

## Final Report

# Alignment Analysis of the 2006 Virginia Standards of Learning Tests, the Virginia Grade Level Alternative Assessments, and Standards of Learning

Prepared by

Lisa M. Abrams, PhD  
James H. McMillan, PhD

School of Education  
Virginia Commonwealth University

January 8, 2007

## Contents

Executive Summary.....	iii-v
List of Tables.....	vi-vii
Introduction.....	1
Methodology.....	2-9
Mathematics SOL Tests Alignment Review Results.....	10-29
Reading SOL Tests Alignment Review Results.....	30-42
Virginia Grade Level Alternative (VGLA) Alignment Review.....	43-45
Mathematics VGLA Grades 3-8 Alignment Review Results.....	46-55
Reading VGLA Grades 3-8 Alignment Review Results.....	56-62
Conclusions.....	63
References.....	64
Appendix A: Superintendent’s Memo and Application for Participation in the Alignment Review Committee Meeting.....	65-73
Appendix B: Alignment Review Committee Meeting Participant List.....	74-78
Appendix C: SOL Depth-of-Knowledge Example Review Sheet.....	79-83
Appendix D: SOL Test Example Review Sheet.....	84-87
Appendix E: VGLA Portfolio Example Review Sheet.....	88-93

## Executive Summary

In August 2006 the Virginia Department of Education contracted with Virginia Commonwealth University to conduct an external review of the alignment of the state Standards of Learning (SOL) tests with the Standards of Learning for Mathematics and Reading in Grades 3-8, as well as End-of-Course (EOC) SOLs in Algebra I, Geometry, Algebra II, and Reading. The alignment study also included the review of the Virginia Grade Level Alternative Assessment (VGLA) for Grades 3-8 in Mathematics and Reading. The overall purpose of the study was to assess the extent to which the SOL tests and VGLA submissions were aligned with the SOLs. An alignment committee meeting was convened on October 16 -17, 2006 to conduct the review. The committee included 97 reviewers, and was a diverse group comprised of classroom teachers, division instructional specialists, and school administrators representative of the various regions and school districts throughout Virginia. Reviewers were trained and high inter-rater agreement reliability evidence was obtained.

The process used to conduct the alignment study was modeled after procedures developed by Norman Webb (Webb, 2005). The review focused on four different aspects of alignment: (1) Categorical Concurrence; (2) Depth-of-Knowledge (DOK) Consistency, (3) Range-of-Knowledge Correspondence, and (4) Balance of Representation. These four criteria provide for a comprehensive assessment of: (1) the general alignment between the test and the SOLs; (2) the agreement between the cognitive processes required by the test items and the SOLs; (3) the breadth of coverage of the SOLs on the test; and (4) the extent to which the different SOLs are emphasized on the test.

The results of the Alignment Review Committee Meeting indicate that Virginia's state Mathematics and Reading tests and the Standards of Learning are *well aligned* according to the four alignment criteria. Generally, any lack of alignment was associated with a lack of agreement between the DOK levels of the test items and the related SOLs. The inconsistency between the cognitive match was more common at the higher grade levels in both the Mathematics and the Reading assessments. Further, the review of a sample of VGLA submissions indicates that portfolio collections are *well aligned* with the content domain of the

SOLs. However, greater attention to the DOK agreement with the SOLs is warranted at some grade levels, particularly for the Reading Assessment.

With regard to the Mathematics SOL tests, the results of the alignment review indicate that the alignment is reasonably good. Occasionally, the DOK required of the test items was lower than that expressed in the state standards. At the lower grades, the DOK criterion is generally satisfied for the different SOL reporting categories. However, there was some inconsistency between the cognitive demand of the tests and that of the SOLs for the End-of-Course tests in Algebra I, Geometry, and Algebra II.

The alignment of the Reading SOL tests is quite good, and suggests that the SOL tests generally mirror the content and cognitive processes of the SOLs. At the lower grades, the alignment results indicated that SOL tests emphasize some SOLs more than others. However, the disproportionate emphasis on certain SOLs was more significant for the EOC Reading test. The depth-of-knowledge between the SOL tests and the SOLs was generally comparable at the different grade levels. However, there was a lack of agreement between the cognitive demand required by the tests and the SOLs for Grade 8 especially – which generally included items at a lower cognitive level than the standards. Increasing the number of items that addressed higher-order-thinking skills would improve the alignment.

The results of the VGLA Mathematics Grades 3-8 review indicated that generally the alternative portfolio assessments were aligned with the SOLs. The results suggest that range of SOLs demonstrated in the portfolio collections at each grade level accurately reflected the SOLs. The agreement between the DOK levels of the portfolios and that of the SOLs was generally consistent for Grades 3-8.

The alignment of the VGLA Reading Grades 3-8 portfolio collections was also quite good with regard to the coverage of the SOLs or range-of-knowledge. The evidence included in the portfolios generally addressed all of the SOLs at the specified grade levels. However, the inconsistency between the DOK levels demonstrated in the portfolios and those expressed in the

SOLs, is a concern at Grades 3, 5, 6, and 8. The evidence included in these collections was generally at a lower cognitive level than that expressed in the related SOLs.

Overall, the preponderance of evidence from this review indicates substantive alignment, in terms of both the content and cognitive processes required. There were few areas that require attention to bring the SOL tests into full alignment with the standards.

## **List of Tables**

	Page	
Table 1	Alignment Criteria Evaluation Categories	9
Table 2	Reliability of Reviewer Ratings	9
Table 3	Grade 3 Mathematics SOL: Alignment Criteria by Reporting Category	10
Table 4	Grade 4 Mathematics SOL: Alignment Criteria by Reporting Category	13
Table 5	Grade 5 Mathematics SOL: Alignment Criteria by Reporting Category	15
Table 6	Grade 6 Mathematics SOL: Alignment Criteria by Reporting Category	17
Table 7	Grade 7 Mathematics SOL: Alignment Criteria by Reporting Category	19
Table 8	Grade 8 Mathematics SOL: Alignment Criteria by Reporting Category	21
Table 9	Algebra I SOL: Alignment Criteria by Reporting Category	23
Table 10	Geometry SOL: Alignment Criteria by Reporting Category	25
Table 11	Algebra II SOL: Alignment Criteria by Reporting Category	27
Table 12	Grade 3 Reading SOL: Alignment Criteria by Reporting Category	30
Table 13	Grade 4 Reading SOL: Alignment Criteria by Reporting Category	32
Table 14	Grade 5 Reading SOL: Alignment Criteria by Reporting Category	34
Table 15	Grade 6 Reading SOL: Alignment Criteria by Reporting Category	36
Table 16	Grade 7 Reading SOL: Alignment Criteria by Reporting Category	37
Table 17	Grade 8 Reading SOL: Alignment Criteria by Reporting Category	39
Table 18	End-of-Course Reading SOL: Alignment Criteria by Reporting Category	41
Table 19	Grade 3 Mathematics VGLA: Alignment Criteria by Reporting Category	46
Table 20	Grade 4 Mathematics VGLA: Alignment Criteria by Reporting Category	48
Table 21	Grade 5 Mathematics VGLA: Alignment Criteria by Reporting Category	49

	Page
Table 22 Grade 6 Mathematics VGLA: Alignment Criteria by Reporting Category	51
Table 23 Grade 7 Mathematics VGLA: Alignment Criteria by Reporting Category	52
Table 24 Grade 8 Mathematics VGLA: Alignment Criteria by Reporting Category	54
Table 25 Grade 3 Reading VGLA: Alignment Criteria by Reporting Category	56
Table 26 Grade 4 Reading VGLA: Alignment Criteria by Reporting Category	57
Table 27 Grade 5 Reading VGLA: Alignment Criteria by Reporting Category	58
Table 28 Grade 6 Reading VGLA: Alignment Criteria by Reporting Category	59
Table 29 Grade 7 Reading VGLA: Alignment Criteria by Reporting Category	60
Table 30 Grade 8 Reading VGLA: Alignment Criteria by Reporting Category	61

## **Introduction**

Federal guidelines specified in the *No Child Left Behind Act* require states to conduct studies to document the alignment of the state assessments with the state content standards. On October 16 and 17, 2006, an alignment review committee was convened in Richmond, VA, to examine the relationship among the Virginia Standards of Learning (SOLs), the SOL tests, and the Virginia Grade Level Alternative (VGLA) portfolio assessment. Specifically, the purpose of the committee meeting was to answer the following questions:

1. To what extent is there alignment between the content measured in the SOL tests and the content expressed in the SOLs?
2. To what extent is there alignment between the depth-of-knowledge measured by the SOL tests and the depth-of-knowledge expressed in the SOLs?
3. To what extent is there alignment between the range-of-knowledge measured by the SOL tests and the range-of-knowledge expressed in the SOLs?
4. To what extent is each SOL emphasized on the corresponding SOL test?
5. To what extent is there alignment between the content evident in student VGLA portfolio exhibits and the content expressed in the SOLs?
6. To what extent is there alignment between the depth-of-knowledge evident in student VGLA portfolio exhibits and the depth-of-knowledge expressed in the SOLs?
7. To what extent is there alignment between the range-of-knowledge evident in student VGLA portfolio exhibits and the range-of-knowledge expressed in the SOLs?

