2008 High School Mathematics Core Comprehensive Materials Review & Recommendations Report

Final Recommendations

Updated June 15, 2009

RELEVANT
STRATEGIES

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Revision History

Date	Version Notes	Updated By
1/6/09	Preliminary Draft completed. All results subject to change and verification.	Porsche Everson
1/15/09	Initial Recommendations Draft completed. Incorporated changes based upon feedback from Math Panel. Added section on initial recommendations.	Porsche Everson
6/15/09	Edited report to incorporate final recommendations. Added appendix on alternate analysis approach. Removed Mathematical Analysis of Top Ranked Programs section because it was redundant with separately published report.	Porsche Everson

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1 Executive Summary

1.1 Introduction/Purpose

The purpose of this document is to describe the process and outcomes from the 2008 Mathematics Core/Comprehensive Instructional Material Review for high school. The report contains information about the entire process, as well as statistical results from the review.

It is important to note that successful mathematics programs may exist with virtually all of the reviewed curricula. While instructional materials matter, other factors contribute to the success of students in Washington State who are learning mathematics. Those factors include quality of instruction, parent involvement, available support and myriad other aspects.

While the recommended curricula will ultimately receive the bulk of attention within this report, the report also provides other key results as well. These include:

- **Information on all curricula materials reviewed** Districts who currently use instructional material *that was not recommended* will find this report valuable. It contains detailed, specific information on how all programs reviewed meet the newly revised 2008 Washington State High School Mathematics Standards. Instructors, coaches, curriculum specialists and administrators can easily see how their materials line up against the standards, course by course, and identify areas where supplementation may be needed. *No one set of instructional materials matches the new standards completely; each will need some augmentation, including the one that is recommended.*

- **Support to districts in evaluating instructional materials** Finally, local districts can use the rich variety of information contained within to evaluate a wide array of textbooks based upon factors they deem important, to help them make decisions in the future about adopting mathematics textbooks.

Some words of caution are necessary:

- **Reviews of instructional materials represent a point in time**, in a continuously evolving process. New versions will rapidly supplant those reviewed herein.

- **In general, there are multiple versions of instructional materials in use by districts across the state**. This review process examined only one version of each program; typically the most recently copyrighted version. Readers should be aware that older versions of the programs would likely have different results. Many districts are using older versions of these programs.

- **The existing programs were evaluated against newly revised standards**. No publisher has had the chance to update their materials to produce a new version since the high school standards were released in July 2008. This review simply provides a baseline comparison, from which publishers can adapt their materials to be more closely aligned with the revised Washington standards.

- **Finally, it should be noted that there are two sets of standards for high school math**. The first tracks the traditional Algebra 1, Geometry and Algebra 2 series. The second is a re-ordered set of the same standards for Integrated Math 1, 2 and 3. Integrated Math is a more recent development in mathematics education, and does not share the same approach to ordering the standards by course level. Thus, while the more mature Algebra series align to the course-by-course standards, Integrated Math products align to the entire series of standards. There is variability among Integrated Math programs as to when the standards are met in the series. One of the instructional materials review outcomes was to identify where in the submitted products the standards were typically met.

1.2 Scope and Background

As per 2007 and 2008 Legislation, OSPI was required to recommend to the State Board of Education (SBE), for their review and comment, no more than three basic mathematics curricula at the elementary, middle and high school grade spans, within six months of the adoption of the revised standards[1] The high school standards were adopted on July 30, 2008. In undertaking the process for making the recommendations, OSPI elected to conduct an instructional materials review that evaluated published core/comprehensive high school mathematics instructional materials using the 2008 Revised Washington State Mathematics Standards and other factors. The resultant data was used to inform the selection process for the recommendations.

Once OSPI made the initial recommendations to the SBE, the SBE had two months to provide official comments and recommendations. The Superintendent of Public Instruction then made changes to the initial recommendations based upon SBE's comments.

In addition, 2008 Second Substitute House Bill (2SHB) 2598 indicated that appropriate diagnostic and supplemental materials "shall be identified as necessary to support each curricula." OSPI engaged in a Mathematics Supplemental Materials Review to meet this objective for grades K-12. The results from the K-12 Supplemental Review were released in a separate report. To address providing support for the selection of mathematics diagnostic materials, OSPI developed a Diagnostic Assessment Guide that will soon be made available to school districts and provides information on diagnostic assessment materials available in mathematics, reading, writing, and science. This work began in 2007 in response to 2007 Senate Bill 6023.

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[1] See 2008 Second Substitute House Bill (2SHB) 2598.

1.3 Contributing Stakeholders

Many individuals and groups contributed to the development of the instructional materials review process, instrument design, materials review, data analysis and development of the report.

- Instructional Materials Review (IMR) Advisory Group – A group of 22 curriculum specialists, mathematics educators, mathematicians, math coaches, educational service district math coordinators and district administrators from all over the state who have experience in curriculum reviews.
- State Board of Education Math Panel – Educators, mathematicians, parents, university faculty and advocacy group and business representatives who were actively involved in providing input on the revised mathematics standards and have key knowledge on effective, research-based mathematics instruction.
- Materials Reviewers – 28 individuals from around the state representing a diverse coalition of professionals and lay people, including math educators, math coaches, curriculum specialists, parents, business people, advocacy groups, district administrators and mathematicians.
- OSPI Staff – Educational leaders, mathematics specialists and support staff.
- National Experts and External Leaders – Individuals who shared their background and experience with state-level materials review and adoption processes. It is important to note that these individuals contributed information about their state-level materials review and adoption processes. Some but not all of their ideas were incorporated into the Washington process. Inclusion of their names does not imply that they have endorsed the results contained within this report.
    - Charlene Tate-Nicols (Connecticut)
    - Jonathan Weins (Oregon)
    - Drew Hinds (Oregon)
    - James Milgram (California)
    - Jane Cooney (Indiana)
    - Charlotte Hughes (North Carolina)
    - George Bright (Washington)
    - Jim King (Washington)

1.4 Process Overview

The 2008 Core/Comprehensive Mathematics Instructional Materials Review involved high stakes outcomes, particularly the selection of no more than three basic curricula recommendations in the elementary, middle and high school grade spans (K-5, 6-8, and 9-11). Thus, the project processes and controls were designed to be rigorous, transparent, inclusive and reliable. Hundreds of professionals contributed to the success of the project during its multiple phases.

Phase	Process Steps
Design Review	• Sought input from multiple stakeholder groups, including

Phase	Process Steps
Instrument and Process	IMR Advisory Group and SBE Math Panel - Iterative development process with two full cycles of feedback • Research-based foundational resource materials included 2008 Washington Revised Math Standards, National Mathematics Advisory Panel Foundations for Success (NMAP), and the National Council of Teachers of Mathematics (NCTM) Curriculum Focal Points • Designed the instrument and review process by employing process feedback from other states that have successfully completed curriculum reviews of their own • Outcomes included: o Two review instruments (Content/Standards Alignment and Other Factors) o Proposed threshold process for deriving final recommendations o Proposed weighting for instrument scales
Solicit Publisher Involvement	• All publishers invited to submit materials • Publishers' conference held to address questions and clarify submission process • Question and Answer document widely disseminated and updated throughout period prior to the review • Publishers provided alignment worksheet to show where their materials aligned to revised state standards • Publishers submitted multiple sets of materials for review week
Select IMR Review Committee	• Application materials widely distributed statewide to school districts and education stakeholder groups, including math educators, curriculum specialists, advocacy groups • Objective review and scoring of each application by two independent reviewers using a common review instrument • Selections based upon score and having sufficient variation in expertise among reviewers (educators, mathematicians, community representatives, curriculum specialists, administrators, parents, etc.)
Review Instructional Materials	• Rigorous process for controlling inventory, during publisher check-in, reviewer check-in/out, and publisher check-out • Reviewers received full-day training in high school

Phase	Process Steps
	standards • Trained reviewers to use the scoring instruments • Performed real-time data entry • Performed variance checks and corrective training to reduce variance and increase inter-rater reliability • Independent reviews of materials • Five or more reads on all of the material • Random assignment of materials to reviewers • Twice-daily progress monitoring • Process improvement checks daily
Analyze Data	• Exploratory data analysis by two independent statisticians • Quality control checks comparing random 10% of score sheets to electronic data to ensure accuracy of data entry and extract processes • Rigorous design of statistical tests, validated by expert statistician • Presentation of results in easy to read tabular and graphical format
Present Preliminary Results	• Followed legislatively-mandated protocol and timeline • Presented preliminary results to State Board of Education Math Panel • Sought advice from SBE Math Panel on the analysis, recommendations and process • Presented preliminary results to legislators, school districts, publishers, review participants and public
Select Recommendations	• Sought advice from the State Board of Education • Used process and resultant data to inform the initial and final recommendation selections
Provide Support to Districts	• Communicated with districts about what information they need, and included that information in the preliminary report • Provided key information on how all mathematics curricula reviewed align to 2008 revised Mathematics Standards • Provided information about supplemental programs (in a separate report) designed to augment reviewed curricula to better meet Washington standards

After the initial recommendations were presented to the State Board of Education (SBE), the SBE contracted with Strategic Teaching, a consulting firm, to evaluate the initial recommendations. Before beginning their work, Strategic Teaching acknowledged the strength of the OSPI alignment review of these programs. Accordingly, they focused their review of the three recommended program bundles (as well as one additional program bundle) on mathematical soundness based on two mathematicians' reviews of five specific High School Performance Expectations and their development within each program. The four program bundles reviewed were Holt Algebra I, Geometry and Algebra II (Holt McDougal); Discovering Algebra, Geometry and Advanced Algebra (Key Curriculum Press); Glencoe McGraw-Hill Algebra I, Geometry and Algebra II (Glencoe McGraw-Hill) and Core Plus Mathematics, Contemporary Mathematics in Context Course I, II, III (Glencoe McGraw-Hill).

As required by statute, the State Board of Education's Mathematics Advisory Panel was consulted by both OSPI and the SBE for their input and comment throughout this process. In addition, as a final step in OSPI's review process; two independent mathematicians reviewed the recommended programs for their mathematical soundness by reviewing each for the presence of different Performance Expectations, using a different process. The reviews conducted by Strategic Teaching and OSPI differed substantially.

Because of differences of opinion on mathematical soundness among the OSPI and SBE mathematicians, the Board recommended that OSPI and SBE hire additional independent mathematicians to conduct a final review of the top seven programs most strongly aligned to the standards for their mathematical soundness. A strong effort was made to secure private funding for a third review of these programs. Unfortunately, this fundraising effort was unsuccessful, and other state or federal funds that could have been used for a review were simply unavailable due to an unprecedented budget shortfall.

Therefore, per statute, Randy Dorn, Superintendent of Public Instruction, made his final recommendation based on the information that was available to him. The legislation required that Superintendent Dorn "shall make any changes based on the comments and recommendations of the State Board of Education." (2SHB 2598, section 7 (b), Laws of 2008.)

The information available on the OSPI and SBE websites provides guidance for those intending to purchase materials this year. For those districts that have chosen to delay purchasing decisions, OSPI, assuming sufficient funding, plans to conduct another K-12 mathematics instructional materials alignment review within the next two years. In future reviews, we anticipate even higher overall alignment rankings as publishers will have sufficient time to modify their products to fit the new Washington standards.

1.5 Findings

1.5.1 Data

The following tables show the overall ranking for all core comprehensive programs submitted for review. The scaled category score is the rating value expressed as a proportion of all possible points in the category. The scale value is calculated by averaging the raw scores in a category, then dividing by the maximum possible scale value to obtain a scaled average. Each category was assigned a weight, as described elsewhere in this report. The weights were used to derive a final composite score.

The final composite score is calculated using the formula:

$$\sum (Average\ Scale\ Score)(Scale\ Weight)$$

Table 1. Ranked list of all core/comprehensive Algebra 1 and 2 series reviewed, ordered by final composite score.

Overall Ranking for All Algebra 1 and 2 Series							
Program	**Content/ Standards Alignment**	**Program Organization and Design**	**Student Learning**	**Assessment**	**Instructional Planning and Professional Support**	**Equity and Access**	**Final Score**
Weights	**70%**	**9%**	**7.5%**	**5%**	**4.5%**	**4%**	
Discovering – Algebra	0.863	0.897	0.870	0.822	0.837	0.758	0.859
Holt Algebra	0.841	0.821	0.800	0.795	0.777	0.864	0.832
Glencoe McGraw-Hill Algebra	0.823	0.827	0.836	0.807	0.826	0.742	0.821
PH Math Algebra	0.833	0.770	0.776	0.750	0.754	0.783	0.814
CPM Algebra	0.751	0.836	0.867	0.845	0.803	0.601	0.768
McDougal Littell Algebra	0.786	0.661	0.658	0.716	0.595	0.763	0.752
CME Algebra	0.739	0.773	0.755	0.670	0.716	0.545	0.731
Cognitive Tutor Algebra	0.735	0.709	0.703	0.697	0.640	0.485	0.714
CORD Algebra	0.705	0.757	0.733	0.575	0.742	0.511	0.699
PH Classics (Foerster) Algebra	0.709	0.653	0.714	0.531	0.573	0.287	0.672
PH Classics (Smith) Algebra	0.692	0.571	0.612	0.607	0.521	0.575	0.658
MathConnections Algebra	0.528	0.644	0.654	0.279	0.670	0.295	0.532
Average	0.746	0.737	0.744	0.667	0.699	0.594	0.733

Table 2. Ranked list of all geometry programs reviewed, ordered by final composite score.

Overall Ranking for All Geometry Programs							
Program	**Content/ Standards Alignment**	**Program Organization and Design**	**Student Learning**	**Assessment**	**Instructional Planning and Professional Support**	**Equity and Access**	**Final Score**
Weights	**70%**	**9%**	**7.5%**	**5%**	**4.5%**	**4%**	
Holt Geometry	0.860	0.828	0.794	0.778	0.861	0.824	0.847
McDougal Littell Geometry	0.850	0.820	0.813	0.875	0.808	0.833	0.843
Glencoe McGraw-Hill Geometry	0.847	0.800	0.800	0.851	0.786	0.722	0.832
PH Math Geometry	0.854	0.800	0.747	0.717	0.767	0.767	0.827
CORD Geometry	0.810	0.872	0.822	0.590	0.819	0.546	0.795
Discovering – Geometry	0.783	0.793	0.787	0.708	0.767	0.700	0.776
Cognitive Tutor Geometry	0.699	0.833	0.817	0.826	0.854	0.630	0.730
CPM Geometry	0.744	0.757	0.776	0.637	0.679	0.492	0.729
CME Geometry	0.625	0.617	0.639	0.625	0.583	0.370	0.613
MathConnections Geometry	0.512	0.633	0.644	0.410	0.688	0.324	0.528
Average	0.756	0.774	0.764	0.700	0.759	0.613	0.750

Table 3. Ranked list of all integrated math programs reviewed, ordered by final composite score when treated as individual courses.

Overall Ranking for All Comprehensive Integrated Math Programs when Treated as Individual Courses							
Program	Content/ Standards Alignment	Program Organization and Design	Student Learning	Assessment	Instructional Planning and Professional Support	Equity and Access	Final Score
Weights	70%	9%	7.5%	5%	4.5%	4%	
Core Plus Math	0.671	0.771	0.760	0.701	0.799	0.535	0.688
SIMMS Math	0.656	0.763	0.683	0.589	0.672	0.476	0.658
Interactive Math Program	0.490	0.758	0.725	0.406	0.724	0.493	0.538
Average	0.606	0.764	0.723	0.565	0.732	0.501	0.628

Table 4. Ranked list of all integrated math programs reviewed, ordered by final composite score when treated as a series as a whole.

Overall Ranking for All Comprehensive Integrated Math Programs when Treated as a Series							
Program	Content/ Standards Alignment	Program Organization and Design	Student Learning	Assessment	Instructional Planning and Professional Support	Equity and Access	Final Score
Weights	70%	9%	7.5%	5%	4.5%	4%	
Core Plus Math	0.802	0.771	0.760	0.701	0.799	0.535	0.780
SIMMS Math	0.710	0.763	0.683	0.589	0.672	0.476	0.696
Interactive Math Program	0.609	0.758	0.725	0.406	0.724	0.493	0.621
Average	0.707	0.764	0.723	0.565	0.732	0.501	0.699

Table 5 shows the 95% confidence intervals for all comprehensive Algebra 1 and 2 series. The composite score represents the sum of the weighted scaled averages for each scale. See *4.9 Standard Error Calculations* for additional detail.

The charts in this section display the program final composite scores and their confidence intervals. Programs with overlapping confidence intervals should be considered as not being significantly different. Programs with non-overlapping confidence intervals can generally be considered to be statistically different in their ratings. However, when multiple tests are performed and we adjust for multiple comparisons, some non-overlapping intervals may be found to be not statistically different. Thus, the visual chart provides a quick check, but readers should rely on the specific test outcomes to determine statistical significance.

Table 5. Confidence interval values for all Algebra 1 and 2 series reviewed.

Program	Composite Score	Std. err.	95% CI	
			Lower	Upper
Discovering - Algebra	0.859	0.009	0.842	0.876
Holt Algebra	0.832	0.009	0.815	0.849
Glencoe McGraw-Hill Algebra	0.821	0.008	0.804	0.837
PH Math Algebra	0.814	0.009	0.796	0.831
CPM Algebra	0.768	0.012	0.745	0.791
McDougal Littell Algebra	0.752	0.010	0.732	0.771
CME Algebra	0.731	0.011	0.710	0.753
Cognitive Tutor Algebra	0.714	0.009	0.696	0.733
CORD Algebra	0.699	0.011	0.677	0.721
PH Classics (Foerster) Algebra	0.672	0.011	0.650	0.695
PH Classics (Smith) Algebra	0.658	0.010	0.638	0.679
MathConnections Algebra	0.532	0.011	0.511	0.553

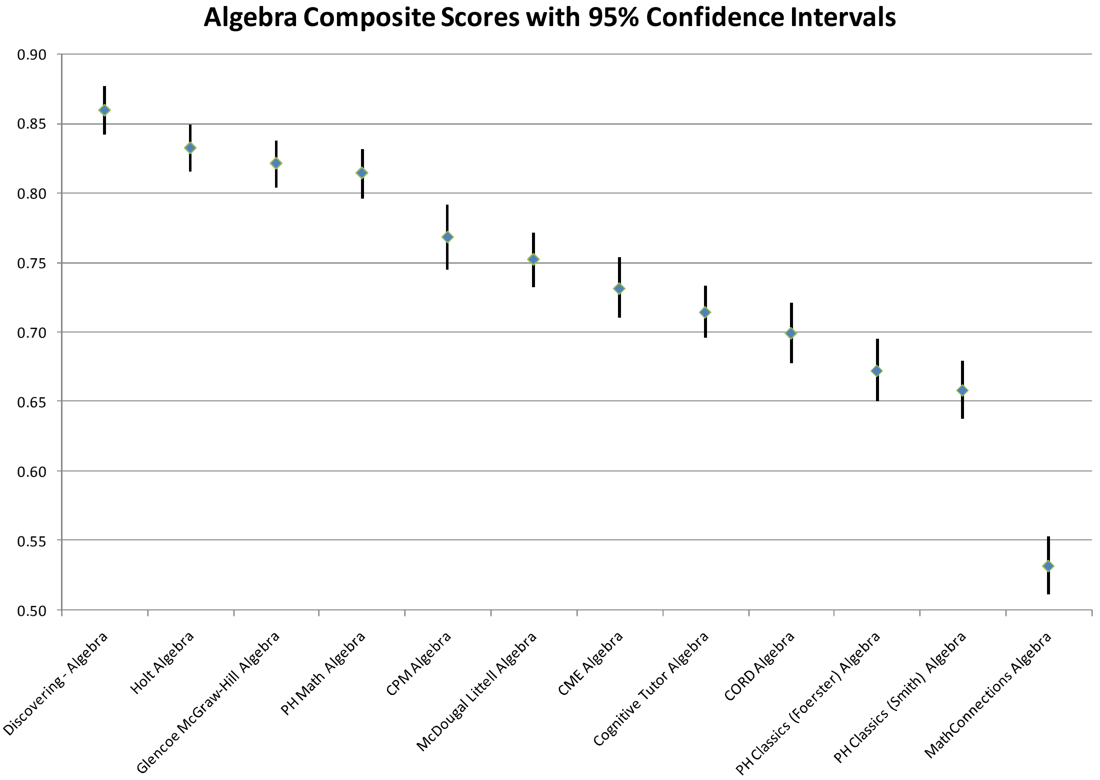

Figure 1. 95% confidence intervals for core/comprehensive Algebra 1 and 2 series.

The geometry results are presented below.

Table 6. Confidence interval values for all geometry programs reviewed.

Program	Composite Score	Std. err.	95% CI	
			Lower	Upper
Holt Geometry	0.847	0.010	0.828	0.866
McDougal Littell Geometry	0.843	0.013	0.818	0.868
Glencoe McGraw-Hill Geometry	0.832	0.009	0.813	0.850
PH Math Geometry	0.827	0.012	0.803	0.851
CORD Geometry	0.795	0.014	0.769	0.822
Discovering - Geometry	0.776	0.014	0.748	0.804
Cognitive Tutor Geometry	0.730	0.015	0.700	0.761
CPM Geometry	0.729	0.013	0.704	0.755
CME Geometry	0.613	0.014	0.586	0.641
MathConnections Geometry	0.528	0.015	0.499	0.557

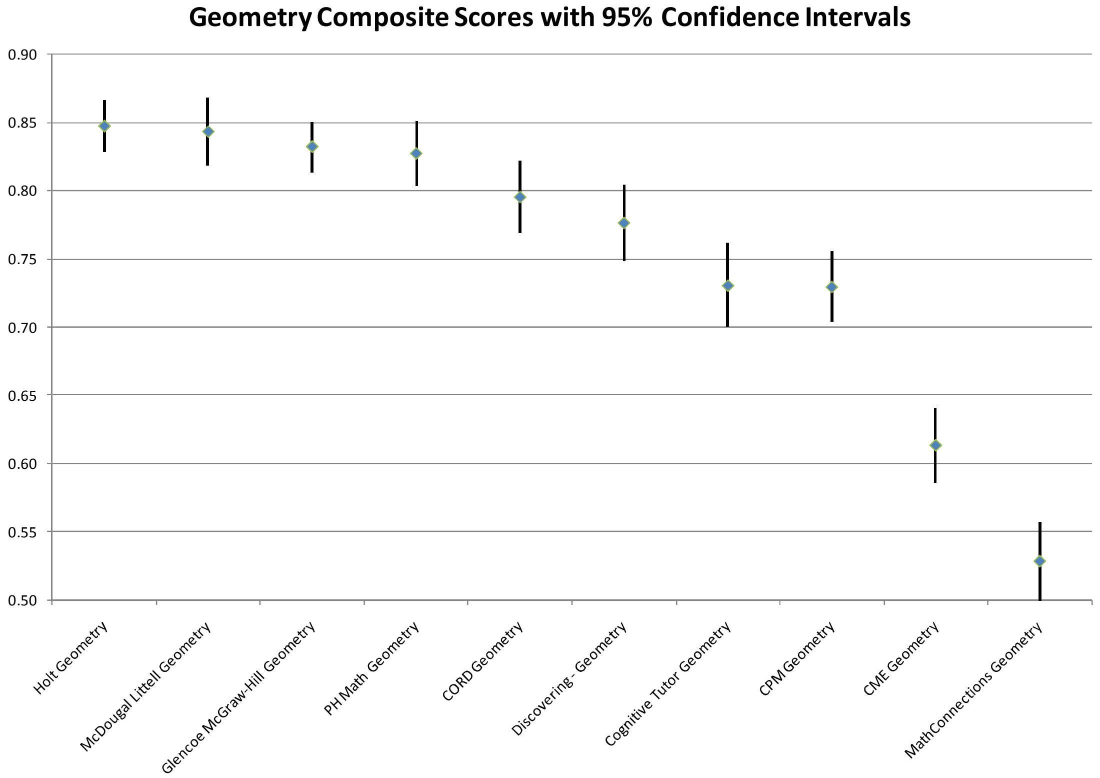

Figure 2. 95% confidence intervals for core/comprehensive geometry programs.

The following tables and graphs show the results for the Integrated Mathematics curricula.

Table 7. Confidence interval values for all integrated mathematics programs reviewed when treated as individual courses.

Program	Composite Score	Std. err.	95% CI Lower	95% CI Upper
Core Plus Math	0.688	0.009	0.670	0.706
SIMMS Math	0.658	0.009	0.639	0.676
Interactive Math Program	0.538	0.010	0.518	0.558

Table 8. Confidence interval values for all integrated mathematics programs reviewed when treated as an entire series.

Program	Composite Score	Std. err.	95% CI Lower	95% CI Upper
Core Plus Math	0.780	0.008	0.764	0.796
SIMMS Math	0.696	0.009	0.678	0.714
Interactive Math Program	0.621	0.010	0.601	0.642

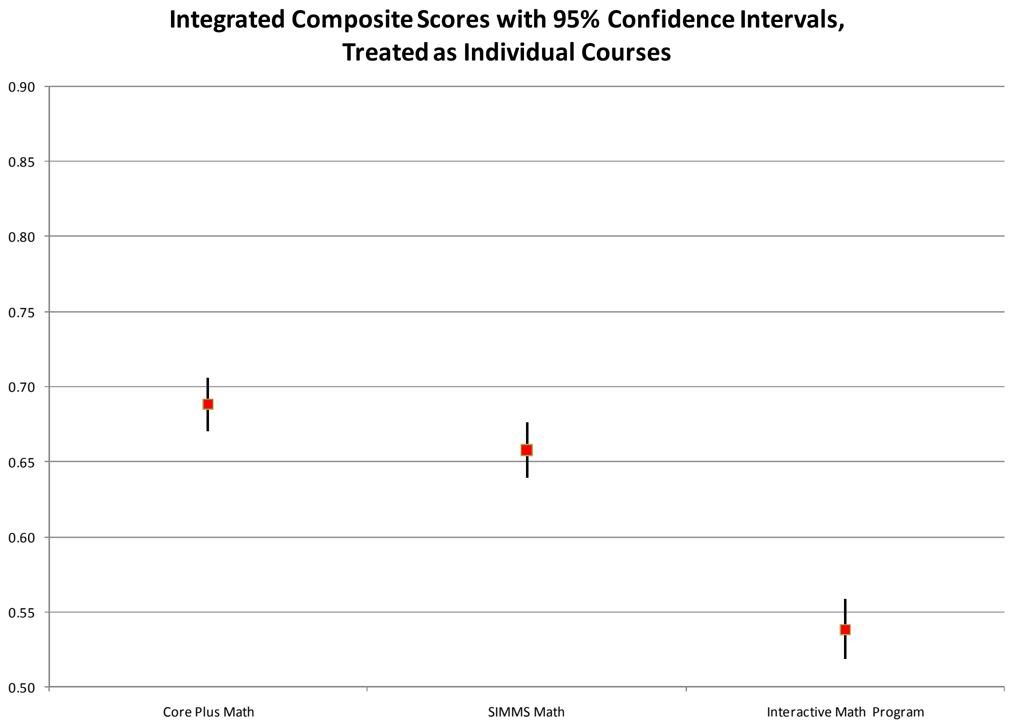

Figure 3. 95% confidence intervals for core/comprehensive integrated math programs when treated as individual courses. (Score reductions were applied when standards were found in alternate courses.)

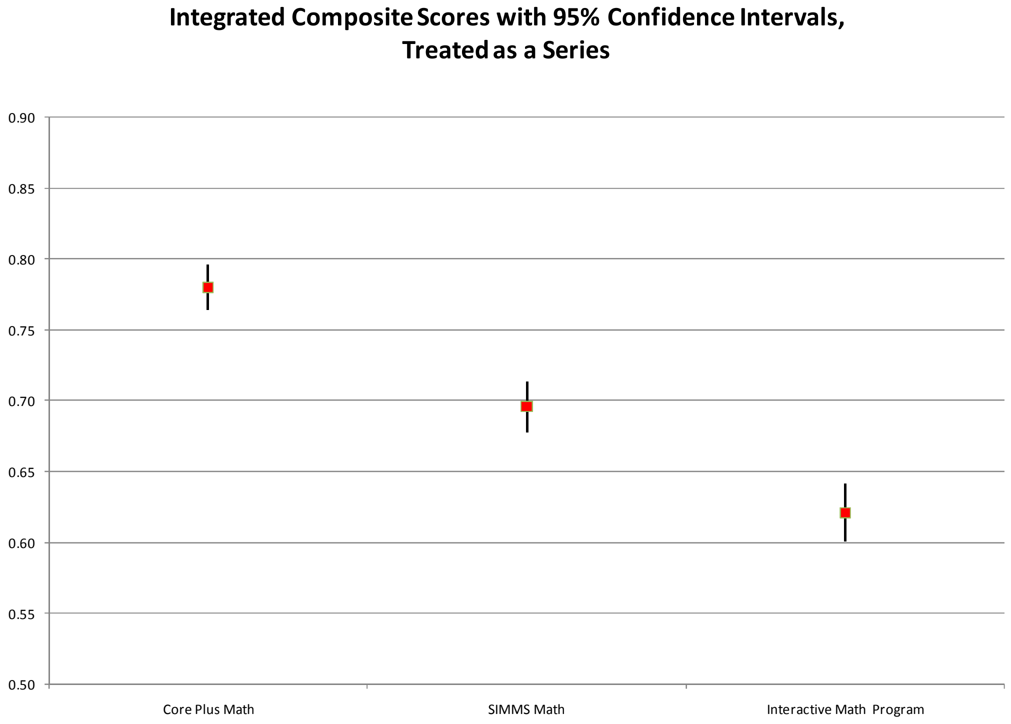

Figure 4. 95% confidence intervals for core/comprehensive integrated math programs when treated as a series. (No reductions for standards found in alternate course levels.)

1.5.2 Publisher Bundle Comparison

It is interesting to compare how traditional and integrated series match up to each other when compared as a three-year series. The following chart and graph show the results. Note that both the Traditional and Integrated products are measured as a series, not as individual courses in this comparison. Thus, there is no reduction in the content score for standards found outside the expected course level.

Table 9. Traditional and Integrated three-year publisher bundles, in rank order, treated as a series (without a reduction in score for standards that are met at alternate course levels).

				95% CI	
Program	**Composite Score**	**Std. err.**	**Type**	**Lower**	**Upper**
Holt	0.838	0.007	Traditional	0.825	0.851
Discovering	0.835	0.007	Traditional	0.820	0.849
Glencoe McGraw-Hill	0.826	0.006	Traditional	0.814	0.838
PH Math	0.820	0.007	Traditional	0.806	0.834
McDougal Littell	0.783	0.008	Traditional	0.767	0.799
Core Plus Math	0.780	0.008	Integrated	0.764	0.796
CPM	0.755	0.009	Traditional	0.738	0.772
CORD	0.739	0.009	Traditional	0.722	0.756
Cognitive Tutor	0.723	0.008	Traditional	0.706	0.739
SIMMS Math	0.696	0.009	Integrated	0.678	0.714
CME	0.692	0.009	Traditional	0.674	0.709
Interactive Math Program	0.621	0.010	Integrated	0.601	0.642
MathConnections	0.562	0.009	Traditional	0.545	0.579

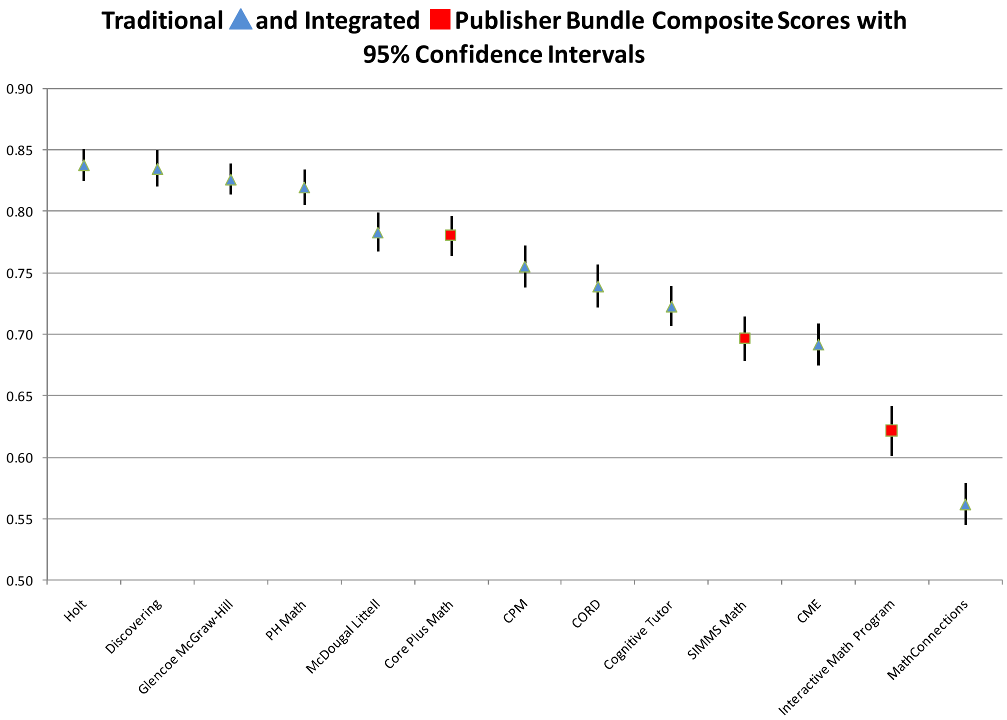

Figure 5. Comparison of both Traditional and Integrated three-course series, treated as whole series, not individual courses. A traditional bundle is Algebra 1, Geometry and Algebra 2. An Integrated bundle is Math 1, 2 and 3.

1.5.3 Course/Standards Placement

The purpose of this section is to describe how well existing courses match up with the new 2008 Washington Mathematics standards.

Almost 4% of the time, Algebra 1 standards were found in the Algebra 2 text, or vice versa. This was mostly in quadratic and exponential functions.

In Integrated Math, almost 30% of the standards were met in a course above or below the level for the specific performance expectation. The concentrated areas for Integrated Math were quadratic functions, conjectures and proofs, volume and surface area.

Algebra 1 and 2 are well established courses, which haven’t changed much in recent years. There is a high degree of agreement among publishers, mathematicians, and educators about what constitutes an Algebra 1 course versus an Algebra 2 course. In contrast, Integrated Math is newer, and there is less agreement about what constitutes a Math 1 course, versus a Math 2 or 3 course. There is more variability among publishers in terms of content placement. Further, there is no national agreement on the placement of standards within Integrated Math. Finally, balancing the standards among the three integrated courses was a key design element for the recent standards revision project.

In the initial data analysis approach for this project, we allocated ½ of the raw score for a standard if it was met in an alternate course level. Thus, if a publisher’s program fully met an Algebra 1 standard in the Algebra 2 text, it received ½ of the raw score of 3, or 1.5. This focuses the data on individual courses, and how well each specific course aligns to its respective performance expectations.

Because of the large number of standards found in alternate course levels within the Integrated Math series, we elected to present results both treated as individual courses, and as an entire series (without a reduction in score if the standard was found in an alternate course level). This will allow readers to see results both ways. Unless otherwise noted, the data shown in tables and charts is measuring results for individual courses, meaning that ½ of the raw score was allocated if the content was found in an alternate course level.

The results for the Algebra 1 and 2 series are unchanged, regardless of whether the grade dip adjustments are applied or not. However, there is significant difference within the Integrated Math programs, both in terms of which programs exceed the minimum content threshold, and the overall content and composite scores for all integrated programs.

1.5.4 Online Availability

One of the further requirements of HB 2598 was for at least one of the recommended curricula at each level to be available online. The online availability of instructional materials typically takes the form of access by teachers, students, and parents to a PDF version of the applicable materials. Holt Mathematics provides course materials and supplemental materials online.

Districts typically negotiate costs of licenses to access the online materials during the purchasing process. Most of the licenses are for a renewable six year period, and offer seats based upon the number of student textbooks purchased. Once purchased, most products have significant flexibility in assigning access rights to the online material.

1.5.5 Comments

Reviewers had the opportunity to provide optional comments on each of the programs they reviewed. Their comments are included in a separate companion document, available on the OSPI web site.

Many individuals commented on the K-8 report. Because the process and methodology are so similar for the high school report, a summary of the most common comments and responses are presented below.

Comment	Response
Will districts be required to adopt these materials?	No. These are recommendations only. Districts are free to select any program they feel best meets the needs of their students. Districts may find this report particularly helpful, along with the accompanying data set as they make their curriculum decisions. The State Board of Education is

Comment	Response
	considering a proposal that would mandate use of one of the recommended programs if the district is consistently failing to meet expectations.
There are other ways to analyze the data. Why didn't you use method ______?	We agree that there are many methods that could have been used to analyze the data. Prior to collecting data, during the design of the process, we considered several possibilities and selected t-tests with multiple comparisons for our primary test statistic. Post hoc changes in methodology are risky; and lead to concerns that the analyst is seeking specific results. Thus, we continued to present results with our planned analysis approach.
What happens if some programs are tied with the top three?	The legislation mandates that OSPI select no more than three programs at each level. Thus, if there are ties, OSPI must still select no more than three. We will note in the report where ties exist.
My district is using program ______, which is not in the top three. What will OSPI do to help us out?	OSPI has provided a report on available supplemental materials and how well those materials align to state standards. In addition there are several tables and charts that show how each program performs, for specific Performance Expectations and mathematics Core Content within the standards. This information will help districts identify areas where supplementation is needed in existing programs.
Will the state be funding textbook purchases, based on these results?	At this point, there is no funding identified for textbook purchases based on these results.
I believe some standards are more important than others; why are they all weighted the same?	Most individuals feel that some standards are more important than others. However, there is no agreement among stakeholder groups about which are the most important. OSPI elected to take a neutral stance and weigh all the standards the same for the purposes of collecting and analyzing the data.
There is some concern about program placement in the rank order, where individuals thought a program should have appeared higher or lower than it did.	It should be noted that the vast majority of the reviewed programs had a very reasonable correlation to the newly revised state standards and the other factors measured. Each program-course had four independent reads. Overall, the scores are good, and just because a program falls in the middle of the pack doesn't mean it isn't a viable choice, depending upon the district's needs. Most states have a textbook evaluation process that sets a basic threshold, and all programs that meet or exceed that basic threshold can be considered for purchase. Washington State is unique in providing no more than three recommendations. If this review had been conducted in a more traditional manner, almost

Comment	Response
	every single program would likely be in the pool of approved materials.

1.6 Recommendations

The 2007 State Legislature directed the Office of Superintendent of Public Instruction (OSPI), in consultation with the State Board of Education (SBE), to recommend no more than three basic mathematics curricula at the elementary, middle and high school levels (HB 1906).

RCW 28A.305.215 (7)(b) prescribes the following process for the Superintendent to make his curricula recommendations: “Within two months after the presentation of the recommended curricula, the state board of education shall provide official comment and recommendations to the superintendent of public instruction regarding the recommended mathematics curricula. The superintendent of public instruction shall make any changes based on the comment and recommendations from the state board of education and adopt the recommended curricula.”

The recommendations serve as a guide to school districts in the state of Washington regarding which curricula are most aligned with the revised K-12 mathematics standards. Superintendent Dorn’s final high school recommendations are based on both the work of OSPI and the SBE as directed by statute. **The final recommendation for high school is: Holt Mathematics.**

Please note that OSPI has recommended the math curricula as per the legislated requirement. It is not the role of OSPI to direct which curricula a school district may or should select. It is not a state requirement for any district to specifically use the recommended curricula.

It is the position of Superintendent Dorn that SBE and OSPI recognize that additional study and a review of the mathematics instructional materials may be appropriate in the next few years after publishers have had sufficient time to make revisions to better align their products with Washington State’s mathematics standards.

BACKGROUND

On January 15, 2009, Superintendent Dorn made initial High School Core/Comprehensive Instructional Materials recommendations to the SBE. Those initial recommendations were Holt Mathematics, Discovering Mathematics and Core-Plus Mathematics.

The SBE was required to "provide review and formal comment on proposed recommendations" to OSPI regarding math curricula. SBE made their comments and recommendations to OSPI during their March 13, 2009 meeting. The board recommended additional work be done to reconcile differences in the two different reviews conducted by OSPI and SBE. In light of an unprecedented budget shortfall, funds for continuing this work were not available and no further study was possible.

As districts are making adoption decisions, excellent information from OSPI and SBE to support school districts with the math curriculum decisions may be found at: http://www.k12.wa.us/CurriculumInstruct/publishernoticesMathematics.aspx
The final results of the SBE's review of OSPI's original recommendations and process are posted on the SBE website: http://www.sbe.wa.gov/documents/2009-3-8WAHSCurriculumStudy.pdf.

Holt had the strongest alignment and the highest composite score of all programs, both traditional and integrated. It was reviewed positively by both OSPI and SBE contracted mathematicians who performed an in-depth analysis of a few key topics. No other program reviewed had all three factors—a high composite score, a positive review by OSPI and SBE mathematicians, and the endorsement of the State Board of Education. Holt's final composite score was 0.838[2].

The following observations are worth noting when considering the final recommendation from OSPI:

- There is a strong depth of field in the traditional Algebra 1, Geometry and Algebra 2 series. Most products have high alignment to the 2008 Washington math standards, exceed the content/standards threshold established in this process, and have high scores on other scale factors.
- About forty percent of the districts in Washington use an integrated series for high school math, either alone or in combination with a traditional series. OSPI has concern over the high number of instances in the integrated curricula where standards were met in course levels either above or below the level specified in the standards, and urges districts to carefully consider the impact of the new end-of-course assessments for both traditional and integrated courses in their curriculum adoption decisions.

1.6.1 Conclusion

The legislature directed OSPI to recommend no more than three programs at the elementary, middle and high school levels. Holt Mathematics is closely aligned with the 2008 Washington Mathematics Standards, received a positive review from all four mathematicians conducting an in-depth review, and provides a variety of instructional approaches. However, no programs aligned completely to the new standards, and even Holt will need some degree of supplementation. OSPI engaged in a supplemental review and has provided an ancillary report that highlights supplemental products that provide a good fit for the recommended program and others in common use around the state.

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[2] Composite score is calculated for the series as a whole, and does not take into account reductions in scores for standards met above or below the expected course level.

2 Project Process

2.1 Review Instrument Development

This section describes the process by which the review instrument and weights were developed. It also includes the scoring rubric for Content/Standards Alignment and Other Factors.

To develop the review instruments, OSPI engaged two groups in two full cycles of development and revision. The IMR Advisory Group and SBE Math Panel were the two primary groups contributing to the development of the instruments. Their work was research based, and used the following primary sources:

- 2008 Washington Revised Math Standards
- NMAP Foundations for Success
- NCTM Curriculum Focal Points

Additionally, the groups also referenced the following secondary sources as resources. Please note that in some instances, the secondary sources were used to compare and contrast effective and ineffective instrument design.

- Math Educators' Summary of Effective Programs
- Park City Mathematics Standards Study Group Report
- Framework for 21st Century Learning
- How People Learn: Brain, Mind, Experience and School
- How Students Learn: Mathematics in the Classroom
- NCTM Principles and Standards for School Mathematics
- Choosing a Standards-Based Mathematics Curriculum – Chapter 6: Developing and Applying Selection Criteria
- Choosing a Standards-Based Mathematics Curriculum – Appendix: Sample Selection Criteria

In addition to seeking advice and guidance from the IMR Advisory Group and the SBE Math Panel, several national and/or external experts were consulted and provided important recommendations for both the process and the review instruments. Several of the external experts provided valuable advice about their state processes where they have successfully completed comprehensive mathematics curriculum reviews.

The outcomes from the review instrument design phase included:

- Two review instruments (Content/Standards Alignment and Other Factors), which are described below.
- Proposed threshold and weighting processes for final recommendations. Both groups recommended that in order for programs to be considered for the final three recommendations, they must first meet a minimum threshold in content/standards alignment. A scaled score of 0.70 was proposed as this

threshold with a recommendation that the threshold be adjusted if a significant proportion of materials failed to reach the threshold. In addition, both groups proposed weighting percentages for the Other Factors.

2.1.1 Content/Standards Alignment Threshold

Part 1 of the review measured the alignment of the core/comprehensive instructional materials to the revised 2008 Washington Mathematics standards. Materials that met a minimum threshold of alignment with state standards were considered for inclusion in the list of recommended mathematics curricula.

Reviewers looked for evidence that each Washington State standard Core Process, Content and Additional Key Information was met in the expected course level.

An additional goal of the Content/Standards Alignment evaluation was to identify the areas where existing materials need supplementation to meet state standards. See *Section 3.1* for charts that show how well each program meets specific Performance Expectations at each course level.

2.1.2 Scale Definitions

Scale	Description
Content/Standards Alignment	The Content/Standards Alignment (Part 1 of the review process) determined to what degree the mathematical concepts, skills and processes were in alignment with revised state mathematics standards. The materials reviewed were accurate, with no errors of fact or interpretation. Adherence to standards implies quality and rigor. It is a fundamental assumption that if the program matches a standard well, the math is accurate, rigorous, and high quality.
Program Organization and Design	Overall program and design. Includes scope and sequence and appropriate use of technology. Content is presented in strands, with definitive beginnings and endings. The program grounds ideas in a bigger framework. The material is logically organized, and includes text-based tools such as tables of contents and indexes.
Balance of Student Experience	Tasks lead to the development of core content and process understanding. They present opportunities for students to think about their thinking, develop both skills and understanding, and apply multiple strategies to solve real-world problems. Tasks provide a balance of activities to develop computational fluency and number sense, problem-solving skills and conceptual understanding.
Assessment	Tools for teachers and students to formally and informally evaluate learning and guide instruction.

Scale	Description
Instructional Planning and Professional Support	Support for teachers that is embedded in the instructional materials to assist them in teaching the content and standards. Instructional materials provide suggestions for teachers in initiating and orchestrating mathematical discourse. Includes key information about content knowledge to help teachers understand the underlying mathematics. Materials help reveal typical student misconceptions and provide ideas for addressing them.
Equity and Access	Unbiased materials, support for ELL, gifted and talented students and students with disabilities, differentiated instruction, diversity of role models, parent involvement, intervention strategies, quality website, and community involvement ideas.

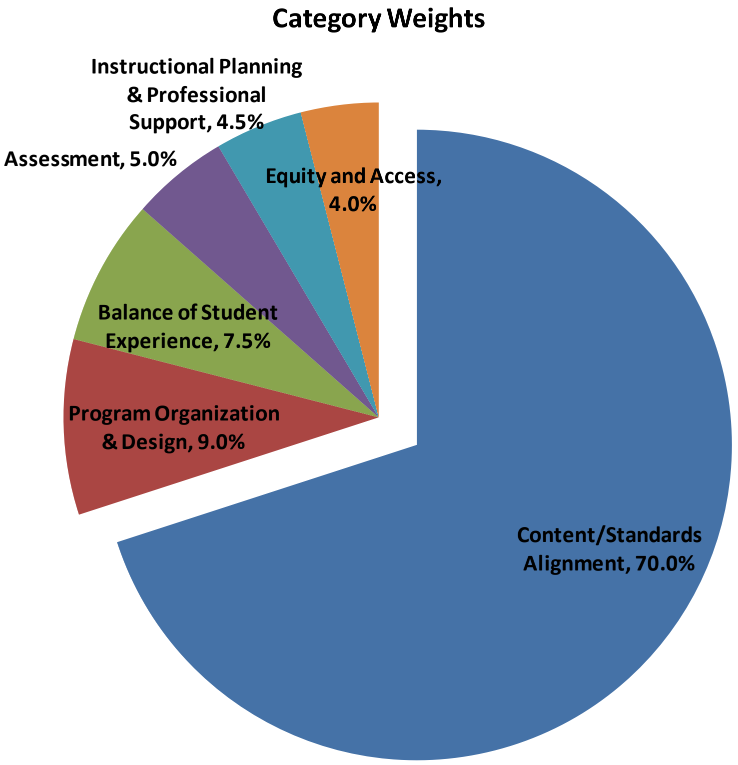


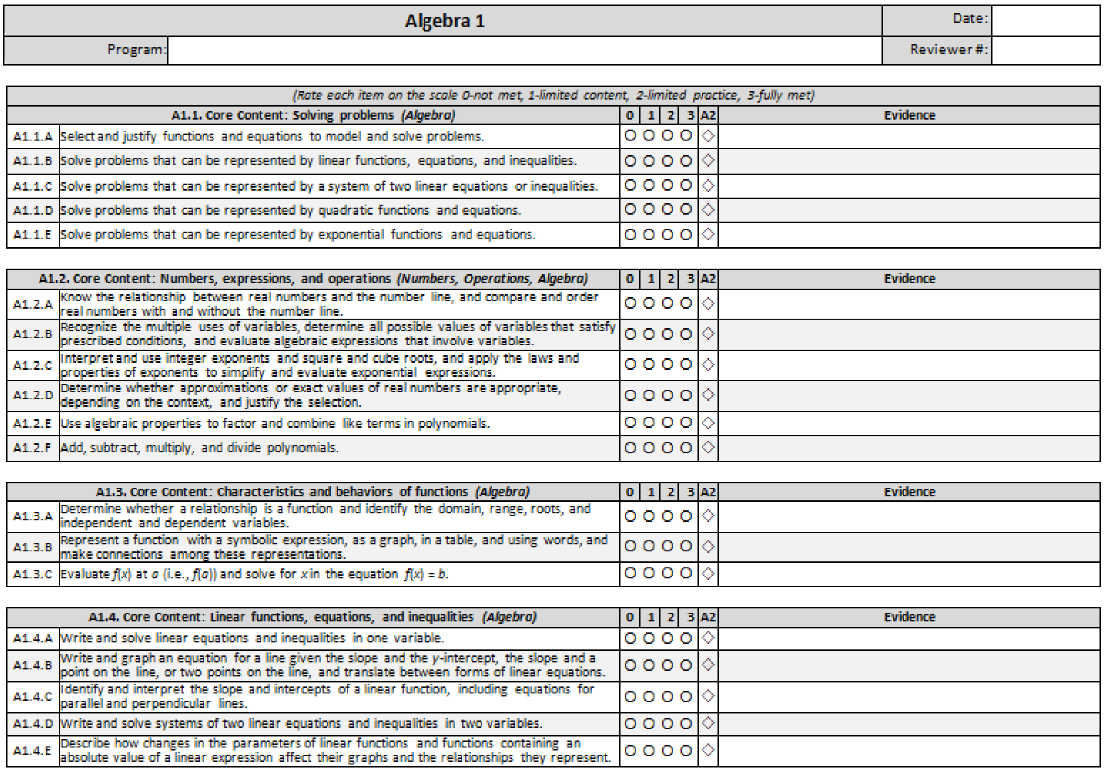
Figure 6. Category weights for the Mathematics Instructional Materials Review. Note that Content/Standards Alignment is both a weighted category and a threshold category, meaning that curricula must meet a minimum average score on content/standards alignment before the material can be considered for possible inclusion in the three recommended core/comprehensive curricula.

