DOCUMENT RESUME

ED 408 339 TM 026 592

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TITLE Creating Local Norms To Evaluate Students in a Norm-Referenced Statewide Testing Program.
PUB DATE Mar 97
NOTE 56p.; Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, March 24-28, 1997).
PUB TYPE Reports - Evaluative (142) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Academic Achievement; Achievement Gains; Achievement Tests; Elementary Secondary Education; Ethnic Groups; Mathematics Tests; *Norm Referenced Tests; Racial Differences; Reading Tests; Scores; Standardized Tests; State Programs; Test Construction; *Test Norms; Test Results; *Testing Programs
IDENTIFIERS *Hawaii; *Stanford Achievement Tests

ABSTRACT

Hawaii uses the eighth edition of the Stanford Achievement Test (Stanford 8) to assess academic performance of the student population in grades 3, 6, 8, and 10. Hawaii was not included in the norming for the Stanford 8, neither for the national nor the Pacific norms. In this study, Hawaii norms were developed based on the Stanford 8 reading and mathematics results from 1992 to 1996 to supplement the national norms and provide an additional means of comparison. Hawaii reading norms were lower at every grade level, especially grades 3 and 8. However, local mathematics norms showed Hawaii students exceeding national norms in the upper quartile on grades 3, 6, and 8. Hawaiian and national grade-10 mathematics norms were very similar. Average performance changes between grades were analyzed, and it was found that the longitudinal cohorts made greater gains in achievement from third to sixth and from eighth to tenth grades than national counterparts, while the sixth-to-eighth grade group made lesser gains. These norms provide tools to improve the understanding of Hawaii student performance relative to their mainland counterparts. (Contains 5 tables, 8 figures, and 26 references.) (Author/SLD)

Running head: CREATING NORMS FOR HAWAII

Creating Local Norms to Evaluate Students in a Norm-Referenced Statewide Testing Program

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Abstract

Hawaii uses the Stanford Achievement Test (Stanford 8) to assess academic performance of the student population in grades 3, 6, 8, and 10. Hawaii was not included in the norming for the Stanford Achievement Test 8th edition (Stanford 8), neither for the national nor the pacific norms. Hawaii norms were therefore developed based on the Stanford 8 reading and mathematics results from 1992 to 1996 to supplement the national norms and provide an additional means of comparison. Hawaii reading norms were lower at every grade level, especially grades 3 and 8. However, local mathematics norms showed Hawaii students exceeding national norms in the upper quartile in grades 3, 6, and 8. Hawaii and national grade 10 mathematics norms were very similar. Average performance changes between tested grades were analyzed. The longitudinal cohorts made greater gains in achievement from 3rd - 6th and 8th - 10th grades than the national counterparts, while the 6th - 8th grade group made lesser gains. These norms provide tools to improve the understanding of Hawaii student performance relative to their mainland counterparts.

Creating Local Norms to Evaluate Students in a Norm-Referenced Statewide Testing Program

Assessment of student achievement is required by legislation in many states.The Hawaii Department of Education mandates annual testing for all public school students in grades 3, 6, 8, and 10 unless specifically excluded from testing. The most widely used standardized tests are norm-referenced ones, which were developed to compare individual student performance to a representative national sample. The norm-referenced Stanford Achievement Test, 8th Edition (Stanford 8), published in 1992 by the Psychological Corporation, is generally the standardized instrument used to measure academic achievement in Hawaii. The Stanford 8 results can be reported in a variety of normed scores (e.g., stanines, percentiles, and scaled scores) for use in comparing students in the target group (Hawaii) with the norming group (Heim, 1994). Even though commentators have emphasized the shortcomings and questioned the validity of standardized tests, it is improbable that these tests will be discarded as assessment instruments (Crouse & Trusheim, 1989; Powell & Steelman, 1996) as they appear to be the most efficient, and relatively objective method of measuring student achievement.

There have been numerous controversies surrounding the use of norm-referenced tests in Hawaii (Aizawa, 1994; Chin-Chance, 1994; Heim, 1994; Paris, 1994). However, in order to consider the appropriateness of administering the Stanford 8, the purpose of the mandated assessment must be understood: to assess the performance of students. To assess the achievement of Hawaii public school students, their performance on the Stanford 8 is compared with the performance of other students and schools in the nation.

The Stanford 8 national norms are based upon a sample (n=175,000) of students assessed in 1991 (The Psychological Corporation, 1992). However, students in Hawaii's public schools were not included in the sample, neither in the pilot testing nor in the development of the national norms. The Psychological Corporation maintains that Hawaii's lack of representation in the national norming process does not significantly affect the national norms, as Hawaii's student population includes ethnic groups that comprise only 1-2% of the United States' student population (J. Mayo, personal communication, September, 1994). Moreover, when Stanford 8 norms were developed for the Pacific region, students in American Samoa, Guam, and CNMI were included but students in Hawaii were not (M. Turituri, personal communication, October 23, 1996).

It is often advantageous for a state or school district to develop special norms to supplement the national norms, which may be inadequate for the local setting, to provide an additional means of comparison (Nunnally, 1972; Petersen, Kolen, & Hoover, 1989; Brown & Bryant, 1984). Brown and Bryan recommend the development of local norms when there are significant differences in characteristics of ethnicity, gender, achievement performance, or age between the local population and the normative group. The typical characteristics of Hawaii's public school students warrant the development of local norms.

Rationale for Development of Local Norms in Hawaii.

Ethnicity. Unlike the rest of the contiguous states, the ethnicity of the public school population in Hawaii is approximately 23% Caucasian, 4 % Hispanic, .4% African American, 21% Native Hawaiian and Part Hawaiian, 34% Asian, and 18% other (Chin-Chance, Gronna, & Jenkins, 1996a). The Stanford 8 norms, however, were developed using a representative national

sample of 72% Caucasian, 7% Hispanic, 15% African American, and 5% other ethnicity (The Psychological Corporation, 1992b). Studies have linked achievement in Hawaii to ethnicity (Brandon, 1984; Educational Testing Service, 1993; Gallimore, Boggs, & Jordan, 1974). The national norms therefore do not reflect Hawaii's multicultural student population and achievement.

Gender. The achievement pattern in mathematics is atypical for boys and girls in Hawaii (Brandon, Jordan, & Higa, 1995; Kiplinger, 1996). The Total Reading and Total Mathematics "dimensions" of the Stanford 8 are computed based on the scores of several subtests in each area. Hawaii is the only large school district in the United States where girls outperform boys in Stanford 8 Total Reading and Total Mathematics at all grade levels (Liskum & Chin-Chance, 1996).

Achievement. Unlike the national average (10.4%), Hawaii has a higher (19%), proportion of students enrolled in private schools (Lai, Saka, & Chin-Chance, 1994). Research indicates that private school students who once attended public schools in Hawaii typically score in the above average range of achievement (Lai, et al., 1994). Furthermore, 12.9 % of the tested student population in Hawaii is comprised of special education students (Chin-Chance, Gronna, & Jenkins, 1996b). Studies have indicated that students with disabilities typically score in the below average range of achievement (Gronna, Jenkins, & Chin-Chance, 1996). The Stanford 8 normative sample only includes 4.9% special education students (The Psychological Corporation, 1992a). When Hawaii is compared to the nation, the normative sample includes more "bright" students who are not attending private schools and fewer students with disabilities.

Age. Hawaii is one of eight states maintaining late entrance admission (December 1 to January 1) cut-off dates (Liskum & Chin-Chance, 1996). Hawaii has more "younger" students within each grade than other states. Younger children are usually at an academic disadvantage when compared to older classmates (Crosser, 1991). Liskum and Chin-Chance found a relationship between age and Stanford 8 test scores in Hawaii at all tested grades. Children born in the last three months of the year, had statistically significant lower achievement scores than their older peers. Liskum and Chin-Chance (1996) suggest that Hawaii is at relative disadvantage in norm-referenced comparisons with other states, because the Stanford 8 normative sample was based on an older population.

Purpose of study

This study sought to analyze the standardized test score data for students within Hawaii in order to profile their achievement. We hypothesized that the overall test performance of students within Hawaii is different from the mainland population. This study developed local or state-wide norms for public school students taking the Stanford 8 in grades 3, 6, 8, and 10 based on cross-sectional data from 1992 to 1996 in order to assess performance of these students. A longitudinal analysis was conducted to develop a sense of typical changes in reading and mathematics based on the Stanford 8.

Method

The Hawaii Department of Education, Test Development Section of the Planning and Evaluation Group maintains an extensive student identity database on all public school students that includes ethnicity, home language, age, and gender. The Stanford 8 results have been stored in annual databases. The student identity and Stanford 8 databases for 1992 through 1996 (n =

247,817) were used for analysis. During this period, approximately 68,679 grade 3 students, 66,553 grade 6 students, 60,400 grade 8 students, and 51,185 grade 10 students were assessed using the Stanford 8.