## Methodology

The alignment study design included adapted procedures developed by Norman Webb, which is one of the four models for alignment recommended by the Council of Chief State School Officers (CCSSO, 2002). Webb defines alignment as the degree to which expectations and assessments are in agreement and serve in conjunction with one another to enhance expected student learning outcomes. In other words, alignment is a way of assuring that assessments provide an accurate and credible measure of the nature and extent of student performance on the SOLs. Based on Webb's approach, alignment is measured using four criteria: (1) categorical concurrence (content relevancy), (2) depth-of-knowledge consistency (DOK), (3) range-of-knowledge correspondence, and (4) balance of representation.

The process for determining alignment is based on established and validated procedures, also developed by Webb. Generally, the review process includes identifying and convening content area experts who will (1) review the content standards to identify the DOK articulated in the standard and (2) review the operational test items to identify the aligned standard and the DOK level expressed in each item.

### *Dept- of-Knowledge (DOK) Categories*

As mentioned, this alignment study used a modified Webb approach. Although the process and procedures used are the same as Webb's, the DOK categories reflected those in Bloom's taxonomy rather than Webb's categories. The DOK levels included the following four categories:

Recall Knowledge: This is the lowest level of cognitive process and involves memorizing and remembering information. At the recall DOK level, standards or test items may require students to count, define, identify, label, list, match, name, quote, recite, repeat, reproduce, select, or state content information.

Comprehension: At this level students may be using or manipulating recall level information in a basic way such as explaining an idea or concept in one's own words. Comprehension level standards or test items may ask students to translate, rephrase, interpret, describe, classify, compare, contrast, discuss, distinguish, estimate, explain, generalize, give examples, infer, interpret, or summarize.

Application: This DOK level involves the process of using known information to solve new problems. Application level standards or test items may ask students to compute, construct, demonstrate, illustrate, or solve.

Higher-Order-Thinking: This level combines the three most complex levels of cognitive process in Bloom's Taxonomy: analysis, synthesis, and evaluation. At the analysis level, students break down information into parts to categorize, diagram, differentiate, discriminate, outline, separate, or subdivide content. At the synthesis level students combine elements into a whole to integrate, organize, construct, design, combine, arrange, compile, create, formulate, generate, group, or summarize. At the evaluation

level students are asked to judge, assess, appraise, value, conclude, critique, criticize, grade, recommend, or support.

### *Review Process*

The alignment study involved the review of 18 standard forms of the SOL tests and 12 VGLA grade-level and subject-area portfolio collection. The following SOL tests were reviewed:

- Reading, grades 3-8
- Mathematics, grades 3-8
- Algebra I, End-of-Course
- Geometry, End-of-Course
- Algebra II, End-of-Course
- English: Reading, End-of-Course
- VGLA, Reading, grades 3-8
- VGLA, Math, grades 3-8.

To complete the alignment study and answer the questions posed at the outset, two general processes were involved: (1) a review of the SOL content standards, and (2) a review of the SOL test items or VGLA portfolios. Prior to the review of the SOL content standards, test items, and student VGLA portfolios, the reviewers were provided with a training session to develop a sound understanding of the DOK categories and the specific alignment study procedures.

Committee Meeting Organization: Content area experts were organized into one of the following ten groups: 3-5 Reading SOL, 3-5 Mathematics SOL, 6-8 Reading SOL, 6-8 Mathematics SOL, 9-11 English: Reading End-of-Course SOL, Algebra I, Algebra II, and Geometry End-of-Course SOL, VGLA 3-5 Reading, VGLA 3-5 Mathematics, VGLA 6-8 Reading, VGLA 6-8 Mathematics. A total of 97 reviewers participated in the alignment study. On September 8, 2006, the Superintendent of Public Instruction issued a memorandum to division superintendents to request nominations and solicit individual applications for participation in the alignment review (see Appendix A). Interested individuals completed an application for participation that detailed their experience and interest in the alignment review (see Appendix A). Reviewers included classroom and resource teachers, content area instructional specialists, district level coordinators and supervisors, as well as school administrators. Study participants represented all eight school regions in Virginia: Region 1 (n=11), Region 2 (n=15), Region 3 (n=9), Region 4 (n=10), Region 5 (n=15), Region 6 (n=4), Region 7 (n=16), Region 8 (n=17). Each reviewer was assigned to a content area in which he/she had expertise. There were approximately 6 to 7 reviewers per group and one reviewer per group was randomly selected as the table leader (see Appendix B for a complete list of study participants).

Reviewer Training: Prior to conducting the analysis of the SOLs and the corresponding SOL tests, reviewers were given an instructional session about the four different DOK categories and the alignment study procedures. A formal instructional presentation was delivered in which each DOK level was explained and supplemented with example SOLs and released test items. Following the presentation, reviewers completed hands-on application exercises in which they

determined the DOK level of various SOLs and test-items that were selected from the released items available on the Virginia Department of Education website. Reviewers in the alternative assessment groups used examples from student portfolios instead of released items during the training, but otherwise they engaged in a similar process. Similar to Webb’s procedures, each group was asked to arrive at a consensus with regard to the DOK level of the content standards. Following the SOL review to determine DOK levels, group members were instructed to individually determine the DOK level of the SOL test items or VGLA portfolio exhibits and the appropriate SOL match, and DOK of the example test items. Following this process each group discussed the individual determinations to address differences in interpretations. This process was designed to mirror the procedures involved in the alignment study as well as generate consistent understanding of the DOK levels.

At the end of the two-day study session each participant was asked to complete an evaluation. Several of the items addressed the training portion of the committee meeting. Of the 80 committee members who completed the session evaluation, the vast majority indicated that the training session prepared them for understanding the DOK levels either “very well” (46.3%) or “adequately” (45%). Similarly, a sizable majority indicated that the training session prepared them either “very well” (37.5%) or “adequately” (48.8%) for the alignment review process. In addition, 91.3% of the reviewers reported that they were either “very comfortable” or “comfortable” with the process for identifying the DOK levels of the SOLs, while 87.3% indicated that they were either “very comfortable” or “comfortable” with the process for identifying the DOK levels of the test items or VGLA exhibits. The evaluation results suggest that reviewers were confident in their understanding and capacity to effectively participate in the alignment review.

#### Alignment Analysis Part 1: Review of the SOLs to determine DOK

As noted previously, each study group was charged with analyzing the alignment between the SOLs and SOL tests for three different grade levels within the same subject area (i.e., mathematics or reading). The first stage of the process required individual reviewers to make a determination about the DOK level of the SOL content standard. Following this process, each table leader facilitated his or her group’s consensus building about the DOK level for each standard and objective. The goal of the consensus generating process was to ensure that each reviewer conceptualized the DOK levels similarly. Once the groups completed this initial task, they began Part 2 of the alignment analysis. See Appendix C for an example of the review sheet that was used to code the DOK levels of the SOLs.

Alignment Analysis Part 2: Review the SOL test items to determine DOK The second part of the alignment study data collection required the reviewers to closely examine each test item to determine (1) the appropriate SOL standard and objective match and (2) the DOK level of the corresponding test item. The reviewers independently coded each of the test items using a standard review sheet (see Appendix D). Reviewers first identified the DOK required of the test item, the primary standard to which the item was aligned, and secondary standard if appropriate. Parts 1 and 2 of the alignment analysis were completed for each of the three tests examined by the individual committee groups.

Debriefing Questions: Each group completed Parts 1 and 2 of the alignment analysis for three different grade level SOL tests. After the completion of Parts 1 and 2 for each grade, reviewers answered the following debriefing questions:

1. For each SOL, did the test items cover the most important topics you expected by the standard? If not, what topics were not assessed that should have been?
2. For each SOL, did the test items cover the most important performance (DOK levels) you expected? If not, what performance was not assessed?
3. Was there any content you expected to be assessed but found no items assessing that content? What was that content?
4. What is your general opinion of the alignment between the SOLs and the test? Please select a response by marking an “X” next to the appropriate letter and then explain your answer.  
 Fully aligned, no improvement needed  
 Acceptable alignment, slight improvement needed  
 Unacceptable alignment, major improvement needed
5. Other comments?