Table 10. Measurement scales and weights for/Content Standards Alignment and Other Factors.

Scale	Scale Weight
Content/Standards Alignment	70.0%
Program Organization and Design	9.0%
Balance of Student Experience	7.5%
Assessment	5.0%
Instructional Planning and Professional Support	4.5%
Equity and Access	4.0%

2.1.3 Measurement Criteria

Part 1: Content/Standards Alignment criteria measured how well the Washington State revised mathematics standards were addressed within the materials submitted for review. Reviewers ensured that the mathematics content within the program was rigorous and accurate, with few errors of fact or interpretation. In scoring Part 1, reviewers used a four-point scale (corresponding with Not Met, Limited Content, Limited Practice, Fully Met) for each performance expectation. This scale uses interval data to represent ordinal data. The criteria are the Washington Revised Mathematics Standards (6/08). A sample rating form for Part 1 is shown below. Note that the raw scores were adjusted to a range of [0, 1] for analysis and display.



Algebra 1		Date:	
Program:		Reviewer #:	

(Rate each item on the scale 0-not met, 1-limited content, 2-limited practice, 3-fully met)

A1.1. Core Content: Solving problems *(Algebra)*		**0**	**1**	**2**	**3**	**A2**	**Evidence**
A1.1.A	Select and justify functions and equations to model and solve problems.	○	○	○	○	◇	
A1.1.B	Solve problems that can be represented by linear functions, equations, and inequalities.	○	○	○	○	◇	
A1.1.C	Solve problems that can be represented by a system of two linear equations or inequalities.	○	○	○	○	◇	
A1.1.D	Solve problems that can be represented by quadratic functions and equations.	○	○	○	○	◇	
A1.1.E	Solve problems that can be represented by exponential functions and equations.	○	○	○	○	◇	

A1.2. Core Content: Numbers, expressions, and operations *(Numbers, Operations, Algebra)*		**0**	**1**	**2**	**3**	**A2**	**Evidence**
A1.2.A	Know the relationship between real numbers and the number line, and compare and order real numbers with and without the number line.	○	○	○	○	◇	
A1.2.B	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.	○	○	○	○	◇	
A1.2.C	Interpret and use integer exponents and square and cube roots, and apply the laws and properties of exponents to simplify and evaluate exponential expressions.	○	○	○	○	◇	
A1.2.D	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.	○	○	○	○	◇	
A1.2.E	Use algebraic properties to factor and combine like terms in polynomials.	○	○	○	○	◇	
A1.2.F	Add, subtract, multiply, and divide polynomials.	○	○	○	○	◇	

A1.3. Core Content: Characteristics and behaviors of functions *(Algebra)*		**0**	**1**	**2**	**3**	**A2**	**Evidence**
A1.3.A	Determine whether a relationship is a function and identify the domain, range, roots, and independent and dependent variables.	○	○	○	○	◇	
A1.3.B	Represent a function with a symbolic expression, as a graph, in a table, and using words, and make connections among these representations.	○	○	○	○	◇	
A1.3.C	Evaluate $f(x)$ at a (i.e., $f(a)$) and solve for x in the equation $f(x) = b$.	○	○	○	○	◇	

A1.4. Core Content: Linear functions, equations, and inequalities *(Algebra)*		**0**	**1**	**2**	**3**	**A2**	**Evidence**
A1.4.A	Write and solve linear equations and inequalities in one variable.	○	○	○	○	◇	
A1.4.B	Write and graph an equation for a line given the slope and the y-intercept, the slope and a point on the line, or two points on the line, and translate between forms of linear equations.	○	○	○	○	◇	
A1.4.C	Identify and interpret the slope and intercepts of a linear function, including equations for parallel and perpendicular lines.	○	○	○	○	◇	
A1.4.D	Write and solve systems of two linear equations and inequalities in two variables.	○	○	○	○	◇	
A1.4.E	Describe how changes in the parameters of linear functions and functions containing an absolute value of a linear expression affect their graphs and the relationships they represent.	○	○	○	○	◇	

Figure 7. Sample rating form for Content/Standards Alignment Review.

Reviewers used the following rubric to evaluate and score the Content/Standards Alignment worksheets that were completed by each publisher. During the review week, we posted variance reports that showed the rare instances where two or more independent reviewers had a two point difference on a particular Performance Expectation for a specified program. With clear scoring guidelines this type of variance should not occur, although in the process of collecting 20,000+ data elements some anomalies are expected. In practical terms, if one reviewer selected “Not Met” on a performance expectation for a specific program and another reviewer selected “Fully Met”, there are some possible reasons, including that the initial reviewer might have missed the evidence that shows the performance expectation was fully met. In each case of a variance gap, the discrepancy was highlighted, and reviewers were asked to go back and check their work and/or discuss the differences among each other to understand the reason for the difference. They were given the opportunity to correct their scores or to leave them as-is.

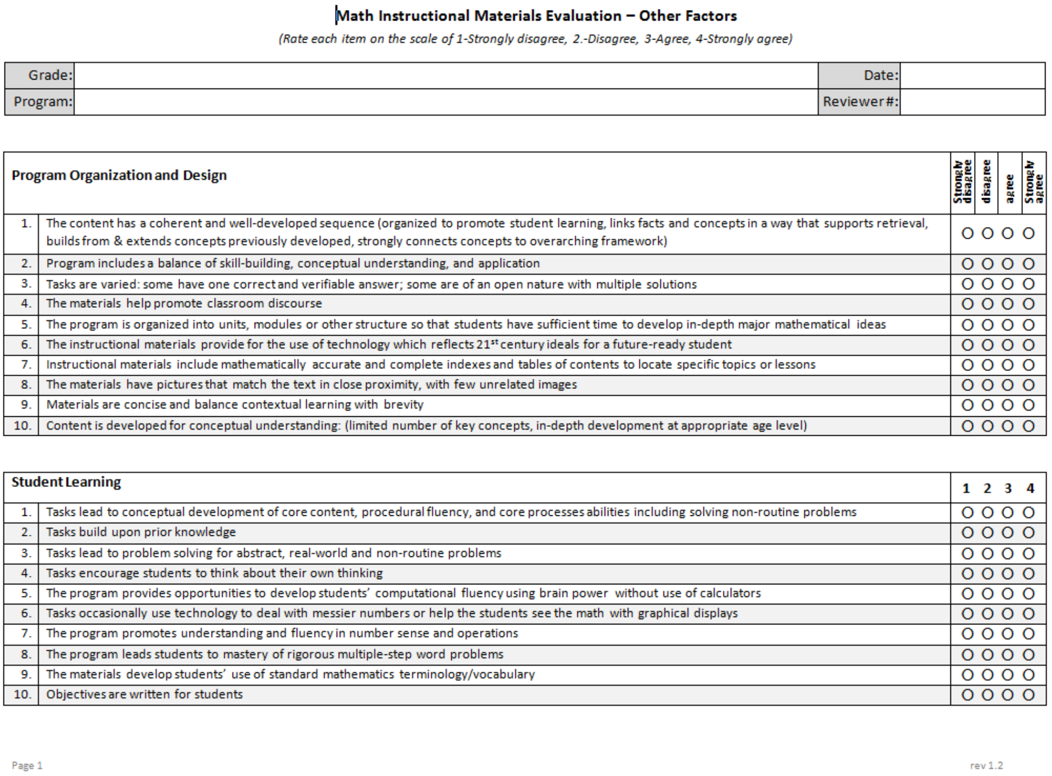
After the review of the K-8 core/comprehensive materials, project leaders sought feedback from participants in that review, the Math Panel, districts, and other stakeholders in order to improve the process for the high school materials review. One key recommendation was to change the content/standards alignment scale to a 4-point scale, with greater differentiation in the middle scores. Below is a table reflecting the updated 4-point scoring rubric.

Table 11. Scoring rubric for Content/Standards Alignment instrument.

There is little or no content (0)	Important content is missing (1)	All or most content is present, but missing some key teaching and learning tools (2)	All content and key teaching and learning tools are present (3)
• All or most of the content in the standard is missing in the program. - It may be completely absent. - It may be briefly mentioned, but it is not developed. • It may contain less sophisticated precursor content that would lead to the content in the standard.*A typical student would not be able to achieve mastery with the core program materials*	• Some significant aspect of the content is not present. - Some of the content may be completely absent. - Some of the content may be less rigorous. • It would take significant time and knowledge to fill the content gaps in the program. *A typical student would not be able to achieve mastery with the core program materials without some content supplementation.*	• The key content from the standard exists in the program. • The core materials need supplementation to support such things as adding additional opportunities for practice or finding other representations to help students consolidate learning. • *Many students would achieve mastery with the core program material.*	• The content from the standard is fully present. • There is adequate information about the content and sufficient teaching and learning ideas included in the program to ensure that students develop conceptual understanding and procedural skill. • There is sufficient practice to ensure mastery. • *A typical student would be able to achieve mastery with the core program materials.*

We collected additional course-level data when the reviewer indicated that the standard was fully met at an alternate course level from the expected level. Algebra 1 and 2 were treated as a series, as well as Integrated Math 1, 2 and 3. Geometry was a standalone course. Reviewers could look at other texts within the series if a particular standard was not addressed in the expected course.

Part 2: Other Factors contributed 30% of the final composite score for each program. There were five scales, with 6-10 elements per scale. In scoring Part 2, reviewers used a consistent, 4-point Likert measurement scale for each item (strongly disagree, disagree, agree, strongly agree). A sample instrument form is shown below.



Math Instructional Materials Evaluation – Other Factors

(Rate each item on the scale of 1-Strongly disagree, 2.-Disagree, 3-Agree, 4-Strongly agree)

Grade:		Date:	
Program:		Reviewer#:	

Program Organization and Design		Strongly disagree	disagree	agree	Strongly agree
1.	The content has a coherent and well-developed sequence (organized to promote student learning, links facts and concepts in a way that supports retrieval, builds from & extends concepts previously developed, strongly connects concepts to overarching framework)	○	○	○	○
2.	Program includes a balance of skill-building, conceptual understanding, and application	○	○	○	○
3.	Tasks are varied: some have one correct and verifiable answer; some are of an open nature with multiple solutions	○	○	○	○
4.	The materials help promote classroom discourse	○	○	○	○
5.	The program is organized into units, modules or other structure so that students have sufficient time to develop in-depth major mathematical ideas	○	○	○	○
6.	The instructional materials provide for the use of technology which reflects 21st century ideals for a future-ready student	○	○	○	○
7.	Instructional materials include mathematically accurate and complete indexes and tables of contents to locate specific topics or lessons	○	○	○	○
8.	The materials have pictures that match the text in close proximity, with few unrelated images	○	○	○	○
9.	Materials are concise and balance contextual learning with brevity	○	○	○	○
10.	Content is developed for conceptual understanding: (limited number of key concepts, in-depth development at appropriate age level)	○	○	○	○

Student Learning		1	2	3	4
1.	Tasks lead to conceptual development of core content, procedural fluency, and core processes abilities including solving non-routine problems	○	○	○	○
2.	Tasks build upon prior knowledge	○	○	○	○
3.	Tasks lead to problem solving for abstract, real-world and non-routine problems	○	○	○	○
4.	Tasks encourage students to think about their own thinking	○	○	○	○
5.	The program provides opportunities to develop students' computational fluency using brain power without use of calculators	○	○	○	○
6.	Tasks occasionally use technology to deal with messier numbers or help the students see the math with graphical displays	○	○	○	○
7.	The program promotes understanding and fluency in number sense and operations	○	○	○	○
8.	The program leads students to mastery of rigorous multiple-step word problems	○	○	○	○
9.	The materials develop students' use of standard mathematics terminology/vocabulary	○	○	○	○
10.	Objectives are written for students	○	○	○	○

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rev 1.2

Figure 8. Other Factors sample instrument form.

In addition, for each Part 2 category (described above in the Scale Definitions section), stakeholders identified 6-10 criteria, which are shown below.

Program Organization and Design

1. The content has a coherent and well-developed sequence (organized to promote student learning, links facts and concepts in a way that supports retrieval, builds from and extends concepts previously developed, strongly connects concepts to overarching framework)
2. Program includes a balance of skill-building, conceptual understanding, and application
3. Tasks are varied: some have one correct and verifiable answer; some are of an open nature with multiple solutions
4. The materials help promote classroom discourse
5. The program is organized into units, modules or other structure so that students have sufficient time to develop in-depth major mathematical ideas
6. The instructional materials provide for the use of technology which reflects 21st century ideals for a future-ready student
7. Instructional materials include mathematically accurate and complete indexes and tables of contents to locate specific topics or lessons

8. The materials have pictures that match the text in close proximity, with few unrelated images
9. Materials are concise and balance contextual learning with brevity
10. Content is developed for conceptual understanding (limited number of key concepts, in-depth development at appropriate age level)

Balance of Student Experience

1. Tasks[3] lead to conceptual development of core content, procedural fluency, and core processing abilities, including solving non-routine problems
2. Tasks build upon prior knowledge
3. Tasks lead to problem solving for abstract, real-world and non-routine problems
4. Tasks encourage students to think about their own thinking[4]
5. The program provides opportunities to develop students' computational fluency using brain power without use of calculators
6. Tasks occasionally use technology to deal with messier numbers or help the students see the math with graphical displays
7. The program promotes understanding and fluency in number sense and operations
8. The program leads students to mastery of rigorous multiple-step word problems
9. The materials develop students' use of standard mathematics terminology/vocabulary
10. Objectives are written for students

Instructional Planning and Professional Support

1. The instructional materials provide suggestions to teachers on how to help students access prior learning as a foundation for further math learning
2. The instructional materials provide suggestions to teachers on how to help students learn to conjecture, reason, generalize and solve problems
3. The instructional materials provide suggestions to teachers on how to help students connect mathematics ideas and applications to other math topics, other disciplines and real world contexts
4. Background mathematics information is included so that the concept is explicit in the teacher guide
5. Instructional materials help teachers anticipate and surface common student misconceptions in the moment
6. The materials support a balanced methodology
7. Math concepts are addressed in a context-rich setting (giving examples in context, for instance)
8. Teacher's guides are clear and concise with easy to understand instructions

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[3] Tasks can include homework, lessons, in-class group or individual activities, assessments, etc.

[4] Students are expected to be able to analyze their thinking process to understand how they came to a conclusion.

Assessment

1. The program provides regular assessments to guide student learning
2. There are opportunities for student self-assessment of learning
3. Assessments reflect content, procedural, and process goals and objectives
4. The program includes assessments with multiple purposes (formative, summative and diagnostic)
5. Assessments include multiple choice, short answer and extended response formats
6. Recommended rubrics or scoring guidelines accurately reflect learning objectives
7. Recommended rubrics or scoring guidelines identify possible student responses both correct & incorrect
8. Accurate answer keys are provided

Equity and Access

1. The program provides methods and materials for differentiating instruction (students with disabilities, gifted/talented, English Language Learners [ELL], disadvantaged)
2. Materials support intervention strategies
3. Materials, including assessments, are unbiased and relevant to diverse cultures
4. Materials are available in a variety of languages
5. The program includes easily accessible materials which help families to become active participants in their students' math education (e.g., "How You Can Help at Home" letters with explanations, key ideas and vocabulary for each unit, free or inexpensive activities which can be done at home, ideas for community involvement[5])
6. The program includes guidance and examples to allow students with little home support to be self-sufficient and successful

2.2 Reviewer Selection Process

OSPI issued a statewide invitation to solicit applications from individuals interested in serving as mathematics Professional Development Facilitators (trainers on the revised standards) and/or to participate as members of the Instructional Materials Reviewers Committee. Over 400 applications were received for both roles. Using a common review instrument and criteria, a committee reviewed and scored the over 100 applications for the instructional materials review and selected 42 individuals. The IMR Committee was selected based first on the score of their applications (primarily based on experience). Next, it was important to have a balanced number of reviewers qualified to review algebra, geometry and integrated math levels. In addition, OSPI sought balance on the review team, ensuring that math educators, curriculum specialists, parents, advocacy group members, mathematicians and math coaches were represented in the final group.

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[5] Community involvement means ideas where students can apply math concepts they are learning in the context of business, environment or public service, for example.

Parent recommendations were solicited from the Washington State Parent Teacher Association and Where's the Math.

2.3 Publisher Involvement

All publishers were invited to submit core/comprehensive mathematics materials for review. The materials did not have to be in widespread use in Washington in order to be considered. Information about the review was disseminated widely by the Washington Oregon Alaska Textbook Representatives Association (WOATRA), the American Association of Publishers (AAP) and was available on the OSPI Publisher Notice web site.

In addition, OSPI hosted a Publisher's Meeting to address questions prior to the review. As a result, OSPI maintained a web-based Question and Answer document for the publishers, providing up-to-date information regarding the submission and review process.

In addition to providing curricular materials for review, publishers were asked to review their materials and compare them to the 2008 Washington Revised Mathematics Standards. For each program submitted for review, publishers completed a Program Alignment Worksheet that provided between one and five references to locations in their materials where the standard was presented.

Publishers also submitted a Professional Development plan that outlined what standard professional development was available with the purchase of materials, and the optimal, recommended amount and type of professional development.

Publishers delivered materials to the review site the day before the review. They were escorted into the library repository, and participated in an inventory check with OSPI staff. After the review week was completed, they collected their material. Publishers did not meet with or present to the IMR Review Committee.

2.4 Review Week Process

The high school core/comprehensive mathematics review week took place in SeaTac, Washington from November 9-14, 2008.

On Sunday, November 9, the review team participated in an eight-hour mathematics standards training, led by Dr. George Bright from OSPI. The purpose of this training was to familiarize the reviewers with the standards at the course levels they would be reviewing. Dr. Bright provided clarity on the meaning of each standard, and example evidence that showed how the standard could be developed in instructional materials.

Reviewers participated in another four-hour training on Monday morning that focused on the review instruments (Content/Standards Alignment and Other Factors), how to score the elements, and expectations for reviewers, such as independent assessments, bias-free professional judgments, consistent scoring and productivity.

Between Monday afternoon and Friday morning, reviewers read and evaluated all materials submitted. They checked out programs (and ancillary materials, if submitted) from the library, and spent on average of about 3.5 hours per program-grade evaluating and scoring the material.

Staff entered data from the instruments in near real-time. Twice per day, the group gathered for progress updates, variance checks and process improvement changes.

The initial expectation was for each program-grade to receive three independent reviews. However, the reviewers ended up working both before and after the standard day (The review room was open between 6 a.m. and 9 p.m. daily) and were able to complete four reviews per program-grade for all of the instructional materials reviewed.

2.5 Data Analysis Process/Methodology

The purpose of this section is to describe in easy-to-understand terms how the data were analyzed. For example, it describes the process by which programs met a threshold level and how the comprehensive score was calculated (with weights).

Professional data entry staff entered the data into an Access database in near real-time. Once the review week was complete, we extracted the scores into a flat-file Excel worksheet for graphics publication and also text file format for statistical processing using the statistical package R.

Two statisticians worked independently with the data, first doing exploratory data analysis, looking for any anomalies or outliers (like a score value of 11, when the max score value should have been a 1). The statisticians checked counts of data, ranges, distributions and variance, as examples. No entry or extract errors were apparent, which was expected given the input constraints on the data entry application.

Some data cleaning and recoding ensued. Several program names were shortened or clarified to prepare the data for final graphic presentation.

The data for the Other Factors scales had an original range of [1,4] and the Content/Standards Alignment scale had a range of [0,3]. Before scaling the data and converting it to a common [0,1] range, the Other Factors range was adjusted to [0,3]. This was done to prevent an inflation of the Other Factors after the data were adjusted. (If a range of [1,4] is divided by 4, it becomes [0.25,1], which cannot be directly compared to the scaled content score at [0,1].)

After exploratory data analysis (EDA) and the data cleaning/recoding were completed, we re-checked the accuracy of the data elements by randomly sampling 10% of the original data entry forms and comparing them to the values in the electronic data set. Only 0.06% of items on the sampled forms were found to be entered incorrectly (and corrected), indicating a high level of accuracy in the data entry.

The final composite score was calculated by multiplying the scaled average values by the scale weights and summing the values. Confidence intervals were set at 95% and calculated for each instructional materials series.

One important consideration in ranking the data is to identify where statistical ties might occur. The tables and graphs that show confidence intervals for each instructional materials series are critical for understanding that small differences in composite scores may be due to sampling or other error (including measurement error) rather than a true difference in means.

The most critical statistical tie in the ranked list of composite scores involves the recommended programs and subsequent lower ranked instructional materials series. For example, if the third, fourth and fifth ranked series are statistical ties, then the simple ranking is not sufficient justification alone to select and recommend the set of the first through third ranked instructional materials.

To test for statistical ties, we used a one-tailed t-test and accounted for multiple tests. Prior to collecting the data, the statistical team considered several statistical tests, and decided to use the one-tailed t-test for three reasons: 1) the expected number of data elements, the expected distribution of the averages and the data type (ordinal converted to interval) made the t-test a good fit; 2) the t-test is one of the most commonly used and most easily understood statistical tests to use; and 3) it provides a very robust mechanism for measuring differences of means.

We want to identify any statistical ties with the recommended curricula in each course type. To do so, it is sufficient to ascertain if any curriculum has a statistically equivalent rating to the last rated program in the set of recommendations. The following example assumes the selection of the top three ranked programs, and a comparison of the third-ranked program to lower ranked (4th, 5th, etc.) programs.

First, we perform hypothesis tests comparing the ratings of all lower ranked materials to the third.

H_O: rating 3 = rating [4…n]
H_A: rating 3 > rating [4…n]

The test is a one-sided two-sample t-test. To allow for differences in the variances of the means across materials, we used an unequal variance statistic:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{s_{\overline{X}_1 - \overline{X}_2}}$$

Where the standard error of the difference is calculated by:

$$s_{\overline{x_1}-\overline{x_2}} = \sqrt{se_1^2 + se_2^2}$$

See *Section 4.9* for the degrees of freedom calculations for the following tables.

Table 12 and Table 13 give the adjusted significance levels for algebra, geometry and integrated math respectively, calculated using the Holm-Bonferroni method. Since we are performing several comparisons for each course type, we need to correct for multiple testing. Rather than comparing each p-value to 0.05, we order the p-values from smallest to largest and then compare them, in order, to the nominal significance level (0.05) divided by the number of tests remaining. When we reach a p-value that is deemed insignificant, we then say that all remaining values are also insignificant.

Table 12. t-test results comparing lower-scoring programs to the third-highest scoring Algebra 1 and 2 series.

Program	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Discovering - Algebra	0.859					
Holt Algebra	0.832					
Glencoe McGraw-Hill Algebra	0.821					
MathConnections Algebra	0.532	-21.08	98	2.69E-38	9	0.006
PH Classics (Smith) Algebra	0.658	-12.28	90	3.11E-21	8	0.006
PH Classics (Foerster) Algebra	0.672	-10.48	93	1.14E-17	7	0.007
CORD Algebra	0.699	-8.71	88	8.88E-14	6	0.008
Cognitive Tutor Algebra	0.714	-8.47	89	2.49E-13	5	0.010
CME Algebra	0.731	-6.47	95	2.10E-09	4	0.013
McDougal Littell Algebra	0.752	-5.31	89	4.05E-07	3	0.017
CPM Algebra	0.768	-3.63	94	2.31E-04	2	0.025
PH Math Algebra	**0.814**	**-0.59**	**86**	**0.277**	**1**	**0.050**

Table 13. t-test results comparing lower-scoring programs to the third-highest scoring geometry program.

Program	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Holt Geometry	0.847					
McDougal Littell Geometry	0.843					
Glencoe McGraw-Hill Geometry	0.832					
MathConnections Geometry	0.528	-17.33	73	1.07E-27	7	0.007
CME Geometry	0.613	-12.79	76	7.78E-21	6	0.008
CPM Geometry	0.729	-6.41	83	4.35E-09	5	0.010
Cognitive Tutor Geometry	0.730	-5.61	70	1.95E-07	4	0.013
Discovering - Geometry	0.776	-3.25	76	8.63E-04	3	0.017
CORD Geometry	0.795	-2.21	80	0.015	2	0.025

Program	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
PH Math Geometry	**0.827**	**-0.31**	**87**	**0.377**	**1**	**0.050**

Prentice Hall Math Algebra is the fourth-ranked algebra series. It is not statistically different from the third-ranked program, Glencoe McGraw-Hill Algebra.

Of the geometry programs, only Prentice Hall Geometry is not statistically different from the third-ranked program, Glencoe McGraw-Hill Geometry. However, all remaining curricula are significantly different from the third-highest rated program.

Only Core Plus Mathematics and SIMMS Math exceeded the content/standards alignment threshold for the integrated programs, when treated as a series. The second and third ranked integrated program mean scores are statistically different from Core Plus Mathematics.

Table 14. t-test results comparing integrated programs.

Program	Mean score	t statistic	Degrees of freedom	p-value
Core Plus Math	0.780			
SIMMS Math	0.696	-6.78	112	3.05E-10
Interactive Math Program	0.621	-11.96	102	2.35E-21

3 Results

3.1 Content/Standards Alignment

The following graphs show ranked results for the content/standards alignment scale for all the series that were reviewed (Algebra 1 and 2, Geometry, and Integrated Math 1, 2 and 3).

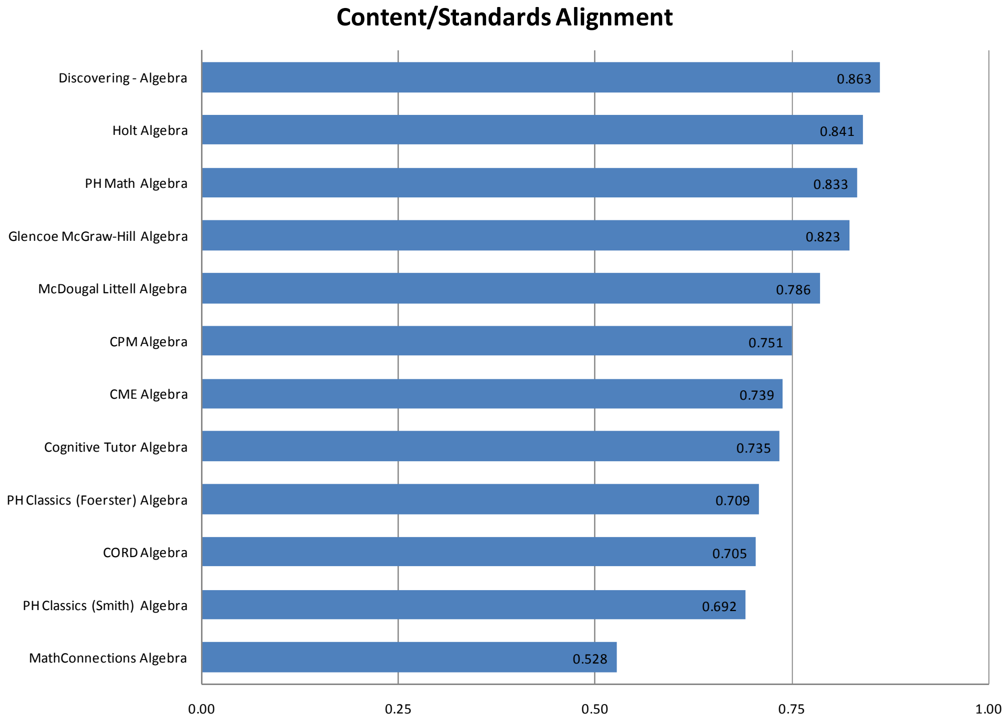


Figure 9. Algebra 1 and 2 series content/standards alignment scale, in rank order.

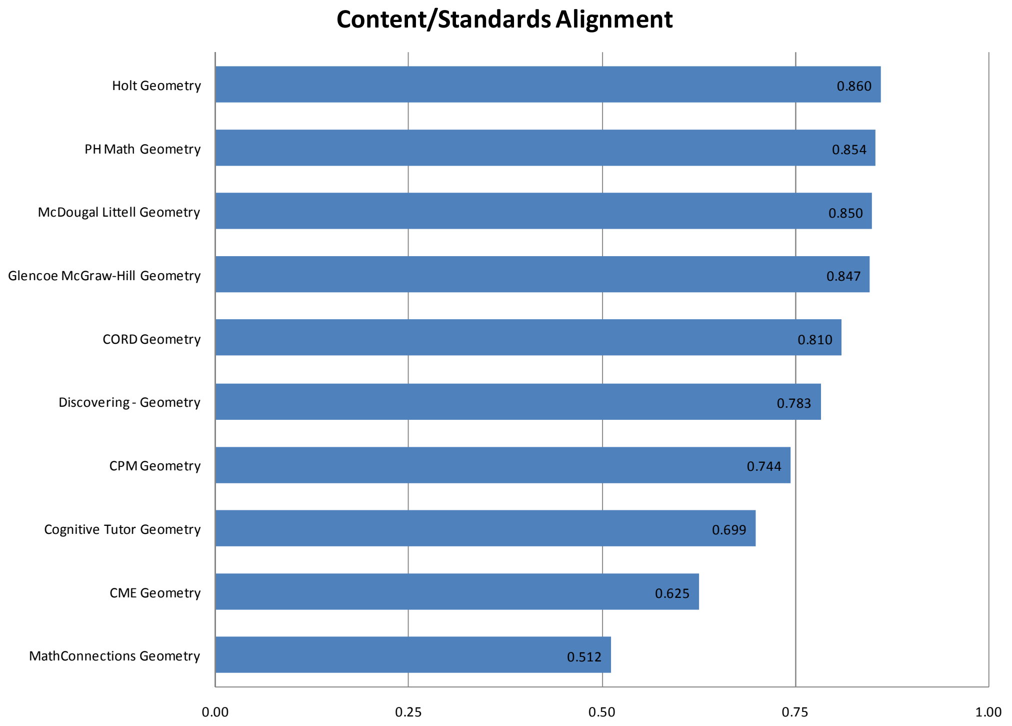


Figure 10. Geometry programs content/standards alignment scale.

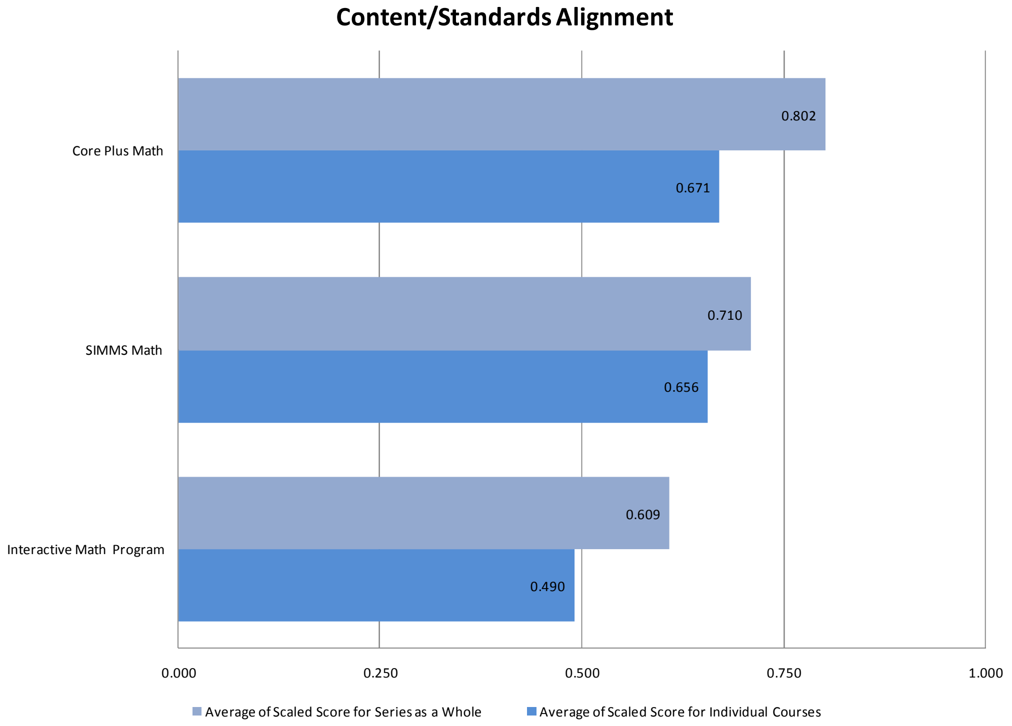


Figure 11. Integrated programs content/standards alignment scale, treated as a series (light blue) and as individual courses (dark blue).

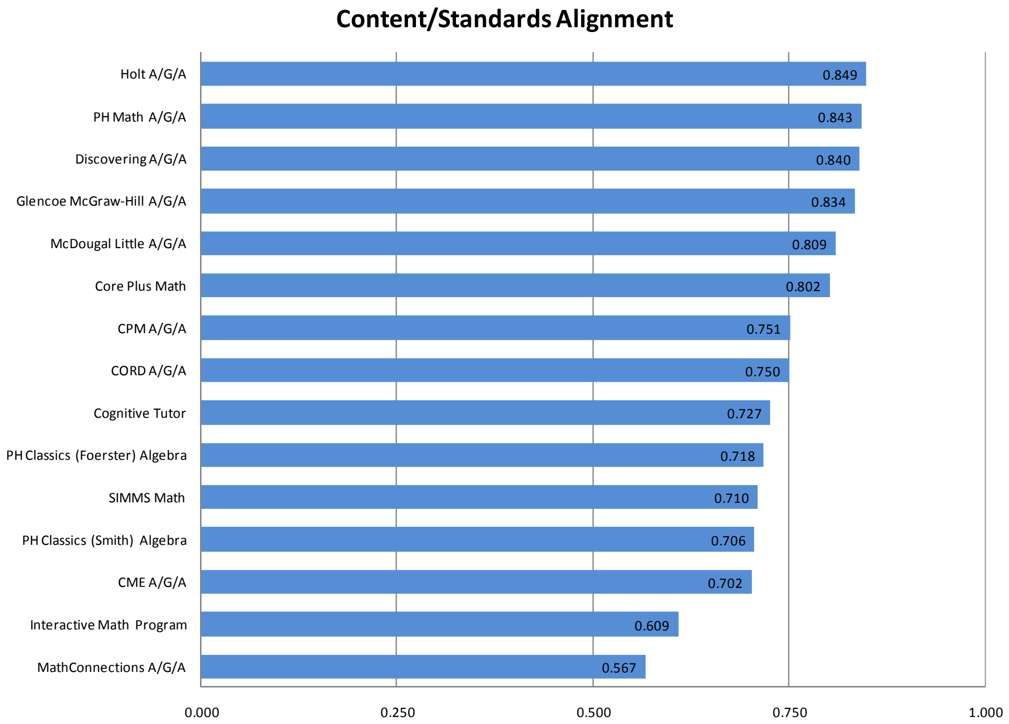


Figure 12. Content/Standards Alignment for all publisher bundles, treated as a series (no reduction in score for standards met above or below the expected course level).

3.2 Content Dashboards

The following tables show summary and detailed information about content. The dashboard view shows a filled circle if the scaled average score from the reviewers is ≥ 0.70 (on a 1.0 scale); a half circle if the scale is between 0.50 and 0.69 inclusive, and a clear circle if the average score is below 0.50.

3.2.1 Summary

Table 15. Core Content Area summary for Algebra 1 courses.

Core Content Area	Glencoe McGraw-Hill Algebra	Discovering - Algebra	PH Math Algebra	Holt Algebra	CPM Algebra	McDougal Littell Algebra	CORD Algebra	CME Algebra	Cognitive Tutor Algebra	PH Classics (Smith) Algebra	PH Classics (Foerster) Algebra	MathConnections Algebra	Overall
Solving Problems	●	●	●	●	●	●	●	●	●	●	●	○	●
Numbers, expressions and operations	●	◑	●	●	●	●	◑	●	●	●	●	○	●
Characteristics and behaviors of functions	●	●	●	●	●	●	●	●	●	◑	●	○	●
Linear functions, equations and inequalities	●	●	●	●	●	●	●	●	●	●	●	○	●
Quadratic functions and equations	●	●	●	●	●	●	●	●	●	●	●	○	●
Data and distributions	●	◑	◑	◑	○	◑	◑	◑	◑	◑	○	◑	◑
Additional Key Content	●	●	●	●	◑	●	◑	◑	◑	○	○	○	◑
Reasoning, Problem Solving, and Communication	●	●	●	●	●	●	●	●	●	◑	◑	◑	●
Overall	●	●	●	●	●	●	●	●	●	◑	◑	○	●

Table 16. Core Content Area summary for Geometry courses.

Core Content Area	Holt Geometry	PH Math Geometry	McDougal Littell Geometry	Glencoe McGraw-Hill Geometry	CORD Geometry	Discovering - Geometry	CPM Geometry	Cognitive Tutor Geometry	CME Geometry	MathConnections Geometry	Overall
Logical arguments and proofs	●	●	●	●	●	●	◑	○	○	○	●
Lines and angles	●	●	●	●	●	●	●	●	◑	◑	●
Two- and Three-Dimensional Figures	●	●	●	●	●	●	●	●	●	◑	●
Geometry in the coordinate plane	●	●	●	●	●	●	◑	◑	◑	○	◑
Geometric transformations	●	●	●	●	●	●	●	●	◑	○	●
Additional Key Content	●	◑	◑	●	○	◑	◑	○	○	◑	◑
Reasoning, Problem Solving, and Communication	●	●	●	●	●	●	●	●	●	●	●
Overall	●	●	●	●	●	●	●	◑	◑	◑	●

Table 17. Core Content Area summary for Algebra 2 courses.

Core Content Area	Discovering - Algebra	Holt Algebra	PH Math Algebra	Glencoe McGraw-Hill Algebra	PH Classics (Foerster) Algebra	McDougal Littell Algebra	Cognitive Tutor Algebra	PH Classics (Smith) Algebra	CPM Algebra	CME Algebra	MathConnections Algebra	CORD Algebra	Overall
Solving Problems	●	●	●	●	●	●	●	●	◑	◑	◑	●	●
Numbers, expressions and operations	●	●	●	●	●	●	●	●	◑	●	○	◑	●
Quadratic functions and equations	●	●	●	●	●	●	●	●	◑	◑	○	◑	●
Exponential and logarithmic functions and equations	●	●	●	●	●	●	●	●	●	●	●	●	●
Additional functions and equations	●	●	●	●	◑	●	●	○	●	●	○	○	●
Probability, data, and distributions	●	●	●	●	◑	●	◑	◑	◑	○	●	○	◑
Additional Key Content	●	●	●	●	●	●	◑	●	●	●	◑	●	●
Reasoning, Problem Solving, and Communication	●	●	●	●	●	◑	◑	◑	◑	●	●	◑	●
Overall	●	●	●	●	●	●	●	●	●	◑	◑	◑	●

Table 18. Core Content Area summary for Integrated Math 1 courses, treated as a series (no reductions in score for standards met above or below the expected course level).

Core Content Area	Core Plus Math	SIMMS Math	Interactive Math Program	Overall
Solving Problems	●	●	◑	●
Numbers, expressions and operations	●	○	◑	◑
Characteristics and behaviors of functions	●	●	◑	●
Linear functions, equations and relationships	●	●	○	◑
Proportionality, similarity, and geometric reasoning	●	○	◑	◑
Data and distributions	●	◑	●	●
Additional Key Content	●	◑	○	◑
Reasoning, Problem Solving, and Communication	●	●	●	●
Overall	●	◑	◑	●

Table 19. Core Content Area summary for Integrated Math 2 courses, treated as a whole series.

Core Content Area	Core Plus Math	SIMMS Math	Interactive Math Program	Overall
Modeling situations and solving problems	●	●	●	●
Quadratic functions, equations, and relationships	●	○	◑	◑
Conjectures and proofs	●	●	○	◑
Probability	●	●	●	●
Additional Key Content	●	◑	◑	◑
Reasoning, Problem Solving, and Communication	●	●	●	●
Overall	●	●	◑	●

Table 20. Core Content Area summary for Integrated Math 3, treated as a whole series.

Core Content Area	SIMMS Math	Core Plus Math	Interactive Math Program	Overall
Solving Problems	●	●	◑	●
Transformations and functions	●	●	○	◑
Functions and modeling	◑	◑	○	◑
Quantifying variability	●	◑	○	◑
Three-dimensional geometry	●	○	○	◑
Algebraic properties	○	●	○	○
Additional Key Content	◑	◑	○	◑
Reasoning, Problem Solving, and Communication	●	●	●	●
Overall	●	●	○	◑

Table 21. Core Content Area summary for Integrated Math 1, treated as an individual course (score reductions applied when standard is met above or below the expected course level).

Core Content Area	Core Plus Math	SIMMS Math	Interactive Math Program	Overall
Solving Problems	●	●	◑	●
Numbers, expressions and operations	◑	○	◑	◑
Characteristics and behaviors of functions	○	●	○	◑
Linear functions, equations and relationships	●	●	○	◑
Proportionality, similarity, and geometric reasoning	◑	○	◑	◑
Data and distributions	●	◑	●	●
Additional Key Content	●	◑	○	◑
Reasoning, Problem Solving, and Communication	●	●	●	●
Overall	●	◑	◑	◑

Table 22. Core Content Area summary for Integrated Math 2, treated as an individual course.

Core Content Area	SIMMS Math	Core Plus Math	Interactive Math Program	Overall
Modeling situations and solving problems	●	●	◑	●
Quadratic functions, equations, and relationships	○	◑	○	○
Conjectures and proofs	◑	○	○	○
Probability	●	◑	○	◑
Additional Key Content	○	◑	○	○
Reasoning, Problem Solving, and Communication	●	●	●	●
Overall	◑	◑	○	◑

Table 23. Core Content Area summary for Integrated Math 3, treated as an individual course.

Core Content Area	SIMMS Math	Core Plus Math	Interactive Math Program	Overall
Solving Problems	◑	●	◑	●
Transformations and functions	●	○	○	○
Functions and modeling	◑	◑	○	○
Quantifying variability	●	◑	○	○
Three-dimensional geometry	◑	○	○	○
Algebraic properties	○	◑	○	○
Additional Key Content	○	◑	○	○
Reasoning, Problem Solving, and Communication	●	●	●	●
Overall	◑	◑	○	◑

3.2.2 Detail

Table 24 shows the degree in which the Algebra 1 and 2 materials reviewed meet each Performance Expectation for Algebra 1. The dashboard view shows a filled circle if the scaled average score from the four reviewers is ≥ 0.70 (on a 1.0 scale); a half circle if the scale is between 0.50 and 0.69 inclusive, and a clear circle if the average score is below 0.50.

The programs are listed in rank order from left to right based on the average score across all Algebra 1 performance expectations. For example, *Glencoe McGraw-Hill Algebra*, with an overall average Algebra 1 rating on content/standards alignment of 0.82, is shown first.

There are a couple of key conjectures that could be drawn from this chart. The standards are organized into sections or core content areas, (A1.1.A through A1.1.D for example). Some programs are very strong in some sections while weak across other sections. See for instance, *CPM Algebra*, which performs well in *A1.1 Solving Problems, A1.2 Numbers, expressions and operations, A1.3 Characteristics and behaviors of functions, A1.4 Linear functions, equations and inequalities, A1.5Quadratic functions and equations, A1.7 Additional Key Content*, and *A1.8 Reasoning, Problem Solving, and Communication*, but is very weak in *A1.6 Data and distributions*. Thus, it may be that certain instructional materials need to be heavily supplemented in some key content areas. It might also be noted that some areas are easier to supplement than others. For example, given the large volume of computational fluency programs available, it might be easier to supplement numbers and operations than reasoning and problem solving.

Additionally, the far right column shows how all programs performed overall for each specific performance expectation. For example, standard A1.8.A (*Analyze a problem* *situation and represent it mathematically*) is well covered in all reviewed programs, but standard A1.6.C (*Describe how linear transformations affect the center and spread of univariate data)* is not well covered in any program. This data may provide valuable feedback in understanding which of the revised math standards may need supplementation to support a majority of the students in the state.

Table 24. Performance Expectation Dashboard for Algebra 1 courses.

PE	Glencoe McGraw-Hill Algebra	Discovering - Algebra	PH Math Algebra	Holt Algebra	CPM Algebra	McDougal Littell Algebra	CORD Algebra	CME Algebra	Cognitive Tutor Algebra	PH Classics (Smith) Algebra	PH Classics (Foerster) Algebra	MathConnections Algebra	Overall
Solving Problems	●	●	●	●	●	●	●	●	●	●	●	○	●
A1.1.A	●	●	●	●	●	●	●	●	●	◑	●	◑	●
A1.1.B	●	●	●	●	●	●	●	●	●	●	●	◑	●
A1.1.C	●	●	●	●	●	●	●	●	●	●	●	◑	●
A1.1.D	●	●	●	●	●	●	●	●	●	●	●	○	●
A1.1.E	●	●	●	●	◑	●	◑	●	●	○	◑	◑	◑
Numbers, expressions and operations	●	◑	●	●	●	●	◑	●	●	●	●	○	●
A1.2.A	●	○	●	◑	●	●	◑	●	●	●	●	○	●
A1.2.B	●	●	●	●	●	●	●	●	◑	●	●	◑	●
A1.2.C	●	●	●	●	●	●	●	●	◑	●	●	○	●
A1.2.D	○	◑	○	○	○	◑	○	○	◑	○	◑	○	○
A1.2.E	●	●	●	●	●	●	●	●	●	●	●	○	●
A1.2.F	●	○	●	●	●	●	◑	◑	●	●	●	○	●
Characteristics and behaviors of functions	●	●	●	●	●	●	●	●	●	◑	●	◑	●
A1.3.A	●	●	●	●	●	●	●	◑	◑	◑	●	○	●
A1.3.B	●	●	●	●	●	●	●	●	●	●	●	◑	●
A1.3.C	●	●	●	◑	●	●	◑	●	●	◑	◑	○	●
Linear functions, equations and inequalities	●	●	●	●	●	●	●	●	●	●	●	○	●
A1.4.A	●	●	●	●	●	●	●	●	●	●	●	○	●
A1.4.B	●	●	●	●	●	●	●	●	●	●	●	◑	●
A1.4.C	●	●	●	●	●	●	●	◑	●	●	◑	◑	●
A1.4.D	●	●	●	●	●	●	●	●	●	●	●	○	●
A1.4.E	◑	●	●	●	●	●	●	●	●	○	○	○	◑
Quadratic functions and equations	●	●	●	●	●	●	●	●	●	●	●	○	●
A1.5.A	●	●	◑	●	●	●	●	●	●	●	●	○	●
A1.5.B	●	●	●	●	●	●	●	●	●	●	●	○	●
A1.5.C	●	●	●	●	●	●	●	●	◑	●	●	○	●
A1.5.D	●	●	●	●	●	●	●	●	●	●	●	○	●
Data and distributions	●	◑	◑	◑	○	◑	◑	◑	◑	◑	○	◑	◑
A1.6.A	●	●	◑	●	○	●	◑	●	●	◑	○	●	◑
A1.6.B	●	●	◑	◑	○	●	◑	●	◑	○	○	●	◑
A1.6.C	○	○	○	○	○	○	○	○	○	○	○	○	○
A1.6.D	●	●	●	◑	◑	●	●	●	◑	◑	◑	●	●
A1.6.E	●	○	●	●	◑	●	●	◑	◑	●	○	○	◑
Additional Key Content	●	●	●	●	◑	●	◑	◑	◑	○	○	○	◑
A1.7.A	◑	◑	●	●	◑	●	◑	◑	◑	○	○	○	◑
A1.7.B	●	●	●	●	○	◑	●	●	●	○	○	○	◑
A1.7.C	◑	●	●	◑	●	◑	◑	◑	○	○	○	○	○
A1.7.D	●	●	◑	●	○	●	◑	◑	●	●	●	○	◑
Reasoning, Problem Solving, and Communication	●	●	●	●	●	●	●	●	●	◑	◑	◑	●
A1.8.A	●	●	●	●	●	●	●	●	●	●	●	●	●
A1.8.B	●	●	●	●	●	●	●	●	◑	◑	●	○	●
A1.8.C	●	●	●	◑	●	●	●	●	●	◑	○	●	●
A1.8.D	●	●	●	◑	●	●	●	●	●	○	◑	◑	●
A1.8.E	●	●	●	●	●	●	●	●	◑	◑	◑	●	●
A1.8.F	●	◑	◑	●	●	◑	●	●	●	◑	○	◑	●
A1.8.G	◑	●	◑	◑	●	◑	●	●	◑	○	○	●	◑
A1.8.H	●	●	◑	●	●	◑	○	●	○	◑	○	○	◑
Overall	●	●	●	●	●	●	●	●	●	◑	◑	○	●

Table 25. Performance Expectation Dashboard for Geometry.

