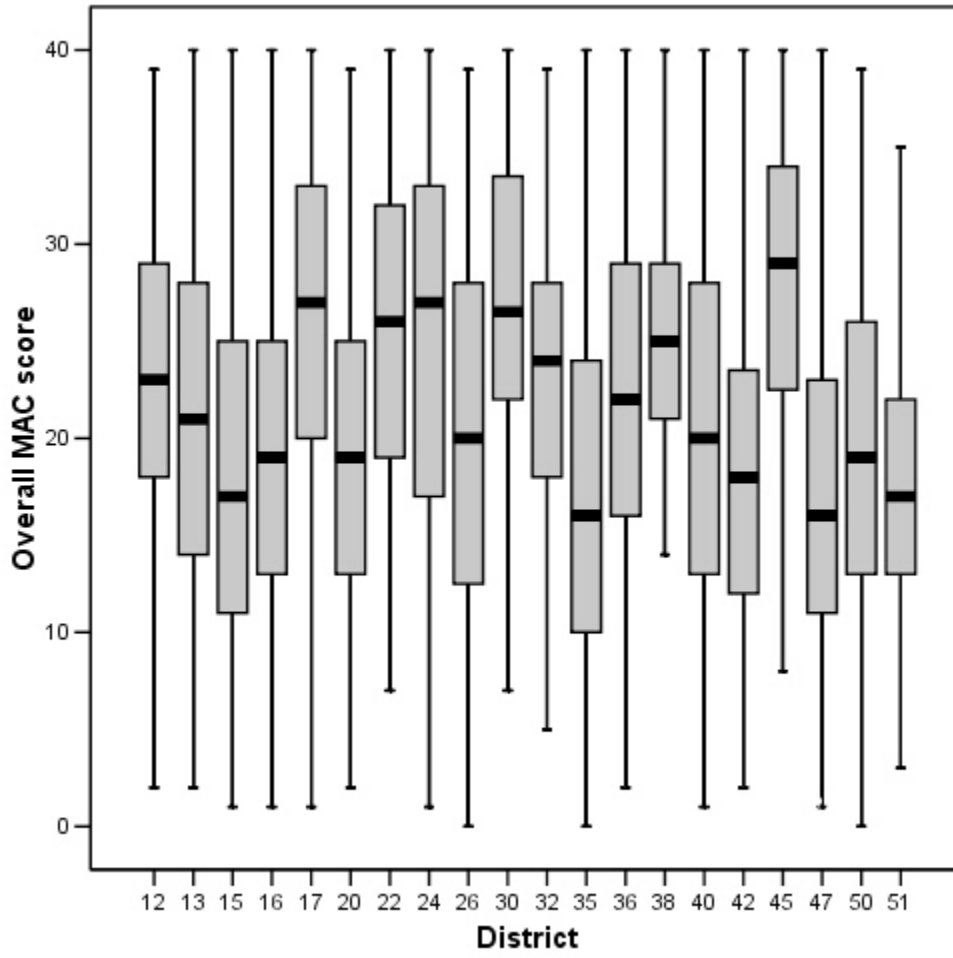
Grade 4



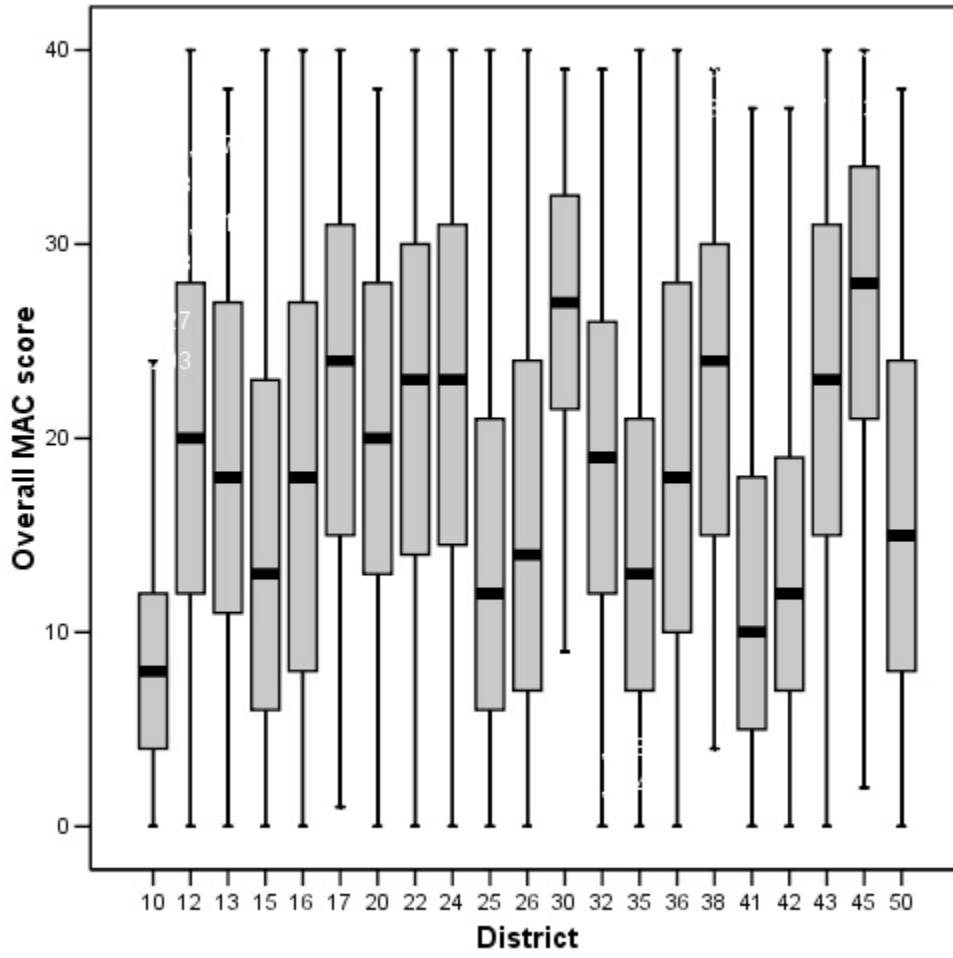
Grade 5



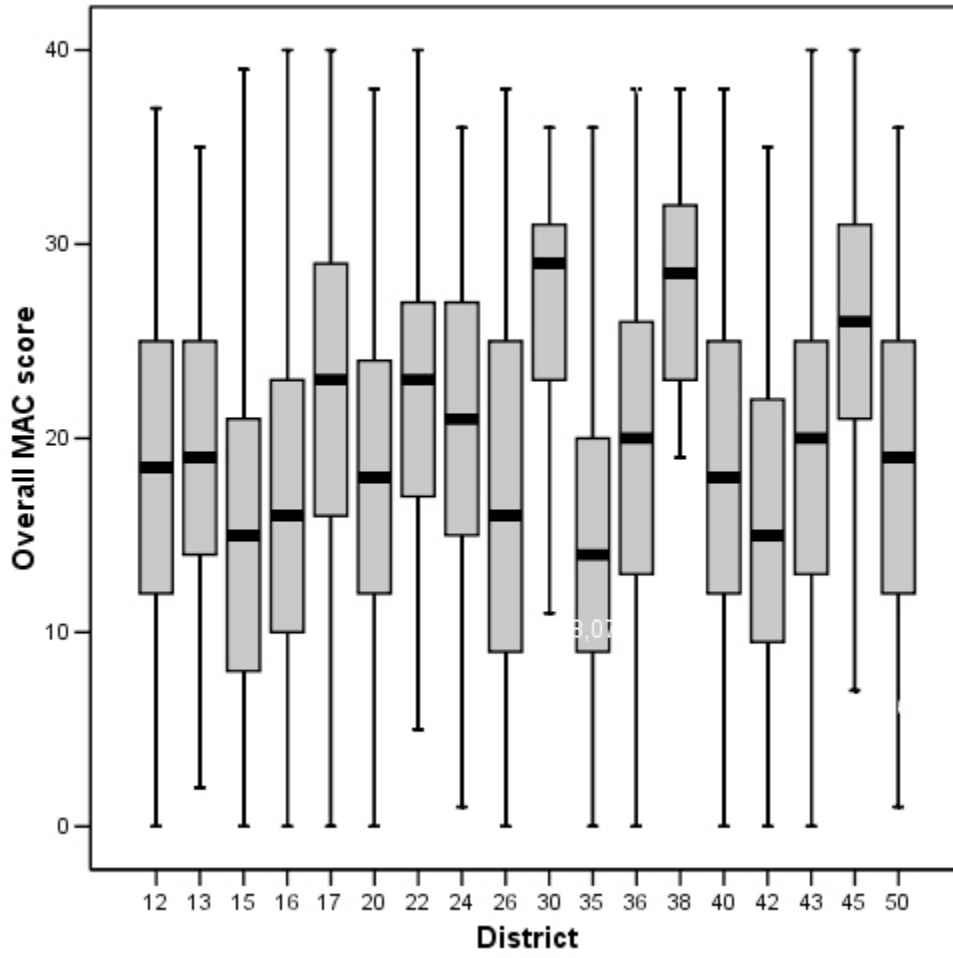
Grade 6



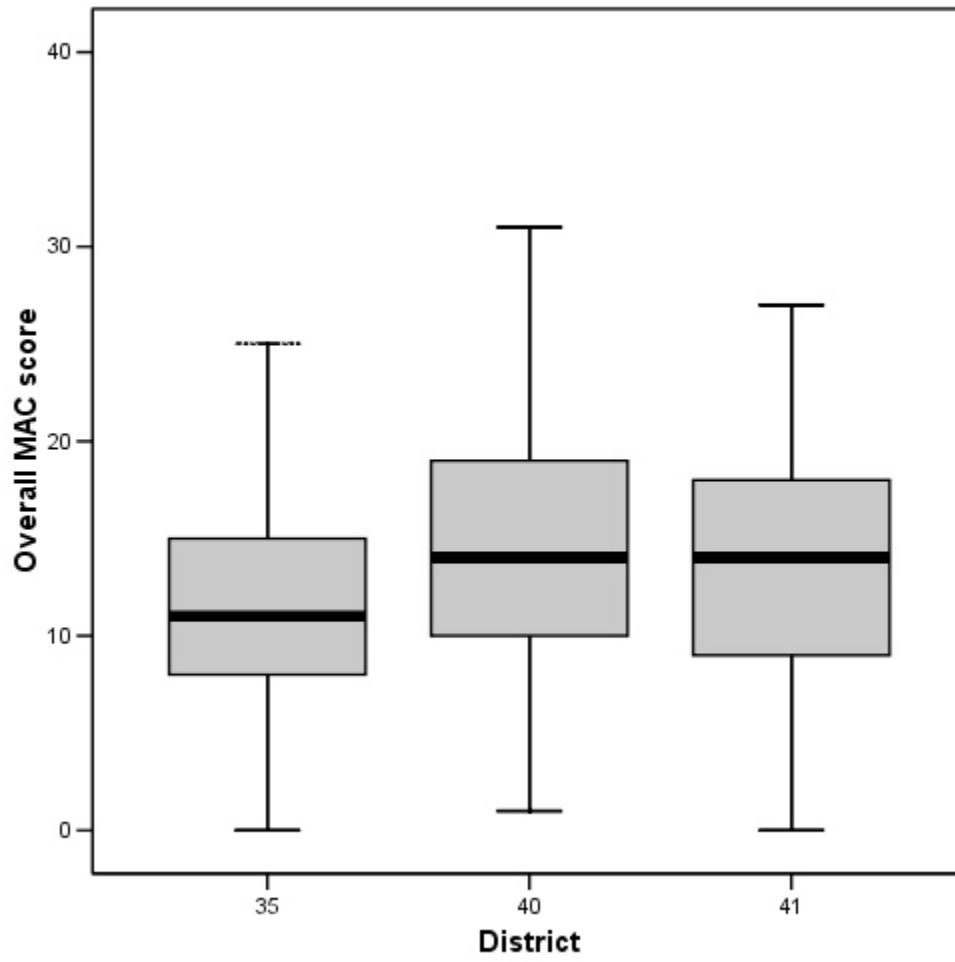
Grade 7



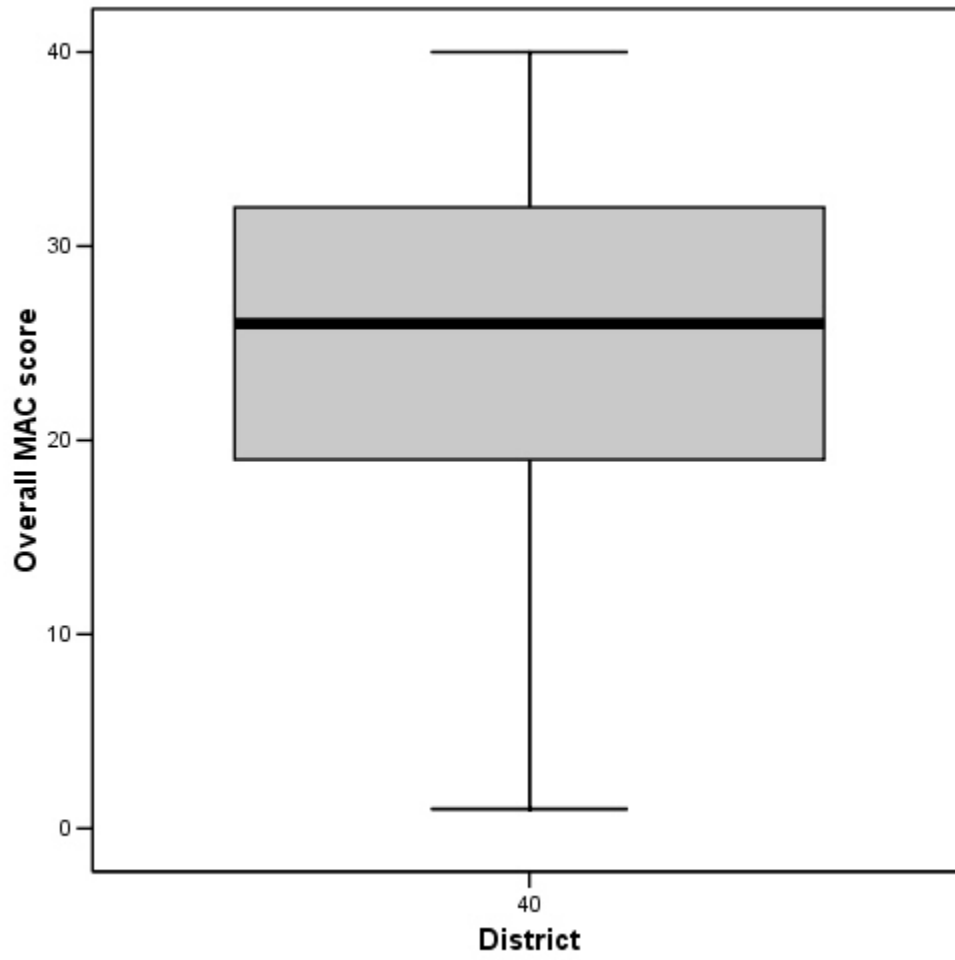
Grade 8



Grade 9



Grade 10



**Understanding the t-test:** If we had a single large pot containing student scores, we could select samples of scores at random, and we could call one, for example, “boys' scores” and another “girls' scores”, and compare them. There would almost always be a difference in the means; small differences would be more common than large differences. Differences in the scores would be larger if the range of scores in the pot were large (say 1 to 100) rather than small (say 1 to 5). For a given range of scores, small differences would be more likely when the sample sizes were large. For any particular sample size, we could count the number of times we got differences of a certain magnitude. Large differences would be rarer. Suppose we have a particular result we want to know about (there were 30 boys and 20 girls; the mean difference was 1.5 and the range of scores was 6, how likely is it that this was just a statistical fluctuation?). We could simulate drawing two sets of scores (of 30 and 20) over and over again from a pot of scores with a range of 6. We could count the relative occurrence of a difference in the means as big as 1.5.