Alignment Analysis of the VGLA: The groups assigned to review the VGLA assessments engaged in a process similar to that of the standard SOL test review. VGLA groups completed Part 1 of the alignment analysis using the same procedures as the groups that reviewed the standard versions of the SOL tests. However, Part 2 of the alignment analysis was slightly modified to account for the different format of the VGLA portfolios. Each VGLA student submission is a compilation or portfolio of student work designed to “demonstrate individual achievement of grade level content standards as presented in the SOL test blueprints for the academic content area in which they are being assessed” (VADOE, 2005). Similar to individual items on a standard form of the SOL test, the student exhibits in a VGLA portfolio provides evidence of the extent to which the SOLs were achieved. As a result, each student exhibit reflecting “demonstrated knowledge” was considered similar to an individual test item for the purpose of the alignment analysis.

Part 2 of the alignment analysis required reviewers to complete a review sheet that identified the teacher-reported SOL, the required DOK level, and the extent of agreement that the reviewers reached on the alignment of the standard with the objective match (see Appendix E). Similar to the other groups, reviewers of the VGLA also completed debriefing questions at the end of each grade level review:

1. Did the student exhibits adequately cover the different DOK levels? Please explain.
2. Were there any exhibits that demonstrated knowledge and/or performance skills that are not covered by the grade-level and subject area SOLs?

3. What is your general opinion of the alignment between the SOLs and the collection of student VGLA portfolios that you reviewed? Please select a response by marking an “X” next to the appropriate letter and then explain your answer.

- Acceptable alignment, no changes needed
- Acceptable alignment, needs slight improvement
- Unacceptable alignment, needs major improvement

4. Overall, do you have any additional comments about the SOL content coverage or the DOK levels demonstrated in the collection of student VGLA portfolios?

5. Other comments?

### *Data Analysis*

Similar to the design and procedures of the alignment review committee meeting, the analysis of the data provided by the reviewers was adapted from Norman Webb’s model. Each of the questions posed at the outset of the alignment review reflects the four categories of Webb’s definition of alignment: (1) categorical concurrence (content relevancy), (2) depth-of-knowledge consistency, (3) range-of-knowledge correspondence, and (4) balance of representation. The data gathered at the alignment committee review provide for interpretations of the extent to which the Virginia SOLs and SOL tests are aligned with each other in terms of each of Webb’s alignment criteria. The analytical procedures involved for each criterion is described in this report.

The results of the analyses are presented at the reporting category level. Each reporting category includes several different SOLs, and in some cases an SOL may have several different objectives. Each SOL is assigned to one reporting category. For example, a reporting category for the Grade 4 Mathematics test is “Computation and Estimation“ and includes the SOL 4.5 “The student will estimate whole-number sums and differences and describe the method of estimation. Students will refine estimates, using terms such as *closer to*, *between*, and *a little more than*” for example. Data analyses were conducted at the SOL level and reporting category level using SPSS 12.0. Analyses were not conducted for specific objectives tied to an SOL.

Categorical Concurrence: According to Webb (2005), the criterion of categorical concurrence provides a general measure of the alignment between the standards and the assessment. The following question illustrates the concept of categorical concurrences: *To what extent is there alignment between the content measured in the SOL tests and the content expressed in the SOLs?* Webb indicates that the criterion is met “if the same or consistent categories of content appear in both documents” (p. 110). This criterion is judged by determining if the assessment included items measuring content from each reporting category. Using Webb’s established evaluation criteria, at least six items measuring content from a reporting category were necessary in order to demonstrate an acceptable level of categorical concurrence. Webb maintains that at least six items are necessary to provide for a reasonably reliable estimate of students’ content mastery on a subscale or reporting category (2005, p.110).

Depth-of-Knowledge Consistency: This criterion of alignment addresses the similarity in the cognitive demand specified in the SOL and the respective assessment items. The question: *To what extent is there alignment between the depth-of-knowledge measured by the SOL tests and the depth-of-knowledge expressed in the SOLs?* addresses the notion of DOK consistency. According to Webb (2005), “depth-of-knowledge consistency between standards and assessment indicates alignment if what is elicited from students on the assessment is as demanding cognitively as what students are expected to know and do as stated in the standards” (p. 111). Webb indicates that for consistency to exist between the assessment and the reporting category, at least 50% of targeted objectives should be “hit” by items of the appropriate complexity. Webb’s cut-point is based on the “assumption that a minimal passing score for any one [reporting category] of greater than 50% would require the student to successfully answer at least some items at or above the depth-of-knowledge level of the corresponding [SOL]” (p. 111).

The DOK level of individual test items was determined by a percent agreement threshold to limit the influence of outliers. A designation of the item DOK level was made if greater than 65% of reviewers were in agreement. However, if a clear majority was not present, the reviewer responses were averaged, similar to Webb’s methodology. The item DOK results were then matched with the DOK of the related content standard to determine the percent agreement.

Using Webb’s criterion, the DOK consistency category was met if more than 50% of the test items had DOK levels that were at or above the DOK level of the corresponding SOLs within each reporting category. This standard was “weakly” met if a reporting category had between 40% and 50% DOK agreement between the test items and the standards. Percentages below 40% indicated that the criterion was not met.

Range-of-Knowledge Correspondence: This criterion addresses the extent to which the scope of knowledge required by the SOLs are consistent with that required on the corresponding SOL test. The question: *To what extent is there alignment between the range-of-knowledge measured by the SOL tests and the range-of-knowledge expressed in the SOLs?* addresses the range-of-knowledge correspondence criterion. Webb (2005) uses the “range-of-knowledge criterion to judge whether a comparable span of knowledge expected of students by a standard is the same as or corresponds to the span of knowledge that students need in order to correctly answer the assessment items” (p. 112). More specifically, this criterion addresses the number of standards within a reporting category that have at least one related assessment item. According to Webb, 50% of the standards for a reporting category should have at least one related test item in order for alignment on this criterion to be determined “acceptable.” Similarly alignment on this criterion is determined “weakly” met if 41%- 49% of the objectives for a reporting category had a corresponding test item, and not met if less than 41% of the standards had at least one corresponding test item.

Balance of Representation: The balance of representation criterion extends the idea of range-of-knowledge alignment by focusing on the distribution of test items corresponding to the different reporting categories. Webb (2005) indicates “the balance of representation criterion is used to indicate the degree to which one objective is given more emphasis on the assessment than another” (p.112). The question: *To what extent is each SOL emphasized on the corresponding SOL test?* captures the balance of representation criterion. Webb uses an index to judge the distribution of test items and includes those objectives for a reporting category that have at least one related assessment item. The index is “computed by considering the difference in the

proportion of objectives and the proportion of related assessment items for that objective. An index of 1 signifies perfect balance and is obtained if the corresponding items related to a [reporting category] are equally distributed among the objectives for a given [reporting category]” (Webb, 2005, p. 112). Conversely, a value of 0 indicates that significant portions of corresponding test items are related to only one or two of the standards. More specifically, Webb suggests that a balance index of .7 or greater suggests that the criterion has been met, while values between .6 and .7 indicate the criterion has been “weakly” met, and values below .6 indicate that the criterion has not been met. The following formula is used to compute the balance index:

$$1 - \Sigma \left( \left| \frac{1}{O} - \frac{I_k}{H} \right| \right) / 2$$

$I_k$  = the number of test items corresponding to standard k

$O$  = the total number of standards with corresponding test items within the reporting category

$H$  = the total number of test items corresponding to a reporting category

It is important to note that Webb’s balance of representation criterion assumes that an even distribution of test items across standards is desirable. While it is important that each standard within a reporting category is measured, it may be desirable that some are emphasized more than others, particularly those SOLs with several different objectives. This report will include the results according to Webb’s criterion; however, the final interpretation of balance of representation alignment characteristics should ultimately rest with the Virginia State Department of Education.

### *Reporting of Results*

The results of the alignment review committee meeting are organized into four sections by type of test (i.e. standard or alternative format) and content area: Standard Mathematics SOL Test; Standard Reading SOL Test; Virginia Grade Level Alternative (VGLA): Mathematics Assessment; and Virginia Grade Level Alternative (VGLA): Reading Assessment. Within each section, the results are reported by grade level at the reporting category level. Each reporting category includes a number of related SOLs. Table 1 summarizes the evaluation criteria used to determine if each of the four alignment criteria is met, weakly met, or not met (Webb, 2005). The results are reported as “yes,” “weak” and “no” respectively throughout the tables included in this report.

Table 1. Alignment Criteria Evaluation Categories

Alignment Characteristics	Evaluation Criteria		
	YES	WEAK	NO
Categorical Concurrence	6 or more test items	4-5 test items	less than 4 test items
Depth-of-knowledge Correspondence	greater than 50%	41%-50%	40% or less
Range-of-knowledge Correspondence	50% or greater	41%-49%	40% or less
Balance of Representation	.7 or greater	.6-.7	less than .6

Reviewers were very consistent in their ratings in assigning the DOK levels to the test items. Intraclass correlations were calculated as a measure of inter-rater reliability; values greater than 0.7 are considered adequate and those greater than 0.8 are considered good. As shown in Table 2, the agreement among raters for both the Reading and Mathematics SOL tests was quite good.