PE	Holt Geometry	PH Math Geometry	McDougal Littell Geometry	Glencoe McGraw-Hill Geometry	CORD Geometry	Discovering - Geometry	CPM Geometry	Cognitive Tutor Geometry	CME Geometry	MathConnections Geometry	Overall
Logical arguments and proofs	●	●	●	●	●	●	◑	○	○	○	●
G.1.A	●	●	●	●	●	●	◑	○	○	○	◑
G.1.B	●	●	●	●	●	●	●	◑	○	●	●
G.1.C	●	●	●	●	●	●	●	●	●	◑	●
G.1.D	●	●	●	●	●	●	◑	○	○	○	◑
G.1.E	●	●	●	●	●	●	◑	○	●	◑	●
G.1.F	●	●	●	●	◑	●	◑	○	◑	○	◑
Lines and angles	●	●	●	●	●	●	●	●	◑	◑	●
G.2.A	●	●	●	●	●	●	◑	●	●	○	●
G.2.B	●	●	●	●	●	●	◑	●	◑	◑	●
G.2.C	●	●	◑	●	●	●	●	◑	◑	◑	●
G.2.D	●	●	●	●	◑	◑	◑	◑	○	◑	◑
Two- and Three-Dimensional Figures	●	●	●	●	●	●	●	●	●	◑	●
G.3.A	●	●	●	●	●	●	●	●	◑	●	●
G.3.B	●	●	●	●	●	●	●	●	●	◑	●
G.3.C	●	●	●	●	●	●	●	●	◑	○	●
G.3.D	●	●	●	●	●	●	◑	●	●	●	●
G.3.E	●	●	●	●	●	●	●	●	●	●	●
G.3.F	●	●	●	●	●	●	●	●	◑	◑	●
G.3.G	●	●	●	●	●	●	●	●	◑	◑	●
G.3.H	●	●	●	●	●	●	●	●	●	○	●
G.3.I	●	●	◑	●	○	●	◑	●	◑	◑	◑
G.3.J	◑	●	●	●	○	●	◑	●	◑	●	◑
G.3.K	●	●	●	●	●	◑	◑	●	●	◑	●
Geometry in the coordinate plane	●	●	●	●	●	●	◑	◑	◑	○	◑
G.4.A	●	●	●	●	●	●	○	●	◑	○	●
G.4.B	●	●	●	●	●	●	◑	●	●	○	●
G.4.C	●	●	◑	●	●	◑	●	●	○	○	◑
G.4.D	●	●	●	◑	◑	○	◑	○	◑	○	◑
Geometric transformations	●	●	●	●	●	●	●	●	◑	○	●
G.5.A	●	●	●	●	●	●	●	●	◑	○	●
G.5.B	●	●	●	●	●	●	●	●	●	○	●
G.5.C	◑	◑	●	◑	●	●	◑	●	◑	○	◑
G.5.D	●	●	●	●	●	●	●	◑	●	○	●
Additional Key Content	●	◑	◑	●	○	◑	◑	○	○	◑	◑
G.6.A	●	●	●	●	●	●	●	●	◑	◑	●
G.6.B	◑	○	◑	●	○	○	◑	○	○	○	○
G.6.C	●	●	●	●	●	●	●	●	●	◑	●
G.6.D	●	●	◑	●	◑	◑	●	◑	●	○	●
G.6.E	◔	○	◑	◑	○	◑	○	○	◑	○	○
G.6.F	○	○	○	●	○	○	○	○	○	◑	○
Reasoning, Problem Solving, and Communication	●	●	●	●	●	●	●	●	●	●	●
G.7.A	●	●	●	●	●	●	●	●	●	●	●
G.7.B	●	●	●	●	●	●	●	●	●	●	●
G.7.C	●	●	●	●	●	◑	●	●	●	◑	●
G.7.D	●	●	●	●	●	●	●	●	●	◑	●
G.7.E	●	●	●	●	●	●	●	●	●	◑	●
G.7.F	●	●	●	●	●	◑	●	●	◑	●	●
G.7.G	●	●	●	●	●	●	●	●	●	●	●
G.7.H	●	●	●	●	●	●	●	●	◑	◑	●
Overall	●	●	●	●	●	●	●	◑	◑	◑	●

Table 26. Performance Expectation Dashboard for Algebra 2.

PE	Discovering - Algebra	Holt Algebra	PH Math Algebra	Glencoe McGraw-Hill Algebra	PH Classics (Foerster) Algebra	McDougal Littell Algebra	Cognitive Tutor Algebra	PH Classics (Smith) Algebra	CPM Algebra	CME Algebra	MathConnections Algebra	CORD Algebra	Overall
Solving Problems	●	●	●	●	●	●	●	●	◑	◑	◑	●	●
A2.1.A	●	●	●	◑	●	◑	●	◑	●	●	○	◑	●
A2.1.B	●	●	●	●	●	●	●	●	●	●	○	●	●
A2.1.C	●	●	●	●	◑	●	◑	●	◑	○	◑	●	●
A2.1.D	●	●	●	●	●	●	●	●	●	●	●	●	●
A2.1.E	●	●	●	◑	●	◑	◑	●	○	○	○	○	◑
A2.1.F	●	●	●	○	●	●	●	●	●	○	●	●	●
Numbers, expressions and operations	●	●	●	●	●	●	●	●	◑	●	○	◑	●
A2.2.A	●	●	●	○	●	◑	◑	●	◑	◑	◑	○	◑
A2.2.B	●	●	●	●	●	●	●	●	◑	●	◑	○	●
A2.2.C	●	●	●	●	●	●	●	●	◑	●	○	●	●
Quadratic functions and equations	●	●	●	●	●	●	●	●	◑	◑	○	◑	●
A2.3.A	●	●	●	●	●	●	●	●	●	◑	○	○	●
A2.3.B	●	●	●	●	●	●	●	●	○	●	◑	●	●
A2.3.C	●	●	●	●	◑	●	◑	◑	◑	○	○	◑	◑
Exponential and logarithmic functions and equations	●	●	●	●	●	●	●	●	●	●	●	●	●
A2.4.A	●	●	●	●	●	●	●	●	●	●	●	●	●
A2.4.B	●	●	●	●	●	●	●	●	●	●	●	●	●
A2.4.C	●	●	●	●	●	●	●	●	●	●	◑	●	●
Additional functions and equations	●	●	●	●	◑	●	●	○	●	●	○	○	●
A2.5.A	●	●	●	●	○	●	●	●	●	●	◑	●	●
A2.5.B	●	●	●	●	◑	●	●	○	●	●	○	○	◑
A2.5.C	●	●	●	●	●	●	●	○	◑	◑	◑	○	◑
A2.5.D	●	●	●	●	●	●	●	◑	◑	●	◑	○	●
Probability, data, and distributions	●	●	●	●	◑	●	◑	◑	◑	○	●	○	◑
A2.6.A	●	●	●	◑	●	●	●	●	●	◑	●	●	●
A2.6.B	●	●	●	●	●	●	◑	●	●	◑	●	●	●
A2.6.C	●	●	●	●	●	●	●	●	●	○	●	●	●
A2.6.D	●	●	●	●	●	●	◑	◑	●	○	◑	○	●
A2.6.E	●	●	○	●	◑	●	●	○	○	○	○	○	◑
A2.6.F	●	◑	●	●	◑	◑	◑	●	●	○	●	○	◑
A2.6.G	●	○	●	●	○	◑	○	○	○	○	◑	○	○
Additional Key Content	●	●	●	●	●	●	◑	●	●	●	◑	●	●
A2.7.A	●	●	●	●	●	●	●	●	●	●	○	●	●
A2.7.B	●	●	●	●	●	●	◑	●	●	●	◑	●	●
Reasoning, Problem Solving, and Communication	●	●	●	●	●	◑	◑	◑	◑	●	●	◑	●
A2.8.A	●	●	●	●	●	●	●	●	●	●	●	●	●
A2.8.B	●	●	◑	◑	●	◑	◑	●	●	●	◑	◑	●
A2.8.C	●	●	●	●	●	○	●	◑	◑	◑	●	●	●
A2.8.D	●	●	●	◑	●	◑	◑	●	◑	●	●	◑	●
A2.8.E	●	●	●	●	◑	●	●	●	○	●	●	◑	●
A2.8.F	●	●	◑	●	◑	○	●	◑	◑	●	◑	◑	●
A2.8.G	◑	●	◑	●	●	○	○	◑	◑	●	◑	○	◑
A2.8.H	●	●	◑	●	◑	○	◑	◑	◑	●	◑	◑	◑
Overall	●	●	●	●	●	●	●	●	●	◑	◑	◑	●

Table 27. This table shows the results from Integrated Math 1, treated as a series (left chart) and as individual courses (right chart).

PE	Core Plus Math	SIMMS Math	Interactive Math Program	Overall	Core Plus Math	SIMMS Math	Interactive Math Program	Overall
Solving Problems	●	●	◑	●	●	●	◑	●
M1.1.A	●	●	●	●	●	●	●	●
M1.1.B	●	●	◑	●	●	●	○	●
M1.1.C	●	●	◑	●	●	●	○	●
M1.1.D	●	●	○	●	●	●	○	●
Characteristics and behaviors of functions	●	●	◑	●	○	●	○	◑
M1.2.A	◑	●	○	◑	○	●	○	◑
M1.2.B	●	●	●	●	◑	●	●	●
M1.2.C	●	◑	◑	◑	○	◑	○	◑
M1.2.D	●	◑	○	◑	○	◑	○	○
Linear functions, equations and relationships	●	●	○	◑	●	●	○	◑
M1.3.A	●	●	○	●	●	●	○	●
M1.3.B	◑	◑	◑	◑	○	◑	○	○
M1.3.C	●	◑	○	◑	◑	◑	○	◑
M1.3.D	◑	●	○	◑	◑	●	○	◑
M1.3.E	●	●	◑	●	●	●	○	●
M1.3.F	●	●	●	●	●	●	●	●
M1.3.G	●	○	○	○	◑	○	○	○
M1.3.H	●	◑	○	◑	●	◑	○	◑
Proportionality, similarity, and geometric reasoning	●	○	◑	◑	◑	○	◑	◑
M1.4.A	●	○	○	◑	◑	○	○	○
M1.4.B	●	◑	●	●	●	◑	●	●
M1.4.C	●	○	●	◑	◑	○	●	◑
M1.4.D	●	◑	●	●	◑	◑	●	◑
M1.4.E	●	○	◑	◑	○	○	◑	○
M1.4.F	●	○	●	●	◑	○	●	◑
M1.4.G	●	○	○	○	○	○	○	○
Data and distributions	●	◑	●	●	●	◑	●	●
M1.5.A	●	●	●	●	●	●	●	●
M1.5.B	●	○	●	◑	●	○	●	◑
M1.5.C	●	●	●	●	◑	●	●	●
Numbers, expressions and operations	●	○	◑	◑	◑	○	○	◑
M1.6.A	◑	○	○	○	◑	○	○	○
M1.6.B	◑	○	◑	○	◑	○	○	○
M1.6.C	●	◑	●	●	●	◑	◑	●
M1.6.D	●	◑	●	●	○	◑	◑	◑
Additional Key Content	●	◑	○	◑	●	◑	○	◑
M1.7.A	●	◑	○	◑	●	◑	○	◑
M1.7.B	●	◑	○	◑	◑	◑	○	○
M1.7.C	●	○	○	◑	●	○	○	◑
M1.7.D	◑	●	○	◑	◑	●	○	◑
Reasoning, Problem Solving, and Communication	●	●	●	●	●	●	●	●
M1.8.A	●	●	●	●	●	●	●	●
M1.8.B	●	●	●	●	●	●	●	●
M1.8.C	●	●	●	●	●	●	●	●
M1.8.D	●	●	●	●	●	●	●	●
M1.8.E	●	●	●	●	●	●	●	●
M1.8.F	●	●	●	●	●	●	●	●
M1.8.G	●	●	●	●	●	●	●	●
M1.8.H	●	◑	●	●	●	◑	●	●
Overall	●	◑	◑	●	●	◑	◑	◑

Table 28. This table shows the results from Integrated Math 2, treated as a series (left chart) and as individual courses (right chart).

PE	Core Plus Math	SIMMS Math	Interactive Math Program	Overall	Core Plus Math	SIMMS Math	Interactive Math Program	Overall
Modeling situations and solving problems	●	●	●	●	●	●	◑	●
M2.1.A	●	●	●	●	●	●	●	●
M2.1.B	●	●	●	●	●	●	◑	●
M2.1.C	●	◑	◑	◑	◑	◑	○	◑
M2.1.D	●	●	●	●	●	●	○	●
M2.1.E	○	●	●	●	○	●	◑	◑
Quadratic functions, equations, and relationships	●	○	◑	◑	◑	○	○	○
M2.2.A	●	●	●	●	●	○	○	◑
M2.2.B	●	●	●	●	●	○	○	◑
M2.2.C	●	●	●	●	○	○	○	○
M2.2.D	●	○	○	○	●	○	○	○
M2.2.E	●	○	○	○	◑	○	○	○
M2.2.F	●	○	○	○	○	○	○	○
M2.2.G	●	○	○	○	○	○	○	○
M2.2.H	○	●	◑	◑	○	●	○	○
Conjectures and proofs	●	●	○	◑	○	◑	○	○
M2.3.A	●	●	○	●	○	●	○	◑
M2.3.B	●	◑	○	◑	○	◑	○	○
M2.3.C	◑	●	○	◑	○	◑	○	○
M2.3.D	◑	●	○	◑	○	●	○	○
M2.3.E	●	●	●	●	○	●	○	○
M2.3.F	●	●	●	●	○	●	○	◑
M2.3.G	●	●	●	●	◑	●	◑	◑
M2.3.H	●	●	◑	●	●	◑	◑	◑
M2.3.I	○	◑	○	○	○	◑	○	○
M2.3.J	●	●	○	◑	○	●	○	○
M2.3.K	●	◑	○	◑	○	◑	○	○
M2.3.L	●	○	○	◑	●	○	○	○
M2.3.M	◑	○	○	○	◑	○	○	○
Probability	●	●	●	●	◑	●	○	◑
M2.4.A	●	●	●	●	●	●	○	◑
M2.4.B	●	●	◑	●	●	●	○	◑
M2.4.C	○	●	●	●	○	●	◑	◑
M2.4.D	●	●	◑	●	○	○	○	○
Additional Key Content	●	◑	◑	◑	◑	○	○	○
M2.5.A	●	○	●	◑	◑	○	○	○
M2.5.B	◑	○	●	◑	◑	○	◑	○
M2.5.C	●	◑	◑	◑	●	○	○	○
M2.5.D	●	●	○	●	○	●	○	◑
Reasoning, Problem Solving, and Communication	●	●	●	●	●	●	●	●
M2.6.A	●	●	●	●	●	●	●	●
M2.6.B	●	●	●	●	●	●	●	●
M2.6.C	●	●	●	●	●	●	●	●
M2.6.D	●	●	●	●	●	●	●	●
M2.6.E	●	●	●	●	●	●	●	●
M2.6.F	●	●	●	●	●	●	●	●
M2.6.G	●	●	●	●	●	●	●	●
M2.6.H	●	●	●	●	●	●	●	●
Overall	●	●	◑	●	◑	◑	○	◑

Table 29. This table shows the results from Integrated Math 3, treated as a series (left chart) and as individual courses (right chart).

PE	Core Plus Math	SIMMS Math	Interactive Math Program	Overall	Core Plus Math	SIMMS Math	Interactive Math Program	Overall
Solving Problems	●	●	◑	●	●	◑	◑	●
M3.1.A	●	●	●	●	●	●	●	●
M3.1.B	●	●	●	●	●	○	●	●
M3.1.C	●	◑	◑	◑	●	◑	◑	◑
M3.1.D	●	●	◑	●	●	●	◑	●
M3.1.E	●	◑	○	◑	●	◑	○	◑
Transformations and functions	●	●	○	◑	○	●	○	○
M3.2.A	●	●	○	◑	◑	●	○	○
M3.2.B	●	●	○	●	●	●	○	◑
M3.2.C	●	●	○	◑	○	●	○	○
M3.2.D	●	◑	○	◑	○	◑	○	○
M3.2.E	○	●	○	◑	○	●	○	◑
Functions and modeling	◑	◑	○	◑	◑	◑	○	○
M3.3.A	●	◑	◑	●	●	◑	○	◑
M3.3.B	○	○	◑	○	○	○	○	○
M3.3.C	●	◑	◑	●	●	◑	○	◑
M3.3.D	○	○	○	○	○	○	○	○
M3.3.E	●	●	○	◑	●	●	○	◑
M3.3.F	●	◑	○	◑	●	○	○	○
M3.3.G	○	●	●	◑	○	○	●	○
Quantifying variability	◑	●	○	◑	◑	●	○	○
M3.4.A	●	●	●	●	●	●	○	●
M3.4.B	○	●	○	○	○	◑	○	○
Three-dimensional geometry	○	●	○	◑	○	◑	○	○
M3.5.A	○	○	●	○	○	○	●	○
M3.5.B	●	●	○	◑	○	●	○	◑
M3.5.C	○	○	○	○	○	○	○	○
M3.5.D	●	●	●	●	○	○	○	○
M3.5.E	○	●	●	◑	○	○	○	○
M3.5.F	○	●	○	○	○	●	○	○
Algebraic properties	●	○	○	○	◑	○	○	○
M3.6.A	◑	○	○	○	◑	○	○	○
M3.6.B	●	●	○	◑	○	○	○	○
M3.6.C	●	○	○	○	●	○	○	○
M3.6.D	●	◑	○	◑	●	◑	○	◑
Additional Key Content	◑	◑	○	◑	◑	○	○	○
M3.7.A	●	●	◑	●	●	○	◑	◑
M3.7.B	●	○	◑	○	○	○	◑	○
M3.7.C	●	●	○	◑	●	○	○	○
M3.7.D	○	●	○	○	○	○	○	○
Reasoning, Problem Solving, and Communication	●	●	●	●	●	●	●	●
M3.8.A	●	●	●	●	●	●	●	●
M3.8.B	●	●	●	●	●	●	●	●
M3.8.C	●	●	●	●	●	●	●	●
M3.8.D	●	●	●	●	●	●	●	●
M3.8.E	●	●	●	●	●	●	●	●
M3.8.F	●	●	●	●	●	●	●	●
M3.8.G	●	●	●	●	●	●	●	●
M3.8.H	●	●	●	●	●	●	●	●
Overall	●	●	○	◑	◑	◑	○	◑

3.3 Program Organization and Design

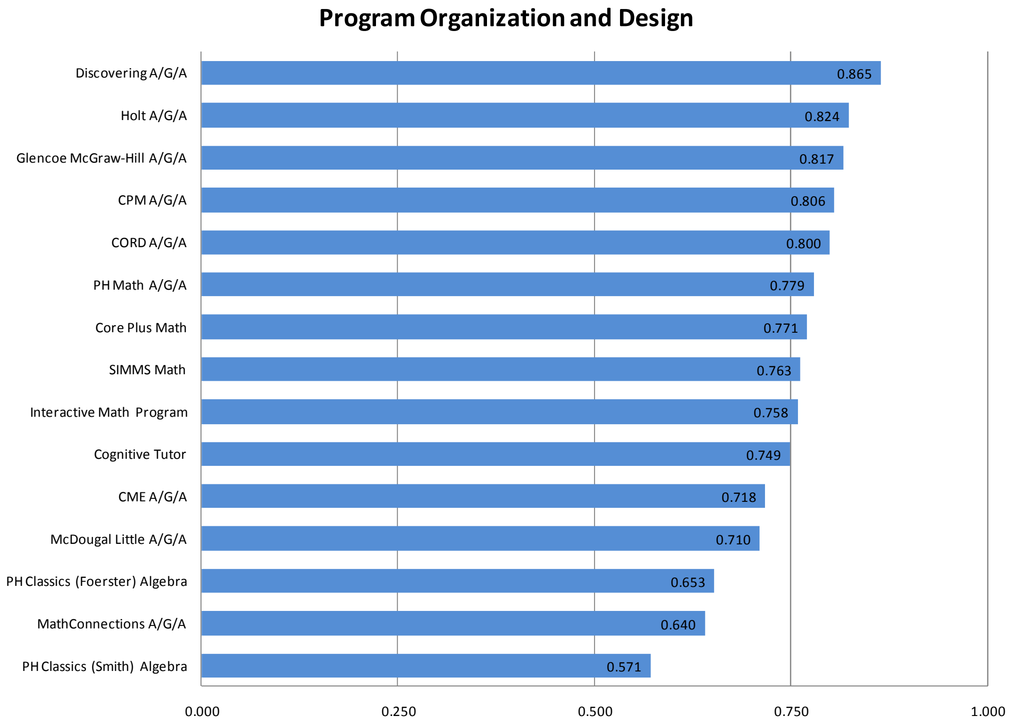


Figure 13. Publisher bundle rank order.

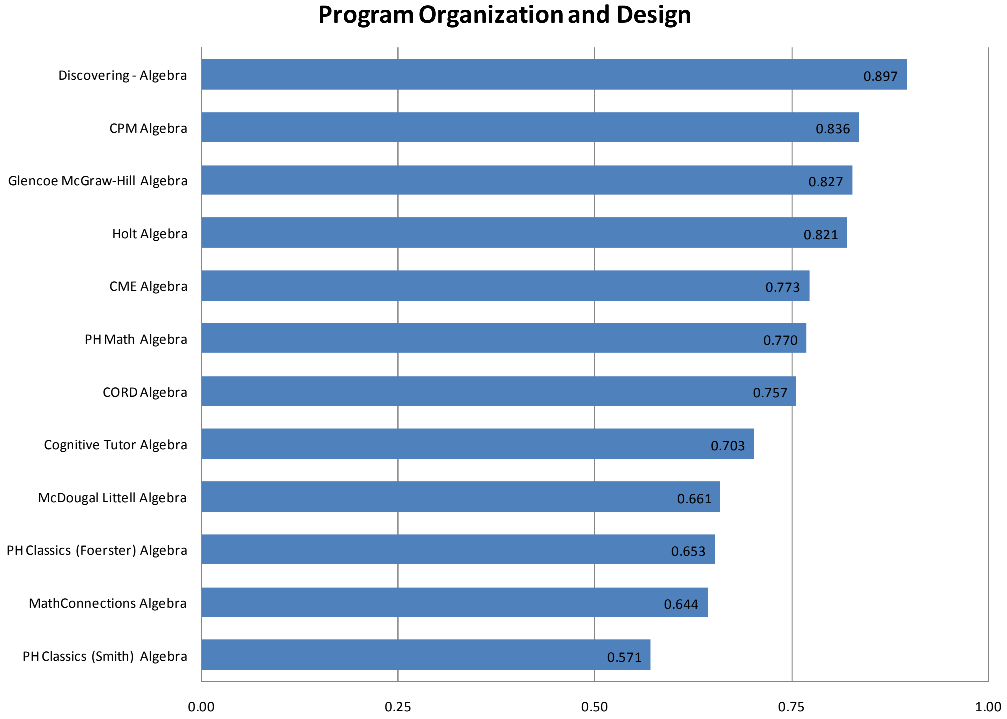


Figure 14. Algebra 1 and 2 series Program Organization and Design scale, in rank order.

Figure 15. Geometry -- Program Organization and Design scale, in rank order.

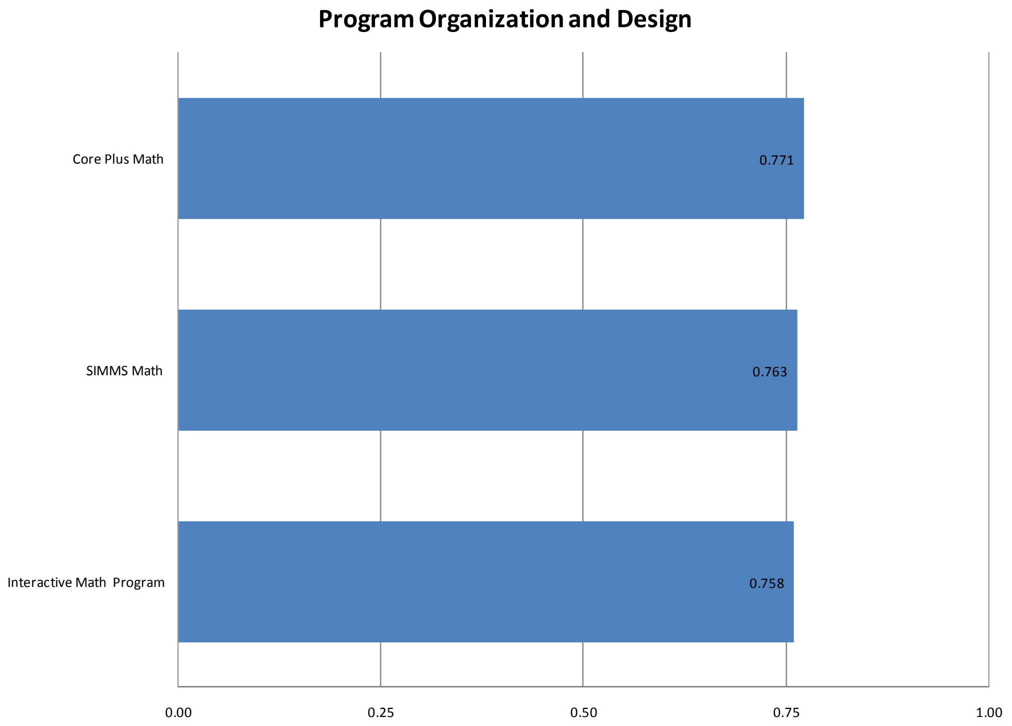


Figure 16. Integrated series Program Organization and Design scale, in rank order.

3.4 Balance of Student Experience

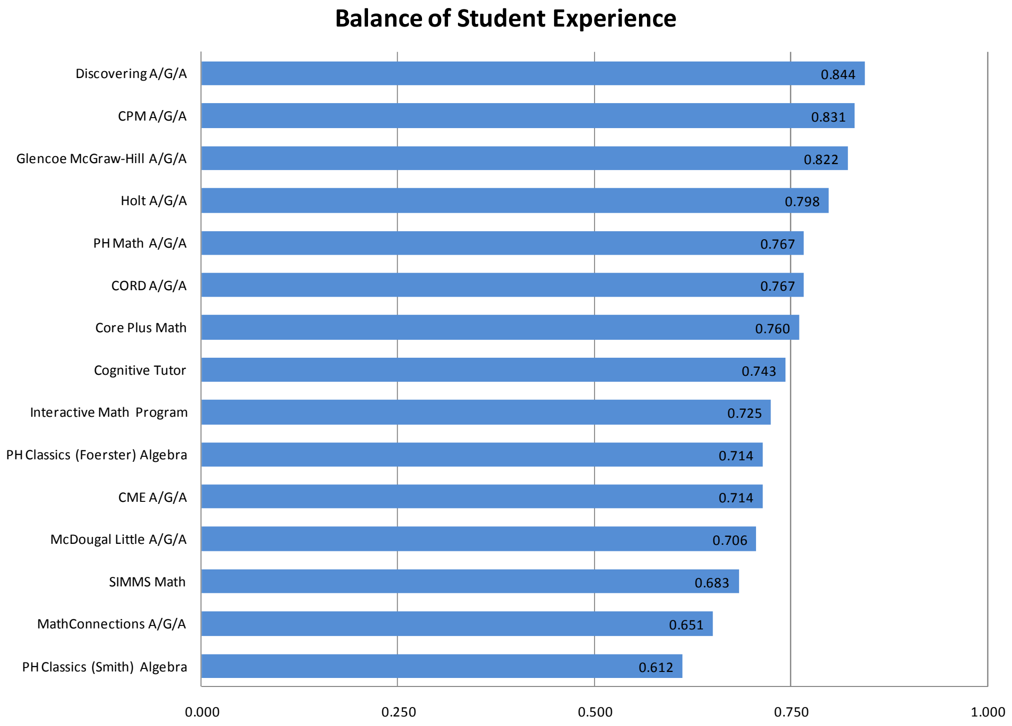


Figure 17. Publisher bundle rank order.

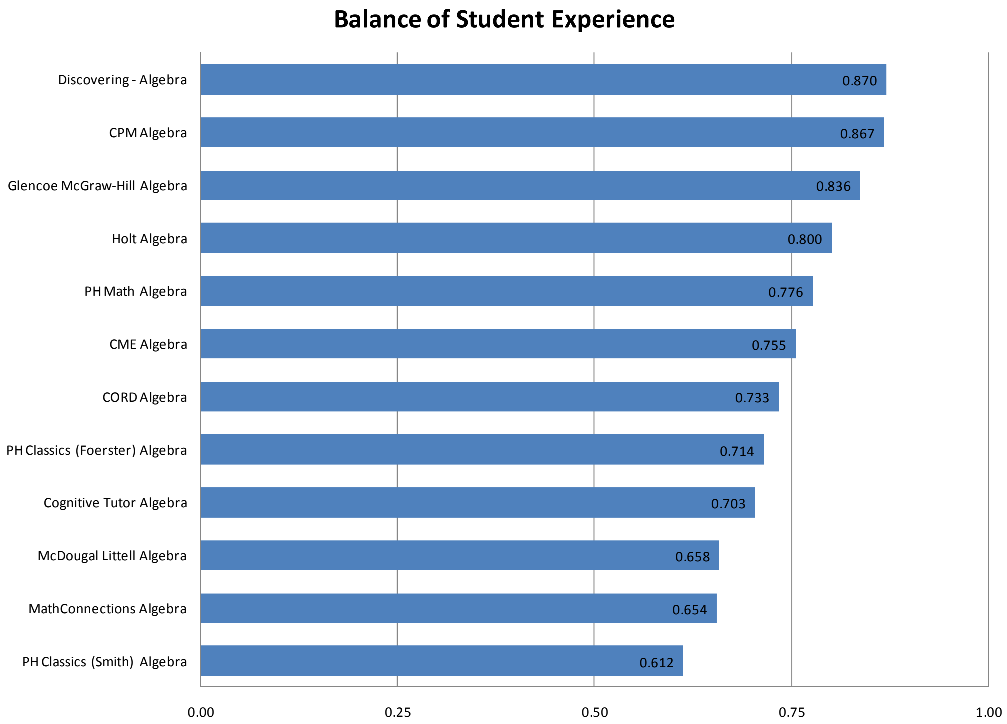


Figure 18. Balance of Student Experience scale for Algebra 1 and 2 series, in rank order.

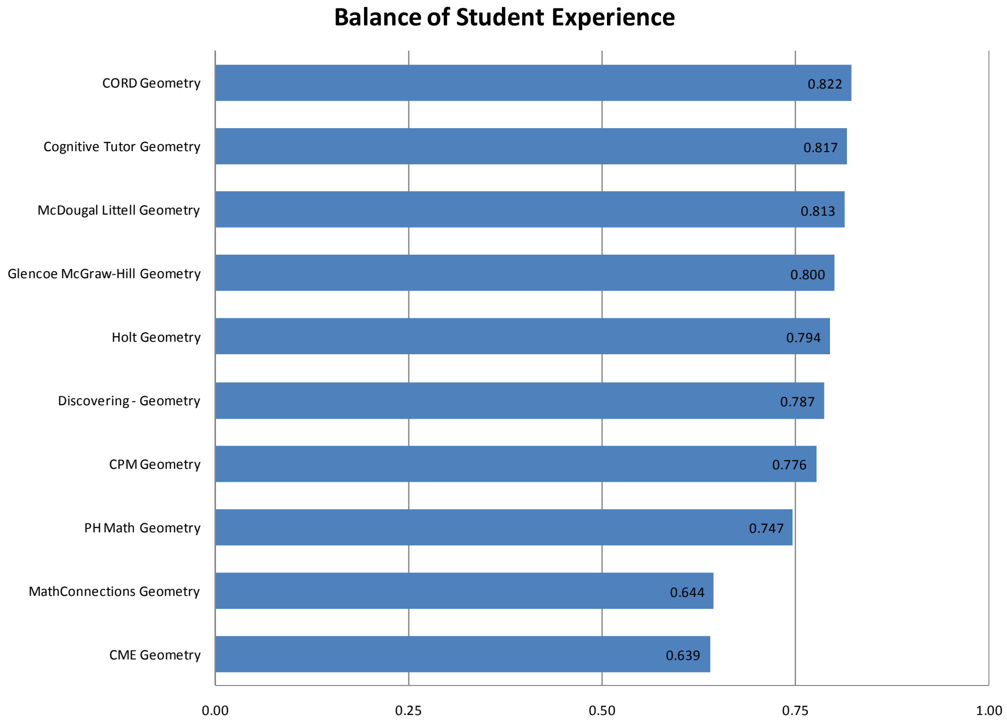


Figure 19. Balance of Student Experience scale for Geometry programs, in rank order.

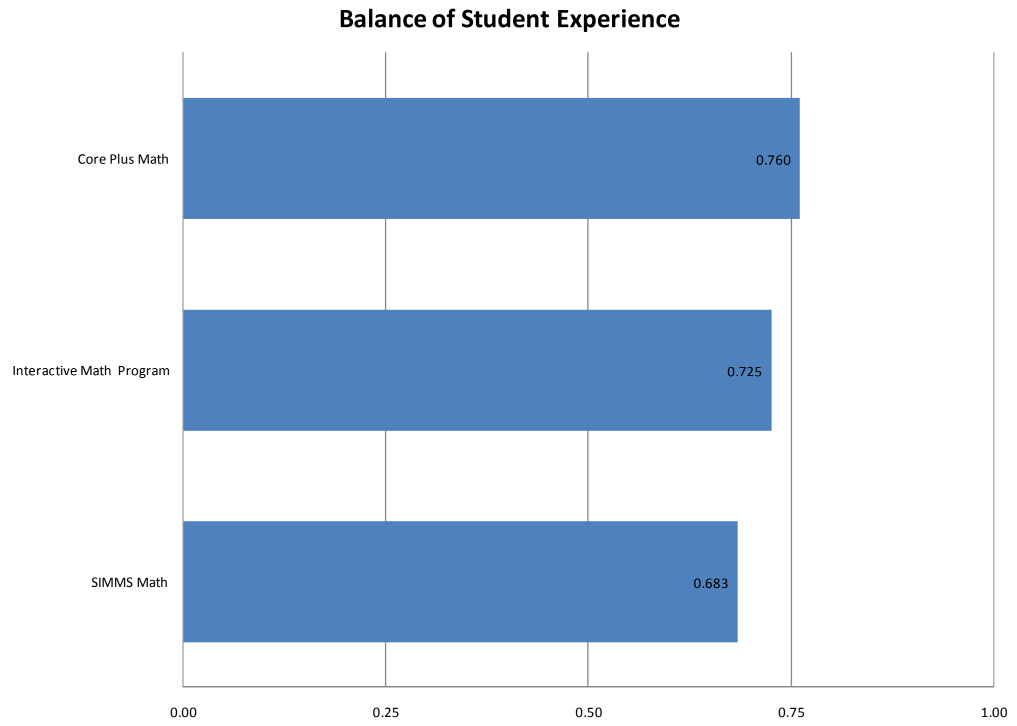


Figure 20. Balance of Student Experience scale for Integrated programs, in rank order.

3.5 Assessment

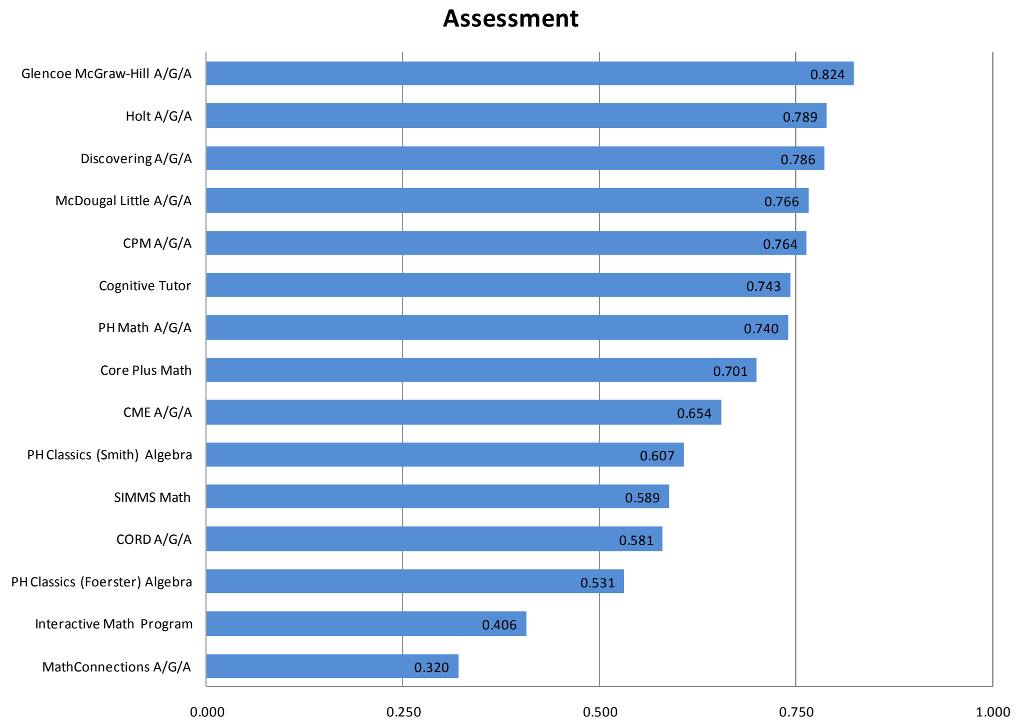


Figure 21. Publisher bundle rank order.

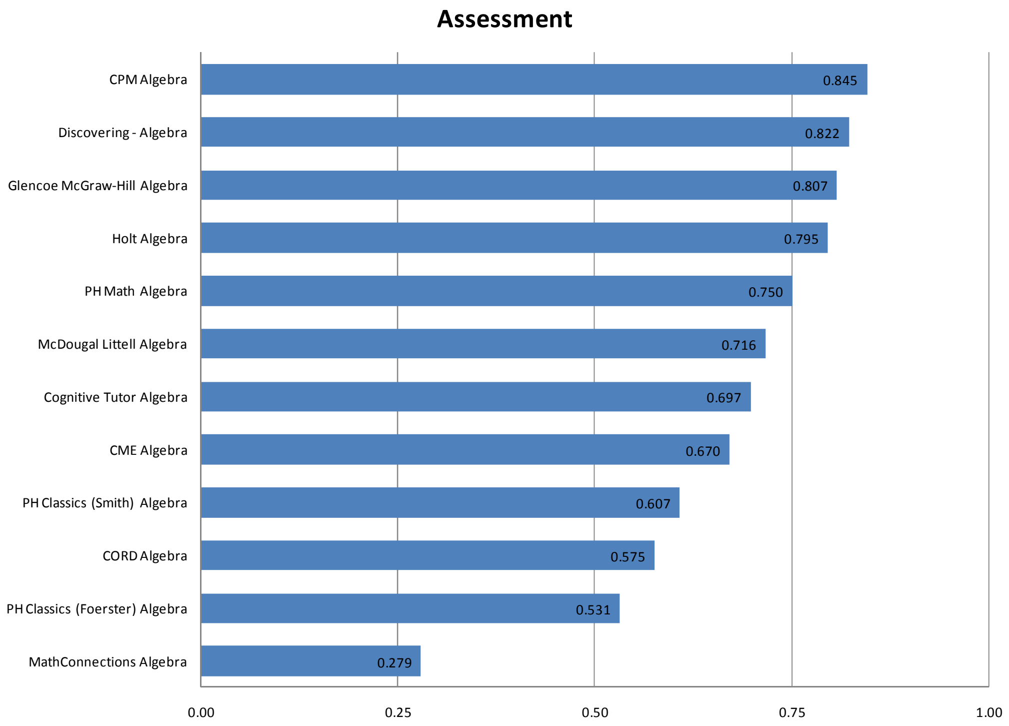


Figure 22. Assessment scale for Algebra 1 and 2 series, in rank order.

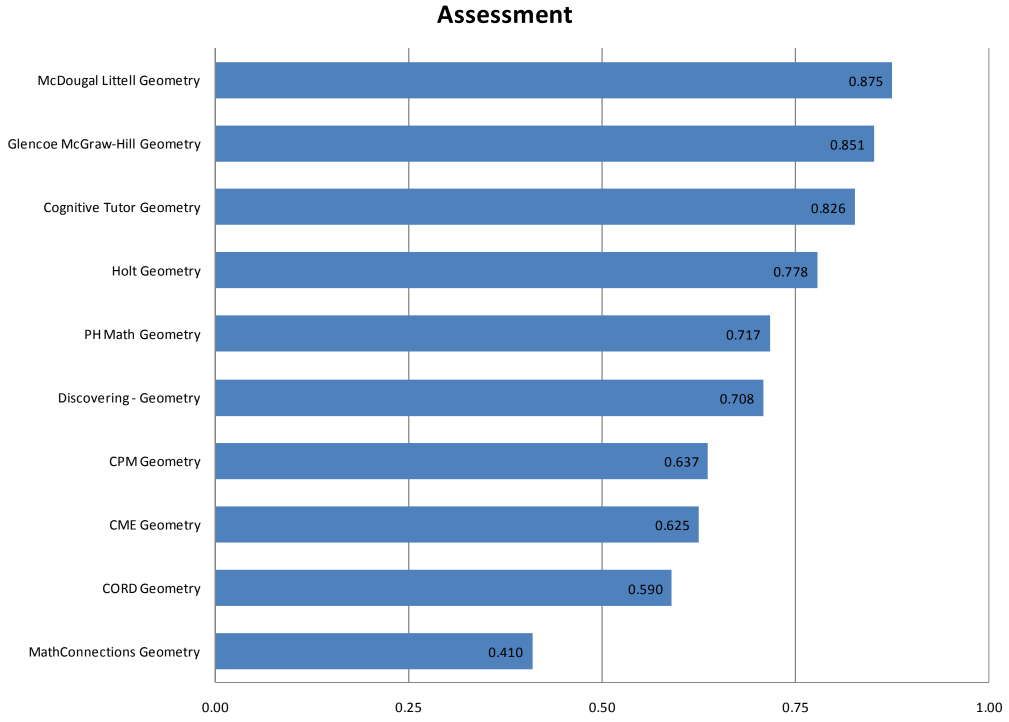


Figure 23. Assessment scale for Geometry programs, in rank order.

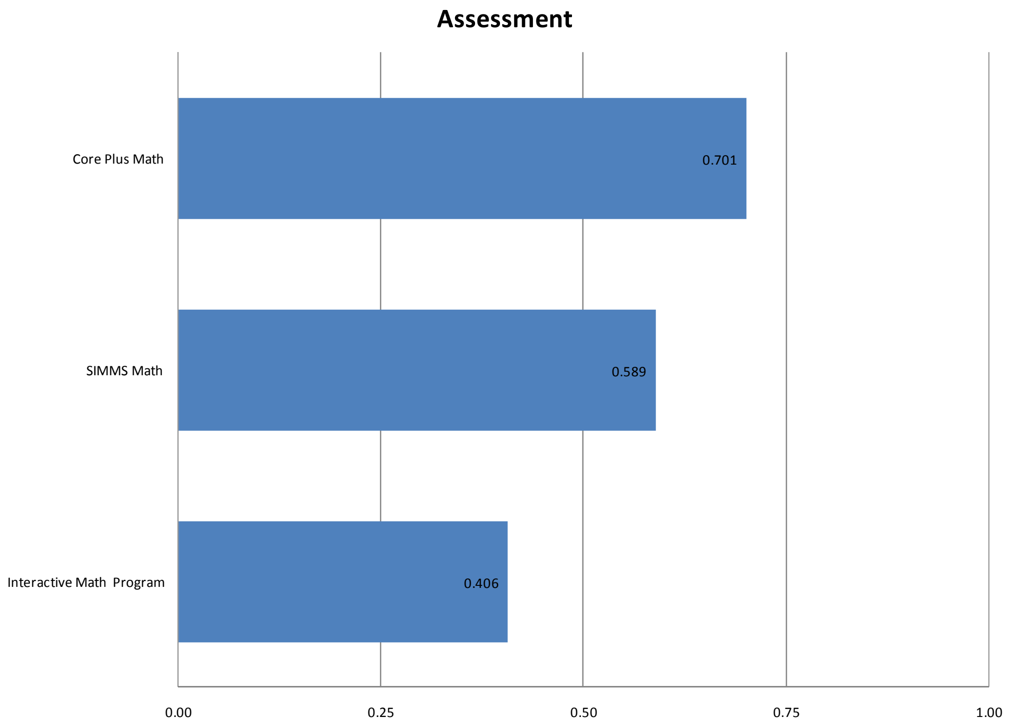


Figure 24. Assessment scale for Integrated programs, in rank order.

3.6 Instructional Planning and Professional Support

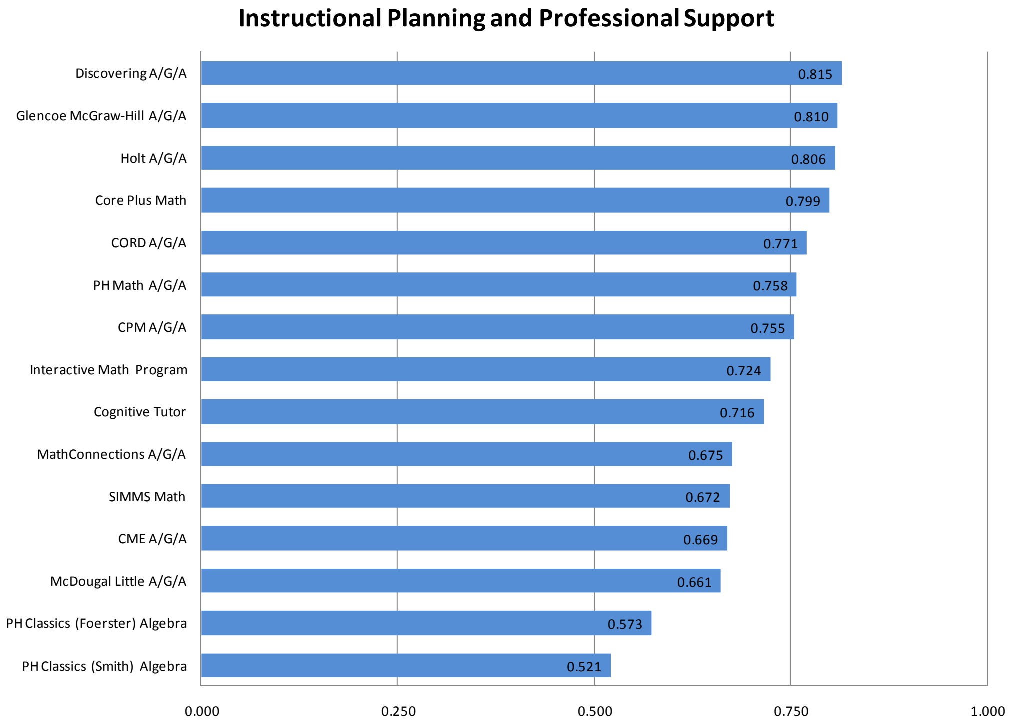


Figure 25. Publisher bundle rank order.