Procedure

Development of Hawaii Norms based on Cross-Sectional Data. Using Microsoft Access (Microsoft, 1995) the individual student records (N = 1,069,500) in the 1992 to 1996 demographic databases were disaggregated into tested grades and linked by student identification numbers to the Stanford 8 databases. The cross-sectional data from 1992 and 1996 were combined to provide more stable benchmarks. Of these, all Total Reading student scaled scores and Total Mathematics scaled scores in grades 3, 6, 8, and 10 were used to develop Hawaii norms for the test dimensions at each tested grade level. The Stanford 8 scaled scores represent approximately equal units in learning on a continuous scale from 1 to 999 and facilitate the conversion into other score types that are suitable for studying the change in performance over time (The Psychological Corporation, 1992a). Descriptive statistics and frequency distributions of scores within tested grades were calculated using SPSS 7.0 for Windows 95 (SPSS, 1996). From these data, tentative Hawaii percentile rank norms were constructed.

National normative data were compiled from the technical data reports for the Stanford 8 (The Psychological Corporation, 1992). The normative data for scaled scores and percentiles were published in the "look-up" tables by administration data and test form. The means and standard deviations of the scaled scores of the combined spring standardization sample and number of students included in the sample were published in National technical reports (The Psychological Corporation, 1992). The mean scores for the combined Spring standardization

sample may vary from specific values found in the "look-up" tables due to slight differences between test forms. The mean scaled scores for Total Reading and Total Mathematics dimensions were determined from the Stanford 8 technical reports and were identified as the nationally normed scaled score at the 50th percentile rank for each grade. The arithmetic differences between national means at sequential grades were computed to determine the national average scaled score increases per grade level and test dimension.

Changes in Scaled Scores Between Grades Based on Longitudinal Data. To develop longitudinal cohorts, the student identity and Stanford 8 data bases were further linked to test results at an earlier grade. The longitudinal analysis was based on two 3rd to 6th grade cohorts (n = 20,826). Cohort A included 3rd grade students in 1992 and 6th grade students in 1995 (na = 10,429). Cohort B included 3rd grade students in 1993 and 6th grade students in 1996 (nb = 10,397). Three 6th to 8th grade cohorts (n = 29,948) were included. Cohort C included 6th grade students in 1992 and 8th grade students in 1994 (nc = 9,781). Cohort D included 6th grade students in 1993 and 8th grade students in 1995 (nd = 9,980). Cohort E included 6th grade students in 1994 and 8th grade students in 1996 (ne =10,187). Finally, three 8th to 10th grade cohorts were included in the longitudinal analysis (n = 23,683). Cohort F included 8th grade students in 1992 and 10th grade students in 1994 (nf = 7,886). Cohort G included 8th grade students in 1993 and 10th grade students in 1995 (ng = 7,823). Cohort H included 8th grade students in 1994 and 10th grade students in 1996 (nh = 7,974).

The cohorts data were aggregated by grade grouping to provide more stable benchmarks. To study the changes between the tested grades the Psychological Corporation scaled scores were

used as they adequately represent approximately equal units on a continuous scale and are equivalent across test forms and test levels (The Psychological Corporation, 1992b).

Hawaii scaled score mean increases were determined for each longitudinal cohort's Total Reading and Total Mathematics dimensions. The associated scaled score corresponding to the 50th percentile rank of the frequency distribution was identified at each grade level and dimension. The arithmetic difference between Hawaii means at sequential grades were computed to determine the Hawaii average scaled score increases per cohort and test dimension.

Results

Tables 1 and 2 represents the descriptive statistics, means, and standard deviations for Stanford 8 Total Reading and Total Mathematics scaled scores for each Hawaii grade level based on the cross-sectional data. Hawaii means and standard deviations for test dimensions are different from the national norms at each grade level. The Total Mathematics kurtosis (.910 to -.145) and skewness (.817 to .390) and Total Reading kurtosis (-.405 to .116) and skewness (.293 to .468) for each Hawaii frequency distribution of scores are represented by grade in Table 3. The distribution of scores is generally positively skewed. The distribution of the Hawaii scaled scores does not fall along the normal distribution of the Stanford 8 scaled scores for the Total Reading and Total Mathematics dimensions.

Tentative Hawaii percentile rank norms were constructed for grades 3, 6, 8, and 10 from the scores of all students who took the Stanford 8 in a standardized manner. These norms include students with disabilities and have a fairly equal representation of male and female students (e.g., males: 51%, 50.5%, 51.2% and 50.1% for grades 3, 6, 8, and 10, respectively). Figures 1 through

8 compare Hawaii percentile rank norms to national norms for reading and mathematics dimensions.

The reading performance gap between the Hawaii and national norms is the greatest at grades 3 (14 to 20 scaled score points) and 8 (10 to 16 scaled score points). Smaller performance gaps are noted for grades 6 and 10. The performance gap is not consistent across all performance levels. For grades 3, 6, and 10 the largest differences occur in the mid-range while grade 8 Hawaii students demonstrate the most severe gap in the lower half of the performance range.

Hawaii mathematics performance indicates relatively small differences (3 to 6 scaled score points) when compared to national norms. In grades 3, 6, and 8, Hawaii students perform better than their national counterparts in the upper quartile range and less well in the middle quartiles. At grade 10, the national normative group performs better at almost every level, but only at a very small amount (3 to 4 scales score points).

Average scaled score values were further analyzed to ascertain the average changes in scaled scores between grades based on a longitudinal analysis the data. Between 3rd and 6th grades the Hawaii group increased an average of 11 Total Reading and 14 Total Mathematics scaled score points above the national norm. However, between 6th and 8th grades, the Hawaii group gained 2 scaled score points less in Total Reading and 16 points less in Total Mathematics dimensions. Between 8th and 10th grade, Hawaii students increased an average of two scaled score points above the national group in Total Reading and exhibited equal scaled score increases in Total Mathematics when compared to the gains made nationally (see Tables 4 and 5).

Discussion

The primary purpose of this study was to analyze the standardized test score data for students within Hawaii in order to evaluate academic performance within the state. Statewide norms for Hawaii's public school students were developed by grade level in order to provide an indicator of Hawaii "normal" performance. By developing local norms, students in Hawaii are being compared to the performance of a more relevant heterogeneous population.

Closer inspection of the Hawaii norms reveal that at all four grades tested, Hawaii students do not perform on par with the national normative group. Hawaii students fail to perform on par in reading with their national counterparts, yet are relatively equivalent in mathematics performance. Hawaii reading norms were lower at every grade level, especially grades 3 and 8. However, Hawaii mathematics norms showed Hawaii students exceeding national norms in the upper quartile in grade 3, 6, and 8. Hawaii and national grade 10 mathematics norms were very similar. In mathematics, Hawaii students generally perform much closer to their national counterparts.

The longitudinal cohorts made greater gains in achievement from 3rd - 6th and 8th -10th grades than their national counterparts, while the 6th - 8th grade group made lesser gains. It is interesting that while gains between grade 6 and 8 are not as substantial as the national normative gains between these years, the grade 3 and 6 cohorts as well as grade 8 and 10 cohorts increase or remain equivalent to national normative performance achievement. These findings are compatible with previous research (Chin-Chance, et al., 1996a; Gronna, et al., 1996; Lai, et al., 1994). The variables that can account for the increase or decrease in Stanford 8 reading scores have not yet been identified nor evaluated. Perhaps the differences in scores between grades

could be related to school philosophies, perceived self-efficacy, students' background characteristics, motivation, or gender.

Since the results of our study are based on the entire public school population at targeted grades, the differences reported must be viewed in terms of educational significance rather than statistical significance. Undoubtedly the grade 3 to 6 cohort differences are large enough to represent relative large changes in relative rankings between Hawaii and national norms while the two to three point differences in the grade 8 to 10 cohort would represent relative minor changes in relative rankings. These analysis and norms provide additional tools to improve the understanding of Hawaii student performance relative to their mainland counterparts.

Summary

There are four important features to use when examining norms: (a) the types of derived scores that are reported, (b) the demographic representativeness of the normative sample, (c) the size of the normative group, and (d) the recency of test standardization (Wallace, Larsen, & Elskin, 1992). One must be wary of comparing the results of students in Hawaii, who take the Stanford 8, to the national norm. The Hawaii "norms" developed in this study more accurately reflect the demographic student characteristics of Hawaii's public school students than the national or Pacific region norms. The Hawaii norms are based on a population much larger than the Stanford 8 sample, and are more current.

The Hawaii norms can provide additional information about how well individual students are performing in comparison to students who are similar to them on important characteristics such as gender, ethnicity, and age. The Hawaii norms could be used to further identify the influence of gender and age on achievement measured by the Stanford 8. The possible finding

could influence school entrance age requirements, curriculum, and teaching styles. The Hawaii norms could be additionally compared to the Stanford 8 norms of the Pacific region for further evaluation of achievement within the Pacific basin. Use of these norms do not imply that the more traditional norms are incorrect. It should be viewed from the standpoint that these norms provide additional interpretive tools for understanding students performance in Hawaii.

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Table 1

Total Reading Scaled Scores for Stanford Achievement Test 8: 1992- 1996

	Hawaii			Natio		
	M	SD	n	SD	n M	n
Third	590	38	65,866	40	611	9,617
Sixth	642	34	65,218	38	656	9,870
Eighth	661	36	58,033	36	676	8,711
Tenth	679	35	47,157	36	688	6,491

Note. The mean scores for the combined Spring standardization sample may vary from specific values found in the "look-up" tables due to slight differences between test forms.