Table 2. Reliability of Reviewer Ratings

Grade	SOL Subject Area	
	Mathematics Intraclass Correlation	Reading Intraclass Correlation
3	.916	.867
4	.883	.882
5	.912	.874
6	.905	.922
7	.940	.890
8	.950	.837
Algebra I	.788	----
Geometry	.919	----
Algebra II	.992	----
EOC English: Reading	----	.973

## Mathematics SOL Test Alignment Review Results

The yearly SOL mathematics assessments are administered in grades 3-8 and as end-of-course assessments in Algebra I, Geometry and Algebra II at the high school level. This section summarizes the extent to which each of the mathematics grade level or end-of-course assessment is aligned with the related content SOLs. Alignment is determined by the four criteria prescribed by Webb: (1) categorical concurrence, (2) depth-of-knowledge consistency, (3) range-of-knowledge, and (4) balance of representation. The results for each grade level/subject area test are presented by reporting category. These categories are the same for grades 3-8 and include Number and Number Sense, Computation and Estimation, Measurement and Geometry, Probability and Statistics, as well as Patterns, Functions, and Algebra. The reporting categories for the end-of-course assessments are different for each of the three subject area tests.

The results from the alignment review committee are presented for each grade and first include a summary table of the four alignment criteria. A “yes” indicates that the criterion was met; “weak” indicates that the criterion was weakly met, and “no” indicates that the criterion was not met according to the criteria established by Webb. In addition, quantitative results are discussed for each criterion following the summary table. Reviewers’ verbatim comments regarding the general alignment of the Mathematics SOL test at each grade level can be found in Appendix F.

### Grade 3

The Grade 3 Mathematics test measures SOLs for grades K-3 organized into five different reporting categories. Since the content and skills of the SOLs at Grades K-2 are incorporated into the Grade 3 SOLs, the range-of-knowledge and balance of representation analyses were based on the Grade 3 SOLs only. Table 3 provides a summary of the extent to which the four alignment criteria were met for the Grade 3 Mathematics SOL test by reporting category.

Table 3. Grade 3 Mathematics SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-knowledge Consistency	Range-of-knowledge	Balance of Representation
Number and Number Sense	YES	YES	YES	YES
Computation and Estimation	YES	YES	YES	YES
Measurement and Geometry	YES	YES	YES	YES
Probability and Statistics	YES	YES	YES	YES
Patterns, Functions, and Algebra	YES	NO	YES	YES

*Categorical Concurrence* This characteristic is a general indicator of alignment and refers to the number of test items that measure the content knowledge of each reporting category. Webb’s

criteria include a minimum of six test items for each reporting to be necessary for a reasonable and reliable measure of student understanding of a particular content domain. The alignment study review indicated that each of the five reporting categories exceeded this minimum requirement. Furthermore, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Number and Number Sense n = 13; Computation and Estimation n = 11, Measurement and Geometry n = 12, Probability and Statistics n = 7, Patterns, Functions, and Algebra n= 7).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the five reporting categories:

1. Number and Number Sense: Ten of the 13 (76.9%) test items had a DOK level at or above that expressed in the standards.
2. Computation and Estimation: Seven of the 11 items (63.6%) associated with this reporting category were in agreement with the cognitive demand of the related standards.
3. Measurement and Geometry: Eight of the 12 items (66.7%) were in agreement with the DOK of the related SOLs.
4. Probability and Statistics: Five of the 7 items (71.4%) were in agreement with the DOK of the related SOLs.
5. Patterns, Functions, and Algebra: Of the five reporting categories, this one had the weakest association between the DOK levels of the test items and standards. Two of the 7 (28.6%) test items were at or above the cognitive level of the aligned standards. This criterion was not met.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each Grade 3 Mathematics SOL within a given reporting category was measured by at least one test item.

1. Number and Number Sense: All seven standards (100%) comprising this reporting category had at least one corresponding test item.
2. Computation and Estimation: Of the five standards comprising this reporting category, four (80%) had at least one corresponding test item.
3. Measurement and Geometry: Of the eight standards comprising this reporting category, six (75%) had at least one corresponding test item.
4. Probability and Statistics: Of the three standards comprising this reporting category, each (100%) had at least one corresponding test item.
5. Patterns, Functions, and Algebra: Of the two standards comprising this reporting category, each (100%) had at least one corresponding test item.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance of representation index value for each reporting category. As shown, the values exceed Webb’s minimum criteria of .7 suggesting that they are fairly evenly distributed. The “Patterns, Functions, and Algebra” reporting category had an index value of 1.0 indicating that a perfect balance of test items was obtained – each standard within this category had an equal number of corresponding test items.

1. Number and Number Sense: .84
2. Computation and Estimation: .88
3. Measurement and Geometry: .83
4. Probability and Statistics: .90
5. Patterns, Functions, and Algebra: 1.0

*Summary* As shown, the Grade 3 Mathematics test was fairly well aligned. The four alignment criteria were met in four of the five reporting categories. The “Patterns, Functions, and Algebra” reporting category met three of the four criteria and did not meet the DOK consistency. Reviewers indicated that 42.9% and 57.1% of the test item DOK levels were at the comprehension and application levels respectively. However, a majority of the corresponding SOLs addressed higher-order thinking (71.4%), and a smaller percentage (28.6%) targeted application focused cognitive processes. The additional two items at the higher-order-thinking level would improve the alignment of the test items and the SOLs in this category. Reviewers generally indicated that the alignment of the Grade 3 Mathematics SOL test was “acceptable” with 33.3 percent reporting that the “alignment was acceptable with no changes needed,” and 66.7 percent indicated that the “alignment was acceptable” but slight improvements were necessary.

## Grade 4

Table 4 provides a summary of the extent to which the four alignment criteria were met for the Grade 4 Mathematics SOL test by reporting category.

Table 4. Grade 4 Mathematics SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-knowledge Consistency	Range-of-knowledge	Balance of Representation
Number and Number Sense	YES	YES	YES	YES
Computation and Estimation	YES	YES	YES	YES
Measurement and Geometry	YES	YES	YES	YES
Probability and Statistics	YES	WEAK	YES	YES
Patterns, Functions, and Algebra	YES	YES	YES	YES

*Categorical Concurrence:* This characteristic is a general indicator of alignment and refers to the number of test items that measure the content knowledge of each reporting category. Webb's criteria include a minimum of six test items for each reporting as necessary for a reasonable and reliable measure of student understanding of a particular content domain. The alignment study review indicated that each of the five reporting categories exceeded this minimum requirement. Furthermore, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Number and Number Sense n = 8; Computation and Estimation n = 12, Measurement and Geometry n = 12, Probability and Statistics n = 8, Patterns, Functions, and Algebra n= 10).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the five reporting categories:

1. Number and Number Sense: Seven of the 8 (87.5%) of the test items had a DOK level at or above that expressed in the standards.
2. Computation and Estimation: All of the 12 items (100%) associated with this reporting category were in agreement with the cognitive demand of the related standards.
3. Measurement and Geometry: Nine of the 12 items (75%) were in agreement with the DOK of the related SOLs.

4. Probability and Statistics: Of the five reporting categories, this one had the weakest association among the DOK levels of the test items and standards. Four of the 8 test items (50%) were at or above the cognitive level of the aligned standards.

5. Patterns, Functions, and Algebra: This reporting category had a 90% match of the DOK levels of the test items and standards (9 out of 10 were in agreement).

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each standard within a given reporting category was measured by a test item.

1. Number and Number Sense: Of the four standards comprising this reporting category, three (75%) had at least one corresponding test item.

2. Computation and Estimation: Of the five standards comprising this reporting category, each (100%) had at least one corresponding test item.

3. Measurement and Geometry: Of the nine standards comprising this reporting category, each (100%) had at least one corresponding test item.

4. Probability and Statistics: Of the two standards comprising this reporting category, each (100%) had at least one corresponding test item.

5. Patterns, Functions, and Algebra: Of the two standards comprising this reporting category, each (100%) had at least one corresponding test item.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance of representation index value for each reporting category. As shown, the values for each reporting category exceed Webb's minimum criteria of .7 suggesting that the items are fairly evenly distributed. The "Number and Number Sense" category had the lowest value at .75. The related SOL test items measured three of the four standards. According to reviewers, none of the test items were aligned to standard 4.3. However, standards 4.1, 4.2, and 4.4 were measured by at least two test items; the number of items associated with each standard ranged from 2 to 3.