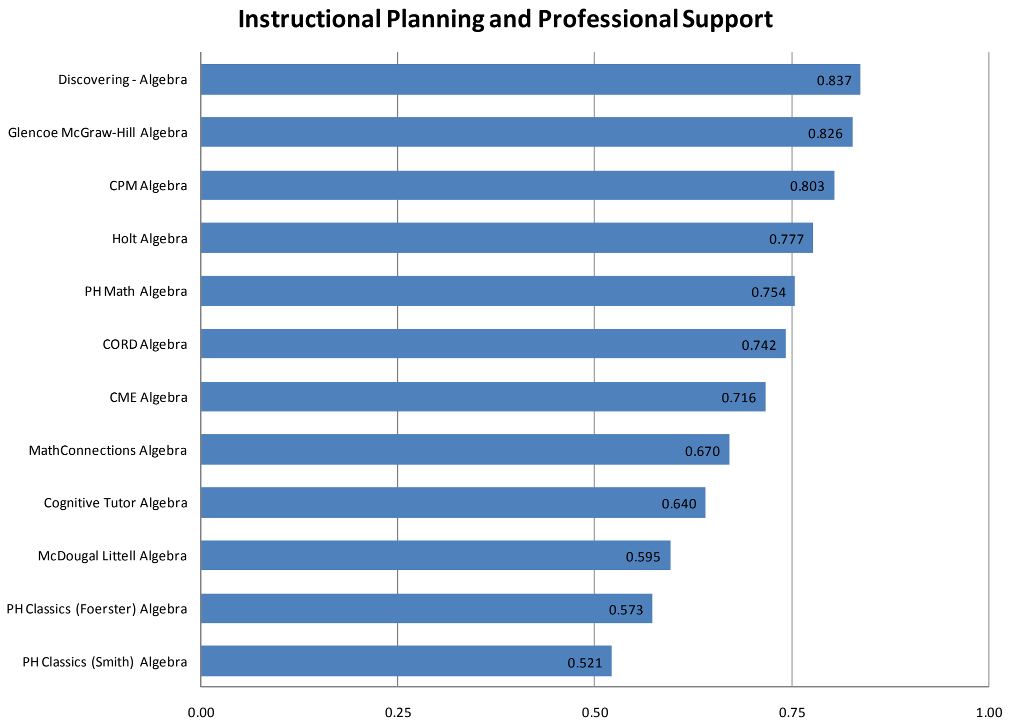


Figure 26. Instructional Planning and Professional Support scale for Algebra 1 and 2 series, in rank order.

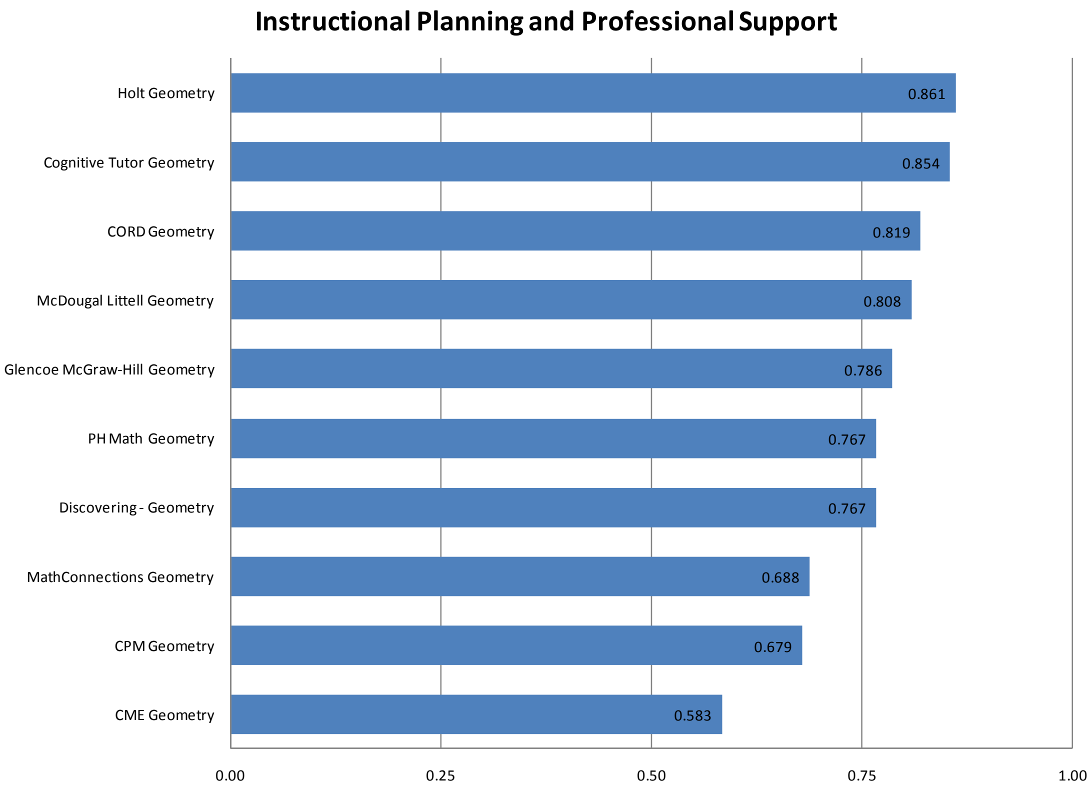


Figure 27. Instructional Planning and Professional Support scale for Geometry programs, in rank order.

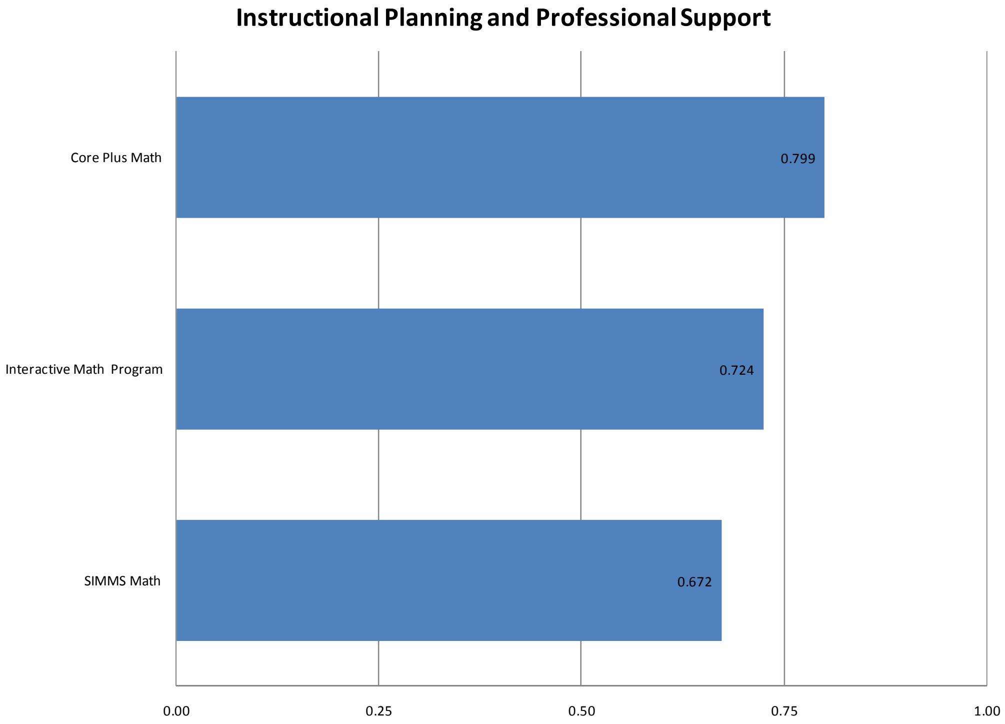


Figure 28. Instructional Planning and Professional Support scale for Integrated programs, in rank order.

3.7 Equity and Access

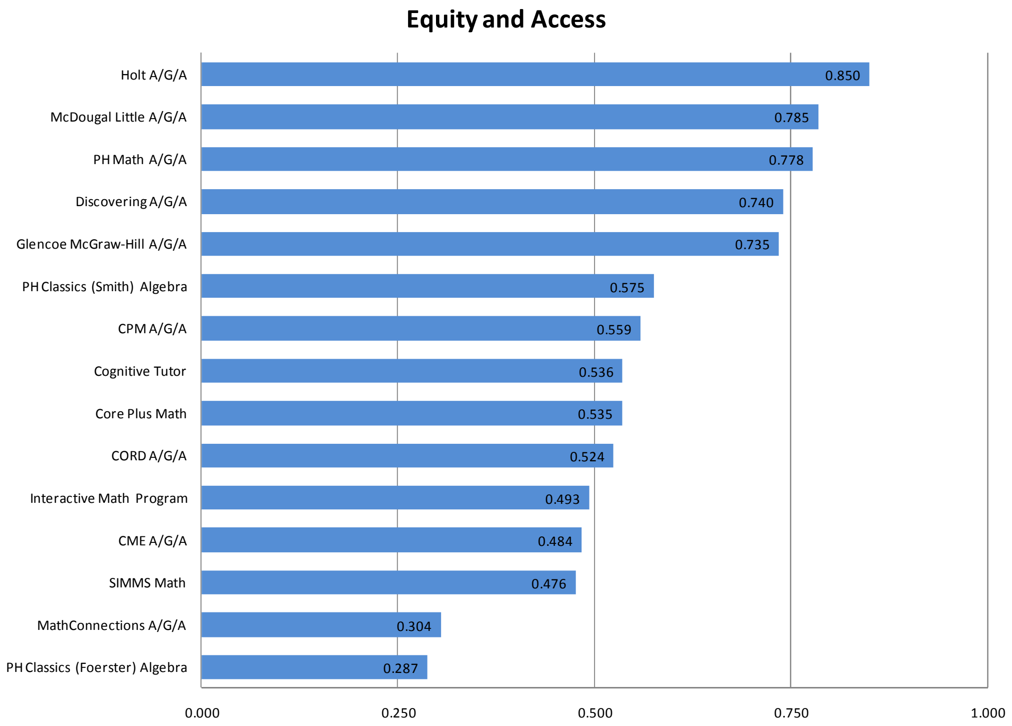


Figure 29. Publisher bundle rank order.

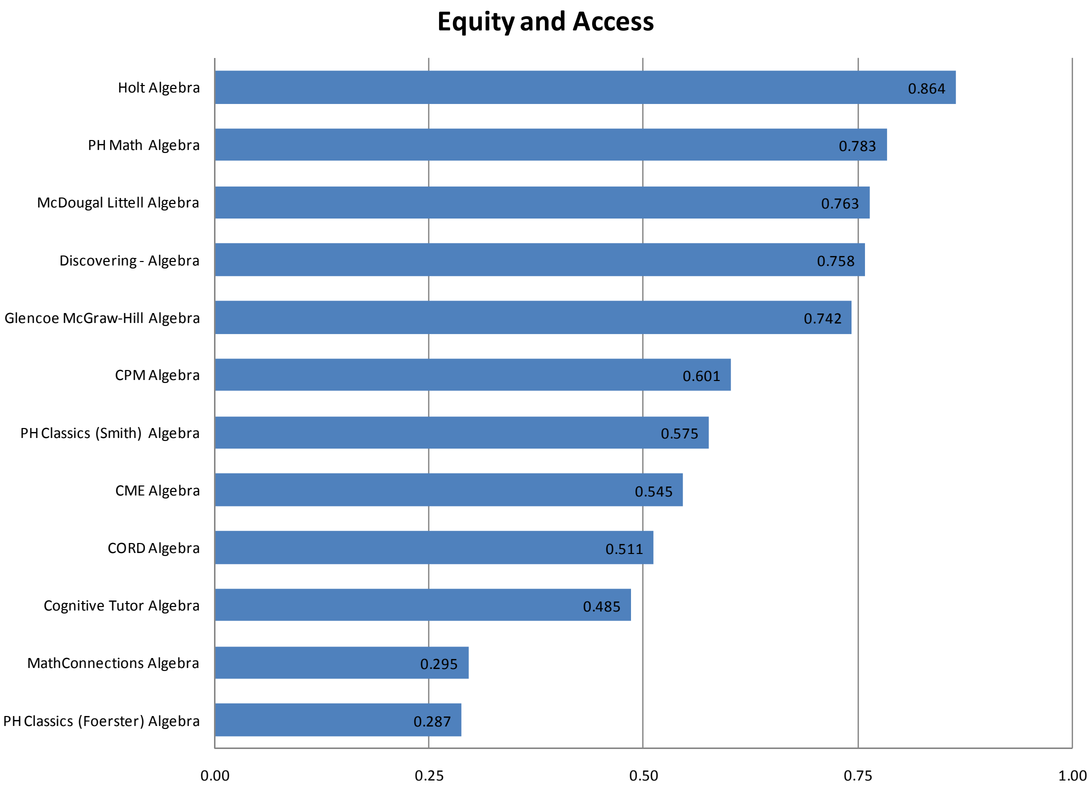


Figure 30. Equity and Access scale results for Algebra 1 and 2 series, in rank order.

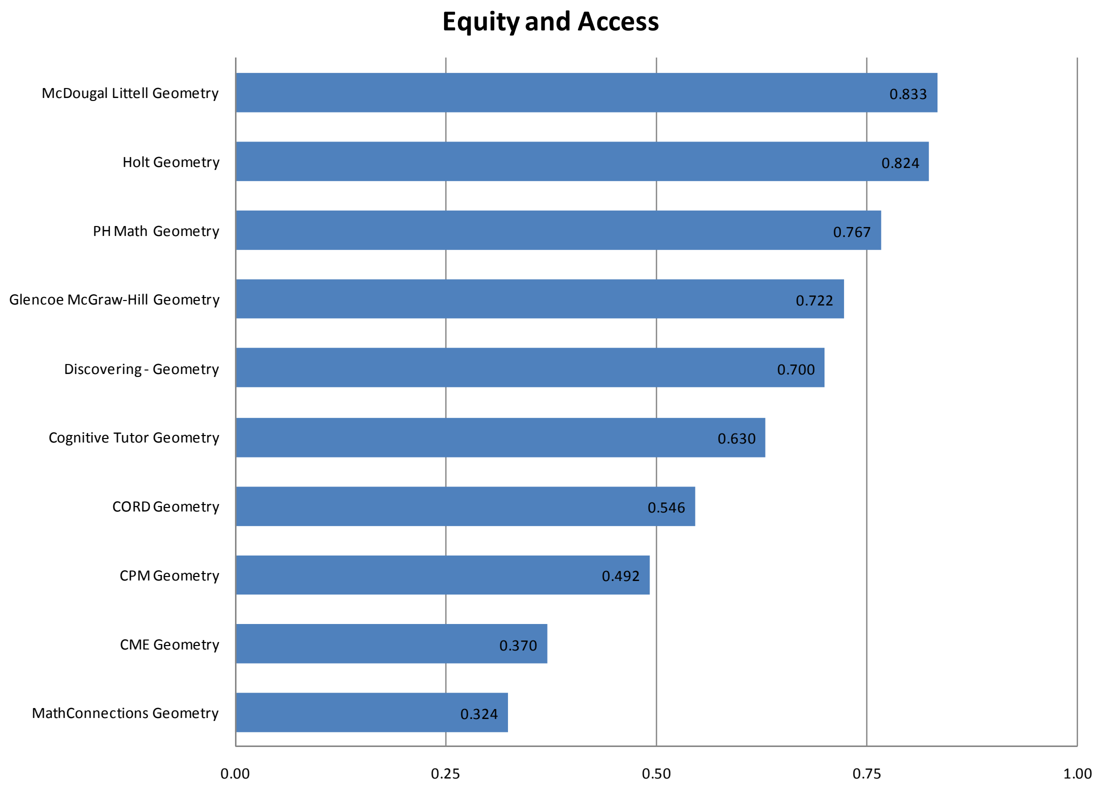


Figure 31. Equity and Access scale results for Geometry programs, in rank order.

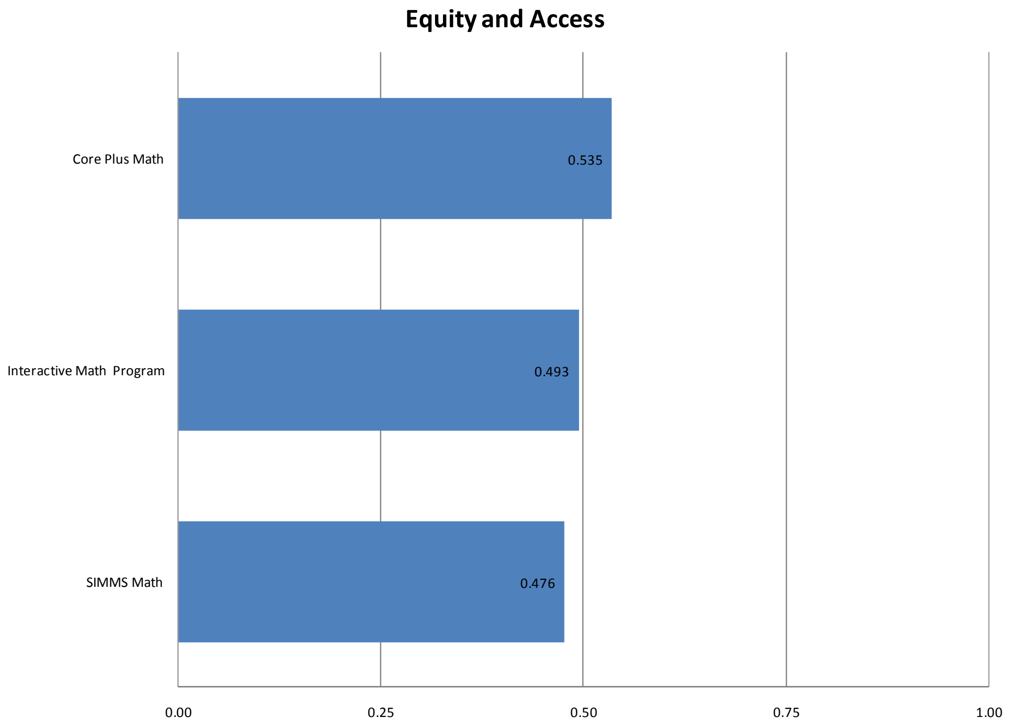
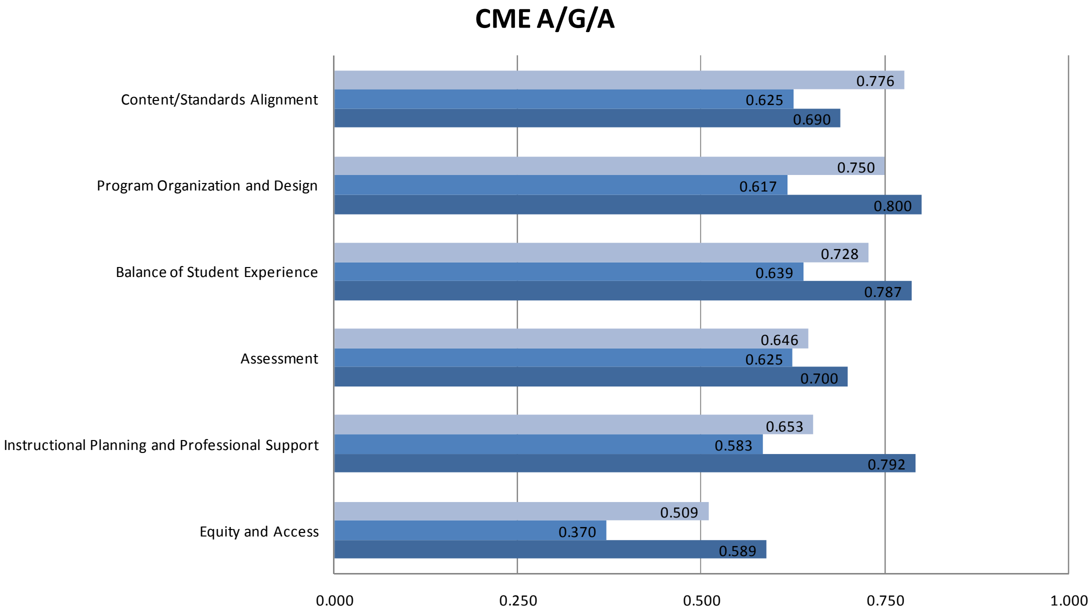


Figure 32. Equity and Access scale results for Integrated programs, in rank order.

3.8 Results of Individual Publisher Series

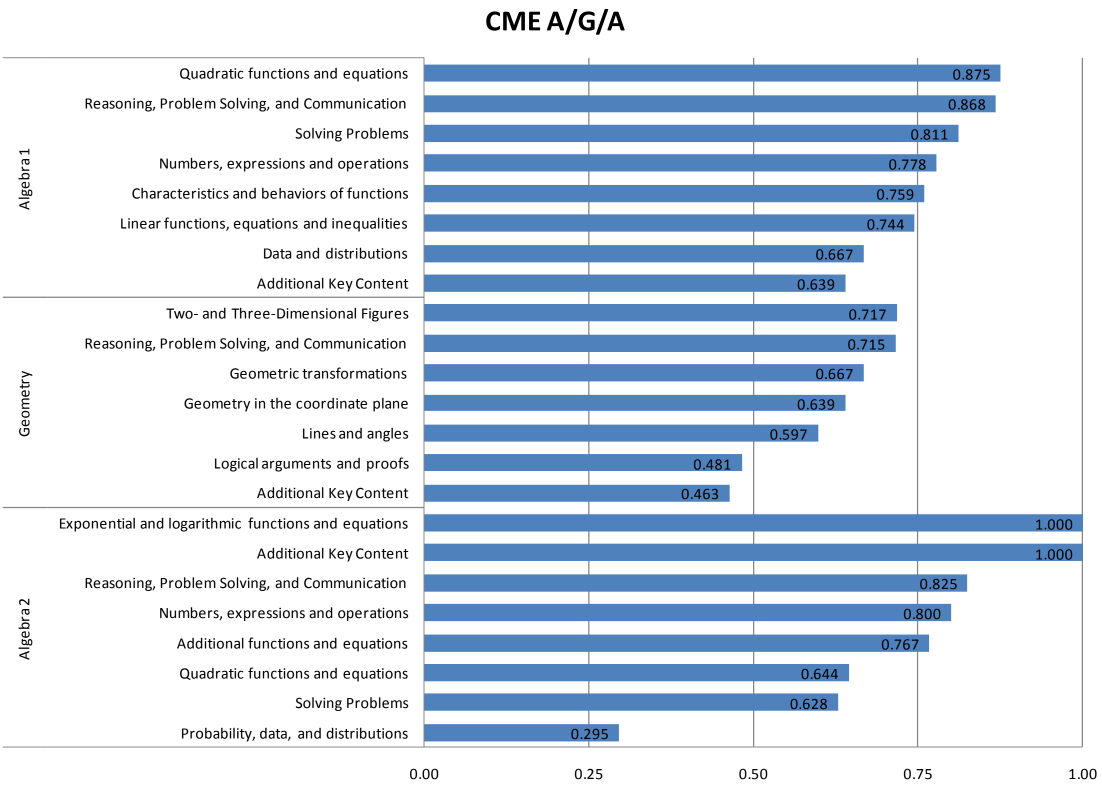
This section presents individual graphs and narrative that describe how the particular publisher series did in the review process. It includes scaled values for each scale, for all courses submitted for review. Note that this section includes results from all programs presented alphabetically.

3.8.1 CME (A/G/A)



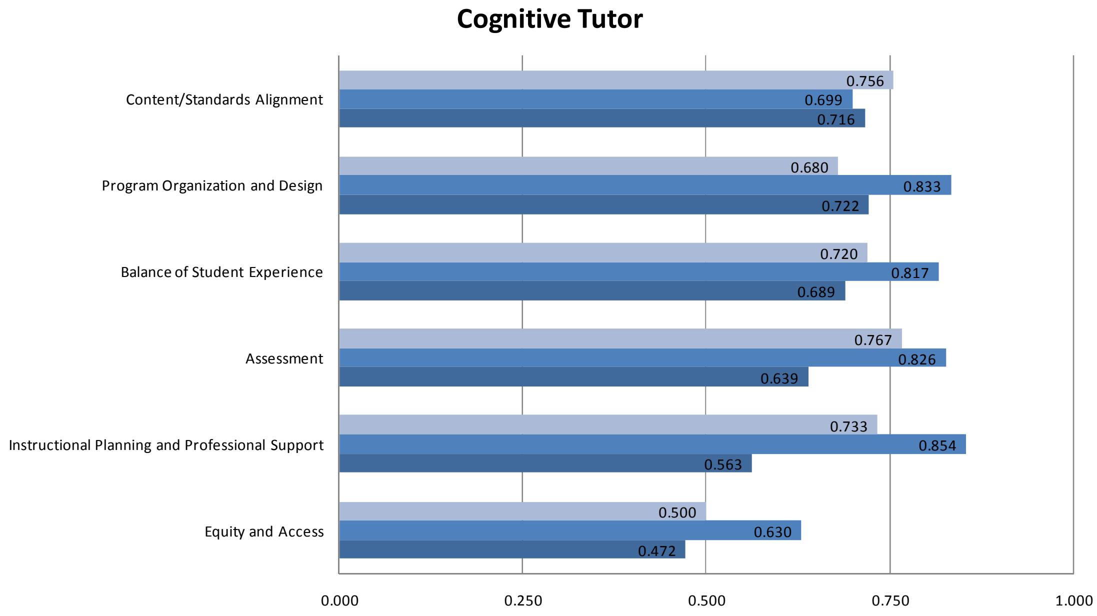
	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
■ Algebra 1	0.509	0.653	0.646	0.728	0.750	0.776
■ Geometry	0.370	0.583	0.625	0.639	0.617	0.625
■ Algebra 2	0.589	0.792	0.700	0.787	0.800	0.690

This graph and chart combination shows each of the scales on the vertical axis, and displays the scaled average score for each course on the horizontal axis. The intent is to see a complete picture of how the program performed at all course levels and all scales.

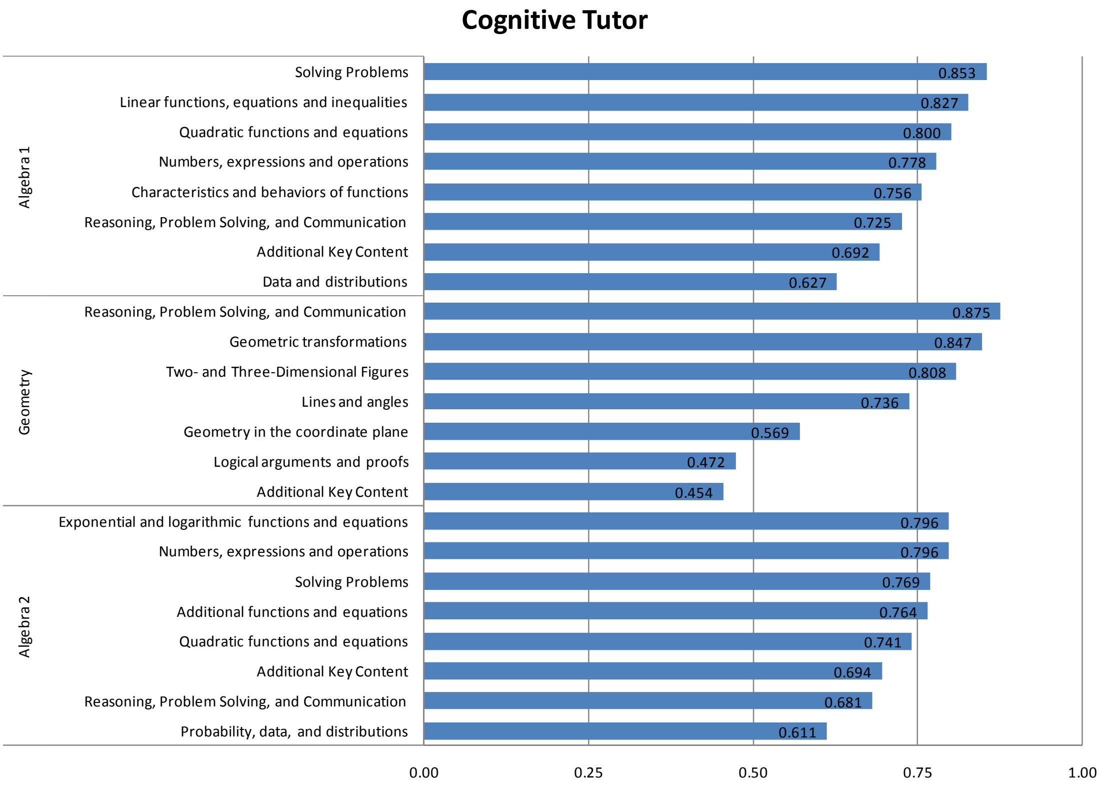


This graph shows the Core Content Areas of the 2008 Revised Washington Standards, organized by course for the program CME. Within each course, the core content areas are organized by average score, from highest to lowest. This graph gives school districts valuable information on broad categories of areas where the series does well, or where it might need to be supplemented.

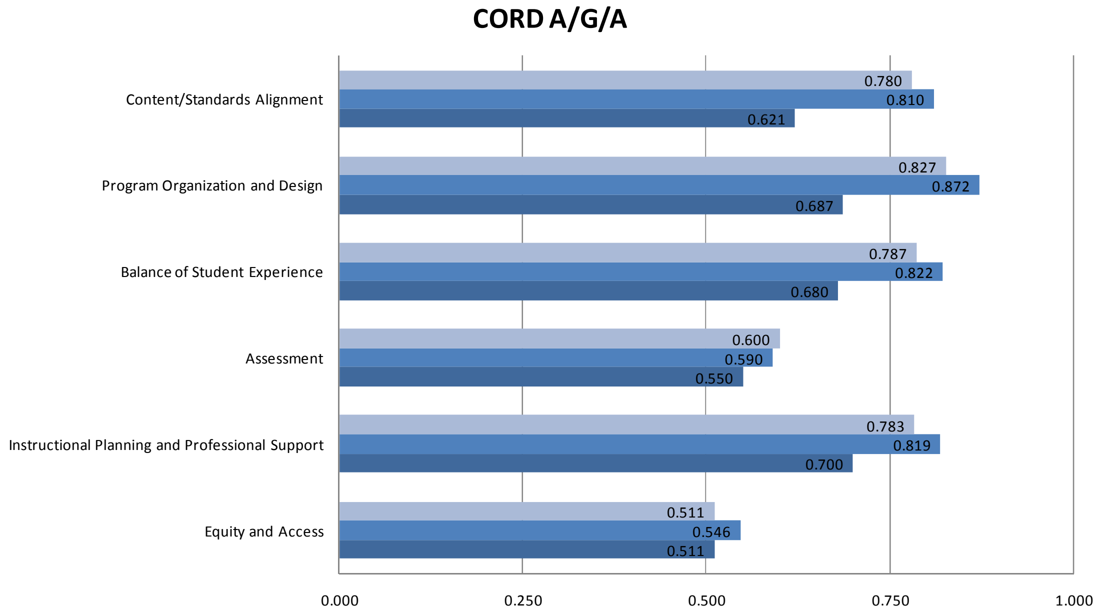
3.8.2 Cognitive Tutor (A/G/A)



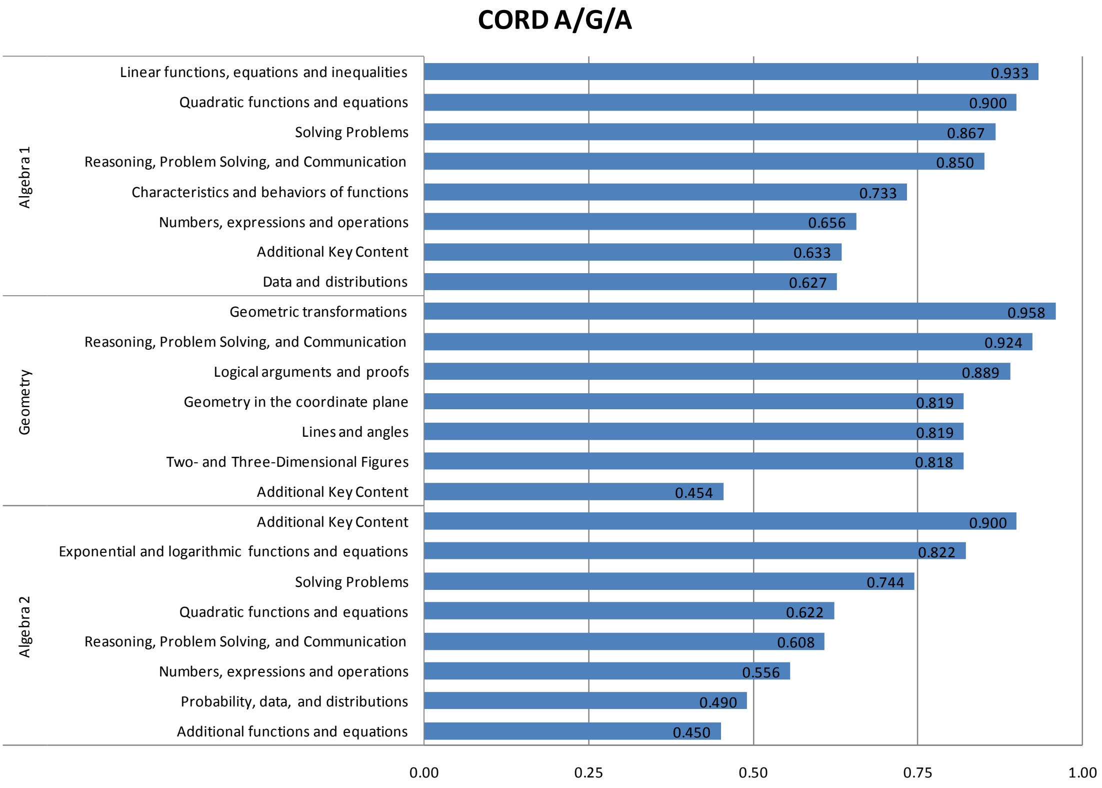
	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
■ Algebra 1	0.500	0.733	0.767	0.720	0.680	0.756
■ Geometry	0.630	0.854	0.826	0.817	0.833	0.699
■ Algebra 2	0.472	0.563	0.639	0.689	0.722	0.716



3.8.3 CORD (A/G/A)

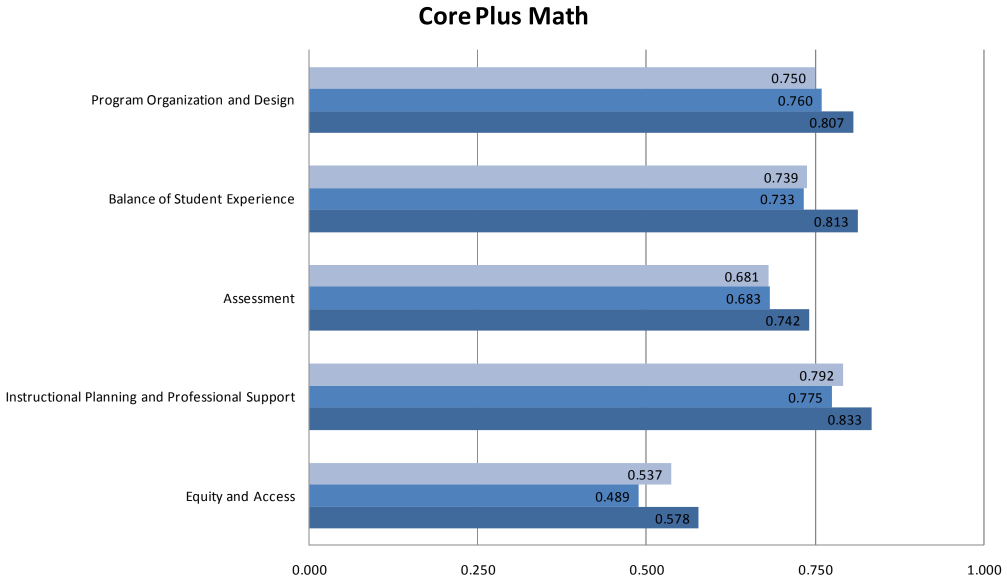


	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
▨ Algebra 1	0.511	0.783	0.600	0.787	0.827	0.780
▨ Geometry	0.546	0.819	0.590	0.822	0.872	0.810
▨ Algebra 2	0.511	0.700	0.550	0.680	0.687	0.621



3.8.4 Core Plus Math (Integrated)

Graphs for the integrated programs are presented differently. Figure 33 shows the results for the Core Plus Math series by scale. Content/Standards Alignment scale results are presented in Figure 34, and reflect treating the product as individual courses and as a series as a whole. This is shown both ways because almost 30% of the time, the integrated texts reviewed met the standards in a course above or below the expected level. One explanation for the high percentage of grade dips may be the placement of the integrated standards in Math 1, 2 and 3. Figure 35 and Figure 36 show core content area results, for individual courses and the series as a whole. All three integrated programs reviewed show results in both formats.



	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design
▨ Math 1	0.537	0.792	0.681	0.739	0.750
▨ Math 2	0.489	0.775	0.683	0.733	0.760
▨ Math 3	0.578	0.833	0.742	0.813	0.807

Figure 33. This graph shows all scales except for content/standards alignment for Math 1, 2 and 3 for Core Plus Math.

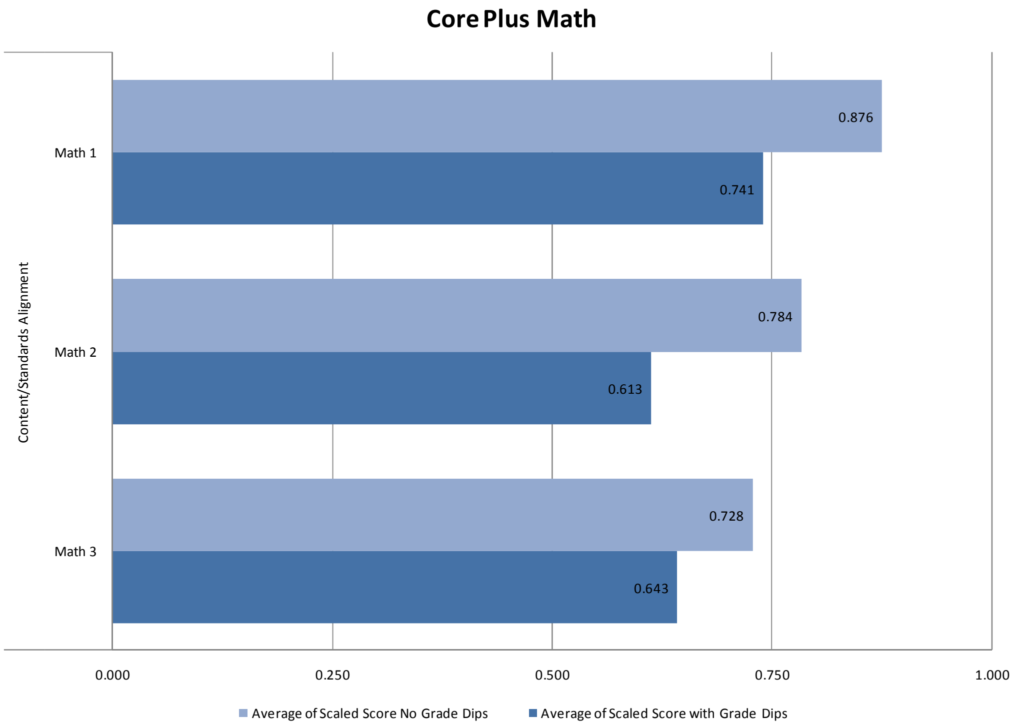


Figure 34. Content/Standards Alignment scale results for the series as a whole (light blue) and for individual courses (dark blue) for Core Plus Math Integrated series.

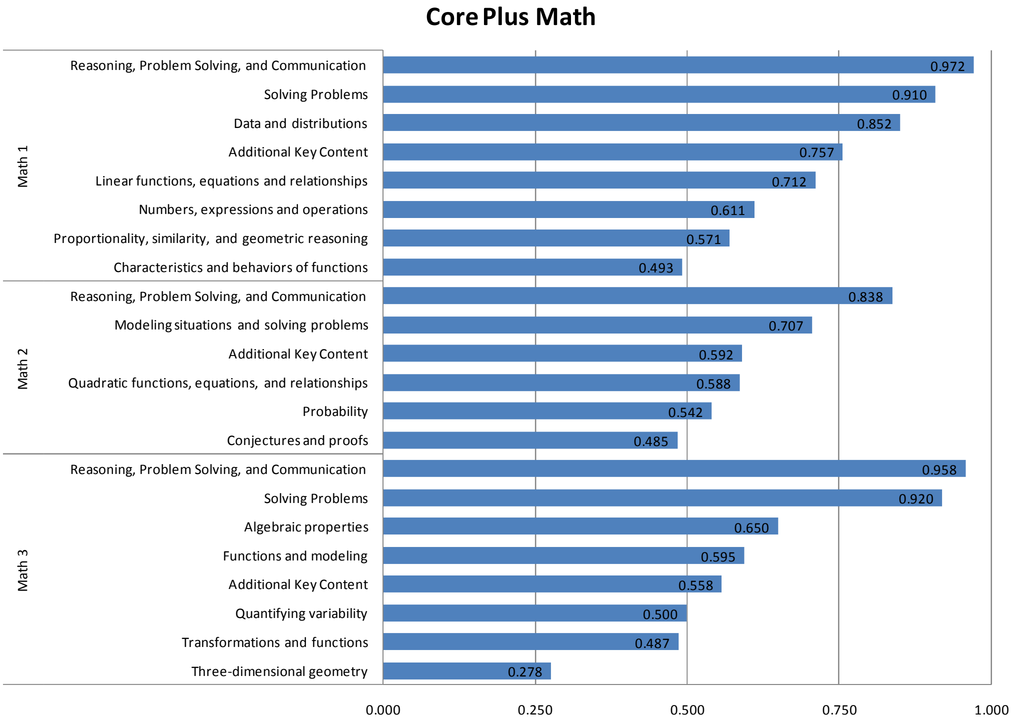


Figure 35. Core Content Area results for individual courses.

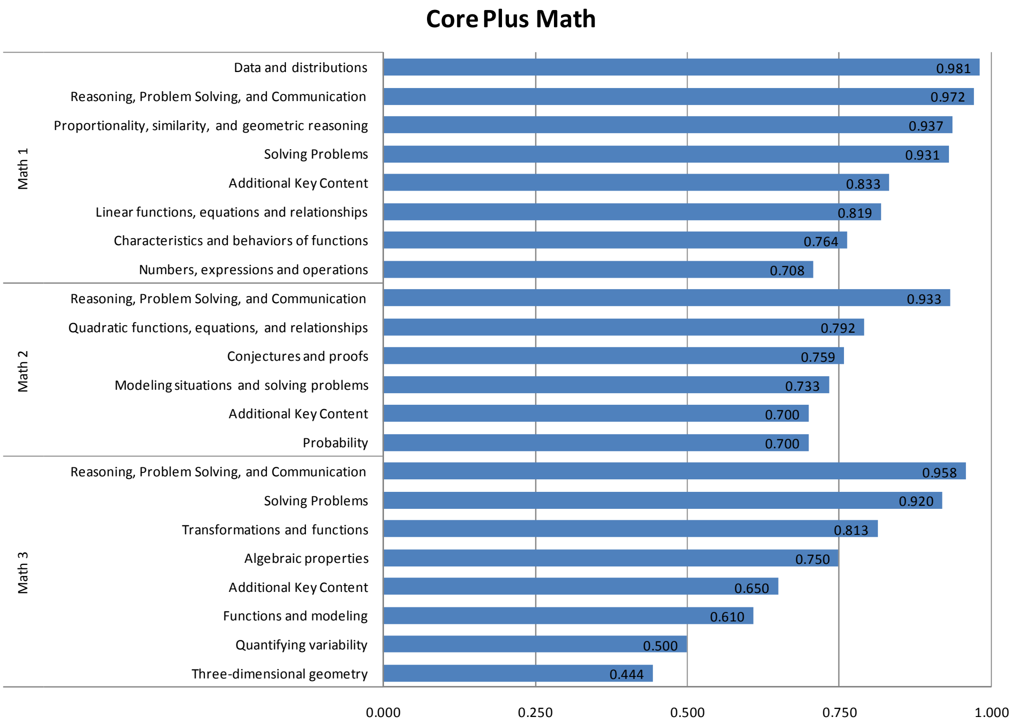
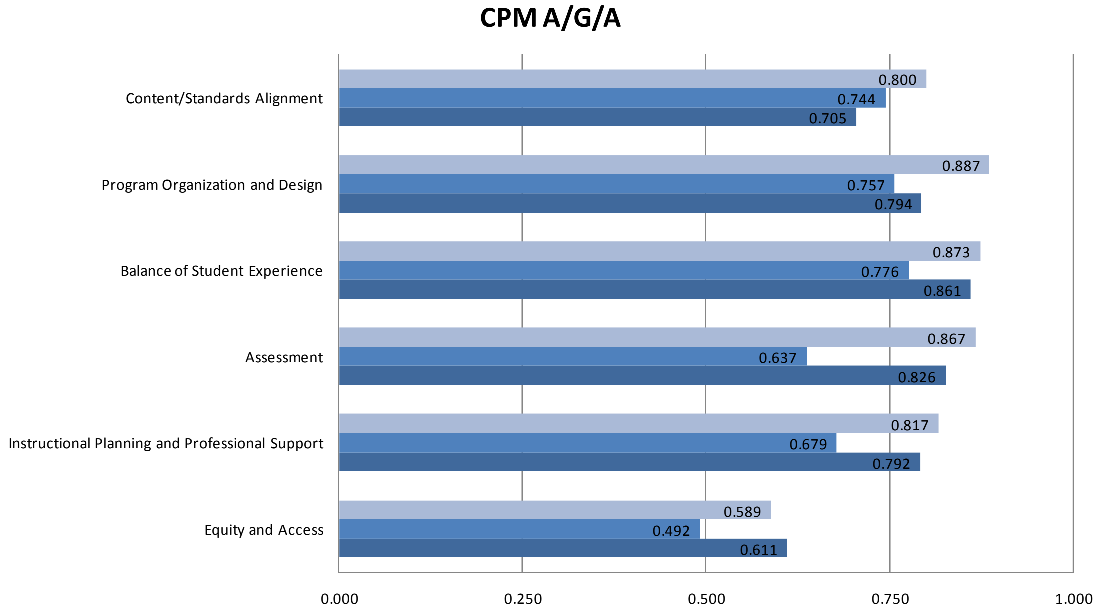
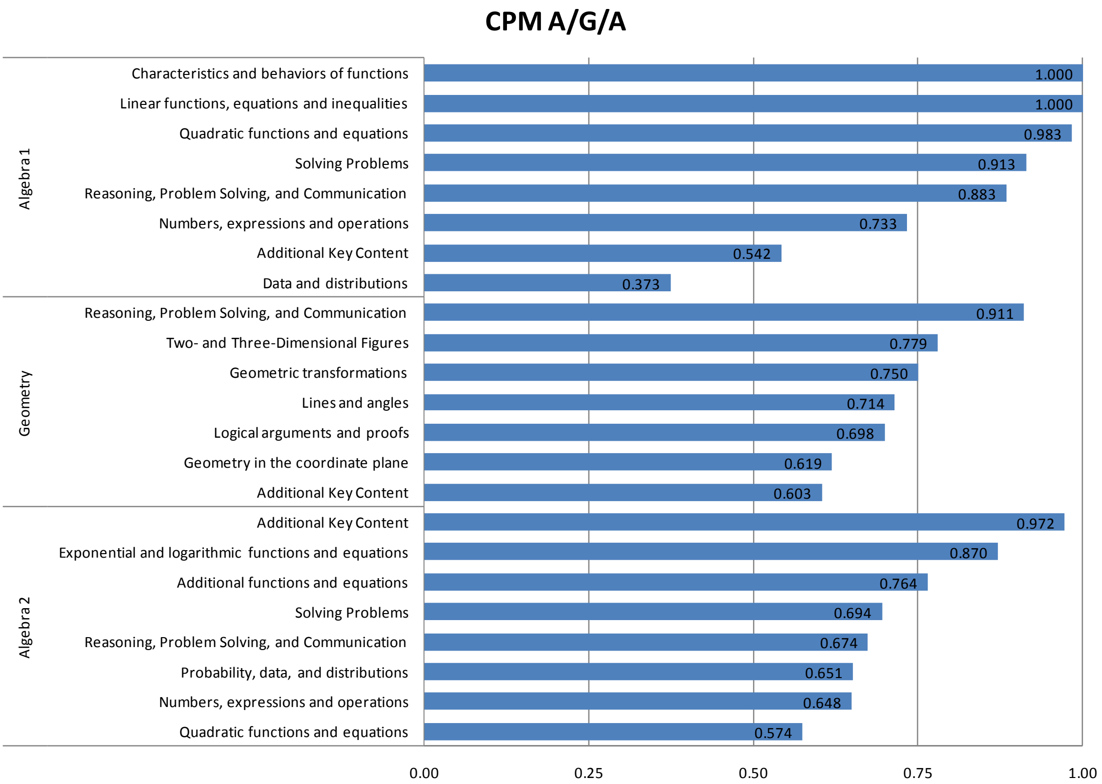


Figure 36. Core Content Area results for the series as a whole.