The t-test provides a way of calculating the rarity of an observed difference between two sample means, if all the scores were actually drawn from the same pot, without having to do the simulation. Statistical significance is assessed in terms of the probability of getting a difference as big or bigger than the one observed, if the scores were actually drawn from the same pot. If an event would happen very rarely, the idea of “all scores coming from the same pot” is thrown away, and an alternative view- that the scores came from different pots- is accepted. By convention, if the observed difference would occur less than 1 in 20 times, we conclude that there is a “statistically significant difference between the means”. So statistically significant differences occur when the number “Significance 2-tailed” is smaller than 0.05.

The **correlation coefficient** provides a measure of the agreement between two sets of scores. Imagine the situation where 2 people grade a pile of scripts, independently. We could create a scatter plot of scores with the scores from the first marker along the y-axis, and the scores of the second marker along the x-axis. If all the points lie on a straight line with a positive slope, then there is perfect agreement about the rank order of students. If the points look like a fat cloud, there is little agreement. The correlation coefficient quantifies this intuitive idea. For linear relationships, a correlation of +1.00 signifies perfect agreement; a correlation of -1.00 signifies perfect disagreement. A correlation of 0.00 shows no relation between the scores at all. Typically, test designers use correlations to measure the agreement between scorers, and talk about “scorer reliability” (similarly, if students take parallel forms of the same test, it is common to talk about “test-retest reliability”-again using the correlation coefficient.). 'Statistical significance' is judged in ways analogous to the t-test. If two sets of scores were drawn from the same pot, in pairs, the correlation coefficient can be calculated. We could do this over and over again - the calculated correlation coefficient would almost never be exactly zero, but it would usually be small. When we have a real correlation coefficient, we could see how often a correlation that big would arise as the result of a random process. If it would occur less than one in 20 times (or one in 100 times) we conclude that the result is statistically significant at the 5% level (or the 1% level). The Spearman's rho correlation coefficient is used to correlate continuous and rank ordered variables.

**Understanding the F-test:** The variability in a given set of data can be calculated by looking at the amount by which the individual data points vary from the mean. In practice, this involves taking the squared values of these differences so that positive and negative differences can be taken into account. This measure is known as the variance of the sample. If, as in the t-test, sample scores were selected at random from the same large pot, there would be a difference in the variance of the two samples, small differences being more common than large differences. In the same way as the t-test provides a measure of the probability that the mean of the two samples are in fact significantly different statistically, the F-test provides a measure of the statistical significance of the recorded difference in the variance of the two samples. To inspect the reliability of trends in samples of data recorded at different times, the variance of each sample is compared to that of the whole. If the measured difference in variance is shown to be unlikely to occur by chance (By convention, less than 1 in 20), then the variation in data and therefore any observed trend, is said to be statistically significant.

## **Director's Note**

The MAC Project is made possible through the generous contributions of the Robert Noyce Foundation. David Foster has been instrumental in his clear vision for mathematics, identifying the work of MARS and how it connects to that vision, and being able to pull together the diverse groups, which make up the Mathematics Assessment Collaborative. None of this would have materialized without his leverage and encouragement.

The Santa Clara Valley Mathematics Project, led by Dr. Joanne Rossi Becker, has been instrumental in the success of the Mathematics Assessment Collaborative. Dr. Becker and the Math Project provide support to MAC in various capacities. Dr. Becker serves on the M.A.C. Executive Committee and plays an important role in advising the director and membership on matters of mathematics education. In other roles, Dr. Becker helps the Collaborative keep focused on mathematics standards, provides mathematical expertise and helps to set performance level boundaries. The San Jose State University Foundation is the fiscal agent of M.A.C. Dr. Becker plays an essential role in overseeing the budget and expense payments. Dr. Becker assists with high school professional development and arranging the audit scoring sessions that employ San Jose State University students and are conducted in their Mathematics Department. In addition SCMVP and Dr. Becker provide ongoing professional development for the member districts through projects such as the Summer Lab Schools and the Summer Coaching Institutes. These grants and programs also provide support that allows participating teachers to attend the MAC professional development sessions.