1. Number and Number Sense: .75

2. Computation and Estimation: .92

3. Measurement and Geometry: .83

4. Probability and Statistics: .88

5. Patterns, Functions, and Algebra: .90

*Summary:* As shown, the Grade 4 Mathematics test was well aligned. The alignment criteria were met for all of the reporting categories with the exception of the DOK consistency for the "Probability and Statistics" category. The addition of one or two test items at the higher-order-thinking level would improve the alignment of the test items and the SOLs in this category. Reviewers generally indicated that the alignment of the Grade 4 Mathematics SOL test was "acceptable" with 33.3 percent reporting that the "alignment was acceptable with no changes

needed” and 66.7 percent indicated that the “alignment was acceptable” but slight improvements were needed.

## Grade 5

Table 5 provides a summary of the extent to which the four alignment criteria were met for the Grade 5 Mathematics SOL test by reporting category.

Table 5. Grade 5 Mathematics SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-knowledge Consistency	Range-of-knowledge	Balance of Representation
Number and Number Sense	YES	YES	YES	YES
Computation and Estimation	YES	YES	YES	YES
Measurement and Geometry	YES	YES	YES	YES
Probability and Statistics	YES	YES	YES	YES
Patterns, Functions, and Algebra	YES	YES	YES	YES

*Categorical Concurrence:* The alignment study review indicated that each of the five reporting categories exceeded Webb’s minimum requirement of six items used to measure each standard or reporting category in this case. Further, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Number and Number Sense n = 8; Computation and Estimation n = 12, Measurement and Geometry n = 12, Probability and Statistics n = 8, Patterns, Functions, and Algebra n = 10).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the percent of agreement between the DOK levels required of the SOL test items and the corresponding standards by reporting category.

1. Number and Number Sense: All 8 of the test items (100%) had a DOK level at or above that expressed in the standards.
2. Computation and Estimation: Nine of the 12 (75%) associated with this reporting category were in agreement with the cognitive demand of the related standards.
3. Measurement and Geometry: Seven of the 12 test items (58.3 %) were in agreement with the DOK of the related SOLs.

4. Probability and Statistics: Five of the 8 test items (62.5%) were in agreement with the DOK level of the related SOLs.
5. Patterns, Functions, and Algebra: This reporting category had a 70% match of DOK levels of the test items and standards (7 out of 10 were in agreement).

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each standard within a given reporting category was measured by a test item.

1. Number and Number Sense: Of the two standards comprising this reporting category, both (100%) had at least 2 corresponding test items.
2. Computation and Estimation: Of the five standards comprising this reporting category, each (100%) had at least 2 corresponding test items.
3. Measurement and Geometry: Of the nine standards comprising this reporting category, each (100%) had at least one corresponding test item.
4. Probability and Statistics: Of the three standards comprising this reporting category, each (100%) had at least 2 corresponding test items.
5. Patterns, Functions, and Algebra: Of the three standards comprising this reporting category, each (100%) had at least one corresponding test item.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance of representation index value for each reporting category. As shown, the values for each reporting category exceed Webb’s minimum criteria of .7 suggesting that the items are fairly evenly distributed. The “Number and Number Sense” and “Patterns, Functions, and Algebra” categories had the lowest values at .75 and .73 respectively. Although each of the standards was measured by at least one test item, the number of items associated with each standard ranged from 1 to 6 which resulted in the comparatively lower index value for these reporting categories.

1. Number and Number Sense: .75
2. Computation and Estimation: .90
3. Measurement and Geometry: .83
4. Probability and Statistics: .92
5. Patterns, Functions, and Algebra: .73

*Summary:* As shown, the Grade 5 Mathematics SOL test was well aligned with the content standards. Each of the four alignment criteria was met for each of the five reporting categories. A majority of reviewers (53.8%) indicated that the alignment of the Grade 5 Mathematics SOL test with the SOLs was acceptable and “no changes were needed.” In addition, a smaller, but sizable percentage (46.2%) reported that the grade level alignment was “acceptable, but some slight improvements were necessary”.

## Grade 6

Table 6 provides a summary of the extent to which the four alignment criteria were met for the Grade 6 Mathematics SOL test by reporting category.

Table 6. Grade 6 Mathematics SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-knowledge Consistency	Range-of-knowledge	Balance of Representation
Number and Number Sense	YES	YES	YES	YES
Computation and Estimation	YES	YES	YES	YES
Measurement and Geometry	YES	YES	YES	WEAK
Probability and Statistics	YES	YES	YES	YES
Patterns, Functions, and Algebra	YES	YES	YES	YES

*Categorical Concurrence:* The alignment study review indicated that each of the five reporting categories exceeded Webb’s minimum requirement of six items used to measure each standard or reporting category in this case. Furthermore, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Number and Number Sense n = 8; Computation and Estimation n = 10, Measurement and Geometry n = 12, Probability and Statistics n = 8, Patterns, Functions, and Algebra n = 12).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following provides the percent agreement of the DOK levels of the SOL test items and the corresponding standards by reporting category.

1. Number and Number Sense: Seven of the 8 test items (87.5%) had a DOK level at or above that expressed in the related standards.
2. Computation and Estimation: Eight of the 10 (80%) test items associated with this reporting category were in agreement with the cognitive demand of the related standards.
3. Measurement and Geometry: Seven of the 12 test items (58.3 %) were in agreement with the DOK of the related SOLs.
4. Probability and Statistics: Six of the 8 test items (75 %) were in agreement with the DOK level of the related SOLs.

5. Patterns, Functions, and Algebra: This reporting category had a 75% match of the DOK levels of the test items and standards (9 out of 12 test items were in agreement).

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each standard within a given reporting category was measured by a test item.

1. Number and Number Sense: Of the five standards comprising this reporting category, each (100%) had at least one corresponding test item.

2. Computation and Estimation: Of the three standards comprising this reporting category, each (100%) had at least two corresponding test items.

3. Measurement and Geometry: Of the eight standards comprising this reporting category, seven (87.5 %) had at least one corresponding test item.

4. Probability and Statistics: Of the three standards comprising this reporting category, each (100%) had at least two corresponding test items.

5. Patterns, Functions, and Algebra: Of the three standards comprising this reporting category, each (100%) had at least two corresponding test items.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance of representation index value for each reporting category. As shown, the values for each reporting category exceed Webb’s minimum criteria of .7, with the exception of “Measurement and Geometry” which had an index of .69. Seven of the eight standards were measured by at least one test item, and the number of items associated with these standards ranged from 1 to 3. The lack of a test item associated with standard 6.11 and the varied distribution of test items resulted in the comparatively lower index value.

1. Number and Number Sense: .84

2. Computation and Estimation: .73

3. Measurement and Geometry: .69

4. Probability and Statistics: .92

5. Patterns, Functions, and Algebra: .83

*Summary:* As shown, the Grade 6 Mathematics SOL test was well aligned with the content standards. Each of the four alignment criteria was met by four of the five reporting categories. The “Measurement and Geometry” category met three of the four criteria and “weakly” met the balance of representation criterion. In addition, a majority of reviewers (57.1%) reported that the grade level alignment was “acceptable,” however, a smaller but sizable percentage (42.9%) reported that “major improvements were needed” to enhance the alignment.

## Grade 7

Table 7 provides a summary of the extent to which the four alignment criteria were met for the Grade 7 Mathematics SOL test by reporting category.

Table 7. Grade 7 Mathematics SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-knowledge Consistency	Range-of-knowledge	Balance of Representation
Number and Number Sense	YES	YES	YES	YES
Computation and Estimation	YES	YES	YES	YES
Measurement and Geometry	YES	WEAK	YES	YES
Probability and Statistics	YES	YES	YES	YES
Patterns, Functions, and Algebra	YES	YES	YES	YES

*Categorical Concurrence:* The alignment study review indicated that each of the five reporting categories exceeded Webb’s minimum requirement of six items used to measure each standard or reporting category in this case. Furthermore, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Number and Number Sense  $n = 7$ ; Computation and Estimation  $n = 7$ , Measurement and Geometry  $n = 12$ , Probability and Statistics  $n = 12$ , Patterns, Functions, and Algebra  $n = 12$ ).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the five reporting categories:

1. Number and Number Sense: Four of the seven test items (57.1%) had a DOK level at or above that expressed in the related standards.
2. Computation and Estimation: Five of the seven (71.4%) associated with this reporting category were in agreement with the cognitive demand of the related standards.
3. Measurement and Geometry: Six of the 12 test items (50%) were in agreement with the DOK of the related SOLs.
4. Probability and Statistics: Ten of the 12 test items (83.3%) were in agreement with the DOK level of the related SOLs.
5. Patterns, Functions, and Algebra: This reporting category had a 75% match of the DOK levels of the test items and standards (9 out of 12 test items were in agreement).

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each standard within a given reporting category was measured by a test item.