3.8.5 CPM (A/G/A)



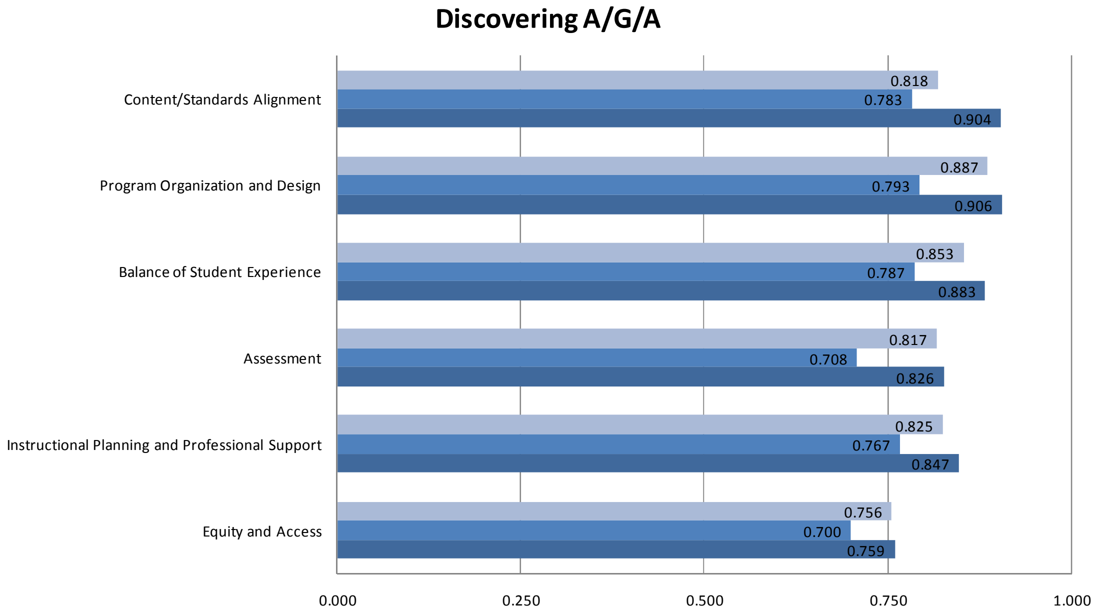
	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
▨ Algebra 1	0.589	0.817	0.867	0.873	0.887	0.800
▨ Geometry	0.492	0.679	0.637	0.776	0.757	0.744
▨ Algebra 2	0.611	0.792	0.826	0.861	0.794	0.705



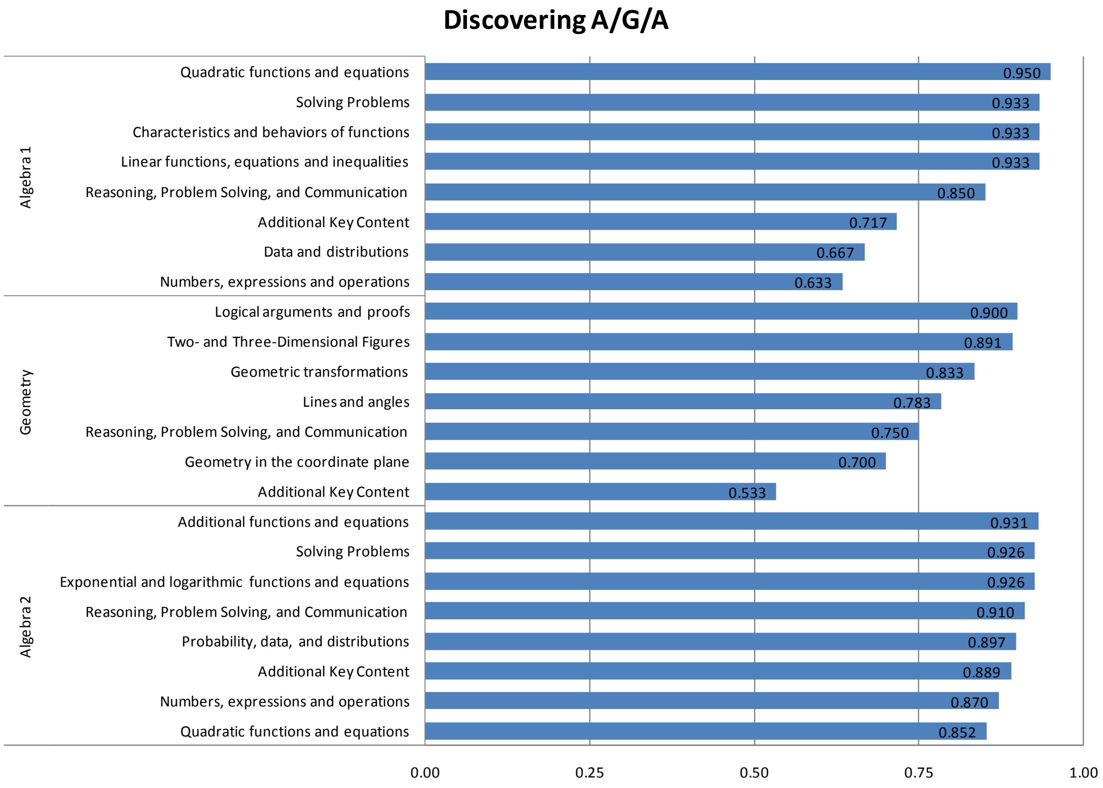
CPM A/G/A

Algebra 1
Characteristics and behaviors of functions 1.000
Linear functions, equations and inequalities 1.000
Quadratic functions and equations 0.983
Solving Problems 0.913
Reasoning, Problem Solving, and Communication 0.883
Numbers, expressions and operations 0.733
Additional Key Content 0.542
Data and distributions 0.373
Geometry
Reasoning, Problem Solving, and Communication 0.911
Two- and Three-Dimensional Figures 0.779
Geometric transformations 0.750
Lines and angles 0.714
Logical arguments and proofs 0.698
Geometry in the coordinate plane 0.619
Additional Key Content 0.603
Algebra 2
Additional Key Content 0.972
Exponential and logarithmic functions and equations 0.870
Additional functions and equations 0.764
Solving Problems 0.694
Reasoning, Problem Solving, and Communication 0.674
Probability, data, and distributions 0.651
Numbers, expressions and operations 0.648
Quadratic functions and equations 0.574
0.00
0.25
0.50
0.75
1.00

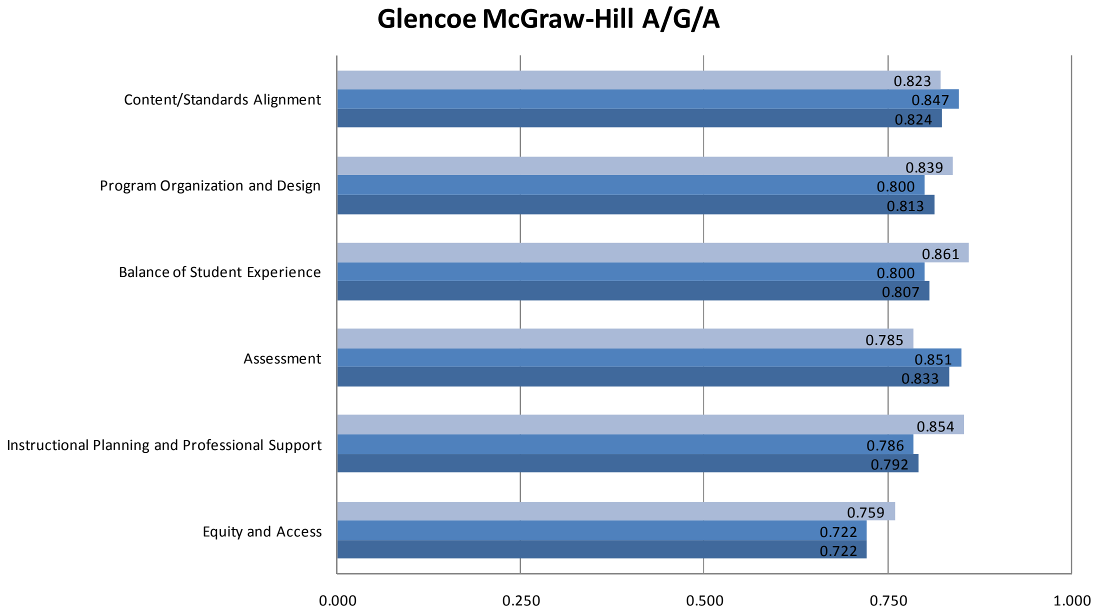
3.8.6 Discovering (A/G/A)



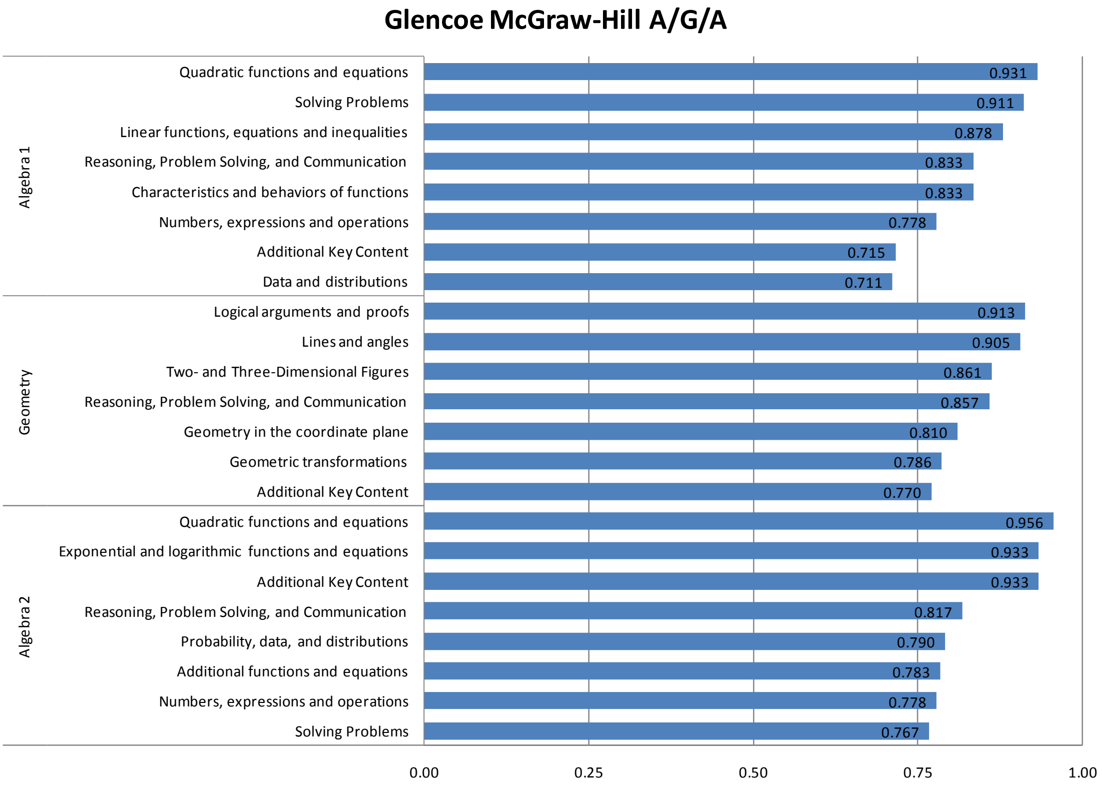
	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
■ Algebra 1	0.756	0.825	0.817	0.853	0.887	0.818
■ Geometry	0.700	0.767	0.708	0.787	0.793	0.783
■ Algebra 2	0.759	0.847	0.826	0.883	0.906	0.904



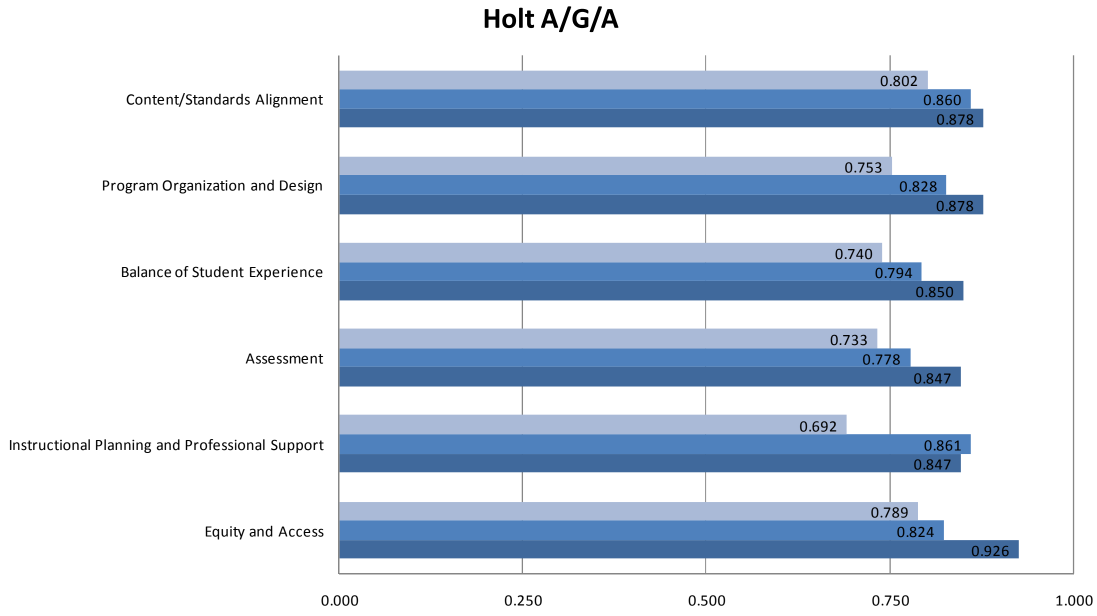
3.8.7 Glencoe McGraw-Hill (A/G/A)



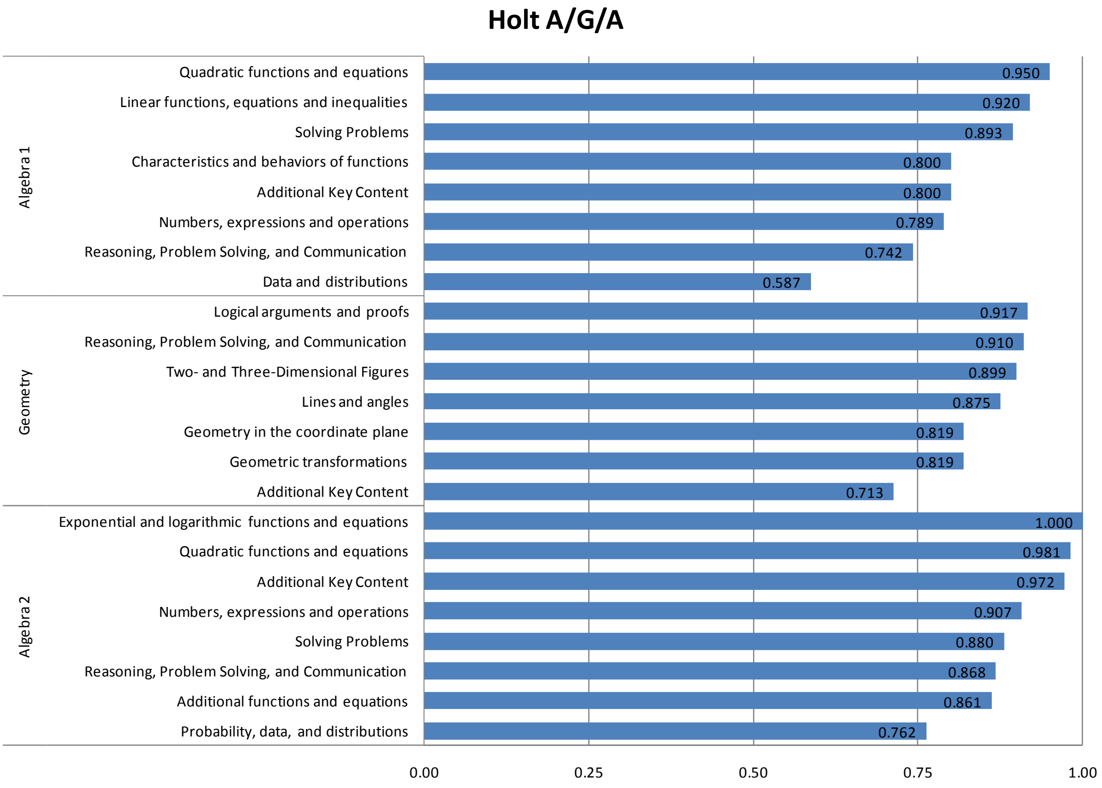
	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
Algebra 1	0.759	0.854	0.785	0.861	0.839	0.823
Geometry	0.722	0.786	0.851	0.800	0.800	0.847
Algebra 2	0.722	0.792	0.833	0.807	0.813	0.824



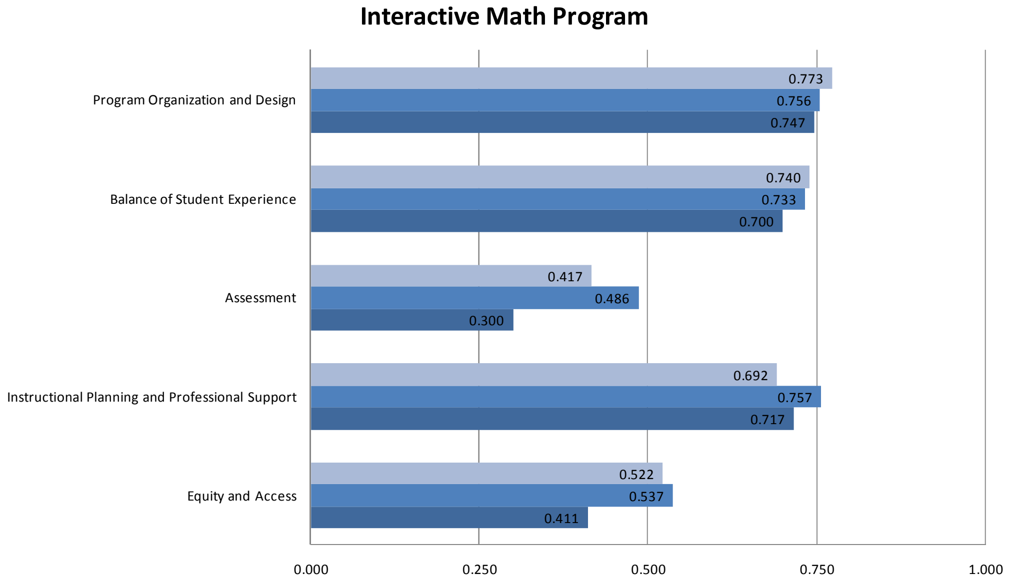
3.8.8 Holt (A/G/A)



	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
■ Algebra 1	0.789	0.692	0.733	0.740	0.753	0.802
■ Geometry	0.824	0.861	0.778	0.794	0.828	0.860
■ Algebra 2	0.926	0.847	0.847	0.850	0.878	0.878



3.8.9 Interactive Math Program (Integrated)



	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design
■ Math 1	0.522	0.692	0.417	0.740	0.773
■ Math 2	0.537	0.757	0.486	0.733	0.756
■ Math 3	0.411	0.717	0.300	0.700	0.747

Figure 37. Scale results for Interactive Math Program, excluding Content/Standards Alignment.

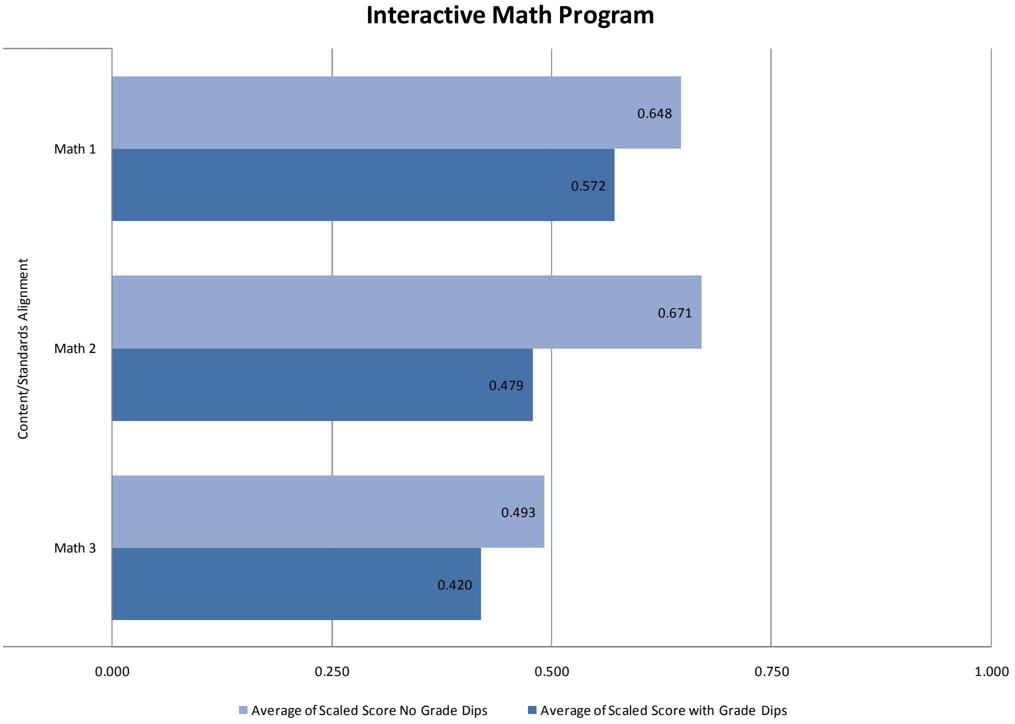


Figure 38. Content/Standards Alignment scale results, for the series as a whole (light blue) and for individual courses (dark blue).

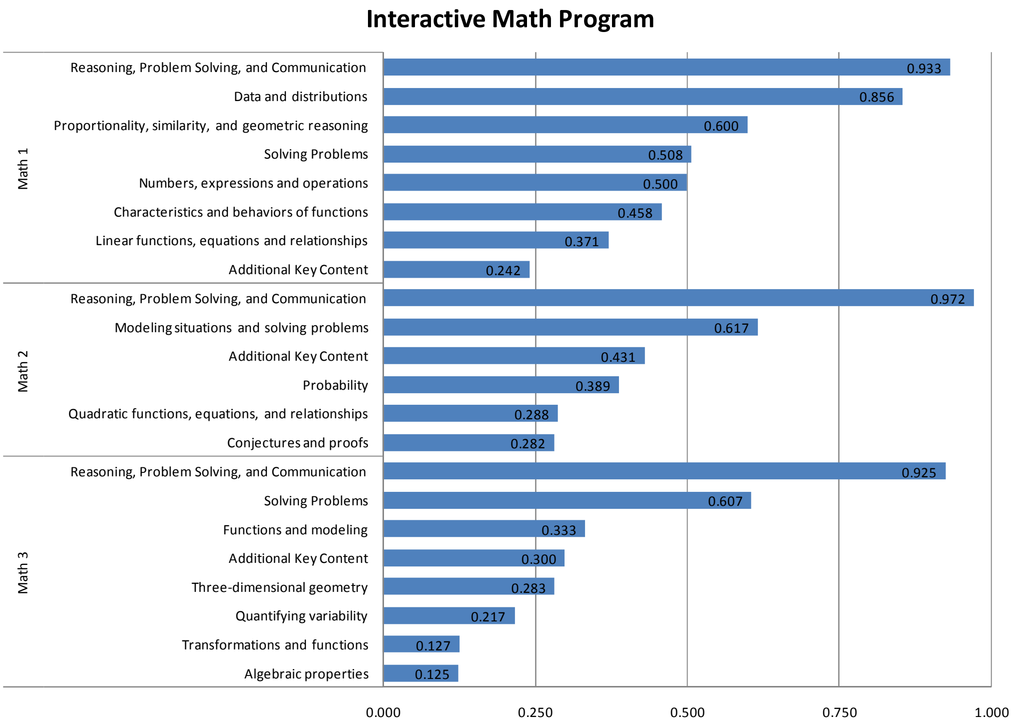


Figure 39. Core Content Area alignment results, for individual courses.

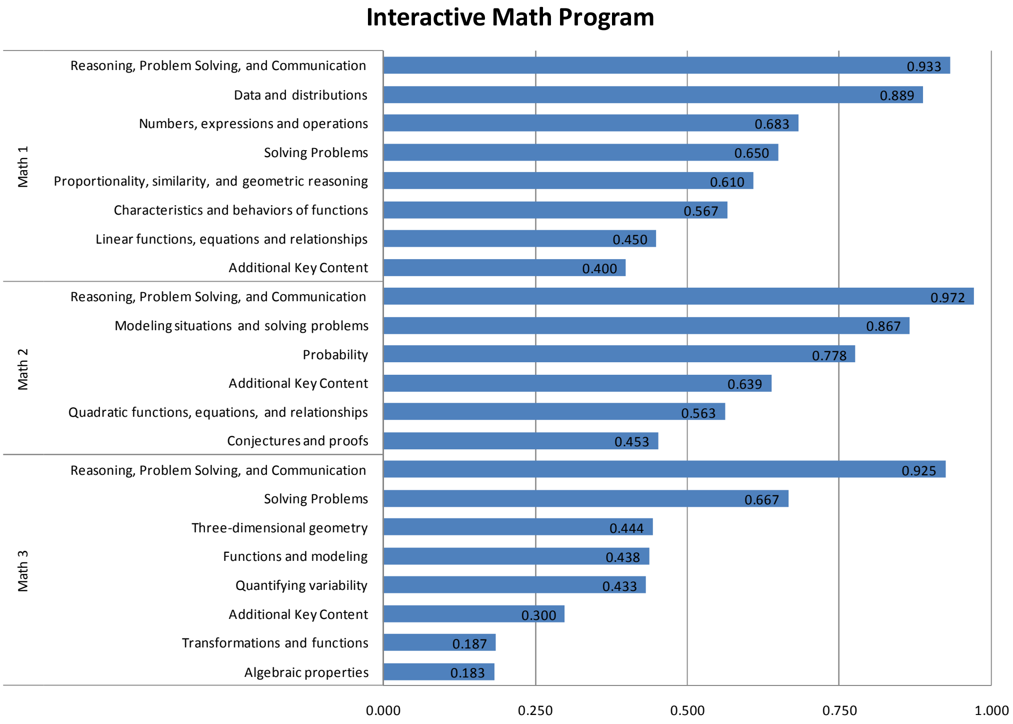
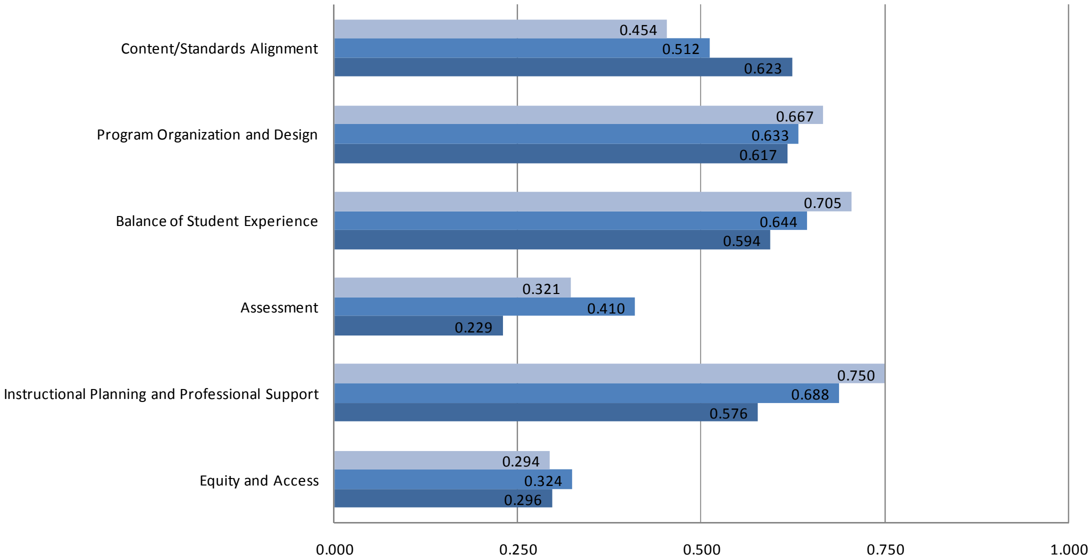


Figure 40. Core Content Area alignment results, for the series as a whole.

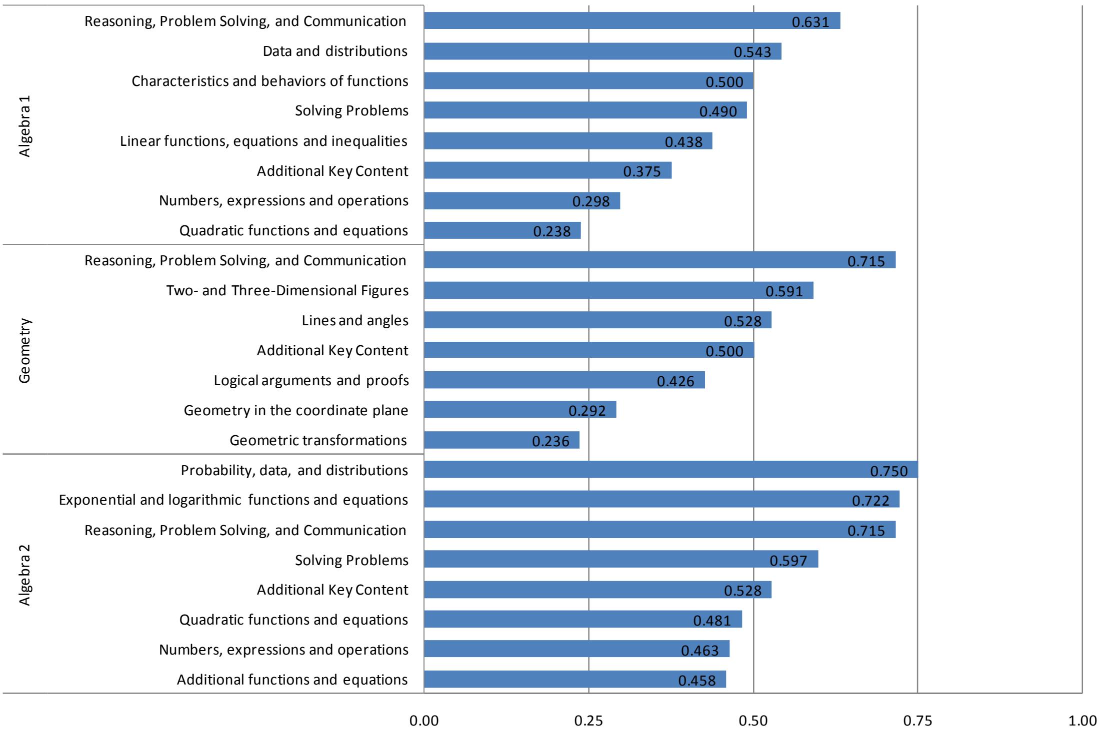
3.8.10 MathConnections (A/G/A)

MathConnections A/G/A

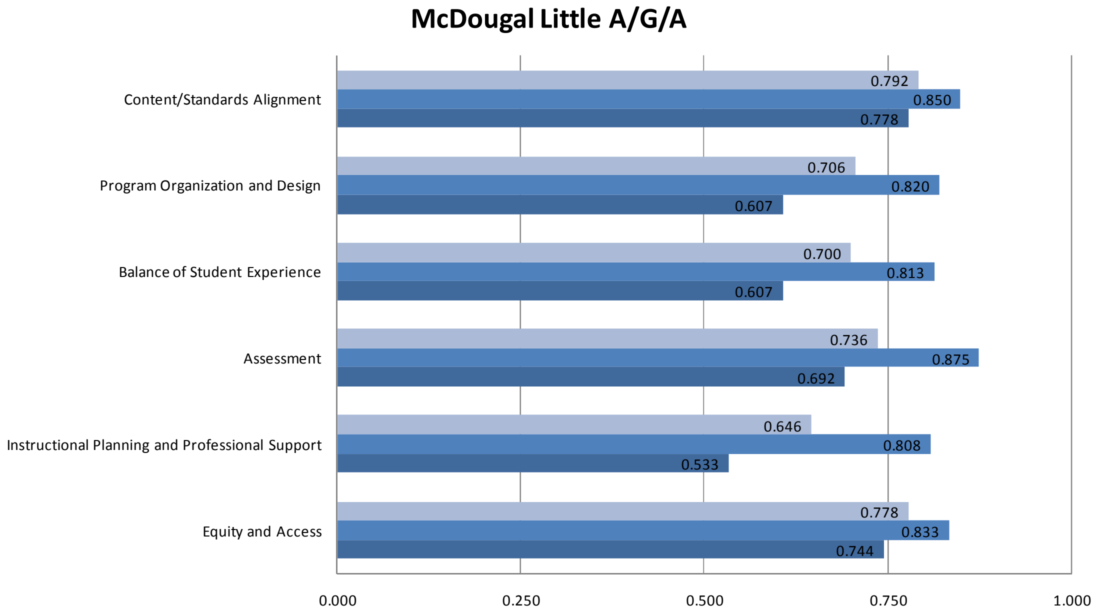


	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
■ Algebra 1	0.294	0.750	0.321	0.705	0.667	0.454
■ Geometry	0.324	0.688	0.410	0.644	0.633	0.512
■ Algebra 2	0.296	0.576	0.229	0.594	0.617	0.623

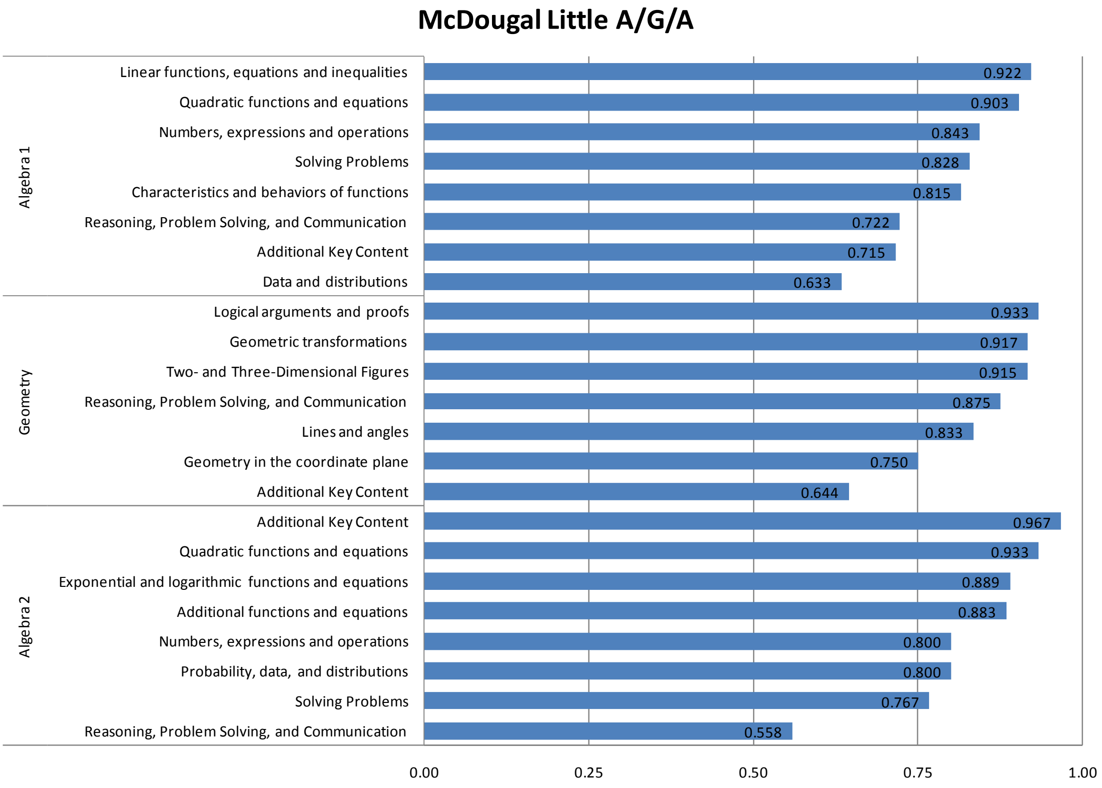
MathConnections A/G/A



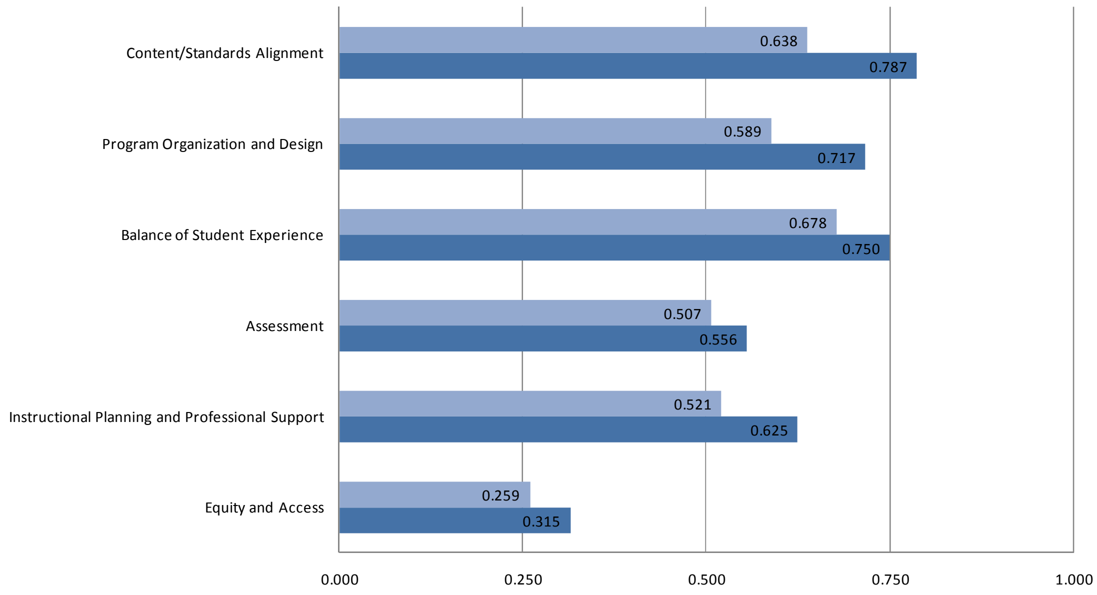
3.8.11 McDougal Little (A/G/A)



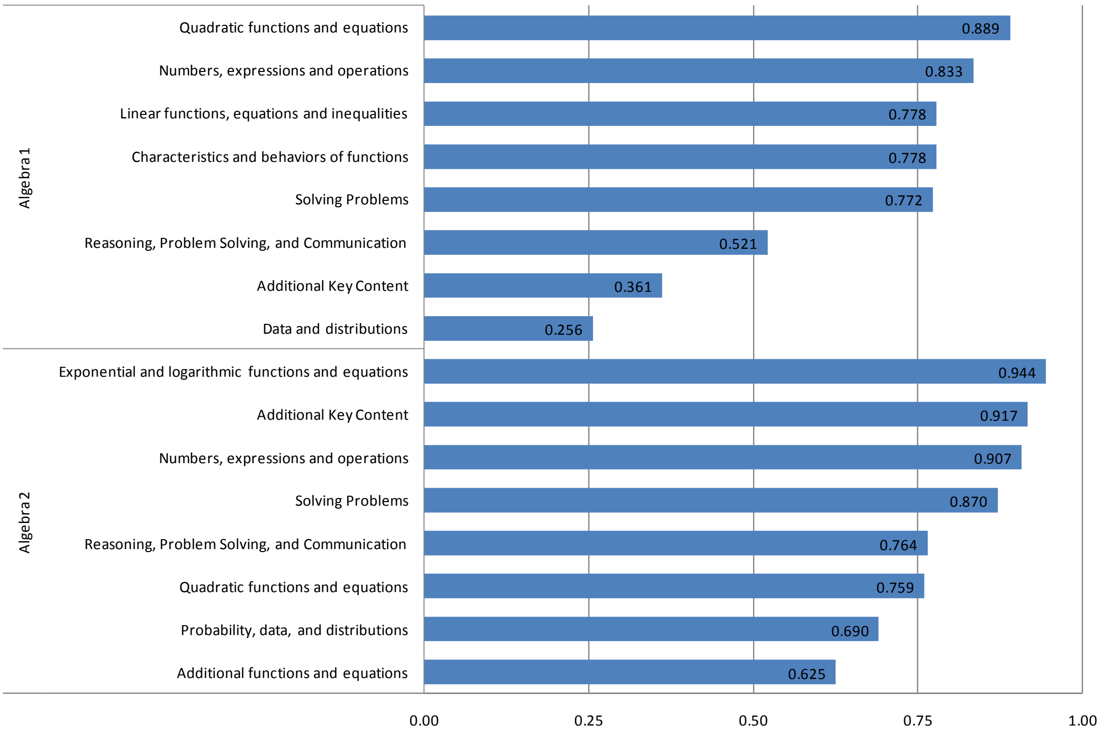
	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
▨ Algebra 1	0.778	0.646	0.736	0.700	0.706	0.792
■ Geometry	0.833	0.808	0.875	0.813	0.820	0.850
■ Algebra 2	0.744	0.533	0.692	0.607	0.607	0.778



3.8.12 PH Classics Foerster (Algebra 1 and 2)

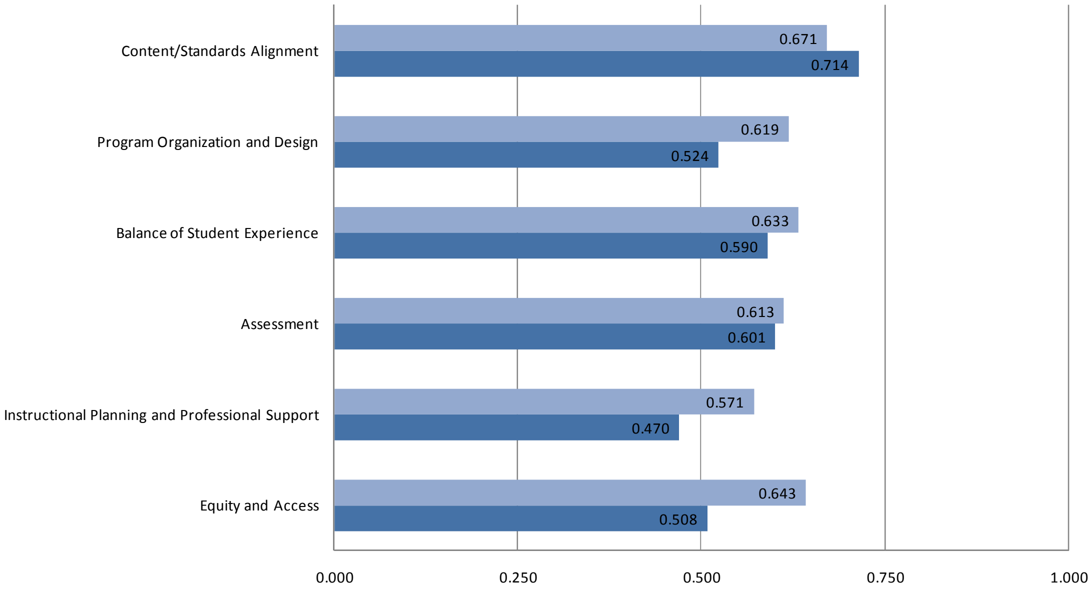

PH Classics (Foerster) Algebra

	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
■ Algebra 1	0.259	0.521	0.507	0.678	0.589	0.638
■ Algebra 2	0.315	0.625	0.556	0.750	0.717	0.787


PH Classics (Foerster) Algebra

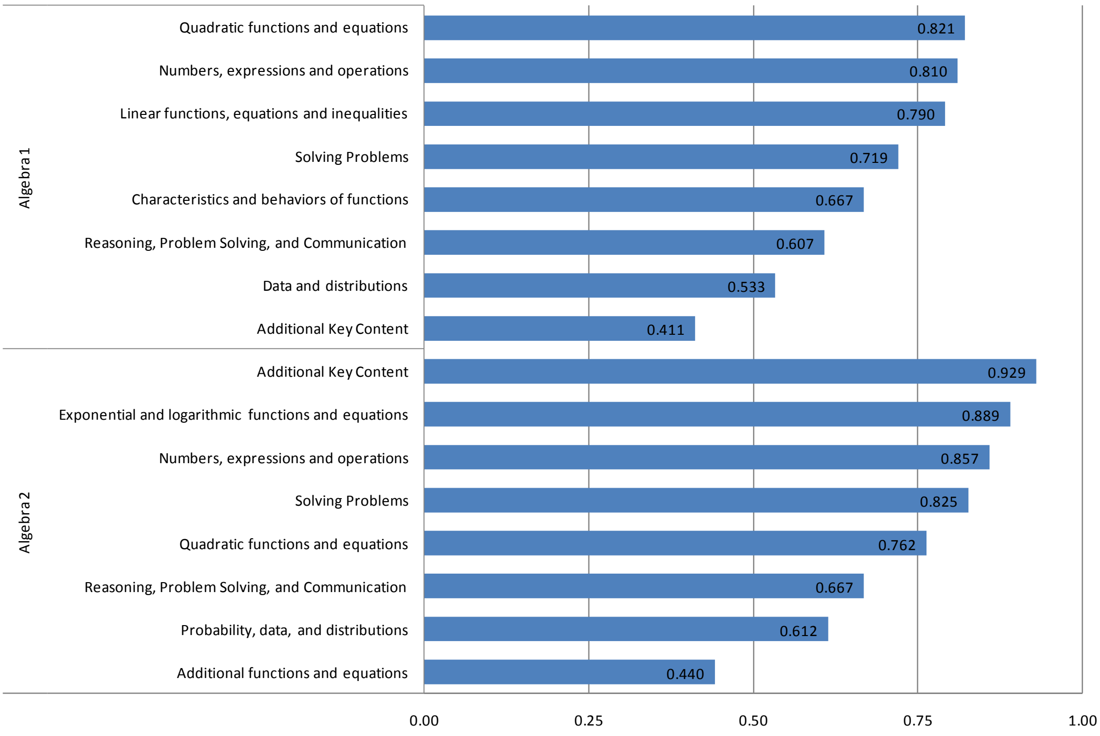
3.8.13 PH Classics Smith (Algebra 1 and 2)

PH Classics (Smith) Algebra

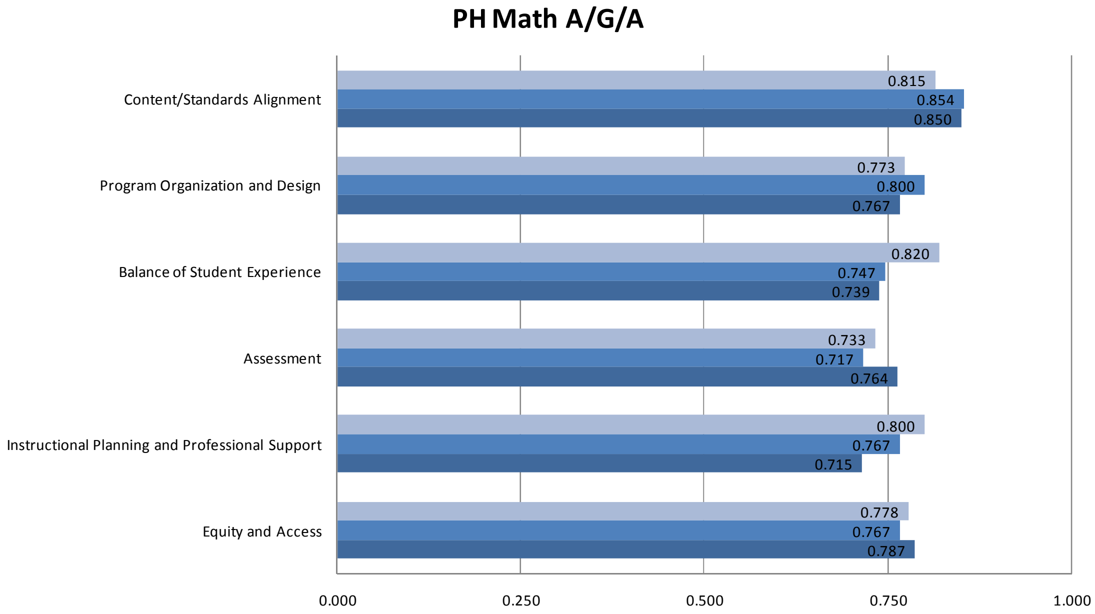


	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
■ Algebra 1	0.643	0.571	0.613	0.633	0.619	0.671
■ Algebra 2	0.508	0.470	0.601	0.590	0.524	0.714

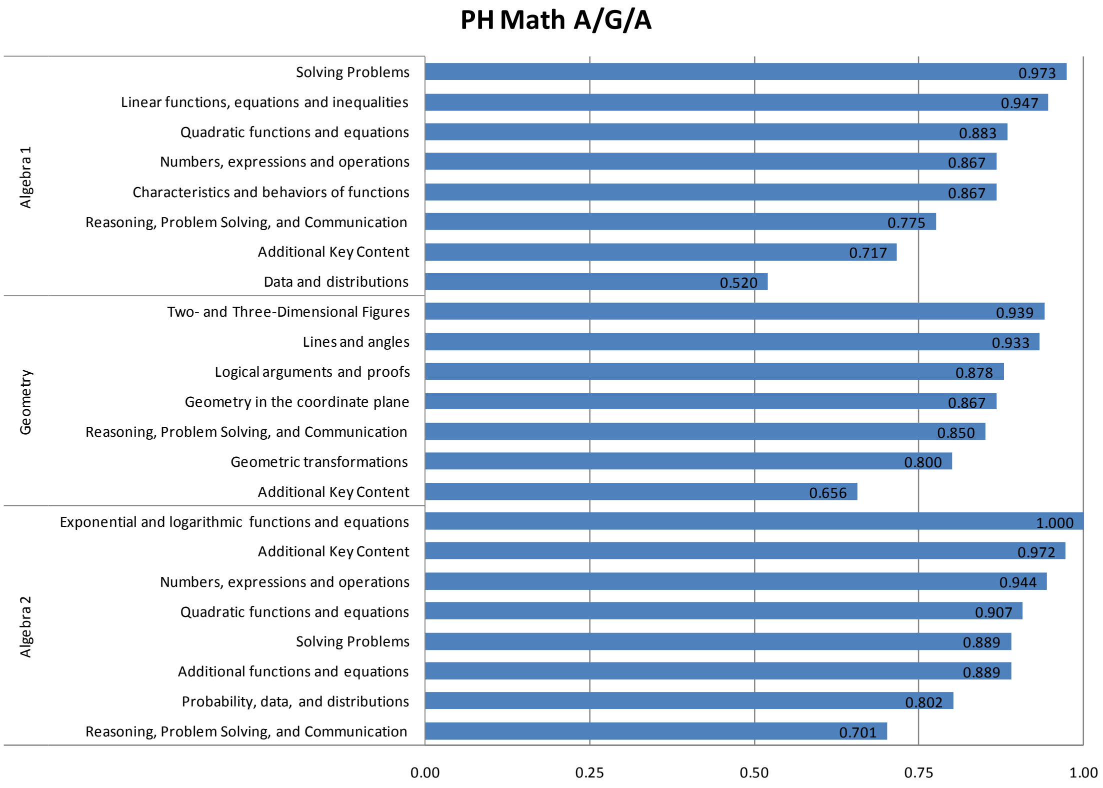
PH Classics (Smith) Algebra



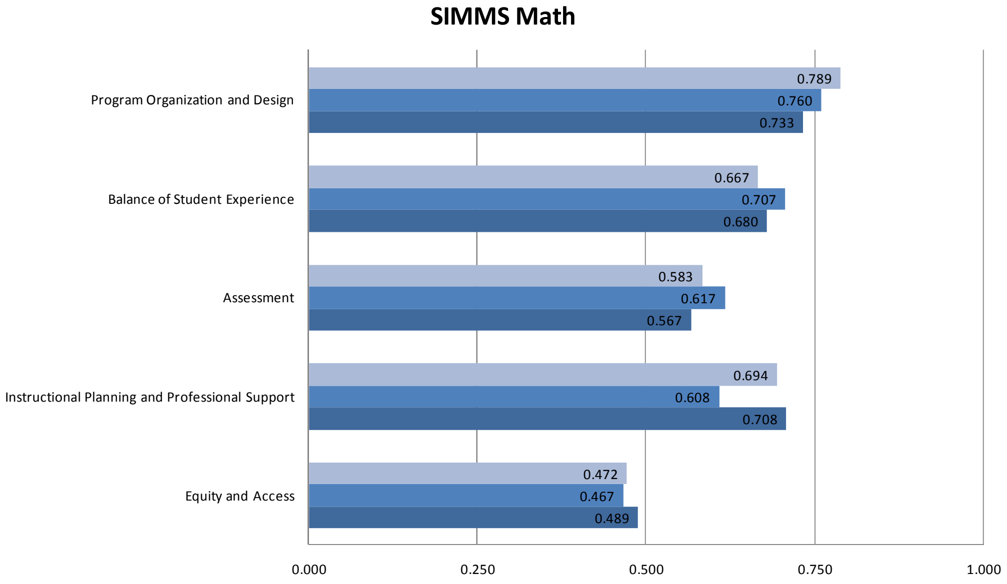
3.8.14 Prentice Hall Math (A/G/A)



	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design	Content/Standards Alignment
■ Algebra 1	0.778	0.800	0.733	0.820	0.773	0.815
■ Geometry	0.767	0.767	0.717	0.747	0.800	0.854
■ Algebra 2	0.787	0.715	0.764	0.739	0.767	0.850



3.8.15 SIMMS Math (Integrated)



	Equity and Access	Instructional Planning and Professional Support	Assessment	Balance of Student Experience	Program Organization and Design
■ Math 1	0.472	0.694	0.583	0.667	0.789
■ Math 2	0.467	0.608	0.617	0.707	0.760
■ Math 3	0.489	0.708	0.567	0.680	0.733

Figure 41. All scale results for SIMMS Math, with the exception of Content/Standards Alignment.