Table 2

Total Mathematics Scaled Scores for Stanford Achievement Test 8: 1992- 1996

	Hawaii			Natio		
	M	SD	n	SD	n M	n
Third	596	43	66,623	40	596	9,636
Sixth	657	37	64,978	39	663	9,792
Eighth	683	39	57,473	39	690	8,671
Tenth	707	44	48,028	44	705	6,440

Note. The mean scores for the combined Spring standardization sample may vary from specific values found in the "look-up" tables due to slight differences between test forms.

Table 3

Kurtosis and Skewness for Frequency Distributions of Scaled Scores in Hawaii

	Total Reading		Total Mathematics	
Grade	Kurtosis	Skewness	Kurtosis	Skewness
Third	-.407	.334	-.145	.390
Sixth	-.193	.333	.282	.656
Eighth	.116	.468	.588	.817
Tenth	-.225	.293	.910	.801

Table 4

Mean Total Reading Scaled Score Differences for Selected Cohorts.

	Grade 3 to 6			Grade 6 to 8			Grade 8 to 10		
	3	6	Δ	6	8	Δ	8	10	Δ
Hawaii	591	643	52	640	662	22	666	680	14
National sample (Typical)	608	649	41	649	673	24	673	685	12

Table 5

Mean Total Mathematics Scaled Score Differences for Selected Cohorts.

	Grade 3 to 6			Grade 6 to 8			Grade 8 to 10		
	3	6	Δ	6	8	Δ	8	10	Δ
Hawaii	598	658	60	657	685	28	690	710	20
National sample (Typical)	594	640	46	640	684	44	684	704	20

Figure 1. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for third grade Total Mathematics.

Figure 2. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for third grade Total Reading.

Figure 3. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for sixth grade Total Mathematics.

Figure 4. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for sixth grade Total Reading.

Figure 5. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for eighth grade Total Mathematics.

Figure 6. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for eighth grade Total Reading.

Figure 7. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for tenth grade Total Mathematics.

Figure 8. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for tenth grade Total Reading.

Hawaii Local Norm -3rd Grade Total Mathematics								National Norm -3rd GradeTotal Mathematics							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	458	**26**	565	**51**	594	**76**	627	**1**	511	**26**	567	**51**	595	**76**	624
2	527	**27**	566	**52**	595	**77**	628	**2**	518	**27**	569	**52**	596	**77**	625
3	530	**28**	567	**53**	596	**78**	630	**3**	521	**28**	570	**53**	597	**78**	626
4	531	**29**	568	**54**	597	**79**	632	**4**	525	**29**	571	**54**	598	**79**	627
5	535	**30**	569	**55**	598	**80**	633	**5**	529	**30**	572	**55**	599	**80**	628
6	536	**31**	570	**56**	600	**81**	635	**6**	531	**31**	574	**56**	600	**81**	629
7	537	**32**	572	**57**	601	**82**	636	**7**	533	**32**	575	**57**	601	**82**	631
8	538	**33**	573	**58**	602	**83**	638	**8**	535	**33**	576	**58**	602	**83**	633
9	540	**34**	574	**59**	603	**84**	640	**9**	538	**34**	577	**59**	603	**84**	635
10	542	**35**	575	**60**	604	**85**	642	**10**	540	**35**	578	**60**	604	**85**	637
11	543	**36**	576	**61**	605	**86**	644	**11**	542	**36**	580	**61**	605	**86**	638
12	545	**37**	577	**62**	607	**87**	646	**12**	543	**37**	581	**62**	607	**87**	639
13	547	**38**	579	**63**	608	**88**	648	**13**	545	**38**	582	**63**	608	**88**	641
14	548	**39**	580	**64**	609	**89**	650	**14**	548	**39**	583	**64**	609	**89**	644
15	550	**40**	582	**65**	611	**90**	653	**15**	550	**40**	584	**65**	610	**90**	646
16	551	**41**	583	**66**	612	**91**	654	**16**	551	**41**	585	**66**	611	**91**	648
17	553	**42**	584	**67**	613	**92**	657	**17**	554	**42**	586	**67**	613	**92**	651
18	554	**43**	585	**68**	616	**93**	661	**18**	555	**43**	587	**68**	614	**93**	654
19	555	**44**	586	**69**	617	**94**	665	**19**	557	**44**	588	**69**	615	**94**	657
20	557	**45**	587	**70**	618	**95**	670	**20**	559	**45**	589	**70**	616	**95**	663
21	558	**46**	588	**71**	619	**96**	675	**21**	560	**46**	590	**71**	618	**96**	667
22	559	**47**	589	**72**	620	**97**	681	**22**	562	**47**	591	**72**	619	**97**	671
23	560	**48**	590	**73**	622	**98**	687	**23**	563	**48**	592	**73**	620	**98**	679
24	562	**49**	591	**74**	624	**99**	702	**24**	565	**49**	593	**74**	621	**99**	685
25	563	**50**	592	**75**	625	**100**	778	**25**	566	**50**	594	**75**	623	**100**	778

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.

Hawaii Local Norm -3rd Grade Total Reading								National Norm -3rd GradeTotal Reading							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	474	**26**	561	**51**	589	**76**	619	**1**	539	**26**	579	**51**	609	**76**	637
2	528	**27**	562	**52**	590	**77**	620	**2**	541	**27**	581	**52**	610	**77**	639
3	529	**28**	563	**53**	592	**78**	621	**3**	544	**28**	582	**53**	611	**78**	640
4	533	**29**	564	**54**	593	**79**	623	**4**	546	**29**	583	**54**	612	**79**	641
5	534	**30**	565	**55**	594	**80**	624	**5**	548	**30**	585	**55**	613	**80**	643
6	536	**31**	567	**56**	595	**81**	626	**6**	550	**31**	586	**56**	614	**81**	644
7	537	**32**	568	**57**	596	**82**	627	**7**	552	**32**	587	**57**	615	**82**	645
8	539	**33**	569	**58**	597	**83**	629	**8**	554	**33**	589	**58**	616	**83**	647
9	540	**34**	570	**59**	598	**84**	631	**9**	556	**34**	590	**59**	617	**84**	648
10	541	**35**	572	**60**	599	**85**	632	**10**	557	**35**	591	**60**	618	**85**	650
11	542	**36**	573	**61**	600	**86**	634	**11**	559	**36**	593	**61**	619	**86**	652
12	543	**37**	574	**62**	601	**87**	636	**12**	560	**37**	594	**62**	620	**87**	654
13	545	**38**	575	**63**	602	**88**	638	**13**	561	**38**	595	**63**	621	**88**	655
14	546	**39**	576	**64**	603	**89**	640	**14**	562	**39**	596	**64**	622	**89**	657
15	547	**40**	577	**65**	604	**90**	642	**15**	563	**40**	597	**65**	623	**90**	660
16	549	**41**	578	**66**	606	**91**	644	**16**	565	**41**	599	**66**	625	**91**	663
17	550	**42**	580	**67**	607	**92**	647	**17**	567	**42**	599	**67**	626	**92**	666
18	551	**43**	581	**68**	608	**93**	650	**18**	569	**43**	601	**68**	627	**93**	669
19	552	**44**	582	**69**	610	**94**	652	**19**	570	**44**	602	**69**	628	**94**	672
20	554	**45**	583	**70**	611	**95**	656	**20**	571	**45**	603	**70**	630	**95**	676
21	555	**46**	584	**71**	612	**96**	660	**21**	573	**46**	604	**71**	631	**96**	680
22	556	**47**	585	**72**	613	**97**	666	**22**	574	**47**	605	**72**	632	**97**	685
23	557	**48**	586	**73**	615	**98**	672	**23**	575	**48**	606	**73**	633	**98**	690
24	558	**49**	587	**74**	616	**99**	681	**24**	577	**49**	607	**74**	635	**99**	703
25	559	**50**	588	**75**	617	**100**	784	**25**	578	**50**	608	**75**	636	**100**	784

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.