1. Number and Number Sense: Of the three standards comprising this reporting category, each (100%) had at least 2 corresponding test items.
2. Computation and Estimation: Of the three standards comprising this reporting category, each (100%) had at least 2 corresponding test items.
3. Measurement and Geometry: Of the seven standards comprising this reporting category, each (100 %) had at least one corresponding test item.
4. Probability and Statistics: Of the five standards comprising this reporting category, four (80%) had at least 2 corresponding test items.
5. Patterns, Functions, and Algebra: Of the four standards comprising this reporting category, each (100%) had at least 2 corresponding test items.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance of representation index value for each reporting category. As shown, the values for each reporting category exceed Webb’s minimum criteria of .7 suggesting that the items are evenly distributed across the standards within each reporting category.

1. Number and Number Sense: .91
2. Computation and Estimation: .91
3. Measurement and Geometry: .82
4. Probability and Statistics: .75
5. Patterns, Functions, and Algebra: .92

*Summary:* As shown, the Grade 7 Mathematics SOL test was well aligned with the content standards. Each of the four alignment criteria was met for each of the five reporting categories, with the exception of the DOK consistency criterion for the “Measurement and Geometry” reporting category. This criterion was “weakly” rather than fully met by only a small margin. The addition of one or two test items requiring higher-order-thinking skills would enhance the alignment of the test items in this category with the related SOLs. A majority of reviewers (54.5%) reported that “major changes were needed” to improve the alignment. Alternatively, a smaller percentage (36.4%) indicated that the alignment was “acceptable, although some minor modifications were necessary”.

## Grade 8

Table 8 provides a summary of the extent to which the four alignment criteria were met for the Grade 8 Mathematics SOL test by reporting category.

Table 8. Grade 8 Mathematics SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-knowledge Consistency	Range-of-knowledge	Balance of Representation
Number and Number Sense	YES	YES	YES	YES
Computation and Estimation	YES	YES	YES	YES
Measurement and Geometry	YES	YES	YES	YES
Probability and Statistics	YES	WEAK	YES	YES
Patterns, Functions, and Algebra	YES	YES	YES	YES

*Categorical Concurrence:* The alignment study review indicated that each of the five reporting categories exceeded Webb’s minimum requirement of six items used to measure each standard or reporting category in this case. Further, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Number and Number Sense  $n = 7$ ; Computation and Estimation  $n = 7$ , Measurement and Geometry  $n = 12$ , Probability and Statistics  $n = 8$ , Patterns, Functions, and Algebra  $n = 16$ ).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The percent agreement between the DOK levels of the SOL test items and the corresponding standards are presented for each reporting category.

1. Number and Number Sense: Four of the seven test items (57.1%) had a DOK level at or above that expressed in the related standards.
2. Computation and Estimation: All seven test items (100%) associated with this reporting category were in agreement with the cognitive demand of the related standards.
3. Measurement and Geometry: Seven of the 12 test items (58.3%) were in agreement with the DOK of the related SOLs.
4. Probability and Statistics: Four of the eight test items (50%) were in agreement with the DOK level of the related SOLs.

5. Patterns, Functions, and Algebra: This reporting category had a 68.8% match of the DOK levels of the test items and standards (11 out of 16 test items were in agreement).

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each standard within a given reporting category was measured by a test item.

1. Number and Number Sense: Of the two standards comprising this reporting category, each (100%) had at least two corresponding test items.
2. Computation and Estimation: Of the three standards comprising this reporting category, each (100%) had at least two corresponding test items.
3. Measurement and Geometry: Of the five standards comprising this reporting category, each (100 %) had at least one corresponding test item.
4. Probability and Statistics: Of the three standards comprising this reporting category, each (100%) had at least two corresponding test items.
5. Patterns, Functions, and Algebra: Of the five standards comprising this reporting category, each (100%) had at least two corresponding test items.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance of representation index value for each reporting category. As shown, the values for each reporting category exceed Webb’s minimum criteria of .7 suggesting that the items are evenly distributed across the standards within each reporting category.

1. Number and Number Sense: .79
2. Computation and Estimation: .91
3. Measurement and Geometry: .85
4. Probability and Statistics: .92
5. Patterns, Functions, and Algebra: .84

*Summary:* As shown, the Grade 8 Mathematics SOL test was well aligned with the content standards. Each of the four alignment criteria was met for each of the five reporting categories, with the exception of the DOK consistency criterion for the “Probability and Statistics” reporting category. This criterion was “weakly” rather than fully met by only a small margin. The addition of one or two test items requiring higher-order-thinking skills would enhance the alignment of the test items in this category with the related SOLs. Generally, reviewers reported that the alignment of the Grade 8 test and the SOLs was strong – 61.5 percent reported that the alignment was “acceptable with no changes needed.” The remaining 38.5 percent indicated that the “alignment was acceptable,” however slight modifications were necessary.

## End-of-Course: Algebra I

Table 9 provides a summary of the extent to which the four alignment criteria were met for the End-of-Course Algebra I SOL test by reporting category.

Table 9. Algebra I SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-knowledge Consistency	Range-of-knowledge	Balance of Representation
Expressions and Operations	YES	YES	YES	YES
Relations and Function	YES	NO	YES	YES
Equations and Inequalities	YES	NO	YES	YES
Statistics	YES	YES	YES	YES

*Categorical Concurrence:* The alignment study review indicated that each of the four reporting categories exceeded Webb’s minimum requirement of six items used to measure each standard or reporting category in this case. Furthermore, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Expressions and Operations n=12; Relations and Functions n=12; Equations and Inequalities n=18; and Statistics n=8)

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The percent agreement between the DOK levels of the SOL test items and the corresponding standards are presented for each reporting category.

1. Expressions and Operations: Nine of the 12 test items (75%) had a DOK level at or above that expressed in the related standards.
2. Relations and Functions: Three of the 12 test items (25%) associated with this reporting category were in agreement with the cognitive demand of the related standards. Of the 12 items, 42% were at the comprehension DOK level; 50% were at the application level; and 8% were at higher-order-thinking cognitive level according to reviewers. However, 42% and 58% of the standards comprising this reporting category were rated at the application and higher-order-thinking levels respectively. None of the standards in this category was considered to be at the comprehension level according to reviewers. Consequently, this criterion was not met for this reporting category.
3. Equations and Inequalities: Seven of the 11 test items (39%) were in agreement with the DOK of the related SOLs. The cognitive demand of the SOL test items included 11 (61%) at the comprehension level, 6 (33.3%) at the application level, and 1 (6%) at the higher-order-thinking level. By comparison, reviewers indicated that the related standards included a smaller

percentage at the comprehension level (16.7%), a similar percentage at the application level (44.4%), and a greater percentage at the higher-order-thinking level (38.9%). Consequently, this criterion was not met by a very small margin.

4. Statistics: Five of the 8 test items (62.5%) were in agreement with the DOK level of the related SOLs comprising this reporting category.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each standard within a given reporting category was measured by a test item.

1. Expressions and Operations: Of the five standards comprising this reporting category, each (100%) had at least two corresponding test items.

2. Relations and Functions: Of the three standards comprising this reporting category, each (100%) had four corresponding test items.

3. Equations and Inequalities: Of the seven standards comprising this reporting category, each (100 %) had at least one corresponding test item.

4. Statistics: Of the three standards comprising this reporting category, each (100%) had at least two corresponding test items.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance of representation index value for each reporting category. As shown, the values for each reporting category exceed Webb’s minimum criteria of .7 indicating that the items are evenly distributed across the standards within each reporting category. Furthermore, the “Relations and Functions” reporting category had an index of 1.0 indicating that perfect balance was obtained – each of the three standards had 4 corresponding test items.

1. Expressions and Operations: .90

2. Relations and Functions: 1.0

3. Equations and Inequalities: .88

4. Statistics: .83

*Summary:* As shown, the End-of-Course Algebra I SOL test was fairly well aligned with the Standards of Learning. All four alignment criteria were met for two of the four reporting categories, with the remaining two categories meeting three of the four criteria. The DOK consistency criterion for the “Relations and Functions” and “Equations and Inequalities” reporting categories was not met. Increasing the number of test items at the higher-order-thinking level in both reporting categories, only one or two items in the case of the “Equations and Inequalities” category, would enhance the alignment of the test items with the related SOLs. A majority of reviewers (61.5%) reported that the alignment was “acceptable”. A smaller percentage (33.3%) indicated that the alignment was “acceptable, however slight modifications were necessary” for improvement.

## End-of-Course: Geometry

Table 10 provides a summary of the extent to which the four alignment criteria were met for the End-of-Course Geometry SOL test by reporting category.