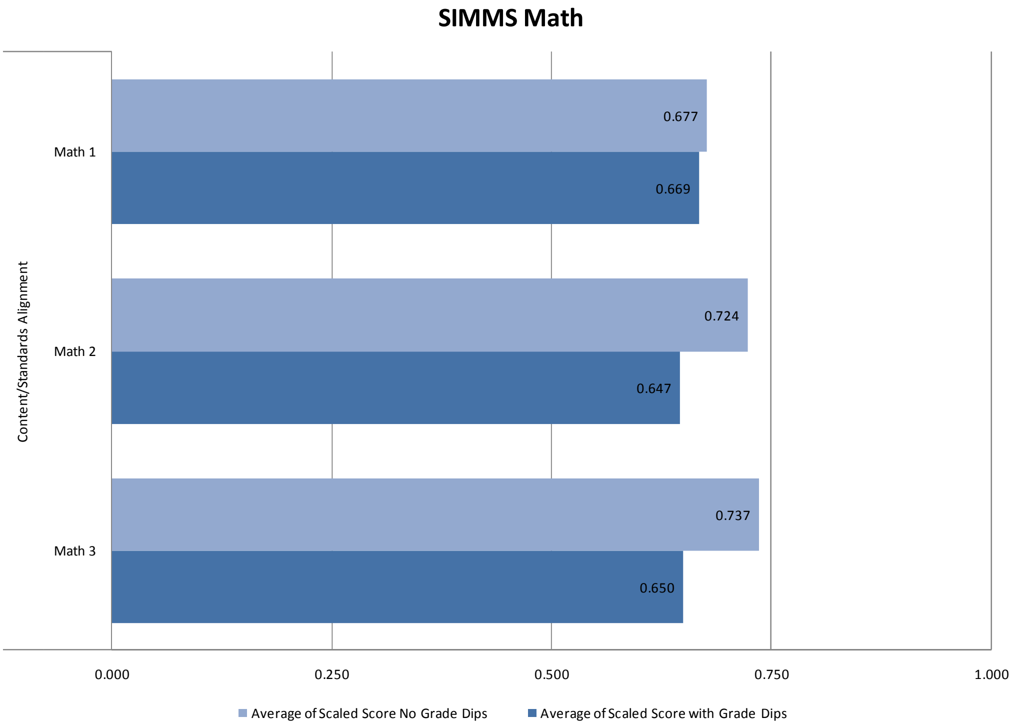


Figure 42. Content/Standards Alignment results, with and without grade dip adjustments.

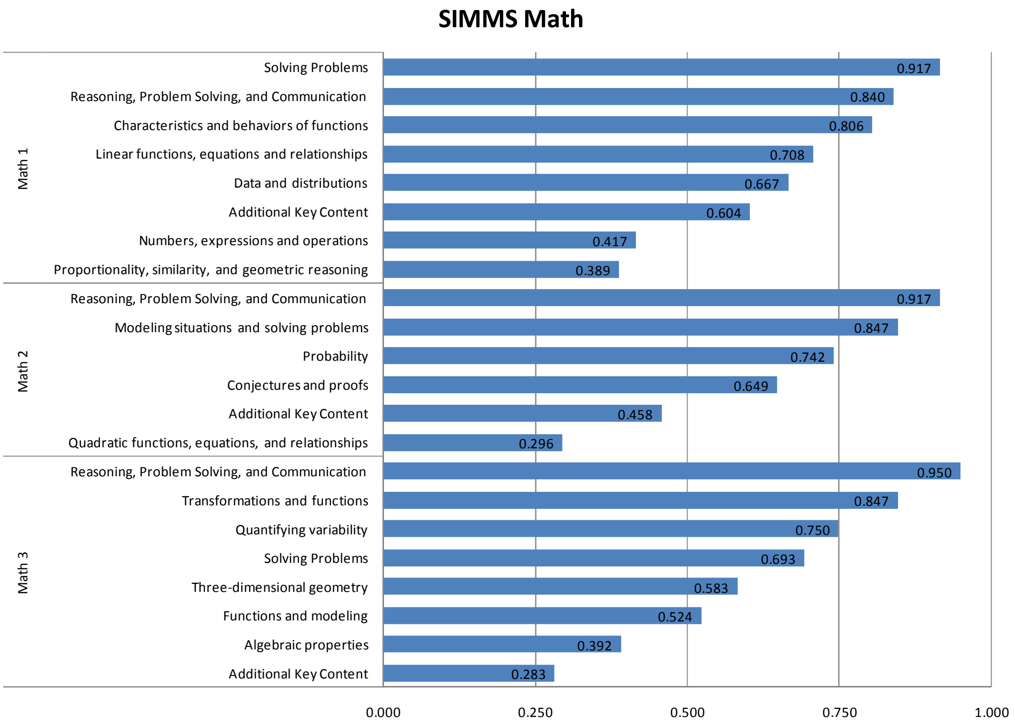


Figure 43. Core Content Area alignment results, with grade dip adjustments.

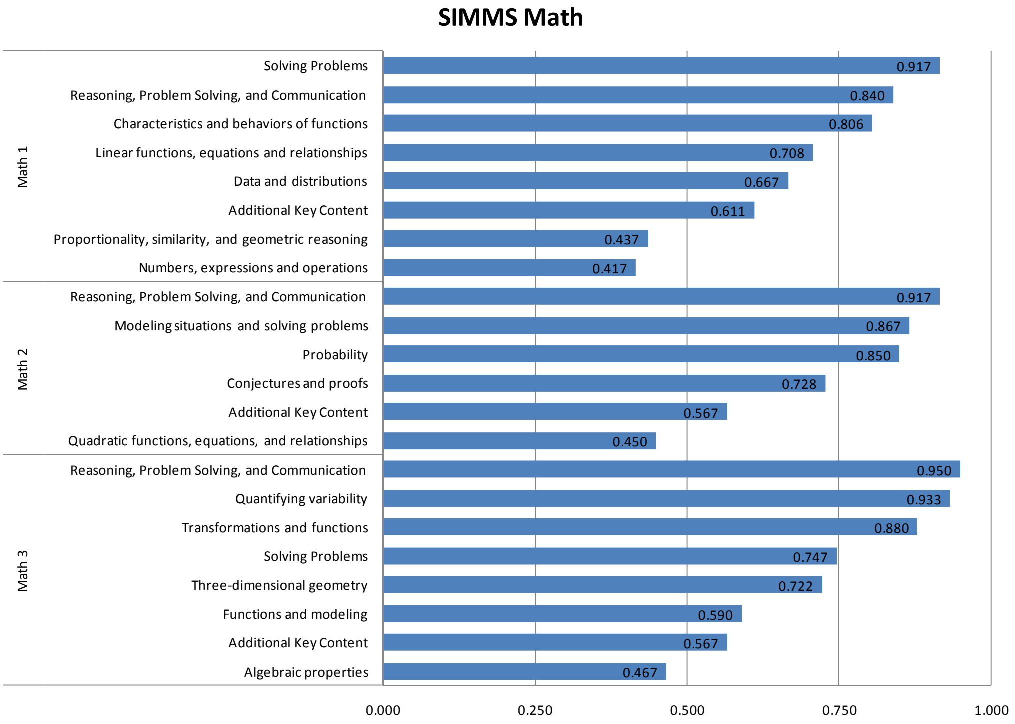


Figure 44. Core Content Area alignment results, without grade dip adjustments.

4 Data Analysis Methodology

4.1 Approach

Prior to data collection, we developed an analysis plan consisting of five main steps:

1. divide the data by program type (Algebra, Geometry, Integrated Math);
2. calculate the average score on standards items;
3. compare those scores to a threshold of 0.7;
4. calculate weighted average scores across all factors for those that surpass the threshold; and
5. compare these remaining programs to determine the top 3 (or fewer).

In calculating both the standards score and overall weighted scores, we considered using a linear mixed effects model to control for possible reviewer bias by including a random intercept for reviewer. However, since the design is not complete—that is only some reviewers review each program—we cannot fully separate reviewer effects and program effects. Thus, if a particular reviewer happened to see only the most strongly aligned programs, their overall average score would be high, not because they were biased, but because they scored strong programs. Adjusting for this would effectively be punishing the programs that were seen by that reviewer. Thus, we chose to test for reviewer bias first, and only use the adjusted model if there was evidence of severe bias. If not a simple average or weighted average was to be used.

There are a number of legitimate ways to then compare the program scores, both to the threshold of 0.7 and to each other. We hoped to keep the analysis relatively clear and simple, to facilitate transparency of the report. To this end, we opted to use t-tests to compare programs, a widely used and well understood method. In this study, we are comparing averages of many scores for each program, which allows us to use a t-test even though the data are not normally distributed. The results, threshold tests and program comparisons, were kept to the traditional 0.05 significance level.

A significance level of 0.05 is meant to imply that we are willing to accept a 5% chance that we will reach the wrong conclusions based on the data we collect. There are theoretical results that show that this significance level is maintained when doing one or more tests (controlling for multiple comparisons in the latter case) *when the analysis plan is constructed without looking at the data*. Once analysis decisions are made based on what we see in the data itself, we no longer can make the assumptions necessary to know the distribution of outcomes. In this case, p-values no longer carry the meaning they did when we planned our analysis in advance; we cannot make rigorous conclusions about the statistical significance of a result.

4.2 Response Scales

In data collection, Content/Standards Alignment (hereafter "content") questions were rated on a Not met/Lacking content/Lacking practice/Fully met scale. Other Factors (Assessment, Equity and Access, Instructional Development and Professional Support, Program Organization and Design, and Student Learning) were rated on a 4 point Likert scale.

These are ordinal variables, and not inherently numeric. In the analysis that follows, we assume that the “distance” between two consecutive levels is the same across a scale. That is, the value added by moving from “Not met” to “Lacking content” is the same as moving from “Lacking content” to “Lacking practice” in the standards. Similarly, the value added moving from “Strongly disagree” to “Disagree” is the same as from “Disagree” to “Agree” on the Likert Scale.

The data were initially recorded on a 0-3 integer scale. For standards items, reviewers also noted whether the standard was found in the appropriate text or in an adjacent one, with half credit given for a standard met in an adjacent text. We rescaled both content and other factors scores to be on a [0,1] scale by dividing by 3.

4.3 Distributions of Scores by Course Type

The following tables show characteristics of the distribution of scores for algebra, geometry and integrated programs, respectively, broken down by the two scales, content and other factors. The unweighted average scores are similar for algebra and geometry programs and somewhat lower for integrated programs. We can assess the normality of the distributions, an important assumption for hypothesis tests, by considering the skewness and kurtosis. Both should be about zero if the distribution is normal. The distributions for content deviate more seriously from normality than do the other factors. This can be seen more clearly in Figure 45.

Table 30. Score distribution characteristics for Algebra 1 and 2 series by Content/Standards Alignment and other factors.

	Content	Other factors
Mean (unweighted)	0.7457	0.6975
Standard deviation	0.2990	0.2848
Skewness	-0.9149	-0.7263
Kurtosis	-0.1640	-0.0867

Table 31. Score distribution characteristics for geometry programs by Content/Standards Alignment and other factors.

	Content	Other factors
Mean (unweighted)	0.756	0.732
Standard deviation	0.298	0.269
Skewness	-1.011	-0.830
Kurtosis	0.062	0.225

Table 32. Score distribution characteristics for integrated programs by Content/Standards Alignment and other factors.

	Content	Other factors
Mean (unweighted)	0.606	0.673
Standard deviation	0.346	0.282
Skewness	-0.225	-0.541
Kurtosis	-1.230	-0.361

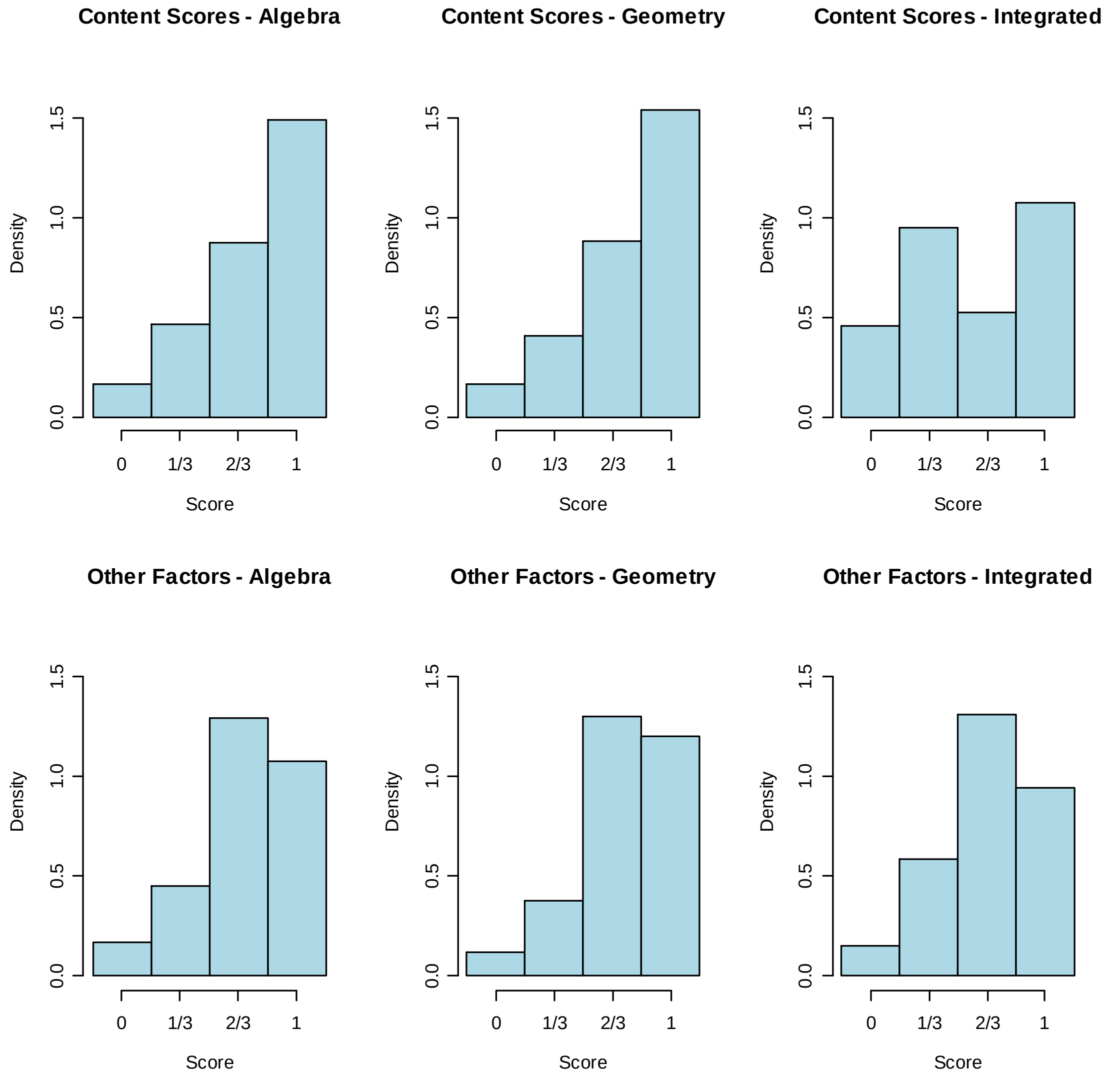


Figure 45. Histograms of adjusted scores on content and other factors scales by program type.

While the distributions are not normal, we will be comparing averages over hundreds of scores, which should make assumptions of normality not unreasonable.

4.4 Reviewer Bias

Table 33 gives the distribution of scores by reviewer on content items. There do not appear to be any reviewers who stand out in the distribution of scores assigned, with the exceptions of 998 and 999. These two reviewers reviewed only one text apiece, so this likely reflects variability in the texts rather than the raters.

Table 33. Distribution of scores by reviewer for content/standards alignment items.

	Raw score			
Reviewer	Not met	Limited content	Limited practice	Met
15	9.4%	12.9%	14.7%	62.9%
18	6.6%	5.7%	30.3%	57.5%
28	11.2%	14.5%	21.1%	53.3%
33	5.8%	15.0%	26.6%	52.6%
52	2.9%	12.9%	33.8%	50.5%
77	6.5%	26.1%	35.2%	32.1%
97	8.3%	9.1%	19.4%	63.2%
117	3.9%	14.6%	28.6%	52.9%
127	3.1%	11.2%	43.4%	42.4%
143	12.2%	12.5%	22.0%	53.3%
168	5.6%	12.8%	33.0%	48.6%
188	3.8%	5.0%	25.2%	66.0%
206	3.9%	14.4%	38.8%	42.8%
232	5.1%	11.0%	61.0%	22.8%
240	17.9%	18.5%	20.8%	42.9%
242	1.5%	10.4%	40.0%	48.1%
274	6.9%	19.0%	19.0%	55.0%
282	4.3%	23.6%	31.4%	40.7%
285	5.1%	9.8%	18.5%	66.5%
287	7.9%	11.3%	29.9%	50.9%
298	6.4%	15.5%	42.8%	35.4%
301	1.2%	12.1%	36.5%	50.2%
320	7.0%	11.1%	29.9%	52.0%
322	3.5%	8.9%	28.3%	59.3%
336	2.2%	12.4%	29.2%	56.2%
360	7.0%	9.9%	23.2%	59.9%
382	18.6%	20.6%	24.3%	36.4%
394	7.8%	13.3%	17.3%	61.6%
442	5.7%	11.1%	19.3%	63.9%
446	5.5%	14.5%	19.6%	60.4%
448	8.5%	24.6%	27.3%	39.6%

	Raw score			
Reviewer	**Not met**	**Limited content**	**Limited practice**	**Met**
449	5.8%	14.7%	34.4%	45.1%
450	2.1%	6.9%	36.2%	54.8%
452	8.4%	24.3%	35.1%	32.2%
457	3.0%	5.0%	17.8%	74.3%
458	4.7%	14.7%	34.9%	45.7%
998	43.9%	19.5%	26.8%	9.8%
999	0.0%	30.6%	19.4%	50.0%
Total	6.2%	13.7%	30.0%	50.2%

We can confirm visually that no single reviewer stands apart from the rest from Figure 46, which gives the average score on standards by reviewer with bands of one standard deviation indicating the variability for each reviewer. While there is one reviewer with a much lower average score than the others, the variability indicates that it is possible that this is simply due to chance. Moreover, this is a person who reviewed one text only, and the score given is consistent with the scores on that particular text given by other reviewers.

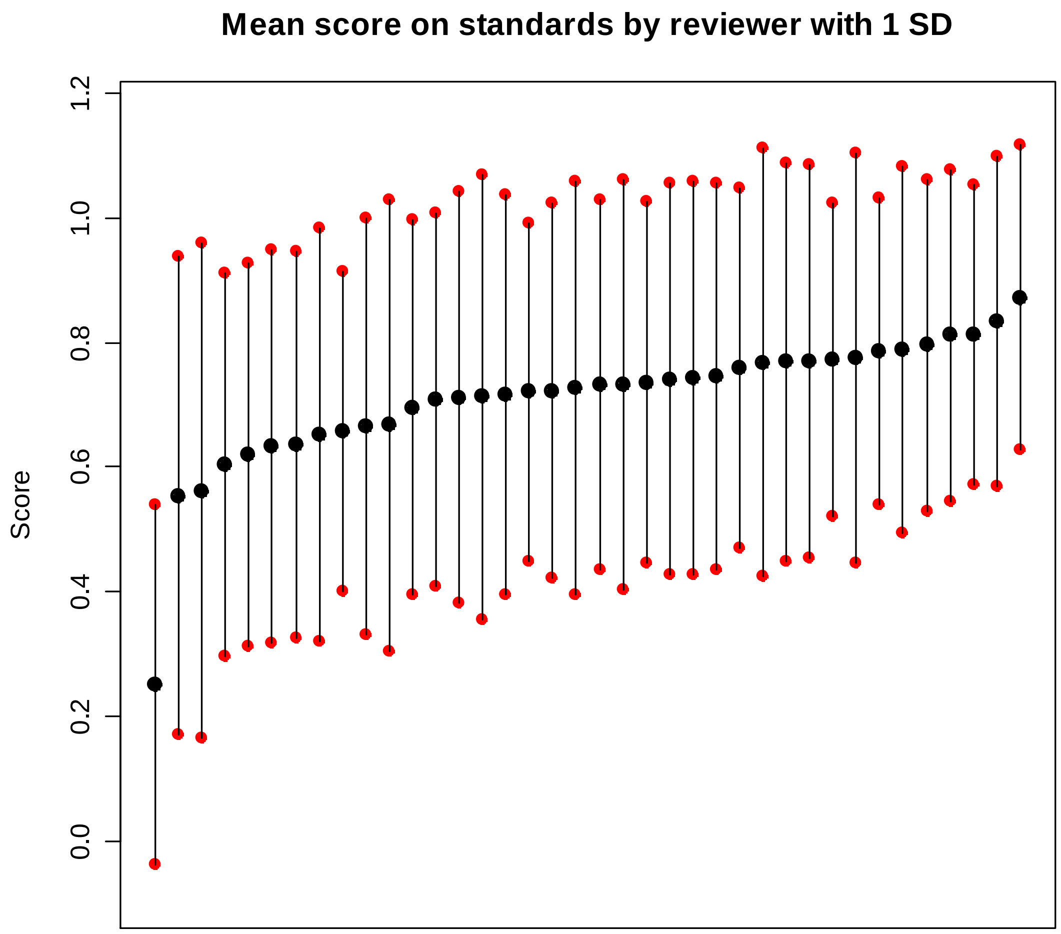


Figure 46. Average standards score by reviewer with bands of one standard deviation.

Table 34 gives the distribution of scores by reviewer on other factors items. The scores here are somewhat more variable, with several reviewers not using "strongly disagree" at all.

Table 34. Distribution of scores by reviewer for other factors items.

	Raw score			
Reviewer	Strongly disagree	Disagree	Agree	Strongly Agree
15	6.0%	22.6%	37.7%	33.7%
18	3.6%	6.7%	15.5%	74.2%
28	1.2%	9.5%	69.6%	19.6%
33	15.0%	16.0%	37.1%	32.0%
52	0.0%	11.4%	77.1%	11.4%
77	4.5%	19.0%	45.5%	31.0%

	Raw score			
Reviewer	Strongly disagree	Disagree	Agree	Strongly Agree
97	2.0%	20.2%	34.5%	43.3%
117	4.8%	14.3%	45.9%	35.0%
127	0.0%	11.6%	54.4%	34.0%
143	10.5%	12.9%	22.1%	54.4%
168	1.0%	29.9%	60.2%	8.8%
188	0.8%	27.4%	63.1%	8.7%
206	5.3%	13.5%	45.5%	35.7%
232	1.6%	17.2%	74.9%	6.3%
240	6.0%	8.9%	27.4%	57.7%
242	4.4%	10.5%	47.6%	37.4%
274	3.6%	22.6%	57.9%	15.9%
282	4.0%	20.6%	56.3%	19.0%
285	2.4%	10.3%	38.9%	48.4%
287	8.3%	15.2%	31.5%	44.9%
298	7.4%	31.3%	50.9%	10.3%
301	1.9%	6.1%	38.1%	53.9%
320	9.5%	6.5%	28.9%	55.1%
322	0.0%	4.0%	32.1%	63.9%
336	6.5%	15.3%	48.3%	29.9%
360	2.4%	25.5%	45.6%	26.5%
382	12.3%	24.2%	46.0%	17.5%
394	9.5%	17.5%	27.0%	46.0%
442	2.4%	6.8%	23.8%	67.0%
446	8.3%	8.3%	23.4%	59.9%
448	11.9%	21.4%	33.0%	33.7%
449	6.0%	6.8%	62.9%	24.3%
450	2.4%	7.6%	68.6%	21.4%
452	11.4%	20.0%	32.9%	35.7%
457	3.0%	8.6%	23.2%	65.2%
458	1.6%	16.7%	50.4%	31.3%
998	31.0%	23.8%	21.4%	23.8%
999	11.9%	28.6%	52.4%	7.1%
Total	5.2%	15.4%	43.4%	36.0%

Figure 47 shows the average score by reviewer on other factors, together with a one standard deviation band to indicate variability. In this case, no single reviewer stands out.

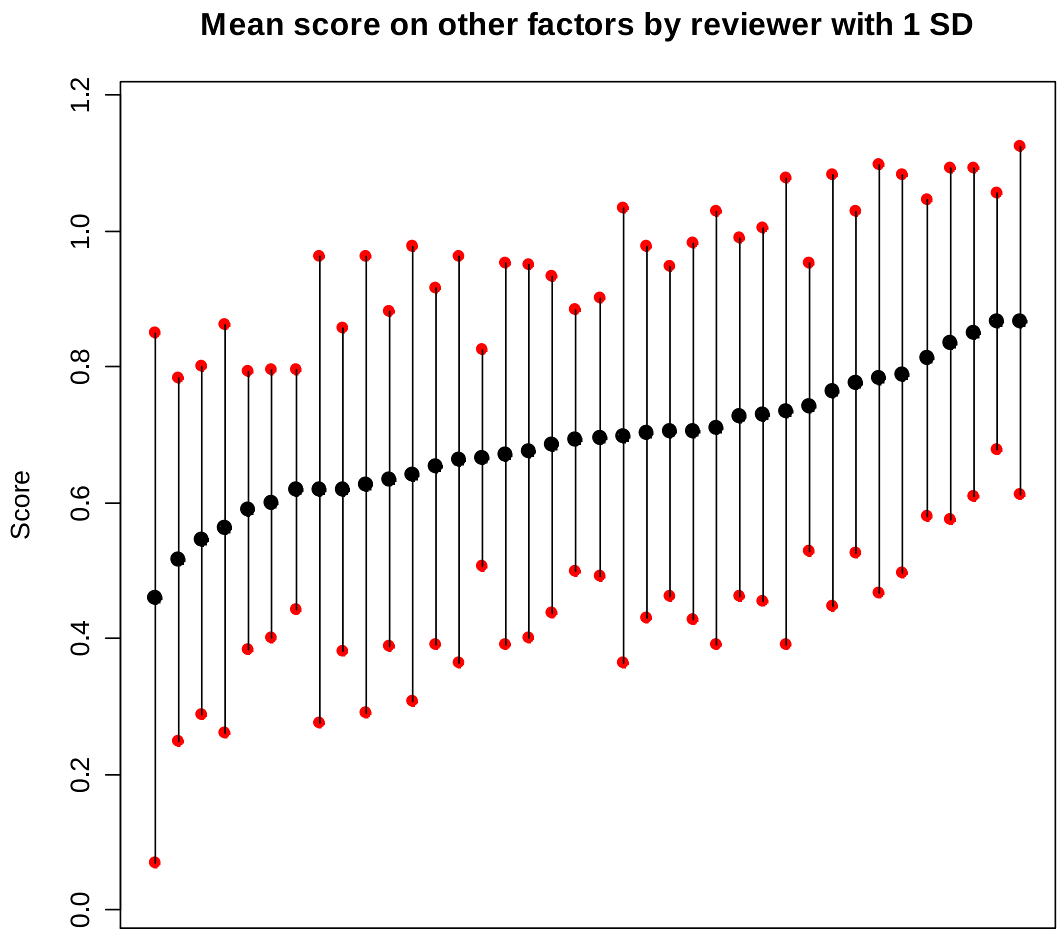


Figure 47. Average other factors score by reviewer with bands of one standard deviation.

In order to test whether any reviewer had a tendency to over- or under-rate, we calculated a standardized score within text for each reviewer, and performed a t-test comparing each average standardized score to 0 to test whether the reviewer tended to score away from the mean. This is only possible for reviewers who completed multiple reviews, so reviewers 998 and 999 are not shown. The results are shown in Table 35 and Table 36 for content and other factors, respectively. Since we are performing tests for the 36 reviewers with multiple reviews, it is important to adjust for multiple comparisons to avoid finding a difference significant when it could have happened by chance when drawing 36 means from the same distribution. The tables give the adjusted significance level, calculated using the Holm-Bonferroni method, in which we compare the ordered p-values to the nominal significance level (0.05) divided by the number of tests remaining. As soon as one test is deemed insignificant, the rest are also.

In this case, we see that even the smallest p-value for content reviews does not reach the adjusted significance level of 0.05/36, so we can conclude that there is no evidence of reviewer bias on content/standards alignment. The score given by reviewer 999 is safely in the middle of the scores for the text reviewed, indicating no significant bias, while the score given by reviewer 998 was the lowest for that text. It does not appear to be substantially lower than the rest, however.

Table 35. t-tests for evidence of reviewer bias on Content/Standards Alignment.

Reviewer	t-value	df	p-value	Tests remaining	Significance level
457	2.93	8	0.0095	36	0.0014
282	-3.04	6	0.0114	35	0.0014
188	2.52	6	0.0227	34	0.0015
448	-2.20	7	0.0319	33	0.0015
298	-1.84	9	0.0491	32	0.0016
168	1.78	7	0.0595	31	0.0016
232	-1.64	9	0.0674	30	0.0017
143	1.57	7	0.0802	29	0.0017
442	1.50	8	0.0866	28	0.0018
452	-1.48	5	0.0991	27	0.0019
360	1.39	7	0.1031	26	0.0019
242	-1.37	7	0.1068	25	0.0020
301	-1.31	11	0.1085	24	0.0021
15	-1.28	6	0.1245	23	0.0022
77	-1.22	9	0.1271	22	0.0023
285	1.15	6	0.1477	21	0.0024
28	-1.19	4	0.1495	20	0.0025
394	-1.13	6	0.1510	19	0.0026
458	-0.99	6	0.1792	18	0.0028
382	-0.97	6	0.1844	17	0.0029
117	-0.86	7	0.2091	16	0.0031
52	-0.75	5	0.2437	15	0.0033
287	-0.71	8	0.2503	14	0.0036
127	-0.58	7	0.2899	13	0.0038
450	-0.47	5	0.3279	12	0.0042
240	0.47	4	0.3301	11	0.0045
449	-0.43	6	0.3414	10	0.0050
446	0.42	6	0.3434	9	0.0056
320	-0.42	7	0.3441	8	0.0063
18	0.35	6	0.3698	7	0.0071
97	-0.28	6	0.3949	6	0.0083
322	0.25	6	0.4057	5	0.0100
33	0.24	7	0.4076	4	0.0125
206	-0.23	9	0.4106	3	0.0167
274	0.17	6	0.4352	2	0.0250
336	0.11	7	0.4559	1	0.0500

It appears, however, that there are two reviewers with a tendency to rate texts higher on other factors. In this case, the score given by reviewer 999 is again in the middle of the scores for the text reviewed and the score given by reviewer 998 was the lowest for that text. It does not appear to be substantially lower than the rest, however, indicating that neither reviewer is likely to have been significantly biased.

Table 36. t-tests for evidence of reviewer bias on other factors.

Reviewer	t-value	df	p-value	Tests remaining	Significance level
442	6.11	8	0.0001	36	0.0014
322	7.05	6	0.0002	35	0.0014
298	-3.12	9	0.0062	34	0.0015
232	-3.09	9	0.0064	33	0.0015
282	-3.11	6	0.0104	32	0.0016
143	2.94	7	0.0109	31	0.0016
336	-2.87	7	0.0120	30	0.0017
301	2.59	11	0.0125	29	0.0017
457	2.70	8	0.0135	28	0.0018
382	-2.62	6	0.0198	27	0.0019
168	-2.31	7	0.0273	26	0.0019
240	2.53	4	0.0323	25	0.0020
28	-2.53	4	0.0324	24	0.0021
188	-2.25	6	0.0328	23	0.0022
18	2.09	6	0.0410	22	0.0023
15	-1.71	6	0.0694	21	0.0024
446	1.52	6	0.0897	20	0.0025
320	1.43	7	0.0976	19	0.0026
394	-1.38	6	0.1080	18	0.0028
285	1.28	6	0.1237	17	0.0029
450	-1.11	5	0.1579	16	0.0031
52	-1.04	5	0.1732	15	0.0033
127	1.01	7	0.1733	14	0.0036
33	-0.81	7	0.2235	13	0.0038
274	-0.81	6	0.2257	12	0.0042
448	-0.77	7	0.2340	11	0.0045
206	0.72	9	0.2436	10	0.0050
117	-0.71	7	0.2511	9	0.0056
452	-0.62	5	0.2825	8	0.0063
449	-0.46	6	0.3293	7	0.0071
77	0.43	9	0.3377	6	0.0083
287	0.37	8	0.3607	5	0.0100
360	-0.32	7	0.3796	4	0.0125
458	0.30	6	0.3858	3	0.0167
97	0.11	6	0.4589	2	0.0250
242	0.00	7	0.4983	1	0.0500

4.5 Content/Standards Alignment

The first step in our analysis is to evaluate the agreement of each program with the state math standards. The following tables give the average score on Content/Standards Alignment items for algebra, geometry and integrated programs, respectively, along with the 95% normal confidence interval for the mean.

Table 37. Summary of Content/Standards Alignment scores for Algebra 1 and 2 series.

					95% CI	
Program	**Mean**	**Std. dev**	**N**	**Std. err.**	**Lower**	**Upper**
Discovering - Algebra	0.863	0.238	416	0.012	0.840	0.886
Holt Algebra	0.841	0.239	416	0.012	0.818	0.864
PH Math Algebra	0.833	0.238	416	0.012	0.810	0.856
Glencoe McGraw-Hill Algebra	0.823	0.228	420	0.011	0.802	0.845
McDougal Littell Algebra	0.786	0.270	420	0.013	0.760	0.811
CPM Algebra	0.751	0.329	416	0.016	0.719	0.782
CME Algebra	0.739	0.308	420	0.015	0.710	0.769
Cognitive Tutor Algebra	0.735	0.254	416	0.012	0.711	0.760
PH Classics (Foerster) Algebra	0.709	0.330	456	0.015	0.678	0.739
CORD Algebra	0.705	0.293	380	0.015	0.675	0.734
PH Classics (Smith) Algebra	0.692	0.316	532	0.014	0.665	0.719
MathConnections Algebra	0.528	0.328	496	0.015	0.499	0.556

Table 38. Summary of Content/Standards Alignment scores for geometry programs.

					95% CI	
Program	**Mean**	**Std. dev**	**N**	**Std. err.**	**Lower**	**Upper**
Holt Geometry	0.860	0.198	258	0.012	0.836	0.885
PH Math Geometry	0.854	0.238	215	0.016	0.822	0.886
McDougal Littell Geometry	0.850	0.247	215	0.017	0.817	0.883
Glencoe McGraw-Hill Geometry	0.847	0.211	301	0.012	0.823	0.871
CORD Geometry	0.810	0.291	258	0.018	0.775	0.846
Discovering - Geometry	0.783	0.282	215	0.019	0.745	0.821
CPM Geometry	0.744	0.295	301	0.017	0.711	0.778
Cognitive Tutor Geometry	0.699	0.338	258	0.021	0.658	0.740
CME Geometry	0.625	0.310	258	0.019	0.588	0.663
MathConnections Geometry	0.512	0.318	258	0.020	0.473	0.550

Table 39. Summary of Content/Standards Alignment scores for integrated programs.

					95% CI	
Program	**Mean**	**Std. dev**	**N**	**Std. err.**	**Lower**	**Upper**
Core Plus Math	0.671	0.319	667	0.012	0.646	0.695
SIMMS Math	0.656	0.330	667	0.013	0.631	0.681
Interactive Math Program	0.490	0.359	667	0.014	0.463	0.518

An eligibility criterion of an average score of at least 0.7 on content was originally proposed. We used one-sided t-tests to compare each program's average score to the threshold value of 0.7; the results are given in Tables 11 through 13. Of the Algebra 1 and 2 series, only Math Connections Algebra has a mean that is significantly lower than 0.7, while both Math Connections Geometry and CME Geometry do not meet the cutoff. All three integrated programs are significantly below the threshold value.

4.6 Threshold Tests

The tables below give the results of t-tests comparing the average Content/Standards Alignment scores for algebra, geometry and integrated math, respectively, to the threshold value of 0.7.

Only one Algebra 1 and 2 series, Math Connections, has a score for content that is significantly below the threshold. Both Math Connections and CME fail to meet the threshold on Geometry programs, while all three Integrated programs do not meet the threshold when treated as individual courses (reductions in scores are applied when the standard is found above or below the expected course level). However, when the integrated programs are treated as a whole series (full score is given regardless of where the standard was met in the series), only Integrated Math Program fails to exceed the content threshold.

Table 40. Summary of Content/Standards Alignment scores for Algebra 1 and 2 programs.

Program	Mean	Std err.	t-value	Degrees of Freedom	p-value	Tests remaining	Significance level
Math Connections Algebra	0.528	0.015	-11.71	495	2.08E-28	12	0.004
PH Classics (Smith) Algebra	0.692	0.014	-0.60	531	0.273	11	0.005
CORD Algebra	0.705	0.015	0.32	379	0.626	10	0.005
PH Classics (Foerster) Algebra	0.709	0.015	0.56	455	0.713	9	0.006
CME Algebra	0.739	0.015	2.61	419	0.995	8	0.006
Cognitive Tutor Algebra	0.735	0.012	2.83	415	0.998	7	0.007
CPM Algebra	0.751	0.016	3.15	415	0.999	6	0.008
McDougal Littell Algebra	0.786	0.013	6.52	419	1.000	5	0.010
Discovering - Algebra	0.863	0.012	14.00	415	1.000	4	0.013
Holt Algebra	0.841	0.012	12.05	415	1.000	3	0.017
PH Math Algebra	0.833	0.012	11.43	415	1.000	2	0.025
Glencoe McGraw-Hill Algebra	0.823	0.011	11.11	419	1.000	1	0.050

Table 41. Summary of Content/Standards Alignment scores for geometry programs.

Program	Mean	Std err.	t-value	Degrees of Freedom	p-value	Tests remaining	Significance level
Math Connections Geometry	0.512	0.020	-9.51	257	7.24E-19	10	0.005
CME Geometry	0.625	0.019	-3.87	214	7.18E-05	9	0.006
Cognitive Tutor Geometry	0.699	0.021	-0.05	214	0.480	8	0.006
CPM Geometry	0.744	0.017	2.59	300	1.00	7	0.007

Program	Mean	Std err.	t-value	Degrees of Freedom	p-value	Tests remaining	Significance level
Discovering - Geometry	0.783	0.019	4.32	257	1.00	6	0.008
CORD Geometry	0.810	0.018	6.09	214	1.00	5	0.010
McDougal Littell Geometry	0.850	0.017	8.89	300	1.00	4	0.013
Holt Geometry	0.860	0.012	13.01	257	1.00	3	0.017
PH Math Geometry	0.854	0.016	9.51	257	1.00	2	0.025
Glencoe McGraw-Hill Geometry	0.847	0.012	12.08	257	1.00	1	0.050

Table 42. Summary of Content/Standards Alignment scores for integrated programs, treated as individual courses (score reductions applied when standard was found above/below expected level).

Program	Mean	Std err.	t-value	Degrees of Freedom	p-value	Tests remaining	Significance level
Interactive Math Program	0.490	0.014	-15.07	666	1.09E-44	3	0.017
SIMMS Math	0.656	0.013	-3.43	666	3.16E-04	2	0.025
Core Plus Math	0.671	0.012	-2.38	666	8.89E-03	1	0.050

Table 43. Summary of Content/Standards Alignment scores for integrated programs, treated as a series (no score reductions applied when standard was found above/below expected level).

Program	Mean	Std err.	t-value	Degrees of Freedom	p-value	Tests remaining	Significance level
Interactive Math Program	0.609	0.014	-6.45527	666	1.04E-10	3	0.017
SIMMS Math	0.710	0.012	0.818857	666	0.79	2	0.025
Core Plus Math	0.802	0.011	9.133529	666	1.00	1	0.050

4.7 Calculation of Program Means and Standard Errors

For the comparison of programs, we consider the weighted averages of scores across all scales and their standard errors. The six scales are weighted as shown in Table 44. The average score for each program is calculated as the weighted sum of the average scores in the six scales.

Table 44. Scale weights for overall averages.

Scale	Weight
Assessment	0.050
Content/Standards Alignment	0.700
Equity and Access	0.040
Instructional Planning and Professional Support	0.045
Program Organization and Design	0.090
Student Learning	0.075

To calculate the standard error of the average score for each program, we first take the variance of the average score for each scale. The variance for the program is the sum of the square of the weight for the scale from Table 44 times the variance of the scale. The standard error is then the square root of this value.

The following tables give the calculated means and standard errors for algebra, geometry and integrated programs, respectively. Also included is a 95% confidence interval for the value of the mean.

Table 45. Summary of overall weighted mean scores for Algebra 1 and 2 series.

			95% CI	
Program	**Mean**	**Std. err.**	**Lower**	**Upper**
Discovering - Algebra	0.859	0.009	0.842	0.876
Holt Algebra	0.832	0.009	0.815	0.849
Glencoe McGraw-Hill Algebra	0.821	0.008	0.804	0.837
PH Math Algebra	0.814	0.009	0.796	0.831
CPM Algebra	0.768	0.012	0.745	0.791
McDougal Littell Algebra	0.752	0.010	0.732	0.771
CME Algebra	0.731	0.011	0.710	0.753
Cognitive Tutor Algebra	0.714	0.009	0.696	0.733
CORD Algebra	0.699	0.011	0.677	0.721
PH Classics (Foerster) Algebra	0.672	0.011	0.650	0.695
PH Classics (Smith) Algebra	0.658	0.010	0.638	0.679
MATHConnections Algebra	0.532	0.011	0.511	0.553

Table 46. Summary of overall weighted mean scores for geometry programs.

			95% CI	
Program	**Mean**	**Std. err.**	**Lower**	**Upper**
Holt Geometry	0.847	0.010	0.828	0.866
McDougal Littell Geometry	0.843	0.013	0.818	0.868
Glencoe McGraw-Hill Geometry	0.832	0.009	0.813	0.850
PH Math Geometry	0.827	0.012	0.803	0.851
CORD Geometry	0.795	0.014	0.769	0.822
Discovering - Geometry	0.776	0.014	0.748	0.804
Cognitive Tutor Geometry	0.730	0.015	0.700	0.761
CPM Geometry	0.729	0.013	0.704	0.755
CME Geometry	0.613	0.014	0.586	0.641
MathConnections Geometry	0.528	0.015	0.499	0.557

Table 47. Summary of overall weighted mean scores for integrated programs.