Hawaii Local Norm -6th Grade Total Mathematics								National Norm -6th GradeTotal Mathematics							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	546	26	629	51	653	76	682	1	576	26	630	51	655	76	682
2	598	27	630	52	654	77	683	2	579	27	631	52	656	77	683
3	602	28	631	53	655	78	685	3	587	28	632	53	657	78	685
4	604	29	632	54	656	79	686	4	591	29	633	54	658	79	686
5	605	30	633	55	657	80	688	5	594	30	634	55	659	80	688
6	606	31	634	56	658	81	690	6	596	31	635	56	660	81	689
7	608	32	635	57	659	82	691	7	600	32	636	57	661	82	691
8	609	33	636	58	660	83	693	8	602	33	637	58	662	83	693
9	611	34	637	59	661	84	695	9	604	34	638	59	663	84	694
10	612	35	638	60	662	85	697	10	605	35	639	60	664	85	696
11	613	36	639	61	663	86	700	11	607	36	640	61	665	86	698
12	615	37	639	62	664	87	702	12	609	37	641	62	666	87	699
13	616	38	640	63	665	88	704	13	612	38	642	63	667	88	700
14	617	39	641	64	666	89	706	14	614	39	643	64	668	89	702
15	618	40	642	65	668	90	709	15	615	40	644	65	669	90	706
16	619	41	643	66	669	91	712	16	617	41	645	66	670	91	708
17	620	42	644	67	670	92	715	17	618	42	646	67	671	92	710
18	621	43	645	68	671	93	717	18	620	43	647	68	672	93	714
19	622	44	646	69	672	94	721	19	622	44	648	69	673	94	717
20	623	45	647	70	674	95	725	20	623	45	649	70	674	95	719
21	624	46	648	71	675	96	731	21	624	46	650	71	676	96	725
22	625	47	649	72	676	97	737	22	625	47	651	72	677	97	731
23	626	48	650	73	677	98	745	23	626	48	652	73	678	98	741
24	627	49	651	74	679	99	756	24	628	49	653	74	679	99	745
25	628	50	652	75	680	100	848	25	629	50	654	75	680	100	848

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.
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Hawaii Local Norm -6th Grade Total Reading								National Norm -6th GradeTotal Reading							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	532	**26**	616	**51**	640	**76**	666	**1**	585	**26**	624	**51**	650	**76**	675
2	581	**27**	617	**52**	641	**77**	667	**2**	587	**27**	625	**52**	651	**77**	676
3	585	**28**	618	**53**	642	**78**	668	**3**	591	**28**	627	**53**	652	**78**	677
4	587	**29**	619	**54**	643	**79**	669	**4**	593	**29**	628	**54**	653	**79**	679
5	589	**30**	621	**55**	644	**80**	671	**5**	595	**30**	629	**55**	654	**80**	680
6	591	**31**	622	**56**	645	**81**	673	**6**	597	**31**	630	**56**	655	**81**	682
7	593	**32**	623	**57**	646	**82**	674	**7**	599	**32**	631	**57**	656	**82**	683
8	594	**33**	624	**58**	647	**83**	675	**8**	601	**33**	632	**58**	657	**83**	684
9	596	**34**	625	**59**	648	**84**	677	**9**	603	**34**	633	**59**	658	**84**	685
10	597	**35**	626	**60**	649	**85**	679	**10**	604	**35**	634	**60**	659	**85**	687
11	599	**36**	626	**61**	650	**86**	680	**11**	606	**36**	635	**61**	660	**86**	688
12	600	**37**	627	**62**	651	**87**	681	**12**	607	**37**	636	**62**	661	**87**	690
13	602	**38**	628	**63**	652	**88**	683	**13**	608	**38**	637	**63**	662	**88**	691
14	603	**39**	629	**64**	653	**89**	685	**14**	610	**39**	638	**64**	663	**89**	693
15	604	**40**	630	**65**	654	**90**	687	**15**	611	**40**	639	**65**	664	**90**	696
16	605	**41**	631	**66**	655	**91**	689	**16**	612	**41**	640	**66**	665	**91**	698
17	606	**42**	632	**67**	656	**92**	692	**17**	613	**42**	641	**67**	666	**92**	699
18	607	**43**	633	**68**	657	**93**	694	**18**	615	**43**	642	**68**	667	**93**	703
19	608	**44**	634	**69**	658	**94**	696	**19**	616	**44**	643	**69**	668	**94**	706
20	610	**45**	635	**70**	659	**95**	699	**20**	617	**45**	644	**70**	669	**95**	710
21	611	**46**	636	**71**	660	**96**	703	**21**	618	**46**	645	**71**	670	**96**	715
22	612	**47**	637	**72**	661	**97**	709	**22**	619	**47**	646	**72**	671	**97**	719
23	613	**48**	638	**73**	662	**98**	715	**23**	620	**48**	647	**73**	672	**98**	725
24	614	**49**	639	**74**	663	**99**	725	**24**	622	**49**	648	**74**	673	**99**	731
25	615	**50**	639	**75**	664	**100**	819	**25**	623	**50**	649	**75**	674	**100**	819

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.
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Hawaii Local Norm -8th Grade Total Mathematics								National Norm -8th Grade Total Mathematics							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	572	**26**	654	**51**	677	**76**	709	**1**	603	**26**	661	**51**	685	**76**	712
2	627	**27**	655	**52**	678	**77**	710	**2**	606	**27**	662	**52**	686	**77**	713
3	628	**28**	656	**53**	679	**78**	712	**3**	614	**28**	663	**53**	687	**78**	714
4	630	**29**	657	**54**	680	**79**	713	**4**	619	**29**	664	**54**	688	**79**	715
5	631	**30**	658	**55**	681	**80**	715	**5**	624	**30**	665	**55**	689	**80**	717
6	633	**31**	659	**56**	682	**81**	717	**6**	628	**31**	666	**56**	690	**81**	718
7	634	**32**	660	**57**	684	**82**	719	**7**	630	**32**	667	**57**	691	**82**	720
8	636	**33**	661	**58**	685	**83**	721	**8**	634	**33**	668	**58**	692	**83**	722
9	637	**34**	662	**59**	686	**84**	723	**9**	636	**34**	669	**59**	693	**84**	723
10	638	**35**	663	**60**	687	**85**	725	**10**	639	**35**	670	**60**	694	**85**	725
11	639	**36**	664	**61**	688	**86**	727	**11**	641	**36**	671	**61**	695	**86**	727
12	640	**37**	665	**62**	689	**87**	730	**12**	643	**37**	672	**62**	696	**87**	728
13	641	**38**	665	**63**	690	**88**	733	**13**	644	**38**	673	**63**	697	**88**	730
14	642	**39**	666	**64**	691	**89**	736	**14**	646	**39**	674	**64**	698	**89**	732
15	643	**40**	667	**65**	693	**90**	738	**15**	648	**40**	675	**65**	699	**90**	734
16	644	**41**	668	**66**	694	**91**	740	**16**	649	**41**	676	**66**	700	**91**	736
17	645	**42**	669	**67**	696	**92**	744	**17**	651	**42**	677	**67**	701	**92**	740
18	646	**43**	670	**68**	697	**93**	748	**18**	652	**43**	678	**68**	702	**93**	742
19	647	**44**	670	**69**	698	**94**	752	**19**	653	**44**	679	**69**	703	**94**	744
20	648	**45**	671	**70**	699	**95**	757	**20**	654	**45**	680	**70**	704	**95**	749
21	649	**46**	672	**71**	700	**96**	763	**21**	656	**46**	681	**71**	705	**96**	754
22	650	**47**	673	**72**	702	**97**	770	**22**	657	**47**	682	**72**	706	**97**	760
23	651	**48**	674	**73**	704	**98**	778	**23**	658	**48**	682	**73**	708	**98**	770
24	652	**49**	675	**74**	705	**99**	793	**24**	659	**49**	683	**74**	709	**99**	773
25	653	**50**	676	**75**	707	**100**	880	**25**	660	**50**	684	**75**	710	**100**	880

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.

Hawaii Local Norm -8th Grade Total Reading								National Norm -8th GradeTotal Reading							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	515	26	634	51	659	76	686	1	614	26	650	51	674	76	697
2	598	27	635	52	660	77	687	2	616	27	651	52	674	77	698
3	602	28	636	53	661	78	688	3	618	28	652	53	675	78	699
4	605	29	637	54	662	79	689	4	620	29	653	54	676	79	701
5	607	30	638	55	662	80	691	5	622	30	654	55	677	80	703
6	609	31	639	56	663	81	692	6	624	31	655	56	677	81	704
7	610	32	641	57	664	82	693	7	625	32	656	57	678	82	706
8	612	33	642	58	665	83	695	8	627	33	657	58	679	83	707
9	613	34	643	59	666	84	697	9	629	34	658	59	680	84	709
10	615	35	644	60	667	85	700	10	631	35	659	60	681	85	710
11	617	36	645	61	669	86	701	11	632	36	660	61	682	86	712
12	618	37	646	62	670	87	703	12	634	37	661	62	683	87	713
13	620	38	647	63	671	88	705	13	636	38	662	63	684	88	715
14	621	39	648	64	671	89	708	14	637	39	663	64	685	89	717
15	622	40	649	65	672	90	709	15	638	40	664	65	686	90	719
16	623	41	650	66	673	91	712	16	639	41	665	66	687	91	721
17	624	42	651	67	674	92	714	17	641	42	666	67	688	92	723
18	625	43	651	68	676	93	717	18	642	43	667	68	689	93	724
19	626	44	652	69	677	94	721	19	643	44	668	69	690	94	727
20	627	45	653	70	678	95	724	20	644	45	669	70	691	95	731
21	629	46	654	71	679	96	728	21	645	46	670	71	692	96	736
22	630	47	655	72	680	97	736	22	646	47	671	72	693	97	741
23	631	48	656	73	681	98	743	23	647	48	672	73	694	98	747
24	632	49	657	74	683	99	754	24	648	49	672	74	695	99	754
25	633	50	658	75	684	100	835	25	649	50	673	75	696	100	835