Table 10. Geometry SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-knowledge Consistency	Range-of-knowledge	Balance of Representation
Lines and Angles	YES	YES	YES	YES
Triangles and Logic	YES	WEAK	YES	YES
Polygons and Circles	YES	NO	YES	YES
Three-Dimensional Figures	YES	YES	YES	YES
Coordinate Relations and Transformations	YES	NO	YES	YES

*Categorical Concurrence:* The alignment study review indicated that three of the five reporting categories exceed Webb’s minimum requirement of six items, and the remaining two met the six-item criterion. Furthermore, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Lines and Angles n= 11; Triangles and Logic n=12; Polygons and Circles n=10; Three-Dimensional Figures n=6; and Coordinate Relations and Transformations n=6).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The percent agreement between the DOK levels of the SOL test items and the corresponding standards are presented for each reporting category.

1. Lines and Angles: Six of the 11 test items (54.5%) had a DOK level at or above that expressed in the related standards.
2. Triangles and Logic: Six of the 12 test items (50%) associated with this reporting category were in agreement with the cognitive demand of the related standards. This criterion was “weakly” rather than fully met by a small margin. Of the 12 items, 58% were at the comprehension DOK level, and 42% were at the application level according to reviewers. None of the test items in this category was considered to be at the higher-order-thinking level according to reviewers. However, 16.7% of the corresponding standards were at the comprehension level, 66.7% at the application level, and 16.7% at the higher-order-thinking level.

3. Polygons and Circles: Three of the 10 test items (30%) were in agreement with the DOK of the related SOLs. Consequently, this criterion was not met. The cognitive demand of the SOL test items included 3 (30%) at the comprehension level, 5 (50%) at the application level, and 2 (20%) at the higher-order-thinking level. By comparison, reviewers indicated that the related standards included a smaller percentage at the application level (20%) and a substantially greater percentage at the higher-order-thinking level (80%). None of the standards in this reporting category was considered at the comprehension level by reviewers. Additional test items at the higher-order-thinking level would improve the alignment of this reporting category.

4. Three-Dimensional Figures: All six of the test items (100%) were in agreement with the DOK level of the related SOLs comprising this reporting category.

5. Coordinate Relations and Transformations: Two of the six (33.3%) test items were in agreement with the DOK level of the related SOLs comprising this reporting category. As a result, this alignment criterion was not met. Reviewers reported that 66.7 percent of the test items were at the comprehension, and the remaining 33.3 percent were at the application levels. None of the items was considered at the higher-order-thinking level. By comparison, the related SOLs were evenly split between the application and higher-order-thinking categories. Substantially decreasing the number of comprehension items and increasing the application and especially the higher-order-thinking items would improve the alignment of this reporting category.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each standard within a given reporting category was measured by a test item.

1. Lines and Angles: Of the three standards comprising this reporting category, each (100%) had at least 2 corresponding test items.

2. Triangles and Logic: Of the four standards comprising this reporting category, each (100%) had at least one corresponding test item.

3. Polygons and Circles: Of the three standards comprising this reporting category, each (100%) had at least three corresponding test items.

4. Three-Dimensional Figures: Of the three standards comprising this reporting category, each (100%) had at least two corresponding test items.

5. Coordinate Relations and Transformations: The standard comprising this reporting category had six corresponding test items. Further, each of the three objectives had at least one corresponding test item.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance of representation index value for each reporting category. As shown, the values for each reporting category exceed Webb's minimum criteria of .7 suggesting that the items are evenly distributed across the standards within each reporting category. Three reporting categories had

an index value of 1.0 indicating that a perfect balance of test items was obtained – each standard within these categories had an equal number of corresponding test items.

1. Lines and Angles: .79
2. Triangles and Logic: 1.0
3. Polygons and Circles: .93
4. Three-Dimensional Figures: 1.0
5. Coordinate Relations and Transformations: 1.0

*Summary:* As shown, the End-of-Course Geometry SOL test was fairly well aligned with the SOLs. All four alignment criteria were met for two of the five reporting categories, while the remaining three categories met three of the four criteria. The DOK consistency criterion was “weakly” met for the “Triangles and Logic” category and not met for the “Three-Dimensional Figures” and “Coordinate Relations and Transformations” categories. Increasing the number of test items at the application and higher-order-thinking levels in all three categories would enhance the alignment of the test items with the related SOLs. A majority of reviewers (57.1%) also indicated that the alignment of the Geometry SOL test was in need of modification.

## End-of-Course: Algebra II

Table 11 provides a summary of the extent to which the four alignment criteria were met for the End-of-Course Algebra II SOL test by reporting category.

Table 11. Algebra II SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-knowledge Consistency	Range-of-knowledge	Balance of Representation
Expressions and Operations	YES	NO	YES	YES
Relations and Function	YES	NO	YES	YES
Equations and Inequalities	YES	NO	YES	YES
Analytical Geometry	YES	NO	YES	YES
Systems of Equations/Inequalities	YES	NO	YES	YES

*Categorical Concurrence:* The alignment study review indicated that four of the five reporting categories exceed Webb’s minimum requirement of six items, and the remaining category met the criterion. Furthermore, results of the alignment study indicated that the same number of test items that were associated with three of the reporting categories was in *exact agreement* with the number specified in the test blueprint (Expressions and Operations n=10; Analytical Geometry n=6; and Systems of Equations/Inequalities n=8). Seventeen test items were associated with the “Relations and Functions” reporting category as determined by the reviewers. This number

exceeds the blueprint number by one. In addition, reviewers indicated that 9 items were aligned with the standards comprising the “Equations and Inequalities” reporting category.

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The percent agreement between the DOK levels of the SOL test items and the corresponding standards are presented for each reporting category.

1. Expressions and Operations: Two of the 10 test items (20%) had a DOK level at or above that expressed in the related standard. Reviewers reported that of the 10 items one (10%) was at the recall-knowledge level, 6 (60%) were comprehension level items, and the remaining 3 (30%) targeted application level knowledge. By comparison, reviewers reported that of the related standards 70 percent addressed application-level knowledge, and the remaining 30 percent targeted higher-order-thinking. As a result of these differences the criterion was not met.

2. Relations and Functions: Five of the 17 test items (29.4%) associated with this reporting category were in agreement with the cognitive demand of the related standards. Of the 17 items, 11.8 percent were at the recall-knowledge level, 52.9 percent were at the comprehension DOK level, and 35.3 percent were at the application level according to reviewers. None of the test items required higher-order-thinking. By comparison, reviewers reported that of the related standards, 5.9 percent addressed comprehension-level knowledge, 82.4 percent targeted application-level knowledge, and the remaining 11.8 percent targeted higher-order-thinking. Consequently, this criterion was not met for this reporting category. Increasing the number of items that require greater cognitive demand, especially application and higher-order-thinking items, would improve the alignment of the reporting category.

3. Equations and Inequalities: Three of the nine test items (33.3%) were in agreement with the DOK of the related SOLs. The cognitive demand of the SOL test items included one (11.1%) at the recall-knowledge level, 4 (44.4%) at the comprehension level, 3 (33.3%) at the application level, and one (11.1%) at the higher-order-thinking level. By comparison, reviewers indicated that the related standards included a greater percentage at the application level (55.6%) and a greater percentage at the higher-order-thinking level (33.3%). Consequently, this criterion was not met. Decreasing the number of test items that target comprehension knowledge levels and increasing the emphasis on application and higher-order-thinking would enhance the alignment of this reporting category. In addition, it was not possible to assess the cognitive match between the test item and related standard for one item in this reporting category; five out of seven reviewers indicated that the particular item did not measure an Algebra II SOL.

4. Analytical Geometry: Two of the six test items (33.3%) were in agreement with the DOK level of the related SOLs comprising this reporting category. The cognitive demand of the SOL test items included 4 (66.7%) at the comprehension level and two (33.3%) at the application level. By comparison, 100 percent of the reviewers indicated that all of the related standards targeted application-level knowledge. Consequently, this criterion was not met. Decreasing the number of test items that target comprehension knowledge levels and increasing the emphasis on application focused items would enhance the alignment of this reporting category.

5. Systems of Equations/Inequalities: One of the seven test items (12.5%) was in agreement with the DOK level of the related SOLs comprising this reporting category. The cognitive

demand of the SOL test items included five (62.5%) at the comprehension level and three (37.5%) at the application level. By comparison, reviewers indicated that 75 percent of the related standards targeted application-level knowledge and 25 percent addressed higher-order-thinking. Consequently, this criterion was not met. Decreasing the number of test items that required comprehension knowledge levels and increasing the emphasis on application and higher-order-thinking items would enhance the alignment of this reporting category.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each standard within a given reporting category was measured by a test item.