			95% CI	
Program	**Mean**	**Std. err.**	**Lower**	**Upper**
Core Plus Math	0.688	0.009	0.670	0.706
SIMMS Math	0.658	0.009	0.639	0.676
Interactive Math Program	0.538	0.010	0.518	0.558

4.8 Program Comparison

Since the goal is to identify no more than three program recommendations, we need to test for any statistical ties for third place. To do this, we compare the scores of the lower-ranked programs to the third-ranked (as determined by the weighted average score across scales). We perform the comparisons using t-tests, adjusting for multiple comparisons using the Holm-Bonferroni method. To do so, we compare the ordered p-values to the nominal significance level (0.05) divided by the number of tests remaining. As soon as one test is deemed insignificant, the rest are as well.

The Welch-Sattherwaite equation gives us an approximation to the degrees of freedom for a t-test comparing weighted averages.

Take s_1 and $s_2$to be the standard errors of the two programs to be compared.

The degrees of freedom are then given by

$$\frac{(s_1^2+s_2^2)^2}{m_1+m_2}$$

where

$$m_k=\sum_i \frac{{w_i}^2 * s_i^2}{n_i}$$

The index i ranges over the six response scales. w_i is the category weight, $n_i$is the number of scores in that category and s_i is the standard deviation of observations in that category.

The results for algebra and geometry programs are given in the following tables. In both cases, there is one program, PH Math, which is tied with the top three programs. Since there are only three integrated programs, there is no need to do any tests for ties. We do, however, give the weighted mean scores in Table 50.

Table 48. t-test results comparing lower-scoring programs to the third-highest scoring Algebra 1 and 2 series.

	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Discovering - Algebra	0.859					
Holt Algebra	0.832					
Glencoe McGraw-Hill Algebra	0.821					
MathConnections Algebra	0.532	-21.08	98	2.69E-38	9	0.006
PH Classics (Smith) Algebra	0.658	-12.28	90	3.11E-21	8	0.006
PH Classics (Foerster) Algebra	0.672	-10.48	93	1.14E-17	7	0.007
CORD Algebra	0.699	-8.71	88	8.88E-14	6	0.008

	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Cognitive Tutor Algebra	0.714	-8.47	89	2.49E-13	5	0.010
CME Algebra	0.731	-6.47	95	2.10E-09	4	0.013
McDougal Littell Algebra	0.752	-5.31	89	4.05E-07	3	0.017
CPM Algebra	0.768	-3.63	94	2.31E-04	2	0.025
PH Math Algebra	0.814	-0.59	86	0.277	1	0.050

Table 49. t-test results comparing lower-scoring programs to the third-highest scoring geometry program.

	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Holt Geometry	0.847					
McDougal Littell Geometry	0.843					
Glencoe McGraw-Hill Geometry	0.832					
MathConnections Geometry	0.528	-17.33	73	1.07E-27	7	0.007
CME Geometry	0.613	-12.79	76	7.78E-21	6	0.008
CPM Geometry	0.729	-6.41	83	4.35E-09	5	0.010
Cognitive Tutor Geometry	0.730	-5.61	70	1.95E-07	4	0.013
Discovering - Geometry	0.776	-3.25	76	8.63E-04	3	0.017
CORD Geometry	0.795	-2.21	80	0.015	2	0.025
PH Math Geometry	0.827	-0.31	87	0.377	1	0.050

Table 50. Weighted mean scores for integrated programs when treated as individual courses.

Program name	Mean score
Core Plus Math	0.688
SIMMS Math	0.658
Interactive Math Program	0.538

Recall that we found two reviewers, 442 and 322, to be biased in their scoring of other factors. Both tended to rate texts more highly than the other reviewers rating those texts. However, reviewer 442 rated at least 2 of the 3 texts in all integrated programs, plus one algebra program. Thus, the bias is fairly evenly spread over the integrated programs, and is not likely to significantly impact the results. Reviewer 322 rated 6 of 10 geometry programs; 4 of them are significantly lower-scoring than the top 3, so the bias cannot have given them a falsely high ranking. The other two fall in the top 3, and hence must be checked for inflated position due to biased scoring. Remember, however, that other factors account for only 30% of the final score, so the impact is likely to be minimal.

We repeat the program comparison with other factors ratings from reviewers 442 and 322 removed; the results are given in Tables 21 through 23. The results for algebra programs are virtually unchanged, since only one review of one text is affected. The weighted mean scores for the integrated programs have decreased somewhat, but the order remains unchanged, as we would expect from the equitable distribution of inflation from reviewer

442. The substantive results for geometry programs remain the same, though the mean scores decline somewhat.

Table 51. t-test results comparing lower-scoring programs to the third-highest scoring Algebra 1 and 2 series after removing reviewers 442 and 322.

	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Discovering - Algebra	0.859					
Holt Algebra	0.832					
Glencoe McGraw-Hill Algebra	0.821					
MathConnections Algebra	0.532	-21.08	98	2.69E-38	9	0.006
PH Classics (Smith) Algebra	0.658	-12.28	90	3.11E-21	8	0.006
PH Classics (Foerster) Algebra	0.672	-10.48	93	1.14E-17	7	0.007
CORD Algebra	0.699	-8.71	88	8.88E-14	6	0.008
Cognitive Tutor Algebra	0.714	-8.47	89	2.49E-13	5	0.010
CME Algebra	0.731	-6.47	95	2.10E-09	4	0.013
McDougal Littell Algebra	0.752	-5.31	89	4.05E-07	3	0.017
CPM Algebra	0.765	-3.84	94	1.11E-04	2	0.025
PH Math Algebra	0.814	-0.59	86	0.277	1	0.050

Table 52. t-test results comparing lower-scoring programs to the third-highest scoring geometry program after removing reviewers 442 and 322.

	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Holt Geometry	0.846					
McDougal Littell Geometry	0.841					
Glencoe McGraw-Hill Geometry	0.829					
MathConnections Geometry	0.528	-17.05	73	2.71E-27	7	0.007
CME Geometry	0.613	-12.53	75	2.21E-20	6	0.008
CPM Geometry	0.725	-6.35	81	5.76E-09	5	0.010
Cognitive Tutor Geometry	0.724	-5.74	69	1.20E-07	4	0.013
Discovering - Geometry	0.761	-3.93	75	9.33E-05	3	0.017
CORD Geometry	0.795	-2.01	80	0.024	2	0.025
PH Math Geometry	0.827	-0.12	87	0.454	1	0.050

Table 53. Weighted mean scores for integrated programs after removing reviewers 442 and 322.

Program name	Mean score
Core Plus Math	0.679
SIMMS Math	0.647
Interactive Math Program	0.532

4.9 Standard Error Calculations

This section describes several methodological variants to calculate standard error. The recommended approach is the most straightforward. The more complex variants take into account assumptions about dependence in the data, but ultimately show that substantive results are unaffected for algebra and integrated programs, while one additional geometry program, CORD, is found to be tied with the third-ranked text under certain situations.

4.9.1 Recommended Approach

4.9.1.1 Methodology

Let $X_{ijkl}^{(p)}$ be the score for program p on item l for scale i, grade j, by rater k.

Here:

- p indexes the 25 curricula
- i = 1,…, 6, indexes the 6 scales assessed (Content/Standards Alignment, Equity and Access, etc.)
- j = 1,…,J, indexes the grade levels.
- J=1, 2 or 3 for geometry, algebra or integrated programs, respectively.
- k = 1,…,K$_j$. K$_j$ indexes the reviewers, and ranges from 5 to 7 depending on the text and grade level.
- l = 1,…,L$_{ij}$. L$_{ij}$ index the number of items scored, and varies depending upon the grade level and scale.

The final weighted average score for program p is

$$\overline{X}_w^{(p)} = \sum_{i=1}^{6} w_i \overline{X}_{i\ldots}$$

where w_i is the weight given to scale i, and $\overline{X}_{i\ldots}$ is the average rating given on items in scale i on program p, averaged over grade levels and raters.

More formally,

$$\overline{X}_w^{(p)} = \sum_{i=1}^{6} w_i \sum_{j=1}^{J} \sum_{k=1}^{K_j} \sum_{l=1}^{L_{ij}} X_{ijkl} / N_i ,$$

where

$$N_i = \sum_{j=1}^{J} K_j L_{ij}$$

is the number of item scores on scale i for program p.

4.9.1.2 Variance and standard error of weighted average for final score

The precision with which the final score for program p can be assessed depends upon the number of ratings and the variability of the ratings. More ratings correspond to higher precision (lower variance and standard error). Lower variability of ratings, indicating greater agreement among ratings, corresponds to higher precision. In addition, the weights given to the 6 different categories impact the variance and standard error. Note also that the standard error (SE) is the square root of the variance of the average.

For the current problem, the variance for the weighted average $\overline{X}_w^{(p)}$ (Final Score for program p) can be computed as follows.

$$Var(\overline{X}_w^{(p)}) = \sum_{i=1}^{6} w_i^{\,2} Var(\overline{X}_{i\ldots})$$

Three assumptions are inherent in this computation: (1) independence of the ratings $X_{ijkl}^{(p)}$ (2) independence of scales, and (3) all items within a scale are assessing program p on category i (in other words, all items are independent and identically distributed measures of a true scale average for program p).

$$Var\ (\overline{X}_{i\ldots}) = \sigma_i^{\,2} / N_i\,.$$

The usual estimator for $\sigma_i^{\,2}$ is the sample variance $s_i^{\,2}$, computed from the N_i scores $X_{ijkl}^{(p)}$

Thus the estimated standard error (SE) for $\overline{X}_w^{(p)}$, the Final Score for program p is

$$\sqrt{\sum_{i=1}^{6} w_i^{\,2} s_i^{\,2} / N_i}$$

4.9.1.3 Results

Table 54 and Table 55 give the t-test results, comparing all lower-rated programs to the third-rated program, again by program type. For both algebra and geometry, only the 4th rated program, PH Math, cannot statistically be distinguished from the third-rated program.

Table 54. t-test results comparing lower-scoring programs to the third-highest scoring Algebra 1 and 2 series.

Program	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Discovering - Algebra	0.859					
Holt Algebra	0.832					
Glencoe McGraw-Hill Algebra	0.821					

Program	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
MathConnections Algebra	0.532	-21.08	98	2.69E-38	9	0.006
PH Classics (Smith) Algebra	0.658	-12.28	90	3.11E-21	8	0.006
PH Classics (Foerster) Algebra	0.672	-10.48	93	1.14E-17	7	0.007
CORD Algebra	0.699	-8.71	88	8.88E-14	6	0.008
Cognitive Tutor Algebra	0.714	-8.47	89	2.49E-13	5	0.010
CME Algebra	0.731	-6.47	95	2.10E-09	4	0.013
McDougal Littell Algebra	0.752	-5.31	89	4.05E-07	3	0.017
CPM Algebra	0.768	-3.63	94	2.31E-04	2	0.025
PH Math Algebra	0.814	-0.59	86	0.277	1	0.050

Table 55 t-test results comparing lower-scoring programs to the third-highest scoring geometry program.

Program	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Holt Geometry	0.847					
McDougal Littell Geometry	0.843					
Glencoe McGraw-Hill Geometry	0.832					
MathConnections Geometry	0.528	-17.33	73	1.07E-27	7	0.007
CME Geometry	0.613	-12.79	76	7.78E-21	6	0.008
CPM Geometry	0.729	-6.41	83	4.35E-09	5	0.010
Cognitive Tutor Geometry	0.730	-5.61	70	1.95E-07	4	0.013
Discovering - Geometry	0.776	-3.25	76	8.63E-04	3	0.017
CORD Geometry	0.795	-2.21	80	0.015	2	0.025
PH Math Geometry	0.827	-0.31	87	0.377	1	0.050

4.9.2 Independence of Scales

4.9.2.1 Motivation

We might expect that a program that scores well on one scale would also score well on another scale, simply because it is a high-quality program. This would indicate that program scores on the six scales are not independent. In Table 56 we see the correlations between the six scales. With correlations ranging from 0.42 to 0.86, it is unlikely that the scales are independent.

Table 56. Scale correlations.

	Assessment	Content	Equity and Access	Planning and Support	Program Organization	Student Experience
Assessment	1.00	0.61	0.67	0.47	0.50	0.58
Content	0.61	1.00	0.62	0.42	0.48	0.53

	Assessment	Content	Equity and Access	Planning and Support	Program Organization	Student Experience
Equity	0.67	0.62	1.00	0.53	0.51	0.52
Planning	0.47	0.42	0.53	1.00	0.82	0.79
Program	0.50	0.48	0.51	0.82	1.00	0.86
Student	0.58	0.53	0.52	0.79	0.86	1.00

4.9.2.2 Methodology

The assumption of independence of the scales is what allows us to say that

$$Var(\bar{X}_w^{(p)}) = \sum_{i=1}^{6} w_i^{\,2} Var(\bar{X}_{i...})$$

Without that assumption, we should adjust the variance for the covariances of the scales by taking:

$$Var(\bar{X}_{i...}) = \sum_{i=1}^{6}\sum_{m=1}^{6} w_i w_m Cov(\bar{X}_{i...}, \bar{X}_{m...})$$

Note that

$$Cov(\bar{X}_{i...}, \bar{X}_{i...}) = Var(\bar{X}_{i...})$$

4.9.2.3 Results

The following tables give the confidence interval and t-test results using this modified standard error calculation. We see that the results remain the same as above, except that now the 5th ranked geometry program, CORD Geometry, is not significantly different from the third-ranked program.

Table 57. t-test results comparing lower-scoring programs to the third-highest scoring Algebra 1 and 2 series.

Program Name	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Discovering – Algebra	0.859					
Holt Algebra	0.832					
Glencoe McGraw-Hill Algebra	0.821					
MathConnections Algebra	0.532	-15.97	75	5.59E-26	9	0.006
PH Classics (Smith) Algebra	0.658	-9.16	69	7.62E-14	8	0.006
PH Classics (Foerster) Algebra	0.672	-7.93	70	1.23E-11	7	0.007
CORD Algebra	0.699	-6.47	67	6.68E-09	6	0.008
Cognitive Tutor Algebra	0.714	-6.23	67	1.85E-08	5	0.010
CME Algebra	0.731	-4.88	72	3.07E-06	4	0.013
McDougal Littell Algebra	0.752	-3.94	68	9.81E-05	3	0.017
CPM Algebra	0.768	-2.77	71	3.61E-03	2	0.025

Program Name	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
PH Math Algebra	0.814	-0.44	66	0.331	1	0.050

Table 58. t-test results comparing lower-scoring programs to the third-highest scoring geometry program.

Program Name	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Holt Geometry	0.847					
McDougal Littell Geometry	0.843					
Glencoe McGraw-Hill Geometry	0.832					
MathConnections Geometry	0.528	-12.72	54	4.83E-18	7	0.007
CME Geometry	0.613	-9.58	58	8.99E-14	6	0.008
CPM Geometry	0.729	-4.61	60	1.12E-05	5	0.010
Cognitive Tutor Geometry	0.730	-4.23	54	4.60E-05	4	0.013
Discovering - Geometry	0.776	-2.43	58	9.08E-03	3	0.017
CORD Geometry	0.795	-1.61	59	0.056	2	0.025
PH Math Geometry	0.827	-0.23	64	0.410	1	0.050

4.9.3 Identical Mean Distributions

4.9.3.1 Motivation

Since each item is a measure of a different aspect of alignment with a particular scale (i.e., different math standards in Content/Standards Alignment), it would be reasonable to assume that each item has a different mean value that contributes to the overall mean, rather than considering them all to be independent draws from one distribution.

4.9.3.2 Methodology

In this situation, rather than consider only the variance of the mean within scale, we begin with the variance of the scores themselves.

$$Var(\bar{X}_w^{(p)}) = \sum_{i=1}^{6} w_i \sum_{j=1}^{J} \sum_{k=1}^{K_j} \sum_{l=1}^{L_{ij}} Var(X_{ijkl} / N_i)$$

We estimate

$$Var(X_{ijkl} / N_i) = \sigma_{il}^2 / N_i^2$$

by

$$s_{il}^2 / N_i^2 ,$$

where s_{il}^2 is the sample variance of all scores on item l of category i (across programs).

4.9.3.3 Results

The following tables give results based on this standard error calculation. We see that the results are identical to the simplest standard error calculation given in *Section 4.9.1*.

Table 59. t-test results comparing lower-scoring programs to the third-highest scoring Algebra 1 and 2 series.

Program Name	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Discovering - Algebra	0.859					
Holt Algebra	0.832					
Glencoe McGraw-Hill Algebra	0.821					
MathConnections Algebra	0.532	-21.49	103	5.88E-40	9	0.006
PH Classics (Smith) Algebra	0.658	-12.28	104	2.90E-22	8	0.006
PH Classics (Foerster) Algebra	0.672	-10.84	101	6.33E-19	7	0.007
CORD Algebra	0.699	-8.48	97	1.32E-13	6	0.008
Cognitive Tutor Algebra	0.714	-7.60	99	9.10E-12	5	0.010
CME Algebra	0.731	-6.41	99	2.50E-09	4	0.013
McDougal Littell Algebra	0.752	-4.93	99	1.64E-06	3	0.017
CPM Algebra	0.768	-3.75	99	1.52E-04	2	0.025
PH Math Algebra	0.814	-0.52	99	0.303	1	0.050

Table 60. t-test results comparing lower-scoring programs to the third-highest scoring geometry program.

Program Name	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Holt Geometry	0.847					
McDougal Littell Geometry	0.843					
Glencoe McGraw-Hill Geometry	0.832					
MathConnections Geometry	0.528	-17.62	80	1.43E-29	7	0.007
CME Geometry	0.613	-12.66	80	4.27E-21	6	0.008
CPM Geometry	0.729	-6.18	84	1.13E-08	5	0.010
Cognitive Tutor Geometry	0.730	-5.88	80	4.62E-08	4	0.013
Discovering - Geometry	0.776	-3.05	75	1.56E-03	3	0.017
CORD Geometry	0.795	-2.11	80	0.019	2	0.025
PH Math Geometry	0.827	-0.27	75	0.395	1	0.050

4.9.4 Scale Independence and Identical Distributions

4.9.4.1 Motivation

We might expect that both of the previously discussed assumptions are violated and that the combined adjustment could change the results.

4.9.4.2 Methodology

The assumption of independence of the scales is what allows us to say that

$$Var(\overline{X}_w^{(p)}) = \sum_{i=1}^{6} w_i^2 Var(\overline{X}_{i...})$$

Without that assumption, we should adjust the variance for the covariances of the scales by taking:

$$Var(\bar{X}_{i\ldots}) = \sum_{i=1}^{6}\sum_{m=1}^{6} w_i w_m Cov(\bar{X}_{i\ldots}, \bar{X}_{m\ldots})$$

Note that

$$Cov(\bar{X}_{i\ldots}, \bar{X}_{i\ldots}) = Var(\bar{X}_{i\ldots}) .$$

In this situation, rather than consider only the variance of the mean within scale, we begin with the variance of the scores themselves, to obtain:

$$Var(\bar{X}_{i\ldots}) = \sum_{j=1}^{J}\sum_{k=1}^{K_j}\sum_{l=1}^{L_{ij}} Var(X_{ijkl} / N_i)$$

We estimate

$$Var(X_{ijkl} / N_i) = \sigma_{il}^{2} / N_i^2$$

by

$$s_{il}^{2} / N_i^2$$

where sil2 is the sample variance of all scores on item l of category i (across programs).

We can use

$$Var(\bar{X}_{i\ldots})$$

to calculate the covariance, because

$$Cov(\bar{X}_{i\ldots}, \bar{X}_{i\ldots}) = \rho\sqrt{Var(\bar{X}_{i\ldots})Var(\bar{X}_{j\ldots})}$$

where ρ is the correlation between scales i and j.

4.9.4.3 Results

The following tables give the confidence intervals and t-test results. The conclusions are identical to those in Section 4.9.1

Table 61. t-test results comparing lower-scoring programs to the third-highest scoring Algebra 1 and 2 series.

Program Name	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Discovering - Algebra	0.859					
Holt Algebra	0.832					

Program Name	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
Glencoe McGraw-Hill Algebra	0.821					
MathConnections Algebra	0.532	-11.94	57	1.94E-17	9	0.006
PH Classics (Smith) Algebra	0.658	-6.75	58	3.79E-09	8	0.006
PH Classics (Foerster) Algebra	0.672	-6.70	58	4.70E-09	7	0.007
CORD Algebra	0.699	-4.92	62	3.36E-06	6	0.008
CME Algebra	0.731	-3.65	57	2.86E-04	5	0.010
Cognitive Tutor Algebra	0.714	-3.55	57	3.90E-04	4	0.013
McDougal Littell Algebra	0.752	-3.11	44	1.67E-03	3	0.017
CPM Algebra	0.761	-1.93	62	0.029	2	0.025
PH Math Algebra	0.814	-0.30	42	0.385	1	0.050

Table 62. t-test results comparing lower-scoring programs to the third-highest scoring geometry program.

Program Name	Mean score	t statistic	Degrees of freedom	p-value	# tests remaining	Significance cutoff
McDougal Littell Geometry	0.861					
Holt Geometry	0.844					
PH Math Geometry	0.827					
MathConnections Geometry	0.528	-10.71	48	1.69E-14	7	0.007
CME Geometry	0.613	-7.67	48	4.03E-10	6	0.008
Cognitive Tutor Geometry	0.718	-3.65	46	3.35E-04	5	0.010
CPM Geometry	0.724	-3.53	47	4.72E-04	4	0.013
Discovering - Geometry	0.740	-3.04	47	1.94E-03	3	0.017
CORD Geometry	0.795	-1.06	46	0.147	2	0.025
Glencoe McGraw-Hill Geometry	0.826	-0.02	45	0.492	1	0.050

Appendix A. Programs Reviewed

Table 63. List of core/comprehensive materials submitted for review, including publisher information.

Program Name	Publisher Name	Copyright Date	Course and/or Course Series to be Reviewed	Type of Program	Contact Name	Email	Phone Number
CME Project	Pearson Prentice Hall	2009	Algebra 1 and 2	Text Based	Dorothy Kulwin or Kyle Bender	dorothy.kulwin@pearson.com kyle.bender@pearson.com	206/819-6814 or 253/906-1059
CME Project	Pearson Prentice Hall	2009	Geometry	Text Based	Dorothy Kulwin or Kyle Bender	dorothy.kulwin@pearson.com kyle.bender@pearson.com	206/819-6814 or 253/906-1059
Cognitive Tutor	Carnegie Learning, Inc.	2008	Algebra 1 and 2	Text AND Computer Components	Scott Wallace	swallace@carnegielearning.com	360/260-0435
Cognitive Tutor	Carnegie Learning, Inc.	2008	Geometry	Text AND Computer Components	Scott Wallace	swallace@carnegielearning.com	360/260-0435
CORD Algebra 1 and 2	CORD Communications, Inc.	Algebra 1: 2009 Algebra 2: 2008	Algebra 1 and 2	Text Based	Claudia Maness	cdmaness@cordcommunications.com	254/776-1822 ext. 371
CORD Geometry	CORD Communications, Inc.	2009	Geometry	Text Based	Claudia Maness	cdmaness@cordcommunications.com	254/776-1822 ext. 371
Core Plus Mathematics, Comtemporary Mathematics in Context Course I, II, III	Glencoe McGraw-Hll	2008	Integrated 1, 2, 3	Text Based	Susan Arnold or Jim Coulon	Susan_arnold@mcgraw-hill.com Jim_coulon@mcgraw-hill.com	360/281-2500 Or 760/918-7917
CPM High School Connections Series	CPM Educational Program	Algebra 1: 2006 Algebra 2: 2009	Algebra 1 and 2	Text Based	Brian Hoey	hoey@cpm.org	916/391-3301
CPM High School Connections Series	CPM Educational Program	2007	Geometry	Text Based	Brian Hoey	hoey@cpm.org	916/391-3301
Discovering	Key Curriculum Press	Algebra: 2007	Algebra 1 and 2	Text Based	Kortnii	kjohnson@keypress.com	800/995-

Program Name	Publisher Name	Copyright Date	Course and/or Course Series to be Reviewed	Type of Program	Contact Name	Email	Phone Number
Algebra/Advanced Algebra		Advanced Algebra: 2004			Johnson		6284 ext. 253
Discovering Geometry	Key Curriculum Press	2008	Geometry	Text Based	Kortnii Johnson	kjohnson@keypress.com	800/995-6284 ext. 253
Glencoe McGraw-Hill Algebra 1 and 2	Glencoe McGraw-Hll	2010	Algebra 1 and 2	Text Based	Susan Arnold	Susan_arnold@mcgraw-hill.com	360/281-2500
Glencoe McGraw-Hill Geometry	Glencoe McGraw-Hll	2010	Geometry	Text Based	Susan Arnold	Susan_arnold@mcgraw-hill.com	360/281-2500
Holt Algebra 1 and 2	Holt McDougal	2007	Algebra 1 and 2	Text AND Computer Components	Frank Atkinson	frank.atkinson@hmhpub.com	425/747-7099
Holt Geometry	Holt McDougal	2007	Geometry	Text AND Computer Components	Frank Atkinson	frank.atkinson@hmhpub.com	425/747-7099
Interactive Mathematics Program	Key Curriculum Press	Math I: 2009 Math II: 2004 Math III: 2004	Integrated 1, 2, 3	Text Based	Kortnii Johnson	kjohnson@keypress.com	800/995-6284 ext. 253
MathConnections	It's About Time, Herff Jones Education Division	2006	Algebra 1 and 2	Text Based	Matt Elisara	mpelisara@herffjones.com	360/245-3434
McDougal Littell Algebra 1 and 2	Holt McDougal	2007	Algebra 1 and 2	Text AND Computer Components	Frank Atkinson	frank.atkinson@hmhpub.com	425/747-7099
McDougal Littell Geometry	Holt McDougal	2007	Geometry	Text AND Computer Components	Frank Atkinson	frank.atkinson@hmhpub.com	425/747-7099
Prentice Hall Classics by Foerster	Pearson Prentice Hall	2006	Algebra 1 and 2	Text Based	Dorothy Kulwin or Kyle Bender	dorothy.kulwin@pearson.com kyle.bender@pearson.com	206/819-6814 or 253/906-1059
Prentice Hall Classics by Smith, Charles, etal.	Pearson Prentice Hall	2006	Algebra 1 and 2	Text Based	Dorothy Kulwin or Kyle Bender	dorothy.kulwin@pearson.com kyle.bender@pearson.com	206/819-6814 or 253/906-1059

Program Name	Publisher Name	Copyright Date	Course and/or Course Series to be Reviewed	Type of Program	Contact Name	Email	Phone Number
Prentice Hall Mathematics	Pearson Prentice Hall	2009	Algebra 1 and 2	Text Based	Dorothy Kulwin or Kyle Bender	dorothy.kulwin@pearson.com kyle.bender@pearson.com	206/819-6814 or 253/906-1059
Prentice Hall Mathematics	Pearson Prentice Hall	2009	Geometry	Text Based	Dorothy Kulwin or Kyle Bender	dorothy.kulwin@pearson.com kyle.bender@pearson.com	206/819-6814 or 253/906-1059
SIMMS Integrated Mathematics I, II, III	Kendall/Hunt Publishing	2006	Integrated 1, 2, 3	Text Based	Gloria Hiten	ghiten@kendallhunt.com	877/443-5885

Appendix B. Alternate Analysis of High School Math Series

The following tables show an alternate analysis of the high school math series, organized by type of series, traditional Algebra I/Geometry/Algebra II, Integrated and Algebra I/II only. Priscilla Lewis provided the initial approach and analysis for this section.

Table 64. This table shows the Traditional Algebra I/Geometry/Algebra II series counts of Performance Expectations that were met, partially met, or not met.

		Content Standards														
Final Composite Score	**Traditional A/G/A Course**	Evaluated as Individual Courses								Evaluated as a Series						
		PE Counts			PE Percents			TOTAL		PE Counts			PE Percents			TOTAL
		Not Met[6]	**Partial**	**Met**	**Not Met**	**Partial**	**Met**	**PE**		**Not Met**	**Partial**	**Met**	**Not Met**	**Partial**	**Met**	**PE**
0.838	Holt Algebra I	2	8	30	5%	20%	75%	40		2	8	30	5%	20%	75%	40
	Holt Algebra 2	1	1	34	3%	3%	94%	36		1	1	34	3%	3%	94%	36
	Holt Geometry	1	4	38	2%	9%	88%	43		1	4	38	2%	9%	88%	43
		4	**13**	**102**	**3%**	**11%**	**86%**	**119**		**4**	**13**	**102**	**3%**	**11%**	**86%**	**119**
0.835	Discovering - Algebra I	4	3	33	10%	8%	83%	40		3	3	34	8%	8%	85%	40
	Discovering - Algebra 2	0	1	35	0%	3%	97%	36		0	1	35	0%	3%	97%	36
	Discovering - Geometry	3	7	33	7%	16%	77%	43		3	7	33	7%	16%	77%	43
		7	**11**	**101**	**6%**	**9%**	**85%**	**119**		**6**	**11**	**102**	**5%**	**9%**	**86%**	**119**
0.826	Glencoe McGraw-Hill Algebra I	2	4	34	5%	10%	85%	40		2	4	34	5%	10%	85%	40
	Glencoe McGraw-Hill Algebra 2	2	5	29	6%	14%	81%	36		2	5	29	6%	14%	81%	36
	Glencoe McGraw-Hill Geometry	0	3	40	0%	7%	93%	43		0	3	40	0%	7%	93%	43
		4	**12**	**103**	**3%**	**10%**	**87%**	**119**		**4**	**12**	**103**	**3%**	**10%**	**87%**	**119**

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[6] **Not Met** is the count of Performance Expectations where the average score is below 0.5. **Partial** is the count of Performance Expectations where the average score is greater than or equal to 0.5 and less than 0.7. **Met** is the count of Performance Expectations where the average score is greater than or equal to 0.7.

		Content Standards														
Final Composite Score	**Traditional A/G/A Course**	Evaluated as Individual Courses								Evaluated as a Series						
		PE Counts			PE Percents			TOTAL		PE Counts			PE Percents			TOTAL
		Not Met[6]	**Partial**	**Met**	**Not Met**	**Partial**	**Met**	**PE**		**Not Met**	**Partial**	**Met**	**Not Met**	**Partial**	**Met**	**PE**
0.82	PH Math Algebra 1	2	7	31	5%	18%	78%	40		2	7	31	5%	18%	78%	40
	PH Math Algebra 2	1	4	31	3%	11%	86%	36		1	4	31	3%	11%	86%	36
	PH Math Geometry	3	1	39	7%	2%	91%	43		3	1	39	7%	2%	91%	43
		6	**12**	**101**	**5%**	**10%**	**85%**	**119**		**6**	**12**	**101**	**5%**	**10%**	**85%**	**119**
0.783	McDougal Littell Algebra 1	1	6	33	3%	15%	83%	40		1	5	34	3%	13%	85%	40
	McDougal Littell Algebra 2	4	7	25	11%	19%	69%	36		4	7	25	11%	19%	69%	36
	McDougal Littell Geometry	1	6	36	2%	14%	84%	43		1	6	36	2%	14%	84%	43
		6	**19**	**94**	**5%**	**16%**	**79%**	**119**		**6**	**18**	**95**	**5%**	**15%**	**80%**	**119**
0.755	CPM Algebra 1	6	4	30	15%	10%	75%	40		5	5	30	13%	13%	75%	40
	CPM Algebra 2	5	12	19	14%	33%	53%	36		5	11	20	14%	31%	56%	36
	CPM Geometry	3	15	25	7%	35%	58%	43		3	15	25	7%	35%	58%	43
		14	**31**	**74**	**12%**	**26%**	**62%**	**119**		**13**	**31**	**75**	**11%**	**26%**	**63%**	**119**
0.739	CORD Algebra 1	3	9	28	8%	23%	70%	40		3	9	28	8%	23%	70%	40
	CORD Algebra 2	12	7	17	33%	19%	47%	36		11	7	18	31%	19%	50%	36
	CORD Geometry	5	4	34	12%	9%	79%	43		5	4	34	12%	9%	79%	43
		20	**20**	**79**	**17%**	**17%**	**66%**	**119**		**19**	**20**	**80**	**16%**	**17%**	**67%**	**119**
0.723	Cognitive Tutor Algebra 1	3	12	25	8%	30%	63%	40		2	12	26	5%	30%	65%	40
	Cognitive Tutor Algebra 2	2	11	23	6%	31%	64%	36		2	11	23	6%	31%	64%	36
	Cognitive Tutor Geometry	8	5	30	19%	12%	70%	43		8	5	30	19%	12%	70%	43
		13	**28**	**78**	**11%**	**24%**	**66%**	**119**		**12**	**28**	**79**	**10%**	**24%**	**66%**	**119**
0.692	CME Algebra 1	2	7	31	5%	18%	78%	40		2	7	31	5%	18%	78%	40
	CME Algebra 2	9	6	21	25%	17%	58%	36		7	7	22	19%	19%	61%	36

Final Composite Score	Traditional A/G/A Course	Content Standards													
		Evaluated as Individual Courses							Evaluated as a Series						
		PE Counts			PE Percents			TOTAL PE	PE Counts			PE Percents			TOTAL PE
		Not Met[6]	Partial	Met	Not Met	Partial	Met		Not Met	Partial	Met	Not Met	Partial	Met	
	CME Geometry	7	17	19	16%	40%	44%	43	7	17	19	16%	40%	44%	43
		18	**30**	**71**	**15%**	**25%**	**60%**	**119**	**16**	**31**	**72**	**13%**	**26%**	**61%**	**119**
0.562	MathConnections Algebra I	22	11	7	55%	28%	18%	40	11	15	14	28%	38%	35%	40
	MathConnections Algebra 2	9	15	12	25%	42%	33%	36	9	15	12	25%	42%	33%	36
	MathConnections Geo.	17	17	9	40%	40%	21%	43	17	17	9	40%	40%	21%	43
		48	**43**	**28**	**40%**	**36%**	**24%**	**119**	**37**	**47**	**35**	**31%**	**39%**	**29%**	**119**

Table 65. This table shows the Integrated Math series counts of Performance Expectations that were met, partially met, or not met.

Final Composite Score	Integrated Course	Content Standards													
		Evaluated as Individual Courses							Evaluated as a Series						
		PE Counts			PE Percents			TOTAL PE	PE Counts			PE Percents			TOTAL PE
		Not Met	Partial	Met	Not Met	Partial	Met		Not Met	Partial	Met	Not Met	Partial	Met	
0.78	Core Plus Math I	7	13	22	17%	31%	52%	42	0	6	36	0%	14%	86%	42
	Core Plus Math II	16	7	19	38%	17%	45%	42	4	4	34	10%	10%	81%	42
	Core Plus Math III	15	3	23	37%	7%	56%	41	10	1	30	24%	2%	73%	41
		38	**23**	**64**	**30%**	**18%**	**51%**	**125**	**14**	**11**	**100**	**11%**	**9%**	**80%**	**125**
0.696	SIMMS Math I	10	12	20	24%	29%	48%	42	10	12	20	24%	29%	48%	42
	SIMMS Math II	13	6	23	31%	14%	55%	42	8	5	29	19%	12%	69%	42
	SIMMS Math III	15	8	18	37%	20%	44%	41	7	7	27	17%	17%	66%	41

		Content Standards														
Final Composite Score	**Integrated Course**	Evaluated as Individual Courses								Evaluated as a Series						
		PE Counts			PE Percents			TOTAL		PE Counts			PE Percents			TOTAL
		Not Met	**Partial**	**Met**	**Not Met**	**Partial**	**Met**	**PE**		**Not Met**	**Partial**	**Met**	**Not Met**	**Partial**	**Met**	**PE**
		38	**26**	**61**	**30%**	**21%**	**49%**	**125**		**25**	**24**	**76**	**20%**	**19%**	**61%**	**125**
0.621	Interactive Math Program I	20	4	18	48%	10%	43%	42		15	7	20	36%	17%	48%	42
	Interactive Math Program II	27	6	9	64%	14%	21%	42		12	8	22	29%	19%	52%	42
	Interactive Math Program III	25	4	12	61%	10%	29%	41		19	7	15	46%	17%	37%	41
		72	**14**	**39**	**58%**	**11%**	**31%**	**125**		**46**	**22**	**57**	**37%**	**18%**	**46%**	**125**

Table 66. This table shows the Algebra I/Algebra II series counts of Performance Expectations that were met, partially met or not met.

		Content Standards														
Final Composite Score	**Algebra Only Course**	Evaluated as Individual Courses								Evaluated as a Series						
		PE Counts			PE Percents			TOTAL		PE Counts			PE Percents			TOTAL
		Not Met	**Partial**	**Met**	**Not Met**	**Partial**	**Met**	**PE**		**Not Met**	**Partial**	**Met**	**Not Met**	**Partial**	**Met**	**PE**
0.672	PH Classics (Foerster) Alg I	11	8	21	28%	20%	53%	40		10	8	22	25%	20%	55%	40
	PH Classics (Foerster) Alg 2	2	8	26	6%	22%	72%	36		2	8	26	6%	22%	72%	36
		13	**16**	**47**	**17%**	**21%**	**62%**	**76**		**12**	**16**	**48**	**16%**	**21%**	**63%**	**76**
0.658	PH Classics (Smith) Alg I	10	10	20	25%	25%	50%	40		7	13	20	18%	33%	50%	40
	PH Classics (Smith) Alg 2	4	8	24	11%	22%	67%	36		4	8	24	11%	22%	67%	36
		14	**18**	**44**	**18%**	**24%**	**58%**	**76**		**11**	**21**	**44**	**14%**	**28%**	**58%**	**76**

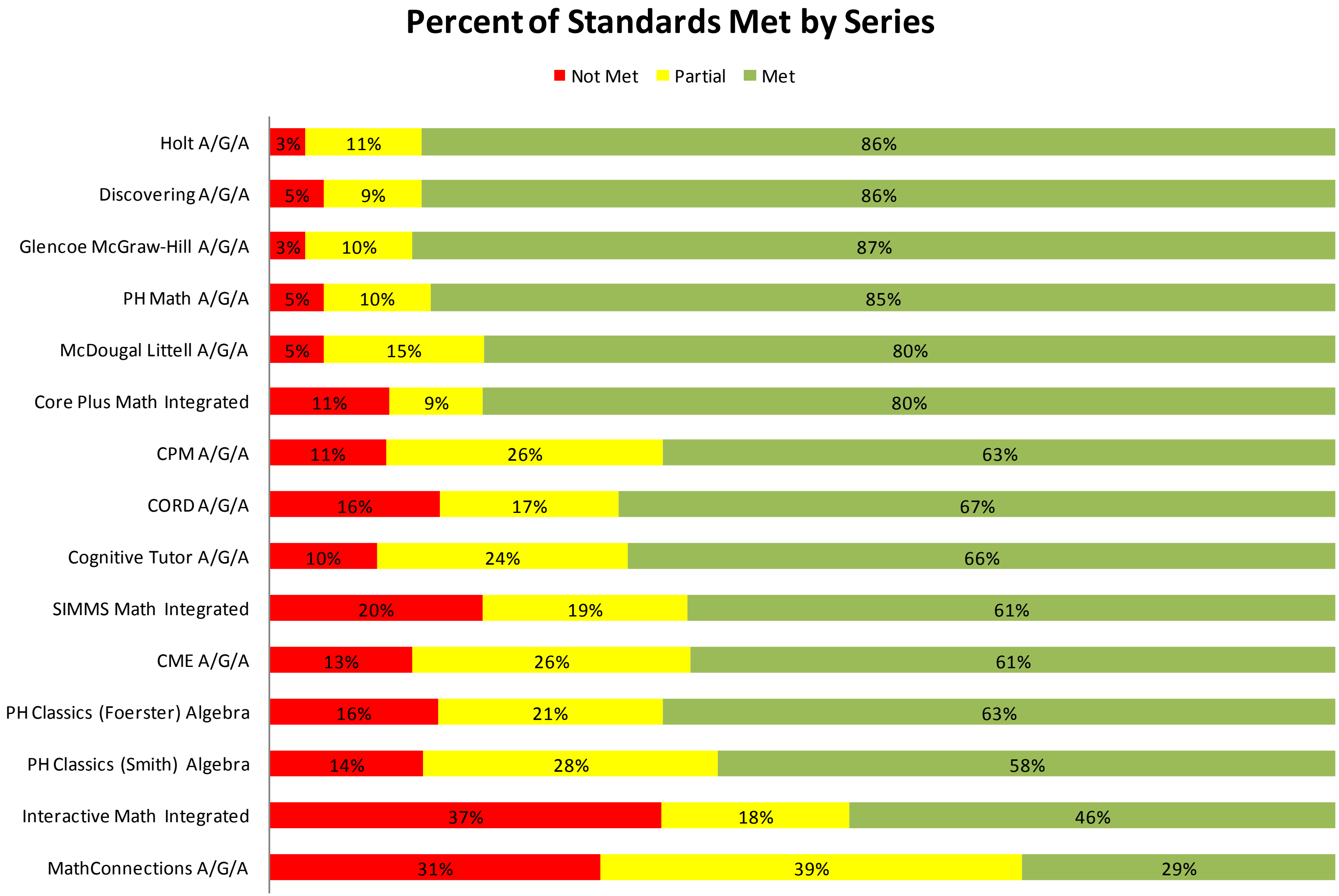

Figure 48. This chart shows the percent of standards for all publisher series, evaluated as a series, not as individual texts.

Appendix C. High School Mathematics Standards Organized by Courses

Traditional Sequence	Integrated Sequence						Performance Expectation
Algebra 1	**Math 1**		**Math 2**		**Math 3**		
A1.1.A	M1.1A	A1.1.A					Select and justify functions and equations to model and solve problems.
A1.1.B	M1.1.B	A1.1.B					Solve problems that can be represented by linear functions, equations, and inequalities.
A1.1.C	M1.1.C	A1.1.C					Solve problems that can be represented by a system of two linear equations or inequalities.
A1.1.D			M2.1.C	A1.1.D			Solve problems that can be represented by quadratic functions and equations. (see also A2.1.C)
A1.1.E	M1.1.D	A1.1.E	M2.1.D	A1.1.E			Solve problems that can be represented by exponential functions and equations.
A1.2.A	M1.6.A	A1.2.A					Know the relationship between real numbers and the number line, and compare and order real numbers with and without the number line.
A1.2.B	M1.6.C	A1.2.B					Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
A1.2.C	M1.7.C	A1.2.C					Interpret and use integer exponents and square and cube roots, and apply the laws and properties of exponents to simplify and evaluate exponential expressions.
A1.2.D	M1.6.B	A1.2.D					Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.
A1.2.E			M2.5.A	A1.2.E			Use algebraic properties to factor and combine like terms in polynomials.
A1.2.F					M3.6.C	A1.2.F	Add, subtract, multiply, and divide polynomials.
A1.3.A	M1.2.A	A1.3.A					Determine whether a relationship is a function and identify the domain, range, roots, and independent and dependent variables.
A1.3.B	M1.2.B	A1.3.B					Represent a function with a symbolic expression, as a graph, in a table, and using words, and make connections among these representations.
A1.3.C	M1.2.C	A1.3.C					Evaluate $f(x)$ at a (i.e., $f(a)$) and solve for x in the equation $f(x) = b$.
A1.4.A	M1.3.A	A1.4.A					Write and solve linear equations and inequalities in one variable.
A1.4.B	M1.3.D	A1.4.B					Write and graph an equation for a line given the slope and the y-intercept, the slope and a point on the line, or two points on the line, and translate between forms of linear equations.
A1.4.C	M1.3.C	A1.4.C					Identify and interpret the slope and intercepts of a linear function, including equations for parallel and perpendicular lines.

Traditional Sequence	Integrated Sequence						Performance Expectation
A1.4.D	M1.3.E	A1.4.D					Write and solve systems of two linear equations and inequalities in two variables.
A1.4.E	M1.3.B	A1.4.E					Describe how changes in the parameters of linear functions and functions containing an absolute value of a linear expression affect their graphs and the relationships they represent.
A1.5.A			M2.2.A	A1.5.A			Represent a quadratic function with a symbolic expression, as a graph, in a table, and with a description, and make connections among the representations.
A1.5.B			M2.2.B	A1.5.B			Sketch the graph of a quadratic function, describe the effects that changes in the parameters have on the graph, and interpret the x-intercepts as solutions to a quadratic equation.
A1.5.C			M2.2.D	A1.5.C			Solve quadratic equations that can be factored as $(ax + b)(cx + d)$ where a, b, c, and d are integers.
A1.5.D			M2.2.F	A1.5.D			Solve quadratic equations that have real roots by completing the square and by using the quadratic formula.
A1.6.A	M1.5.A	A1.6.A					Use and evaluate the accuracy of summary statistics to describe and compare data sets.
A1.6.B	M1.5.C	A1.6.B					Make valid inferences and draw conclusions based on data.
A1.6.C	M1.5.B	A1.6.C					Describe how linear transformations affect the center and spread of univariate data.
A1.6.D	M1.3.F	A1.6.D					Find the equation of a linear function that best fits bivariate data that are linearly related, interpret the slope and y-intercept of the line, and use the equation to make predictions.
A1.6.E	M1.3.G	A1.6.E					Describe the correlation of data in scatterplots in terms of strong or weak and positive or negative.
A1.7.A	M1.7.A	A1.7.A					Sketch the graph for an exponential function of the form $y = ab^n$ where n is an integer, describe the effects that changes in the parameters a and b have on the graph, and answer questions that arise in situations modeled by exponential functions.
A1.7.B	M1.7.B	A1.7.B					Find and approximate solutions to exponential equations.
A1.7.C	M1.7.D	A1.7.C					Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.
A1.7.D	M1.6.D	A1.7.D					Solve an equation involving several variables by expressing one variable in terms of the others.
A1.8.A	M1.8.A	A1.8.A					Analyze a problem situation and represent it mathematically.
A1.8.B	M1.8.B	A1.8.B					Select and apply strategies to solve problems.

Traditional Sequence	Integrated Sequence						Performance Expectation
A1.8.C	M1.8.C	A1.8.C					Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
A1.8.D	M1.8.D	A1.8.D					Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.
A1.8.E	M1.8.E	A1.8.E					Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
A1.8.F	M1.8.F	A1.8.F					Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
A1.8.G	M1.8.G	A1.8.G					Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.
A1.8.H					M3.8.H	A1.8.H	Use inductive reasoning about algebra and the properties of numbers to make conjectures, and use deductive reasoning to prove or disprove conjectures.

Traditional Sequence	**Integrated Sequence**						**Performance Expectation**
Geometry	**Math 1**		**Math 2**		**Math 3**		
G.1.A	M1.4.A	G.1.A					Distinguish between inductive and deductive reasoning.
G.1.B	M1.4.B	G.1.B					Use inductive reasoning to make conjectures, to test the plausibility of a geometric statement, and to help find a counterexample.
G.1.C	M1.4.C	G.1.C	M2.3.A	G.1.C			Use deductive reasoning to prove that a valid geometric statement is true.
G.1.D			M2.3.C	G.1.D			Write the converse, inverse, and contrapositive of a valid proposition and determine their validity.
G.1.E			M2.3.B	G.1.E			Identify errors or gaps in a mathematical argument and develop counterexamples to refute invalid statements about geometric relationships.
G.1.F			M2.3.D	G.1.F			Distinguish between definitions and undefined geometric terms and explain the role of definitions, undefined terms, postulates (axioms), and theorems.
G.2.A	M1.4.E	G.2.A					Know, prove, and apply theorems about parallel and perpendicular lines.
G.2.B	M1.4.F	G.2.B					Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.
G.2.C	M1.4.G	G.2.C					Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.
G.2.D					M3.5.A	G.2.D	Describe the intersections of lines in the plane and in space, of lines and planes, and of planes in space.
G.3.A			M2.3.E	G.3.A			Know, explain, and apply basic postulates and theorems about triangles and the special lines, line segments, and rays associated with a triangle.
G.3.B	M1.4.D	G.3.B	M2.3.F	G.3.B			Determine and prove triangle congruence, triangle similarity, and other properties of triangles.
G.3.C			M2.3.I	G.3.C			Use the properties of special right triangles (30°–60°–90° and 45°–45°–90°) to solve problems.
G.3.D			M2.3.G	G.3.D			Know, prove, and apply the Pythagorean Theorem and its converse.
G.3.E			M2.3.H	G.3.E			Solve problems involving the basic trigonometric ratios of sine, cosine, and tangent.
G.3.F			M2.3.J	G.3.F			Know, prove, and apply basic theorems about parallelograms.
G.3.G			M2.3.K	G.3.G			Know, prove, and apply theorems about properties of quadrilaterals and other polygons.
G.3.H					M3.7.A	G.3.H	Know, prove, and apply basic theorems relating circles to tangents, chords, radii, secants, and inscribed angles.
G.3.I					M3.7.C	G.3.I	Explain and perform constructions related to the circle.