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.
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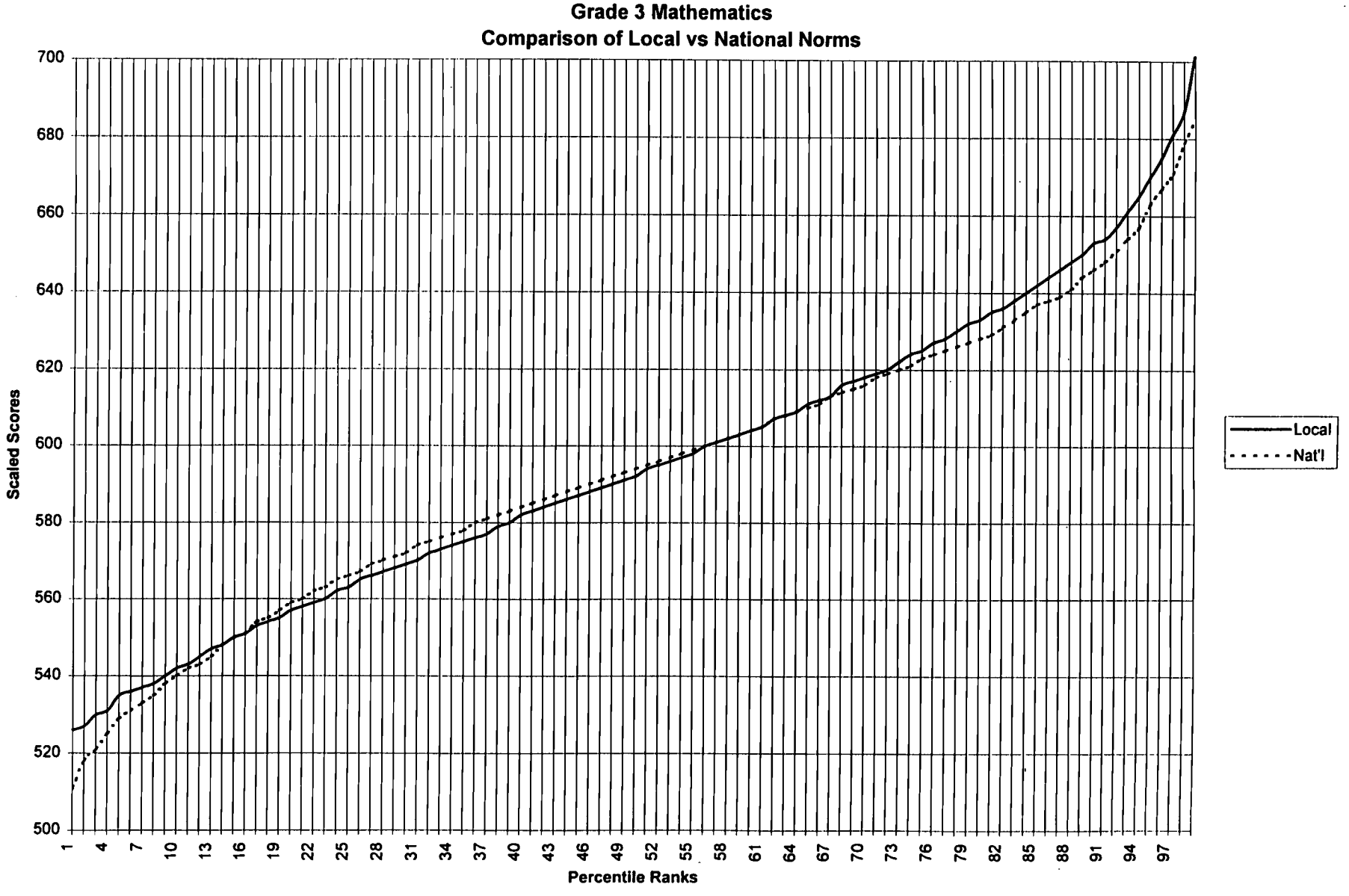
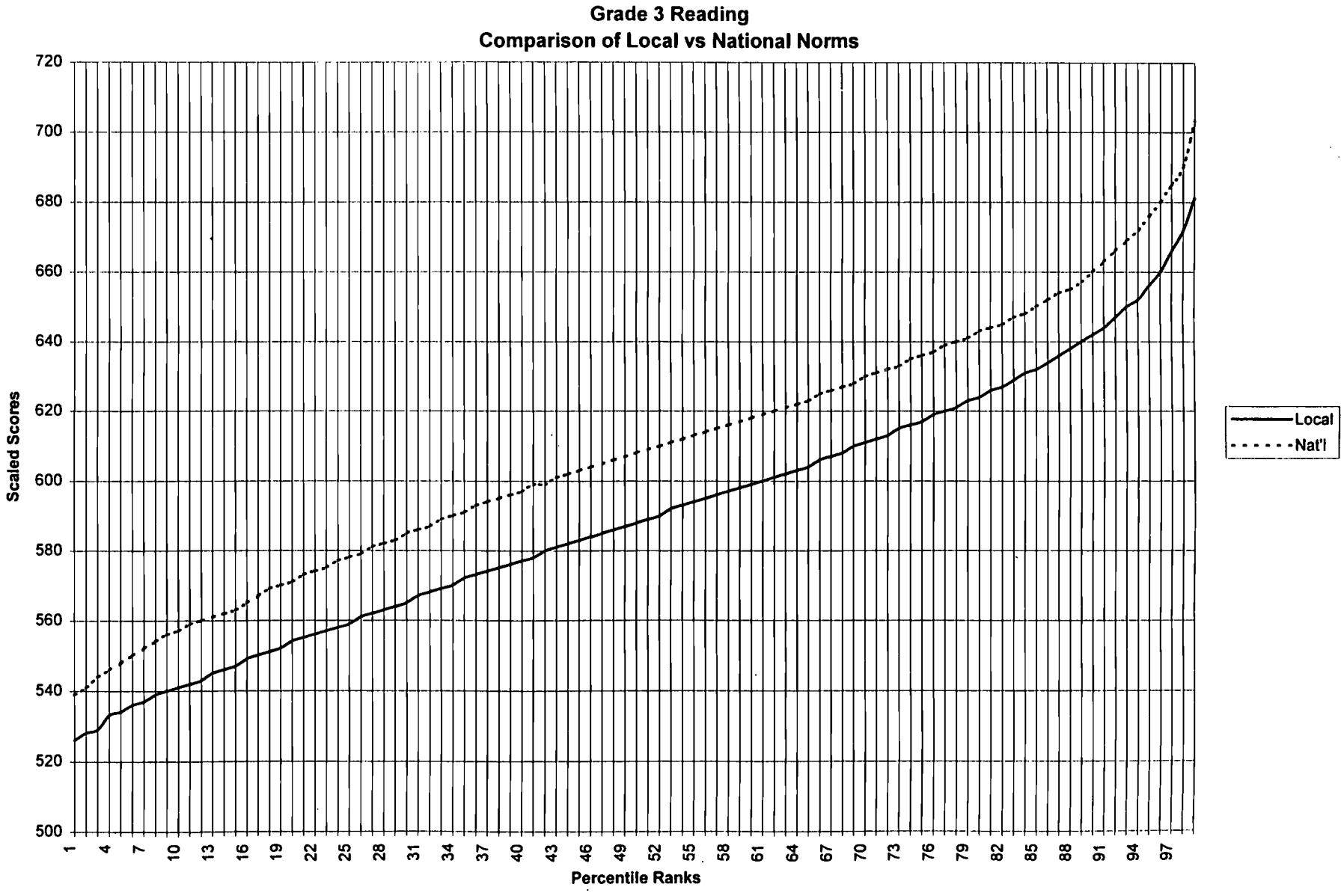
Hawaii Local Norm -10th Grade Mathematics								National Norm -10th Grade Mathematics							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	563	26	676	51	702	76	732	1	613	26	680	51	705	76	739
2	638	27	677	52	703	77	735	2	621	27	681	52	706	77	741
3	639	28	678	53	704	78	736	3	629	28	682	53	707	78	743
4	644	29	679	54	705	79	739	4	636	29	682	54	708	79	745
5	646	30	680	55	706	80	740	5	641	30	684	55	709	80	747
6	649	31	682	56	707	81	742	6	645	31	685	56	710	81	749
7	652	32	683	57	708	82	744	7	648	32	686	57	711	82	751
8	655	33	684	58	709	83	746	8	651	33	687	58	713	83	753
9	656	34	685	59	710	84	749	9	653	34	688	59	714	84	755
10	658	35	686	60	711	85	752	10	655	35	689	60	715	85	757
11	659	36	687	61	712	86	754	11	657	36	690	61	716	86	759
12	660	37	688	62	713	87	757	12	659	37	691	62	718	87	761
13	663	38	689	63	714	88	759	13	661	38	692	63	719	88	763
14	664	39	690	64	715	89	761	14	662	39	693	64	720	89	766
15	664	40	691	65	716	90	765	15	664	40	694	65	722	90	769
16	665	41	692	66	717	91	768	16	666	41	695	66	723	91	772
17	667	42	693	67	718	92	771	17	667	42	696	67	724	92	776
18	668	43	694	68	720	93	776	18	669	43	697	68	726	93	780
19	669	44	695	69	722	94	779	19	670	44	698	69	727	94	785
20	671	45	696	70	724	95	787	20	672	45	699	70	729	95	790
21	672	46	697	71	725	96	795	21	673	46	700	71	730	96	796
22	673	47	698	72	726	97	803	22	675	47	702	72	732	97	803
23	674	48	699	73	728	98	814	23	676	48	702	73	733	98	812
24	674	49	699	74	729	99	847	24	677	49	703	74	735	99	813
25	675	50	670	75	730	100	878	25	679	50	704	75	737	100	878

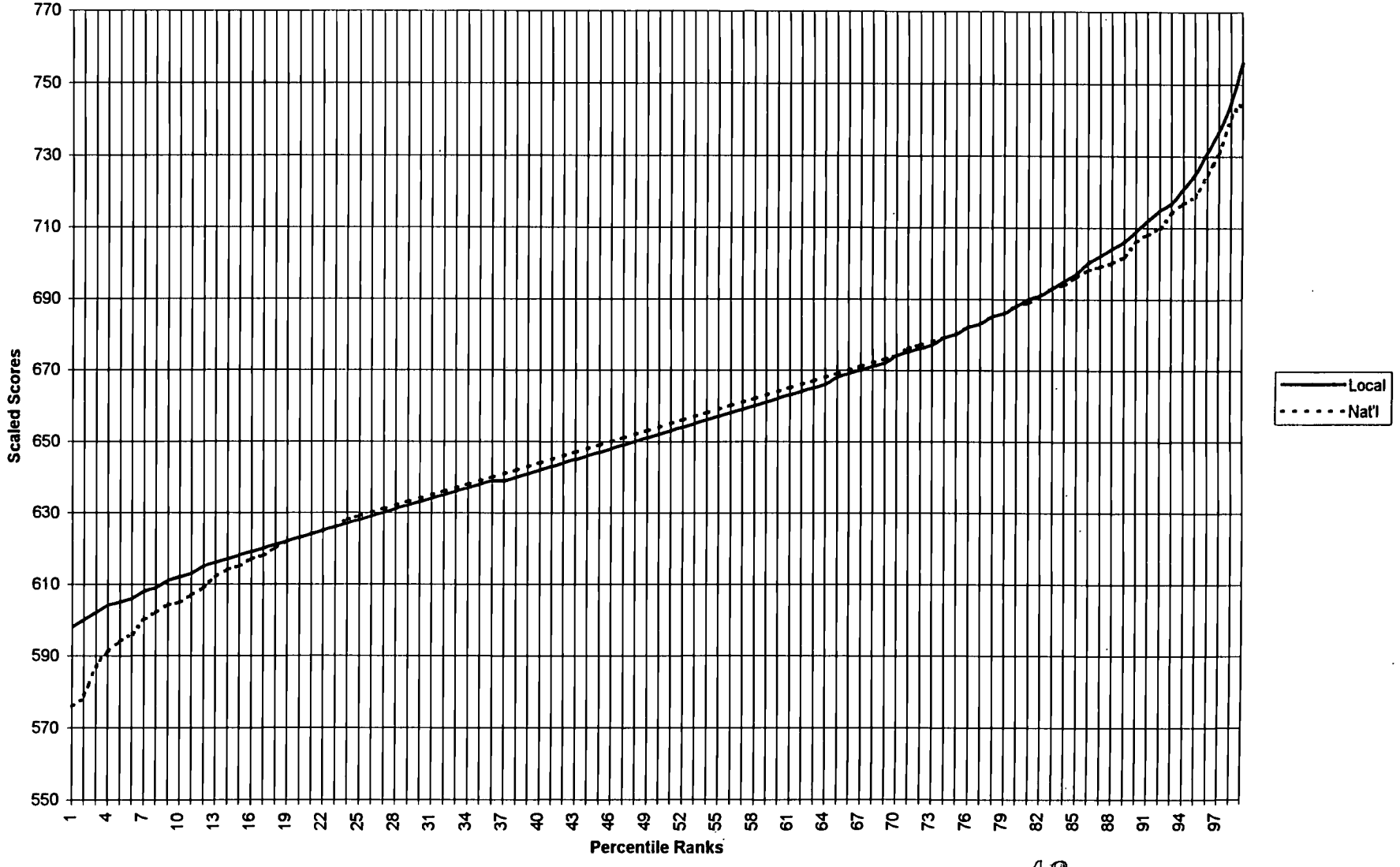
Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.

Hawaii Local Norm -10th GradeTotal Reading								National Norm -10th Grade Total Reading							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	531	**26**	653	**51**	677	**76**	704	**1**	621	**26**	661	**51**	686	**76**	710
2	616	**27**	654	**52**	678	**77**	705	**2**	624	**27**	662	**52**	686	**77**	711
3	620	**28**	655	**53**	679	**78**	706	**3**	627	**28**	663	**53**	687	**78**	712
4	622	**29**	656	**54**	680	**79**	707	**4**	629	**29**	664	**54**	688	**79**	713
5	625	**30**	657	**55**	681	**80**	708	**5**	631	**30**	665	**55**	689	**80**	715
6	627	**31**	658	**56**	682	**81**	710	**6**	633	**31**	666	**56**	690	**81**	716
7	629	**32**	659	**57**	683	**82**	712	**7**	635	**32**	667	**57**	691	**82**	717
8	631	**33**	660	**58**	684	**83**	713	**8**	637	**33**	668	**58**	692	**83**	719
9	633	**34**	661	**59**	685	**84**	715	**9**	639	**34**	669	**59**	693	**84**	720
10	634	**35**	662	**60**	686	**85**	716	**10**	640	**35**	670	**60**	694	**85**	722
11	635	**36**	663	**61**	687	**86**	717	**11**	642	**36**	671	**61**	695	**86**	723
12	637	**37**	664	**62**	688	**87**	720	**12**	643	**37**	672	**62**	696	**87**	725
13	638	**38**	666	**63**	689	**88**	721	**13**	645	**38**	673	**63**	697	**88**	727
14	640	**39**	667	**64**	690	**89**	724	**14**	646	**39**	674	**64**	698	**89**	729
15	641	**40**	667	**65**	691	**90**	726	**15**	648	**40**	675	**65**	699	**90**	731
16	642	**41**	668	**66**	692	**91**	727	**16**	649	**41**	676	**66**	700	**91**	733
17	644	**42**	669	**67**	693	**92**	730	**17**	650	**42**	677	**67**	701	**92**	735
18	645	**43**	670	**68**	694	**93**	732	**18**	652	**43**	678	**68**	702	**93**	738
19	646	**44**	671	**69**	695	**94**	735	**19**	653	**44**	679	**69**	703	**94**	741
20	647	**45**	672	**70**	696	**95**	738	**20**	654	**45**	680	**70**	704	**95**	745
21	648	**46**	672	**71**	697	**96**	742	**21**	655	**46**	681	**71**	705	**96**	749
22	649	**47**	673	**72**	698	**97**	746	**22**	657	**47**	682	**72**	706	**97**	754
23	650	**48**	674	**73**	699	**98**	755	**23**	658	**48**	683	**73**	707	**98**	755
24	651	**49**	675	**74**	701	**99**	762	**24**	659	**49**	684	**74**	708	**99**	761
25	652	**50**	676	**75**	703	**100**	855	**25**	660	**50**	685	**75**	709	**100**	855