Traditional Sequence	Integrated Sequence						Performance Expectation
G.3.J					M3.5.B	G.3.J	Describe prisms, pyramids, parallelepipeds, tetrahedra, and regular polyhedra in terms of their faces, edges, vertices, and properties.
G.3.K					M3.5.C	G.3.K	Analyze cross-sections of cubes, prisms, pyramids, and spheres and identify the resulting shapes.
G.4.A	M1.3.H	G.4.A					Determine the equation of a line in the coordinate plane that is described geometrically, including a line through two given points, a line through a given point parallel to a given line, and a line through a given point perpendicular to a given line.
G.4.B			M2.3.L	G.4.B			Determine the coordinates of a point that is described geometrically.
G.4.C			M2.3.M	G.4.C			Verify and apply properties of triangles and quadrilaterals in the coordinate plane.
G.4.D					M3.7.B	G.4.D	Determine the equation of a circle that is described geometrically in the coordinate plane and, given equations for a circle and a line, determine the coordinates of their intersection(s).
G.5.A					M3.2.A	G.5.A	Sketch results of transformations and compositions of transformations for a given two-dimensional figure on the coordinate plane, and describe the rule(s) for performing translations or for performing reflections about the coordinate axes or the line $y = x$.
G.5.B					M3.2.B	G.5.B	Determine and apply properties of transformations.
G.5.C					M3.2.C	G.5.C	Given two congruent or similar figures in a coordinate plane, describe a composition of translations, reflections, rotations, and dilations that superimposes one figure on the other.
G.5.D					M3.2.D	G.5.D	Describe the symmetries of two-dimensional figures and describe transformations, including reflections across a line and rotations about a point.
G.6.A					M3.7.D	G.6.A	Derive and apply formulas for arc length and area of a sector of a circle.
G.6.B					M3.5.F	G.6.B	Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.
G.6.C					M3.5.D	G.6.C	Apply formulas for surface area and volume of three-dimensional figures to solve problems.
G.6.D					M3.5.E	G.6.D	Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and three-dimensional figures.
G.6.E			M2.5.B	G.6.E			Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.
G.6.F			M2.5.C	G.6.F			Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Traditional Sequence	Integrated Sequence						Performance Expectation
G.7.A			M2.6.A	G.7.A			Analyze a problem situation and represent it mathematically.
G.7.B			M2.6.B	G.7.B			Select and apply strategies to solve problems.
G.7.C			M2.6.C	G.7.C			Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
G.7.D			M2.6.D	G.7.D			Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.
G.7.E			M2.6.E	G.7.E			Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
G.7.F			M2.6.F	G.7.F			Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
G.7.G			M2.6.G	G.7.G			Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.
G.7.H	M1.8.H	G.7.H	M2.6.H	G.7.H			Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.

Traditional Sequence	Integrated Sequence						Performance Expectation
Algebra 2	**Math 1**		**Math 2**		**Math 3**		
A2.1.A			M2.1.A	A2.1.A	M3.1.A	A2.1.A	Select and justify functions and equations to model and solve problems.
A2.1.B			M2.1.B	A2.1.B	M3.1.B	A2.1.B	Solve problems that can be represented by systems of equations and inequalities.
A2.1.C			M2.1.C	A2.1.C	M3.1.C	A2.1.C	Solve problems that can be represented by quadratic functions, equations, and inequalities.
A2.1.D					M3.1.D	A2.1.D	Solve problems that can be represented by exponential and logarithmic functions and equations.
A2.1.E					M3.1.E	A2.1.E	Solve problems that can be represented by inverse variations of the forms $f(x) = \frac{a}{x} + b$, $f(x) = \frac{a}{x^2} + b$, and $f(x) = \frac{a}{(bx+c)}$.
A2.1.F			M2.1.E	A2.1.F			Solve problems involving combinations and permutations.
A2.2.A					M3.6.A	A2.2.A	Explain how whole, integer, rational, real, and complex numbers are related, and identify the number system(s) within which a given algebraic equation can be solved.
A2.2.B					M3.6.B	A2.2.B	Use the laws of exponents to simplify and evaluate numeric and algebraic expressions that contain rational exponents.
A2.2.C					M3.6.D	A2.2.C	Add, subtract, multiply, divide, and simplify rational and more general algebraic expressions.
A2.3.A			M2.2.C	A2.3.A			Translate between the standard form of a quadratic function, the vertex form, and the factored form; graph and interpret the meaning of each form.
A2.3.B			M2.2.E	A2.3.B			Determine the number and nature of the roots of a quadratic function.
A2.3.C			M2.2.G	A2.3.C			Solve quadratic equations and inequalities, including equations with complex roots.
A2.4.A					M3.3.A	A2.4.A	Know and use basic properties of exponential and logarithmic functions and the inverse relationship between them.
A2.4.B					M3.3.B	A2.4.B	Graph an exponential function of the form $f(x) = ab^x$ and its inverse logarithmic function.
A2.4.C					M3.3.C	A2.4.C	Solve exponential and logarithmic equations.
A2.5.A					M3.2.E	A2.5.A	Construct new functions using the transformations $f(x - h)$, $f(x) + k$, $cf(x)$, and by adding and subtracting functions, and describe the effect on the original graph(s).
A2.5.B					M3.3.D	A2.5.B	Plot points, sketch, and describe the graphs of functions of the form $f(x) = a\sqrt{x-c} + d$, and solve related equations.

Traditional Sequence	Integrated Sequence						Performance Expectation
A2.5.C	M1.2.D	A2.5.C			M3.3.E	A2.5.C	Plot points, sketch, and describe the graphs of functions of the form $f(x)=\frac{a}{x}+b$, $f(x)=\frac{a}{x^2}+b$, and $f(x)=\frac{a}{(bx+c)}$, and solve related equations.
A2.5.D					M3.3.F	A2.5.D	Plot points, sketch, and describe the graphs of cubic polynomial functions of the form $f(x) = ax^3 + d$ as an example of higher order polynomials and solve related equations.
A2.6.A			M2.4.A	A2.6.A			Apply the fundamental counting principle and the ideas of order and replacement to calculate probabilities in situations arising from two-stage experiments (compound events).
A2.6.B			M2.4.B	A2.6.B			Given a finite sample space consisting of equally likely outcomes and containing events A and B, determine whether A and B are independent or dependent, and find the conditional probability of A given B.
A2.6.C			M2.4.C	A2.6.C			Compute permutations and combinations, and use the results to calculate probabilities.
A2.6.D			M2.4.D	A2.6.D			Apply the binomial theorem to solve problems involving probability.
A2.6.E			M2.2.H	A2.6.E			Determine if a bivariate data set can be better modeled with an exponential or a quadratic function and use the model to make predictions.
A2.6.F					M3.4.A	A2.6.F	Calculate and interpret measures of variability and standard deviation and use these measures and the characteristics of the normal distribution to describe and compare data sets.
A2.6.G					M3.4.B	A2.6.G	Calculate and interpret margin of error and confidence intervals for population proportions.
A2.7.A					M3.3.G	A2.7.A	Solve systems of three equations with three variables.
A2.7.B			M2.5.D	A2.7.B			Find the terms and partial sums of arithmetic and geometric series and the infinite sum for geometric series.
A2.8.A					M3.8.A	A2.8.A	Analyze a problem situation and represent it mathematically.
A2.8.B					M3.8.B	A2.8.B	Select and apply strategies to solve problems.
A2.8.C					M3.8.C	A2.8.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
A2.8.D					M3.8.D	A2.8.D	Generalize a solution strategy for a single problem to a class of related problems and apply a strategy for a class of related problems to solve specific problems.

Traditional Sequence	Integrated Sequence						Performance Expectation
A2.8.E					M3.8.E	A2.8.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
A2.8.F					M3.8.F	A2.8.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
A2.8.G					M3.8.G	A2.8.G	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.
A2.8.H					M3.8.H	A2.8.H	Use inductive reasoning and the properties of numbers to make conjectures, and use deductive reasoning to prove or disprove conjectures.

Appendix D. Review Instruments

This section shows the content of each of the high school review instruments: Part 1: Content/standards Alignment and Part 2: Other Factors.

Algebra 1		Date:	
Program:		Reviewer #:	

(Rate each item on the scale 0-not met, 1-limited content, 2-limited practice, 3-fully met)

A1.1. Core Content: Solving problems *(Algebra)*		**0**	**1**	**2**	**3**	**A2**	**Evidence**
A1.1.A	Select and justify functions and equations to model and solve problems.	○	○	○	○	◇	
A1.1.B	Solve problems that can be represented by linear functions, equations, and inequalities.	○	○	○	○	◇	
A1.1.C	Solve problems that can be represented by a system of two linear equations or inequalities.	○	○	○	○	◇	
A1.1.D	Solve problems that can be represented by quadratic functions and equations.	○	○	○	○	◇	
A1.1.E	Solve problems that can be represented by exponential functions and equations.	○	○	○	○	◇	

A1.2. Core Content: Numbers, expressions, and operations *(Numbers, Operations, Algebra)*		**0**	**1**	**2**	**3**	**A2**	**Evidence**
A1.2.A	Know the relationship between real numbers and the number line, and compare and order real numbers with and without the number line.	○	○	○	○	◇	
A1.2.B	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.	○	○	○	○	◇	
A1.2.C	Interpret and use integer exponents and square and cube roots, and apply the laws and properties of exponents to simplify and evaluate exponential expressions.	○	○	○	○	◇	
A1.2.D	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.	○	○	○	○	◇	
A1.2.E	Use algebraic properties to factor and combine like terms in polynomials.	○	○	○	○	◇	
A1.2.F	Add, subtract, multiply, and divide polynomials.	○	○	○	○	◇	

A1.3. Core Content: Characteristics and behaviors of functions *(Algebra)*		**0**	**1**	**2**	**3**	**A2**	**Evidence**
A1.3.A	Determine whether a relationship is a function and identify the domain, range, roots, and independent and dependent variables.	○	○	○	○	◇	
A1.3.B	Represent a function with a symbolic expression, as a graph, in a table, and using words, and make connections among these representations.	○	○	○	○	◇	
A1.3.C	Evaluate $f(x)$ at a (i.e., $f(a)$) and solve for x in the equation $f(x) = b$.	○	○	○	○	◇	

A1.4. Core Content: Linear functions, equations, and inequalities *(Algebra)*		0	1	2	3	A2	Evidence
A1.4.A	Write and solve linear equations and inequalities in one variable.	○	○	○	○	◇	
A1.4.B	Write and graph an equation for a line given the slope and the *y*-intercept, the slope and a point on the line, or two points on the line, and translate between forms of linear equations.	○	○	○	○	◇	
A1.4.C	Identify and interpret the slope and intercepts of a linear function, including equations for parallel and perpendicular lines.	○	○	○	○	◇	
A1.4.D	Write and solve systems of two linear equations and inequalities in two variables.	○	○	○	○	◇	
A1.4.E	Describe how changes in the parameters of linear functions and functions containing an absolute value of a linear expression affect their graphs and the relationships they represent.	○	○	○	○	◇	

A1.5. Core Content: Quadratic functions and equations *(Algebra)*		0	1	2	3	A2	Evidence
A1.5.A	Represent a quadratic function with a symbolic expression, as a graph, in a table, and with a description, and make connections among the representations.	○	○	○	○	◇	
A1.5.B	Sketch the graph of a quadratic function, describe the effects that changes in the parameters have on the graph, and interpret the *x*-intercepts as solutions to a quadratic equation.	○	○	○	○	◇	
A1.5.C	Solve quadratic equations that can be factored as $(ax + b)(cx + d)$ where *a, b, c*, and *d* are integers.	○	○	○	○	◇	
A1.5.D	Solve quadratic equations that have real roots by completing the square and by using the quadratic formula.	○	○	○	○	◇	

A1.6. Core Content: Data and distributions *(Data/Statistics/Probability)*		0	1	2	3	A2	Evidence
A1.6.A	Use and evaluate the accuracy of summary statistics to describe and compare data sets.	○	○	○	○	◇	
A1.6.B	Make valid inferences and draw conclusions based on data.	○	○	○	○	◇	
A1.6.C	Describe how linear transformations affect the center and spread of univariate data.	○	○	○	○	◇	
A1.6.D	Find the equation of a linear function that best fits bivariate data that are linearly related, interpret the slope and *y*-intercept of the line, and use the equation to make predictions.	○	○	○	○	◇	
A1.6.E	Describe the correlation of data in scatterplots in terms of strong or weak and positive or negative.	○	○	○	○	◇	

A1.7. Additional Key Content *(Algebra)*		0	1	2	3	A2	Evidence
A1.7.A	Sketch the graph for an exponential function of the form $y = ab^n$ where *n* is an integer, describe the effects that changes in the parameters *a* and *b* have on the graph, and answer questions that arise in situations modeled by exponential functions.	○	○	○	○	◇	
A1.7.B	Find and approximate solutions to exponential equations.	○	○	○	○	◇	
A1.7.C	Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.	○	○	○	○	◇	
A1.7.D	Solve an equation involving several variables by expressing one variable in terms of the others.	○	○	○	○	◇	

A1.8. Core Processes: Reasoning, problem solving, and communication		0	1	2	3	A2	Evidence
A1.8.A	Analyze a problem situation and represent it mathematically.	○	○	○	○	◇	
A1.8.B	Select and apply strategies to solve problems.	○	○	○	○	◇	
A1.8.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.	○	○	○	○	◇	
A1.8.D	Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.	○	○	○	○	◇	
A1.8.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.	○	○	○	○	◇	
A1.8.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.	○	○	○	○	◇	
A1.8.G	Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.	○	○	○	○	◇	
A1.8.H	Use inductive reasoning about algebra and the properties of numbers to make conjectures, and use deductive reasoning to prove or disprove conjectures.	○	○	○	○	◇	

Geometry		Date:	
Program:		Reviewer #:	

(Rate each item on the scale 0-not met, 1-limited content, 2-limited practice, 3-fully met)

G.1. Core Content: Logical arguments and proofs *(Logic)*		**0**	**1**	**2**	**3**	**Evidence**
G.1.A	Distinguish between inductive and deductive reasoning.	○	○	○	○	
G.1.B	Use inductive reasoning to make conjectures, to test the plausibility of a geometric statement, and to help find a counterexample.	○	○	○	○	
G.1.C	Use deductive reasoning to prove that a valid geometric statement is true.	○	○	○	○	
G.1.D	Write the converse, inverse, and contrapositive of a valid proposition and determine their validity.	○	○	○	○	
G.1.E	Identify errors or gaps in a mathematical argument and develop counterexamples to refute invalid statements about geometric relationships.	○	○	○	○	
G.1.F	Distinguish between definitions and undefined geometric terms and explain the role of definitions, undefined terms, postulates (axioms), and theorems.	○	○	○	○	

G.2. Core Content: Lines and angles *(Geometry/Measurement)*		**0**	**1**	**2**	**3**	**Evidence**
G.2.A	Know, prove, and apply theorems about parallel and perpendicular lines.	○	○	○	○	
G.2.B	Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.	○	○	○	○	
G.2.C	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.	○	○	○	○	
G.2.D	Describe the intersections of lines in the plane and in space, of lines and planes, and of planes in space.	○	○	○	○	

G.3. Core Content: Two- and three-dimensional figures *(Geometry/Measurement)*		0	1	2	3	Evidence
G.3.A	Know, explain, and apply basic postulates and theorems about triangles and the special lines, line segments, and rays associated with a triangle.	○	○	○	○	
G.3.B	Determine and prove triangle congruence, triangle similarity, and other properties of triangles.	○	○	○	○	
G.3.C	Use the properties of special right triangles (30°–60°–90° and 45°–45°–90°) to solve problems.	○	○	○	○	
G.3.D	Know, prove, and apply the Pythagorean Theorem and its converse.	○	○	○	○	
G.3.E	Solve problems involving the basic trigonometric ratios of sine, cosine, and tangent.	○	○	○	○	
G.3.F	Know, prove, and apply basic theorems about parallelograms.	○	○	○	○	
G.3.G	Know, prove, and apply theorems about properties of quadrilaterals and other polygons.	○	○	○	○	
G.3.H	Know, prove, and apply basic theorems relating circles to tangents, chords, radii, secants, and inscribed angles.	○	○	○	○	
G.3.I	Explain and perform constructions related to the circle.	○	○	○	○	
G.3.J	Describe prisms, pyramids, parallelepipeds, tetrahedra, and regular polyhedra in terms of their faces, edges, vertices, and properties.	○	○	○	○	
G.3.K	Analyze cross-sections of cubes, prisms, pyramids, and spheres and identify the resulting shapes.	○	○	○	○	

G.4. Core Content: Geometry in the coordinate plane *(Geometry/Measurement, Algebra)*		0	1	2	3	Evidence
G.4.A	Determine the equation of a line in the coordinate plane that is described geometrically, including a line through two given points, a line through a given point parallel to a given line, and a line through a given point perpendicular to a given line.	○	○	○	○	
G.4.B	Determine the coordinates of a point that is described geometrically.	○	○	○	○	
G.4.C	Verify and apply properties of triangles and quadrilaterals in the coordinate plane.	○	○	○	○	
G.4.D	Determine the equation of a circle that is described geometrically in the coordinate plane and, given equations for a circle and a line, determine the coordinates of their intersection(s).	○	○	○	○	

G.5. Core Content: Geometric transformations *(Geometry/Measurement)*		0	1	2	3	Evidence
G.5.A	Sketch results of transformations and compositions of transformations for a given two-dimensional figure on the coordinate plane, and describe the rule(s) for performing translations or for performing reflections about the coordinate axes or the line $y = x$.	○	○	○	○	
G.5.B	Determine and apply properties of transformations.	○	○	○	○	
G.5.C	Given two congruent or similar figures in a coordinate plane, describe a composition of translations, reflections, rotations, and dilations that superimposes one figure on the other.	○	○	○	○	
G.5.D	Describe the symmetries of two-dimensional figures and describe transformations, including reflections across a line and rotations about a point.	○	○	○	○	

G.6. Additional Key Content *(Measurement)*		0	1	2	3	Evidence
G.6.A	Derive and apply formulas for arc length and area of a sector of a circle.	○	○	○	○	
G.6.B	Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.	○	○	○	○	
G.6.C	Apply formulas for surface area and volume of three-dimensional figures to solve problems.	○	○	○	○	
G.6.D	Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and three-dimensional figures.	○	○	○	○	
G.6.E	Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.	○	○	○	○	
G.6.F	Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.	○	○	○	○	

G.7. Core Processes: Reasoning, problem solving, and communication		0	1	2	3	Evidence
G.7.A	Analyze a problem situation and represent it mathematically.	○	○	○	○	
G.7.B	Select and apply strategies to solve problems.	○	○	○	○	
G.7.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.	○	○	○	○	
G.7.D	Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.	○	○	○	○	
G.7.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.	○	○	○	○	
G.7.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.	○	○	○	○	
G.7.G	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.	○	○	○	○	
G.7.H	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.	○	○	○	○	

Algebra 2		Date:	
Program:		Reviewer #:	

(Rate each item on the scale 0-not met, 1-limited content, 2-limited practice, 3-fully met)

A2.1. Core Content: Solving problems		**0**	**1**	**2**	**3**	**A1**	**Evidence**
A2.1.A	Select and justify functions and equations to model and solve problems.	○	○	○	○	◇	
A2.1.B	Solve problems that can be represented by systems of equations and inequalities.	○	○	○	○	◇	
A2.1.C	Solve problems that can be represented by quadratic functions, equations, and inequalities.	○	○	○	○	◇	
A2.1.D	Solve problems that can be represented by exponential and logarithmic functions and equations.	○	○	○	○	◇	
A2.1.E	Solve problems that can be represented by inverse variations of the forms $f(x)=a/x+b$, $f(x) =a/x^2+ b$, and $f(x) = a/(bx + c)$.	○	○	○	○	◇	
A2.1.F	Solve problems involving combinations and permutations.	○	○	○	○	◇	

A2.2. Core Content: Numbers, expressions, and operations *(Numbers, Operations, Algebra)*		**0**	**1**	**2**	**3**	**A1**	**Evidence**
A2.2.A	Explain how whole, integer, rational, real, and complex numbers are related, and identify the number system(s) within which a given algebraic equation can be solved.	○	○	○	○	◇	
A2.2.B	Use the laws of exponents to simplify and evaluate numeric and algebraic expressions that contain rational exponents.	○	○	○	○	◇	
A2.2.C	Add, subtract, multiply, divide, and simplify rational and more general algebraic expressions.	○	○	○	○	◇	

A2.3. Core Content: Quadratic functions and equations *(Algebra)*		**0**	**1**	**2**	**3**	**A1**	**Evidence**
A2.3.A	Translate between the standard form of a quadratic function, the vertex form, and the factored form; graph and interpret the meaning of each form.	○	○	○	○	◇	
A2.3.B	Determine the number and nature of the roots of a quadratic function.	○	○	○	○	◇	
A2.3.C	Solve quadratic equations and inequalities, including equations with complex roots.	○	○	○	○	◇	

A2.4. Core Content: Exponential and logarithmic functions and equations *(Algebra)*		**0**	**1**	**2**	**3**	**A1**	**Evidence**
A2.4.A	Know and use basic properties of exponential and logarithmic functions and the inverse relationship between them.	○	○	○	○	◇	
A2.4.B	Graph an exponential function of the form $f(x) = ab^x$ and its inverse logarithmic function.	○	○	○	○	◇	
A2.4.C	Solve exponential and logarithmic equations.	○	○	○	○	◇	

A2.5. Core Content: Additional functions and equations *(Algebra)*		**0**	**1**	**2**	**3**	**A1**	**Evidence**
A2.5.A	Construct new functions using the transformations $f(x – h)$, $f(x) + k$, $cf(x)$, and by adding and subtracting functions, and describe the effect on the original graph(s).	○	○	○	○	◇	
A2.5.B	Plot points, sketch, and describe the graphs of functions of the form $f(x) = a\sqrt{}(x - c) + d$, and solve related equations.	○	○	○	○	◇	
A2.5.C	Plot points, sketch, and describe the graphs of functions of the form $f(x) = a/x + b$, $f(x) = a/x^2 + b$, and $f(x) = a/(bx + c)$, and solve related equations.	○	○	○	○	◇	
A2.5.D	Plot points, sketch, and describe the graphs of cubic polynomial functions of the form $f(x) = ax^3 + d$ as an example of higher order polynomials and solve related equations.	○	○	○	○	◇	

A2.6. Core Content: Probability, data, and distributions *(Data/Statistics/Probability)*		**0**	**1**	**2**	**3**	**A1**	**Evidence**
A2.6.A	Apply the fundamental counting principle and the ideas of order and replacement to calculate probabilities in situations arising from two-stage experiments (compound events).	○	○	○	○	◇	
A2.6.B	Given a finite sample space consisting of equally likely outcomes and containing events A and B, determine whether A and B are independent or dependent, and find the conditional probability of A given B.	○	○	○	○	◇	
A2.6.C	Compute permutations and combinations, and use the results to calculate probabilities.	○	○	○	○	◇	
A2.6.D	Apply the binomial theorem to solve problems involving probability.	○	○	○	○	◇	
A2.6.E	Determine if a bivariate data set can be better modeled with an exponential or a quadratic function and use the model to make predictions.	○	○	○	○	◇	
A2.6.F	Calculate and interpret measures of variability and standard deviation and use these measures and the characteristics of the normal distribution to describe and compare data sets.	○	○	○	○	◇	
A2.6.G	Calculate and interpret margin of error and confidence intervals for population proportions.	○	○	○	○	◇	

A2.7. Additional Key Content *(Algebra)*		**0**	**1**	**2**	**3**	**A1**	**Evidence**
A2.7.A	Solve systems of three equations with three variables.	○	○	○	○	◇	
A2.7.B	Find the terms and partial sums of arithmetic and geometric series and the infinite sum for geometric series.	○	○	○	○	◇	

A2.8. Core Processes: Reasoning, problem solving, and communication		0	1	2	3	A1	Evidence
A2.8.A	Analyze a problem situation and represent it mathematically.	○	○	○	○	◇	
A2.8.B	Select and apply strategies to solve problems.	○	○	○	○	◇	
A2.8.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.	○	○	○	○	◇	
A2.8.D	Generalize a solution strategy for a single problem to a class of related problems and apply a strategy for a class of related problems to solve specific problems.	○	○	○	○	◇	
A2.8.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.	○	○	○	○	◇	
A2.8.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.	○	○	○	○	◇	
A2.8.G	Use inductive reasoning and the properties of numbers to make conjectures, and use deductive reasoning to prove or disprove conjectures.	○	○	○	○	◇	
A2.8.H	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.	○	○	○	○	◇	

Mathematics 1		Date:	
Program:		Reviewer #:	

(Rate each item on the scale 0-not met, 1-limited content, 2-limited practice, 3-fully met)

M1.1. Core Content: Solving problems *(Algebra)*		0	1	2	3	M2	M3	Evidence
M1.1.A	Select and justify functions and equations to model and solve problems.	○	○	○	○	◇	◇	
M1.1.B	Solve problems that can be represented by linear functions, equations, and inequalities.	○	○	○	○	◇	◇	
M1.1.C	Solve problems that can be represented by a system of two linear equations or inequalities.	○	○	○	○	◇	◇	
M1.1.D	Solve problems that can be represented by exponential functions and equations.	○	○	○	○	◇	◇	

M1.2. Core Content: Characteristics and behaviors of functions *(Algebra)*		0	1	2	3	M2	M3	Evidence
M1.2.A	Determine whether a relationship is a function and identify the domain, range, roots, and independent and dependent variables.	○	○	○	○	◇	◇	
M1.2.B	Represent a function with a symbolic expression, as a graph, in a table, and using words, and make connections among these representations.	○	○	○	○	◇	◇	
M1.2.C	Evaluate $f(x)$ at a (i.e., $f(a)$) and solve for x in the equation $f(x) = b$.	○	○	○	○	◇	◇	
M1.2.D	Plot points, sketch, and describe the graphs of functions of the form $f(x) = a/x + b$.	○	○	○	○	◇	◇	

M1.3 Core Cont.: Linear funcs., equations, and relationships *(Alg., Geom./Meas., Data/Stats./Prob.)*		0	1	2	3	M2	M3	Evidence
M1.3.A	Write and solve linear equations and inequalities in one variable.	○	○	○	○	◇	◇	
M1.3.B	Describe how changes in the parameters of linear functions and functions containing an absolute value of a linear expression affect their graphs and the relationships they represent.	○	○	○	○	◇	◇	
M1.3.C	Identify and interpret the slope and intercepts of a linear function, including equations for parallel and perpendicular lines.	○	○	○	○	◇	◇	
M1.3.D	Write and graph an equation for a line given the slope and the y-intercept, the slope and a point on the line, or two points on the line, and translate between forms of linear equations.	○	○	○	○	◇	◇	
M1.3.E	Write and solve systems of two linear equations and inequalities in two variables.	○	○	○	○	◇	◇	
M1.3.F	Find the equation of a linear function that best fits bivariate data that are linearly related, interpret the slope and y-intercept of the line, and use the equation to make predictions.	○	○	○	○	◇	◇	
M1.3.G	Describe the correlation of data in scatterplots in terms of strong or weak and positive or negative.	○	○	○	○	◇	◇	
M1.3.H	Determine the equation of a line in the coordinate plane that is described geometrically, including a line through two given points, a line through a given point parallel to a given line, and a line through a given point perpendicular to a given line.	○	○	○	○	◇	◇	

M1.4. Core Content: Proportionality, similarity, and geometric reasoning *(Geometry/Measurement)*		**0**	**1**	**2**	**3**	**M2**	**M3**	**Evidence**
M1.4.A	Distinguish between inductive and deductive reasoning.	○	○	○	○	◇	◇	
M1.4.B	Use inductive reasoning to make conjectures, to test the plausibility of a geometric statement, and to help find a counterexample.	○	○	○	○	◇	◇	
M1.4.C	Use deductive reasoning to prove that a valid geometric statement is true.	○	○	○	○	◇	◇	
M1.4.D	Determine and prove triangle similarity.	○	○	○	○	◇	◇	
M1.4.E	Know, prove, and apply theorems about parallel and perpendicular lines.	○	○	○	○	◇	◇	
M1.4.F	Know, prove, and apply theorems about angles, including angles that arise from parallel lines intersected by a transversal.	○	○	○	○	◇	◇	
M1.4.G	Explain and perform basic compass and straightedge constructions related to parallel and perpendicular lines.	○	○	○	○	◇	◇	

M1.5. Core Content: Data and distributions *(Data/Statistics/Probability)*		**0**	**1**	**2**	**3**	**M2**	**M3**	**Evidence**
M1.5.A	Use and evaluate the accuracy of summary statistics to describe and compare data sets.	○	○	○	○	◇	◇	
M1.5.B	Describe how linear transformations affect the center and spread of univariate data.	○	○	○	○	◇	◇	
M1.5.C	Make valid inferences and draw conclusions based on data.	○	○	○	○	◇	◇	

M1.6. Core Content: Numbers, expressions, and operations *(Numbers, Operations, Algebra)*		**0**	**1**	**2**	**3**	**M2**	**M3**	**Evidence**
M1.6.A	Know the relationship between real numbers and the number line, and compare and order real numbers with and without the number line.	○	○	○	○	◇	◇	
M1.6.B	Determine whether approximations or exact values of real numbers are appropriate, depending on the context, and justify the selection.	○	○	○	○	◇	◇	
M1.6.C	Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.	○	○	○	○	◇	◇	
M1.6.D	Solve an equation involving several variables by expressing one variable in terms of the others.	○	○	○	○	◇	◇	

M1.7. Additional Key Content *(Numbers, Algebra)*		**0**	**1**	**2**	**3**	**M2**	**M3**	**Evidence**
M1.7.A	Sketch the graph for an exponential function of the form $y = ab^n$ where n is an integer, describe the effects that changes in the parameters a and b have on the graph, and answer questions that arise in situations modeled by exponential functions.	○	○	○	○	◇	◇	
M1.7.B	Find and approximate solutions to exponential equations.	○	○	○	○	◇	◇	
M1.7.C	Interpret and use integer exponents and square and cube roots, and apply the laws and properties of exponents to simplify and evaluate exponential expressions.	○	○	○	○	◇	◇	
M1.7.D	Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.	○	○	○	○	◇	◇	

M1.8. Core Processes: Reasoning, problem solving, and communication		0	1	2	3	M2	M3	Evidence
M1.8.A	Analyze a problem situation and represent it mathematically.	○	○	○	○	◇	◇	
M1.8.B	Select and apply strategies to solve problems.	○	○	○	○	◇	◇	
M1.8.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.	○	○	○	○	◇	◇	
M1.8.D	Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.	○	○	○	○	◇	◇	
M1.8.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.	○	○	○	○	◇	◇	
M1.8.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.	○	○	○	○	◇	◇	
M1.8.G	Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.	○	○	○	○	◇	◇	
M1.8.H	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.	○	○	○	○	◇	◇	

Mathematics 2		Date:	
Program:		Reviewer #:	

(Rate each item on the scale 0-not met, 1-limited content, 2-limited practice, 3-fully met)

M2.1. Core Content: Modeling situations and solving problems *(Algebra)*		**0**	**1**	**2**	**3**	**M1**	**M3**	**Evidence**
M2.1.A	Select and justify functions and equations to model and solve problems.	○	○	○	○	◇	◇	
M2.1.B	Solve problems that can be represented by systems of equations and inequalities.	○	○	○	○	◇	◇	
M2.1.C	Solve problems that can be represented by quadratic functions, equations, and inequalities.	○	○	○	○	◇	◇	
M2.1.D	Solve problems that can be represented by exponential functions and equations.	○	○	○	○	◇	◇	
M2.1.E	Solve problems involving combinations and permutations.	○	○	○	○	◇	◇	

M2.2. Core Content: Quadratic functions, equations, and relationships *(Algebra)*		**0**	**1**	**2**	**3**	**M1**	**M3**	**Evidence**
M2.2.A	Represent a quadratic function with a symbolic expression, as a graph, in a table, and with a description, and make connections among the representations.	○	○	○	○	◇	◇	
M2.2.B	Sketch the graph of a quadratic function, describe the effects that changes in the parameters have on the graph, and interpret the x-intercepts as solutions to a quadratic equation.	○	○	○	○	◇	◇	
M2.2.C	Translate between the standard form of a quadratic function, the vertex form, and the factored form; graph and interpret the meaning of each form.	○	○	○	○	◇	◇	
M2.2.D	Solve quadratic equations that can be factored as $(ax + b)(cx + d)$ where $a, b, c,$ and d are integers.	○	○	○	○	◇	◇	
M2.2.E	Determine the number and nature of the roots of a quadratic function.	○	○	○	○	◇	◇	
M2.2.F	Solve quadratic equations that have real roots by completing the square and by using the quadratic formula.	○	○	○	○	◇	◇	
M2.2.G	Solve quadratic equations and inequalities, including equations with complex roots.	○	○	○	○	◇	◇	
M2.2.H	Determine if a bivariate data set can be better modeled with an exponential or a quadratic function and use the model to make predictions.	○	○	○	○	◇	◇	

M2.3. Core Content: Conjectures and proofs *(Algebra, Geometry/Measurement)*		0	1	2	3	M1	M3	Evidence
M2.3.A	Use deductive reasoning to prove that a valid geometric statement is true.	○	○	○	○	◇	◇	
M2.3.B	Identify errors or gaps in a mathematical argument and develop counterexamples to refute invalid statements about geometric relationships.	○	○	○	○	◇	◇	
M2.3.C	Write the converse, inverse, and contrapositive of a valid proposition and determine their validity.	○	○	○	○	◇	◇	
M2.3.D	Distinguish between definitions and undefined geometric terms and explain the role of definitions, undefined terms, postulates (axioms), and theorems.	○	○	○	○	◇	◇	
M2.3.E	Know, explain, and apply basic postulates and theorems about triangles and the special lines, line segments, and rays associated with a triangle.	○	○	○	○	◇	◇	
M2.3.F	Determine and prove triangle congruence and other properties of triangles.	○	○	○	○	◇	◇	
M2.3.G	Know, prove, and apply the Pythagorean Theorem and its converse.	○	○	○	○	◇	◇	

M2.3.H	Solve problems involving the basic trigonometric ratios of sine, cosine, and tangent.	○	○	○	○	◇	◇	
M2.3.I	Use the properties of special right triangles (30°–60°–90° and 45°– 45°–90°) to solve problems.	○	○	○	○	◇	◇	
M2.3.J	Know, prove, and apply basic theorems about parallelograms.	○	○	○	○	◇	◇	
M2.3.K	Know, prove, and apply theorems about properties of quadrilaterals and other polygons.	○	○	○	○	◇	◇	
M2.3.L	Determine the coordinates of a point that is described geometrically.	○	○	○	○	◇	◇	
M2.3.M	Verify and apply properties of triangles and quadrilaterals in the coordinate plane.	○	○	○	○	◇	◇	

M2.4. Core Content: Probability *(Data/Statistics/Probability)*		**0**	**1**	**2**	**3**	**M1**	**M3**	**Evidence**
M2.4.A	Apply the fundamental counting principle and the ideas of order and replacement to calculate probabilities in situations arising from two-stage experiments (compound events).	○	○	○	○	◇	◇	
M2.4.B	Given a finite sample space consisting of equally likely outcomes and containing events A and B, determine whether A and B are independent or dependent, and find the conditional probability of A given B.	○	○	○	○	◇	◇	
M2.4.C	Compute permutations and combinations, and use the results to calculate probabilities.	○	○	○	○	◇	◇	
M2.4.D	Apply the binomial theorem to solve problems involving probability.	○	○	○	○	◇	◇	

M2.5. Additional Key Content *(Algebra, Measurement)*		**0**	**1**	**2**	**3**	**M1**	**M3**	**Evidence**
M2.5.A	Use algebraic properties to factor and combine like terms in polynomials.	○	○	○	○	◇	◇	
M2.5.B	Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.	○	○	○	○	◇	◇	
M2.5.C	Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.	○	○	○	○	◇	◇	
M2.5.D	Find the terms and partial sums of arithmetic and geometric series and the infinite sum for geometric series.	○	○	○	○	◇	◇	

M2.6. Core Processes: Reasoning, problem solving, and communication		0	1	2	3	M1	M3	Evidence
M2.6.A	Analyze a problem situation and represent it mathematically.	○	○	○	○	◇	◇	
M2.6.B	Select and apply strategies to solve problems.	○	○	○	○	◇	◇	
M2.6.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.	○	○	○	○	◇	◇	
M2.6.D	Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.	○	○	○	○	◇	◇	
M2.6.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.	○	○	○	○	◇	◇	
M2.6.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.	○	○	○	○	◇	◇	
M2.6.G	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.	○	○	○	○	◇	◇	
M2.6.H	Use inductive reasoning to make conjectures, and use deductive reasoning to prove or disprove conjectures.	○	○	○	○	◇	◇	

Mathematics 3		Date:	
Program:		Reviewer #:	

(Rate each item on the scale 0-not met, 1-limited content, 2-limited practice, 3-fully met)								
M3.1. Core Content: Solving problems *(Algebra)*		**0**	**1**	**2**	**3**	**M1**	**M2**	**Evidence**
M3.1.A	Select and justify functions and equations to model and solve problems.	○	○	○	○	◇	◇	
M3.1.B	Solve problems that can be represented by systems of equations and inequalities.	○	○	○	○	◇	◇	
M3.1.C	Solve problems that can be represented by quadratic functions, equations, and inequalities.	○	○	○	○	◇	◇	
M3.1.D	Solve problems that can be represented by exponential and logarithmic functions and equations.	○	○	○	○	◇	◇	
M3.1.E	Solve problems that can be represented by inverse variations of the forms $f(x) = a/x + b$, $f(x) = a/x^2 + b$, and $f(x) = a/(bx + c)$.	○	○	○	○	◇	◇	

M3.2. Core Content: Transformations and functions *(Algebra, Geometry/Measurement)*		**0**	**1**	**2**	**3**	**M1**	**M2**	**Evidence**
M3.2.A	Sketch results of transformations and compositions of transformations for a given two-dimensional figure on the coordinate plane, and describe the rule(s) for performing translations or for performing reflections about the coordinate axes or the line $y = x$.	○	○	○	○	◇	◇	
M3.2.B	Determine and apply properties of transformations.	○	○	○	○	◇	◇	
M3.2.C	Given two congruent or similar figures in a coordinate plane, describe a composition of translations, reflections, rotations, and dilations that superimposes one figure on the other.	○	○	○	○	◇	◇	
M3.2.D	Describe the symmetries of two-dimensional figures and describe transformations, including reflections across a line and rotations about a point.	○	○	○	○	◇	◇	
M3.2.E	Construct new functions using the transformations $f(x – h)$, $f(x) + k$, $cf(x)$, and by adding and subtracting functions, and describe the effect on the original graph(s).	○	○	○	○	◇	◇	

M3.3. Core Content: Functions and modeling *(Algebra)*		**0**	**1**	**2**	**3**	**M1**	**M2**	**Evidence**
M3.3.A	Know and use basic properties of exponential and logarithmic functions and the inverse relationship between them.	○	○	○	○	◇	◇	
M3.3.B	Graph an exponential function of the form $f(x) = ab^x$ and its inverse logarithmic function.	○	○	○	○	◇	◇	
M3.3.C	Solve exponential and logarithmic equations.	○	○	○	○	◇	◇	
M3.3.D	Plot points, sketch, and describe the graphs of functions of the form $f(x) = a\surd(x – c) + d$, and solve related equations.	○	○	○	○	◇	◇	
M3.3.E	Plot points, sketch, and describe the graphs of functions of the form $f(x) = a/x^2 + b$ and $f(x) = a/(bx + c)$, and solve related equations.	○	○	○	○	◇	◇	
M3.3.F	Plot points, sketch, and describe the graphs of cubic polynomial functions of the form $f(x) = ax^3 + d$ as an example of higher order polynomials and solve related equations.	○	○	○	○	◇	◇	
M3.3.G	Solve systems of three equations with three variables.	○	○	○	○	◇	◇	

M3.4. Core Content: Quantifying variability *(Data/Statistics/Probability)*		**0**	**1**	**2**	**3**	**M1**	**M2**	**Evidence**
M3.4.A	Calculate and interpret measures of variability and std. deviation and use these measures and the characteristics of the normal distribution to describe and compare data sets.	○	○	○	○	◇	◇	
M3.4.B	Calculate and interpret margin of error and confidence intervals for population proportions.	○	○	○	○	◇	◇	

M3.5. Core Content: Three-dimensional geometry *(Geometry/Measurement)*		**0**	**1**	**2**	**3**	**M1**	**M2**	**Evidence**
M3.5.A	Describe the intersections of lines in the plane and in space, of lines and planes, and of planes in space.	○	○	○	○	◇	◇	
M3.5.B	Describe prisms, pyramids, parallelepipeds, tetrahedra, and regular polyhedra in terms of their faces, edges, vertices, and properties.	○	○	○	○	◇	◇	
M3.5.C	Analyze cross-sections of cubes, prisms, pyramids, and spheres and identify the resulting shapes.	○	○	○	○	◇	◇	
M3.5.D	Apply formulas for surface area and volume of three-dimensional figures to solve problems.	○	○	○	○	◇	◇	
M3.5.E	Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and three-dimensional figures.	○	○	○	○	◇	◇	
M3.5.F	Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.	○	○	○	○	◇	◇	

M3.6. Core Content: Algebraic properties *(Numbers, Algebra)*		**0**	**1**	**2**	**3**	**M1**	**M2**	**Evidence**
M3.6.A	Explain how whole, integer, rational, real, and complex numbers are related, and identify the number system(s) within which a given algebraic equation can be solved.	○	○	○	○	◇	◇	
M3.6.B	Use the laws of exponents to simplify and evaluate numeric and algebraic expressions that contain rational exponents.	○	○	○	○	◇	◇	
M3.6.C	Add, subtract, multiply, and divide polynomials.	○	○	○	○	◇	◇	
M3.6.D	Add, subtract, multiply, divide, and simplify rational and more general algebraic expressions.	○	○	○	○	◇	◇	

M3.7. Additional Key Content *(Geometry/Measurement)*		**0**	**1**	**2**	**3**	**M1**	**M2**	**Evidence**
M3.7.A	Know, prove, and apply basic theorems relating circles to tangents, chords, radii, secants, and inscribed angles.	○	○	○	○	◇	◇	
M3.7.B	Determine the equation of a circle that is described geometrically in the coordinate plane and, given equations for a circle and a line, determine the coordinates of their intersection(s).	○	○	○	○	◇	◇	
M3.7.C	Explain and perform constructions related to the circle.	○	○	○	○	◇	◇	
M3.7.D	Derive and apply formulas for arc length and area of a sector of a circle.	○	○	○	○	◇	◇	

M3.8. Core Processes: Reasoning, problem solving, and communication		0	1	2	3	M1	M2	Evidence
M3.8.A	Analyze a problem situation and represent it mathematically.	○	○	○	○	◇	◇	
M3.8.B	Select and apply strategies to solve problems.	○	○	○	○	◇	◇	
M3.8.C	Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.	○	○	○	○	◇	◇	
M3.8.D	Generalize a solution strategy for a single problem to a class of related problems and apply a strategy for a class of related problems to solve specific problems.	○	○	○	○	◇	◇	
M3.8.E	Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.	○	○	○	○	◇	◇	
M3.8.F	Summarize mathematical ideas with precision and efficiency for a given audience and purpose.	○	○	○	○	◇	◇	
M3.8.G	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.	○	○	○	○	◇	◇	
M3.8.H	Use inductive reasoning and the properties of numbers to make conjectures, and use deductive reasoning to prove or disprove conjectures.	○	○	○	○	◇	◇	

Math Instructional Materials Review – Other Factors

(Rate each item on the scale of 1-Strongly disagree, 2.-Disagree, 3-Agree, 4-Strongly agree)

Grade:		Date:	
Program:		Reviewer #:	

Program Organization and Design		Strongly disagree	disagree	agree	Strongly agree
1.	The content has a coherent and well-developed sequence (organized to promote student learning, links facts and concepts in a way that supports retrieval, builds from & extends concepts previously developed, strongly connects concepts to overarching framework)	○	○	○	○
2.	Program includes a balance of skill-building, conceptual understanding, and application	○	○	○	○
3.	Tasks are varied: some have one correct and verifiable answer; some are of an open nature with multiple solutions	○	○	○	○
4.	The materials help promote classroom discourse	○	○	○	○
5.	The program is organized into units, modules or other structure so that students have sufficient time to develop in-depth major mathematical ideas	○	○	○	○
6.	The instructional materials provide for the use of technology which reflects 21st century ideals for a future-ready student	○	○	○	○
7.	Instructional materials include mathematically accurate and complete indexes and tables of contents to locate specific topics or lessons	○	○	○	○
8.	The materials have pictures that match the text in close proximity, with few unrelated images	○	○	○	○
9.	Materials are concise and balance contextual learning with brevity	○	○	○	○
10.	Content is developed for conceptual understanding: (limited number of key concepts, in-depth development at appropriate age level)	○	○	○	○

Student Learning		**1**	**2**	**3**	**4**
1.	Tasks lead to conceptual development of core content, procedural fluency, and core processes abilities including solving non-routine problems	○	○	○	○
2.	Tasks build upon prior knowledge	○	○	○	○
3.	Tasks lead to problem solving for abstract, real-world and non-routine problems	○	○	○	○
4.	Tasks encourage students to think about their own thinking	○	○	○	○
5.	The program provides opportunities to develop students' computational fluency using brain power without use of calculators	○	○	○	○
6.	Tasks occasionally use technology to deal with messier numbers or help the students see the math with graphical displays	○	○	○	○
7.	The program promotes understanding and fluency in number sense and operations	○	○	○	○
8.	The program leads students to mastery of rigorous multiple-step word problems	○	○	○	○
9.	The materials develop students' use of standard mathematics terminology/vocabulary	○	○	○	○
10.	Objectives are written for students	○	○	○	○

Instructional Planning and Professional Support		**Strongly disagree**	**disagree**	**agree**	**Strongly agree**
1.	The instructional materials provide suggestions to teachers on how to help students access prior learning as a foundation for further math learning	○	○	○	○
2.	The instructional materials provide suggestions to teachers on how to help students learn to conjecture, reason, generalize and solve problems	○	○	○	○
3.	The instructional materials provide suggestions to teachers on how to help students connect mathematics ideas and applications to other math topics, other disciplines and real world context	○	○	○	○
4.	Background mathematics information is included so that the concept is explicit in the teacher guide	○	○	○	○
5.	Instructional materials help teachers anticipate and surface common student misconceptions in the moment	○	○	○	○
6.	The materials support a balanced methodology	○	○	○	○
7.	Math concepts are addressed in a context-rich setting (giving examples in context, for instance)	○	○	○	○
8.	Teacher's guides are clear and concise with easy to understand instructions	○	○	○	○

Assessment		**1**	**2**	**3**	**4**
1.	The program provides regular assessments to guide student learning	○	○	○	○
2.	There are opportunities for student self-assessment of learning	○	○	○	○
3.	Assessments reflect content, procedural, and process goals and objectives	○	○	○	○
4.	The program includes assessments with multiple purposes (formative, summative and diagnostic)	○	○	○	○
5.	Assessments include multiple choice, short answer and extended response formats.	○	○	○	○
6.	Recommended rubrics or scoring guidelines accurately reflect learning objectives	○	○	○	○
7.	Recommended rubrics or scoring guidelines identify possible student responses both correct & incorrect	○	○	○	○
8.	Accurate answer keys are provided	○	○	○	○

Equity and Access		**1**	**2**	**3**	**4**
1.	The program provides methods and materials for differentiating instruction (students with disabilities, gifted/talented, ELL, disadvantaged)	○	○	○	○
2.	Materials support intervention strategies	○	○	○	○
3.	Materials, including assessments are unbiased and relevant to diverse cultures	○	○	○	○
4.	Materials are available in a variety of languages	○	○	○	○
5.	The program includes easily accessible materials which help families to become active participants in their students' math education (e.g. "How You Can Help at Home" letters with explanations, key ideas & vocabulary for each unit, free or inexpensive activities which can be done at home, ideas for community involvement)	○	○	○	○
6.	The program includes guidance and examples to allow students with little home support to be self-sufficient and successful	○	○	○	○

Appendix E. Acknowledgements

Hundreds of people contributed toward the success of this project. Many are listed below. We wish to acknowledge countless others who provided input into the process—parents, teachers, district administrators, business and technical leaders, mathematicians and other concerned individuals who shared their ideas and feedback on the process and results.

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Dr. George Bright and Dr. Jim King led the mathematical soundness analysis of the top ranked programs in Algebra, Geometry and Integrated Math.

Relevant Strategies staff Nicole Carnegie provided the bulk of the statistical analysis. Eugene Ryser coordinated the data collection process. Dr. June Morita provided expert analysis on the statistical methods. Porsche Everson was the lead author and contributed to the statistical analysis. Kristopher Hicks-Green provided editing and production support.

Priscilla Lewis, Shoreline School District Math Committee and Sherrill Castrodale proposed and contributed to the alternate analysis of the data presented in Appendix B.

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