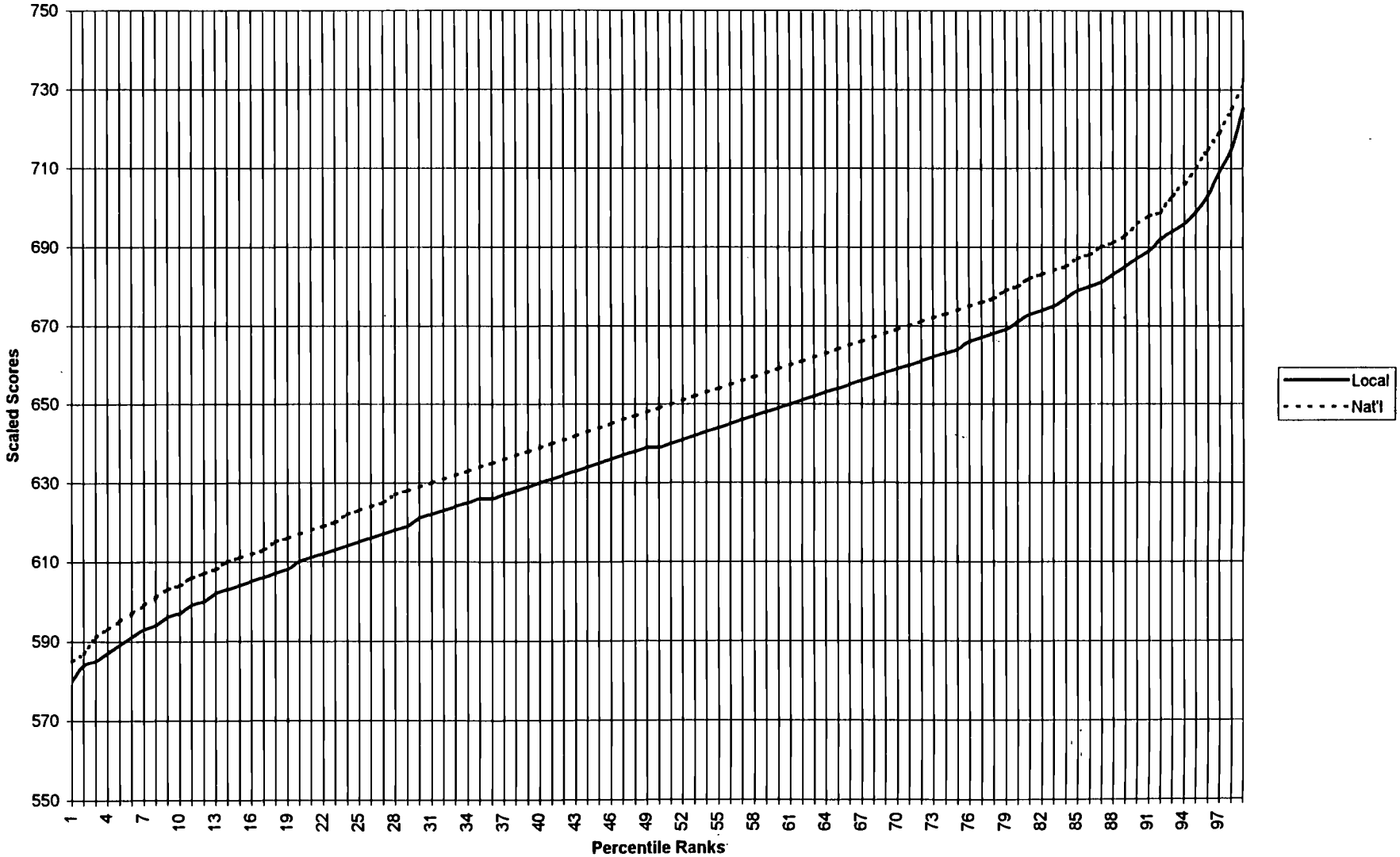

Grade 3 Mathematics
Comparison of Local vs National Norms
Scaled Scores
700
680
660
640
620
600
580
560
540
520
500
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97
Percentile Ranks
Local
Nat'l


Grade 3 Reading
Comparison of Local vs National Norms
Scaled Scores
720
700
680
660
640
620
600
580
560
540
520
500
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
49
52
55
58
61
64
67
70
73
76
79
82
85
88
91
94
97
Percentile Ranks
Local
Nat'l

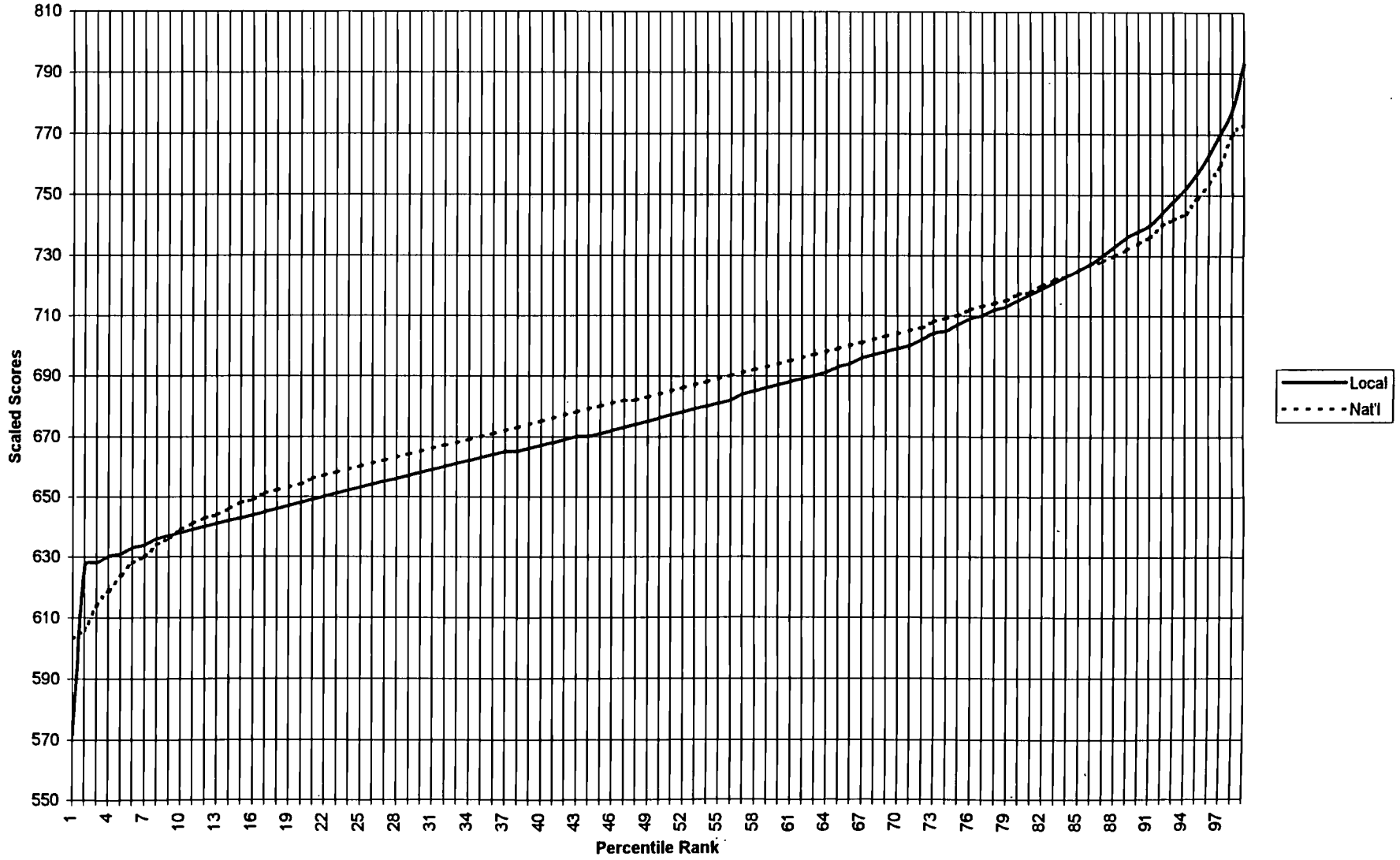
Grade 6 Mathematics
Comparison of Local vs National Norms



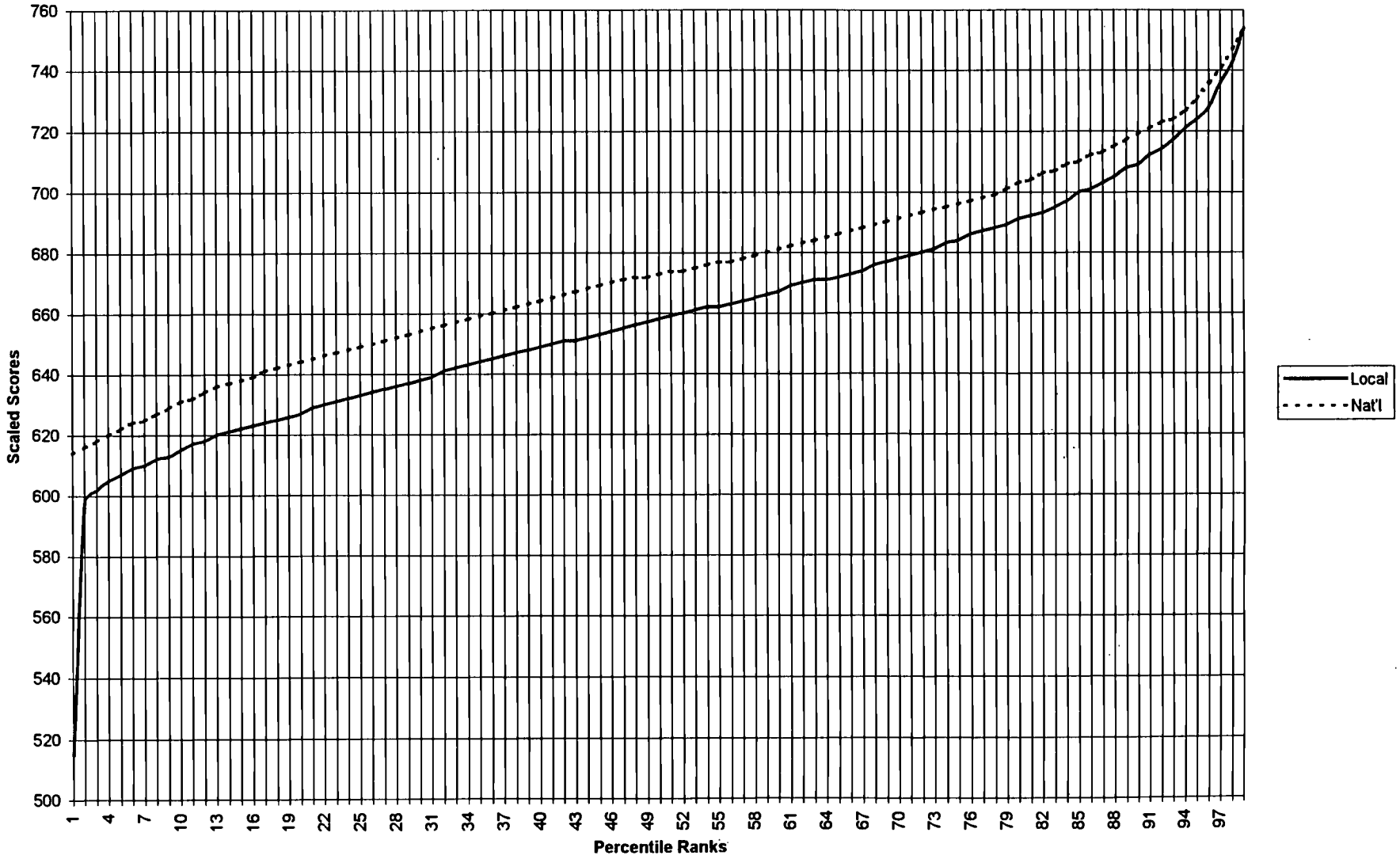
Grade 6 Reading
Comparison of Local vs National Norms



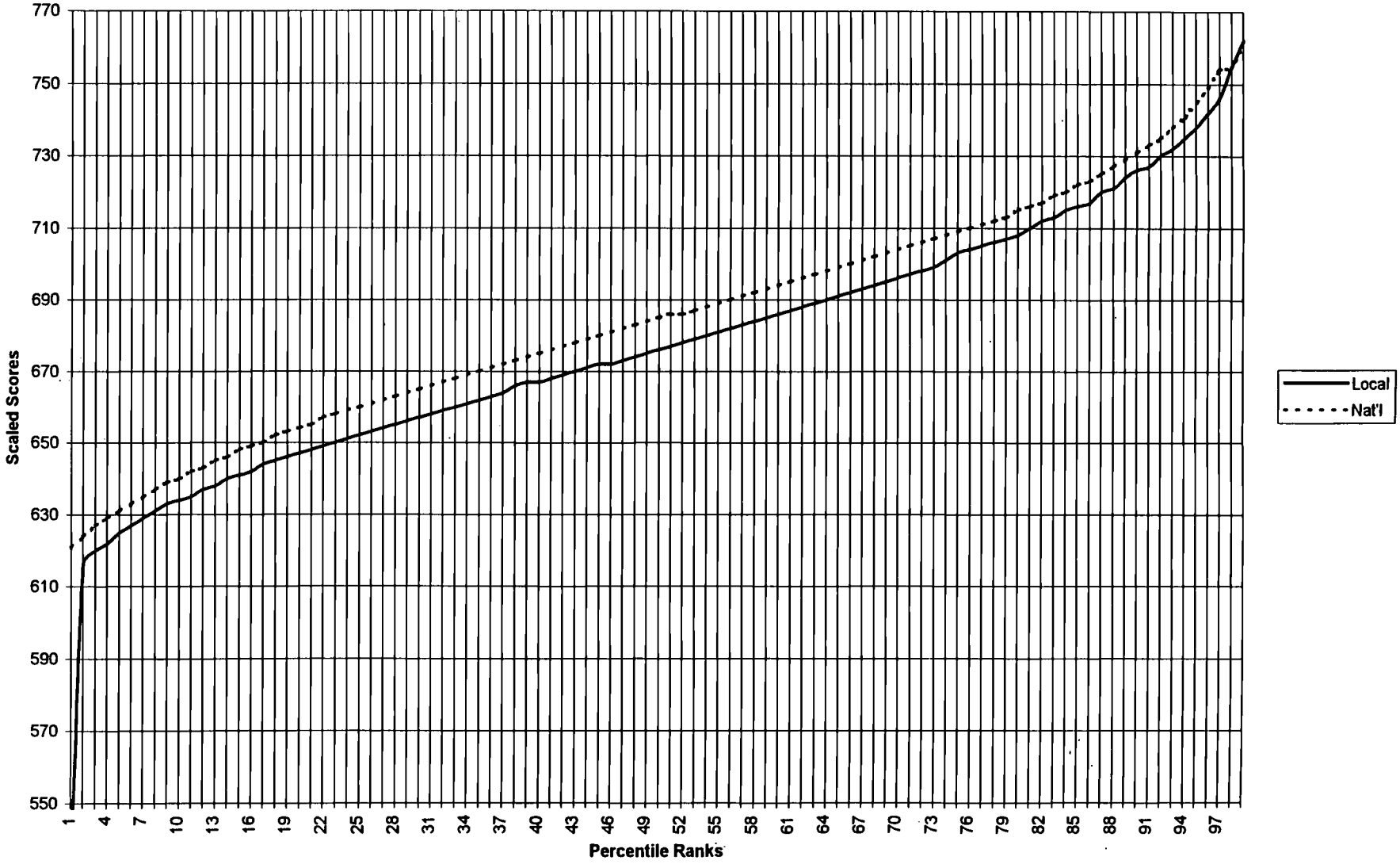
Grade 8 Mathematics
Comparison of Local vs National Norms



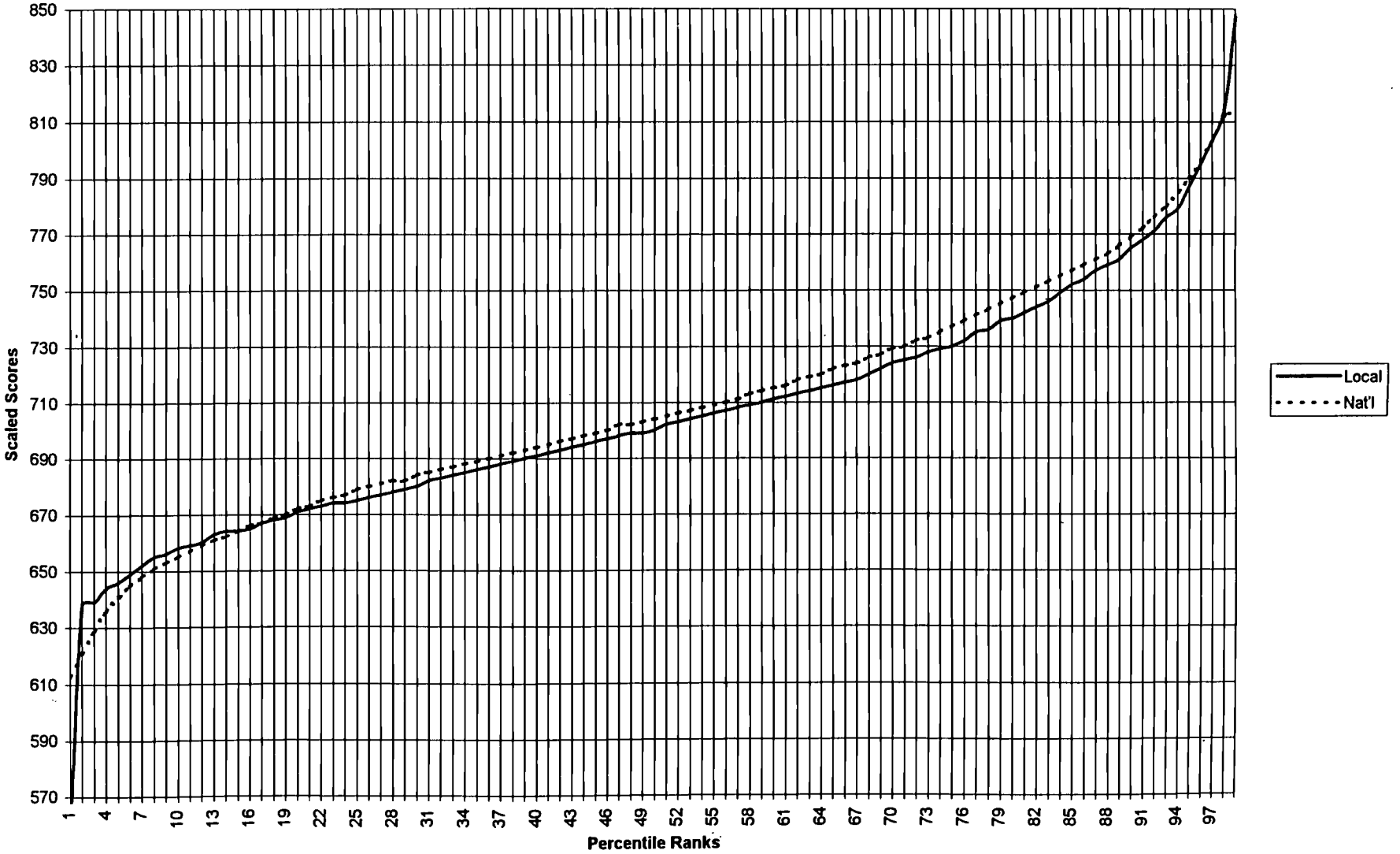
Grade 8 Reading
Comparison of Local vs National Norms



Grade 10 - Reading
Comparison of Local vs National Norms



Grade 10 - Math
Comparison of Local vs National Norms



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