1. Expressions and Operations: Of the five standards comprising this reporting category, each (100%) had at least one corresponding test item.
2. Relations and Functions: Of the six standards comprising this reporting category, each (100%) had at least one corresponding test item.
3. Equations and Inequalities: Of the three standards comprising this reporting category, each (100 %) had at least two corresponding test items.
4. Analytical Geometry: Of the two standards comprising this reporting category, each (100%) had at least three corresponding test items.
5. Systems of Equations/Inequalities: Of the four standards comprising this reporting category, each (100%) had at least two corresponding test items.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance of representation index value for each reporting category. As shown, the values for each reporting category exceed Webb's minimum criteria of .7 suggesting that the items are evenly distributed across the standards within each reporting category. Two reporting categories had an index value of 1.0 indicating that a perfect balance of test items was obtained – each standard within these categories had an equal number of corresponding test items.

1. Expressions and Operations: .90
2. Relations and Functions: .79
3. Equations and Inequalities: .94
4. Analytical Geometry: 1.0
5. Systems of Equations/Inequalities: 1.0

*Summary:* As shown, the End-of-Course Algebra II SOL test was moderately aligned with the SOLs. Each of the five reporting categories met three of the four alignment criteria. The DOK consistency criterion was not met for any of the reporting categories. Reviewers reported that the test items on the Algebra II SOLs had greater percentages of items at the comprehension level compared to the related standards. Increasing the number of test items that target application or higher-order-thinking processes would improve the alignment of the test items with the related SOLs. Furthermore, the analysis of the Algebra II SOL test revealed the only instance of a test item not aligning with an appropriate SOL. Reviewers reported that the

alignment of the Algebra II SOL test was acceptable; equal percentages (42.9%) indicated that no changes or slight modifications were necessary.

### **Reading SOL Tests Alignment Review Results**

The yearly Standards of Learning reading assessments are administered in Grades 3-8 and in high school as an end-of-course test which is cumulative and incorporates reading Standards of Learning for grades 9-11. This section summarizes the extent to which each of the reading grade-level or end-of-course assessment is aligned with the related SOLs. Alignment is determined by the four criteria prescribed by Webb: (1) categorical concurrence, (2) depth-of-knowledge consistency, (3) range-of-knowledge, and (4) balance of representation. The results for each grade level/subject area test are presented by reporting category. The two categories are the same for all of the reading SOL tests and include: (1) Use of Word Analysis Strategies and Information Resources and (2) Demonstrate Comprehension of Printed Materials.

The results from the alignment review committee are presented for each grade and first include a summary table of the four alignment criteria. A “yes” indicates that the criterion was met; “weak” indicates that the criterion was weakly met; and “no” indicates that the criterion was not met according to the criteria established by Webb (see Table 1). In addition, quantitative results are discussed for each criterion following the summary table. Reviewers’ verbatim narrative comments regarding the general alignment of the Reading SOL tests at each grade level can be found in Appendix G.

### **Grade 3**

The Grade 3 Reading test measures SOLs for Grades 2-3 organized into two different reporting categories. Table 12 provides a summary of the extent to which the four alignment criteria were met for the Grade 3 Reading SOL test by reporting category

Table 12. Grade 3 Reading SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range-of-knowledge	Balance of Representation
Use of Word Analysis Strategies and Information Resources	YES	YES	YES	WEAK
Demonstrate Comprehension of Printed Materials	YES	WEAK	YES	WEAK

*Categorical Concurrence:* This characteristic is a general indicator of alignment and refers to the number of test items that measure the content knowledge of each reporting category. Webb’s criteria include a minimum of six test items for each reporting category is necessary for a reasonable and reliable measure of student understanding of a particular content domain. The

alignment study review indicated that this requirement was exceeded for both of the reporting categories. Further, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Use of Word Analysis Strategies and Information Resources n = 8; Demonstrate Comprehension of Printed Materials n =27).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Five of the eight (62.5%) test items had a DOK level at or above that expressed in the related standards.

2. Demonstrate Comprehension of Printed Materials: Twelve of the 27 items (44.4%) associated with this reporting category were in agreement with the cognitive demand of the related standard. The cognitive demand of the SOL test items aligned with this reporting category included four (14.8%) at the recall knowledge level, 13 (48.1%) at the comprehension level, and 10 (37%) at the application level. By comparison, reviewers indicated that 29.6 percent of the related standards targeted comprehension-level knowledge, 59.3 percent addressed application-level knowledge, and 11.1 percent targeted higher-order thinking. Consequently, this criterion was weakly met. Decreasing the number of test items that required recall knowledge and increasing the emphasis on application and higher-order thinking focused items would enhance the alignment of this reporting category.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each Grade 3 SOL within a given reporting category was measured by at least one test item.

1. Use of Word Analysis Strategies and Information Resources: Four of the five standards (80%) comprising this reporting category, had at least one corresponding test item.

2. Demonstrate Comprehension of Printed Materials: Five of the seven standards comprising this reporting category (71.4%) had at least one corresponding test item.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance-of-representation index value for each reporting category. As shown, the values for each reporting category fall within .6 and .7 indicating that this criterion was “weakly” met for both categories. These results are most likely due to test items not measuring specific SOLs within each category.

1. Use of Word Analysis Strategies and Information Resources: .68

2. Demonstrate Comprehension of Printed Materials: .62

*Summary:* As shown, the Grade 3 Reading test was fairly well aligned. Three of the four alignment criteria were met for the “Use of Word Analysis Strategies and Information”. Two of

the four criteria were met for the “Demonstrate Comprehension of Printed Materials” reporting category. The remaining criteria in both categories were “weakly” met. Further, a majority of reviewers (58.3%) reported that the “alignment was acceptable and no changes were needed” compared to 41.7 percent who indicated that the “alignment was acceptable and slight modifications were necessary”.

## Grade 4

Table 13 provides a summary of the extent to which the four alignment criteria were met for the Grade 4 Reading SOL test by reporting category

Table 13. Grade 4 Reading SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range-of-knowledge	Balance of Representation
Use of Word Analysis Strategies and Information Resources	YES	YES	YES	WEAK
Demonstrate Comprehension of Printed Materials	YES	YES	YES	YES

*Categorical Concurrence:* This characteristic is a general indicator of alignment and refers to the number of test items that measure the content knowledge of each reporting category. Webb’s criteria include a minimum of six test items for each reporting category is necessary for a reasonable and reliable measure of student understanding of a particular content domain. The alignment study review indicated that this requirement was exceeded for both of the reporting categories. Further, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Use of Word Analysis Strategies and Information Resources n = 8; Demonstrate Comprehension of Printed Materials n =27).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: All eight (100%) test items had a DOK level at or above that expressed in the related standards.

2. Demonstrate Comprehension of Printed Materials: Fifteen of the 27 items (55.6%) associated with this reporting category were in agreement with the cognitive demand of the related standards.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each Grade 4 SOL within a given reporting category was measured by at least one test item.

1. Use of Word Analysis Strategies and Information Resources: Both standards (100%) comprising this reporting category, had at least one corresponding test item.

2. Demonstrate Comprehension of Printed Materials: Three of the four standards comprising this reporting category (75%) had at least two corresponding test items.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance-of-representation index value for each reporting category. As shown, the value for the “Demonstrate Comprehension and Printed Materials” category exceeded Webb’s minimum criteria of .7 suggesting that the items are fairly evenly distributed. However, this criterion was “weakly” met for the “Use of Word Analysis Strategies and Information Resources” indicating that content related to standard 4.3a-c was more heavily emphasized relative to standard 4.6b.

1. Use of Word Analysis Strategies and Information Resources: .63

2. Demonstrate Comprehension of Printed Materials: .73

*Summary:* As shown, the Grade 4 Reading test was well aligned. All four alignment criteria were met by the “Demonstrate Comprehension of Printed Materials” reporting category. Three of the four criteria were met for the “Use of Word Analysis Strategies and Information” reporting category. The remaining criterion, “Balance of Representation” was “weakly” met. Further, 80 percent of the reviewers indicated that the “alignment was acceptable and no changes were needed” or “slight modifications were necessary.”

## Grade 5

Table 14 provides a summary of the extent to which the four alignment criteria were met for the Grade 5 Reading SOL test by reporting category

Table 14. Grade 5 Reading SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range-of-knowledge	Balance of Representation
Use of Word Analysis Strategies and Information Resources	YES	YES	YES	YES
Demonstrate Comprehension of Printed Materials	YES	YES	YES	YES

*Categorical Concurrence:* This characteristic is a general indicator of alignment and refers to the number of test items that measure the content knowledge of each reporting category. Webb’s criteria include a minimum of six test items for each reporting category is necessary for a reasonable and reliable measure of student understanding of a particular content domain. The alignment study review indicated that this requirement was exceeded for both of the reporting categories. However, results of the alignment study indicated that the number of test items associated with each reporting category differed slightly from the number specified in the test blueprint (Use of Word Analysis Strategies and Information Resources n = 10; Demonstrate Comprehension of Printed Materials n =30). According to results of the alignment review, 11 test items were associated with “Use of Word Analysis Strategies and Information Resources” and 29 were related to SOLs comprising the Demonstrate Comprehension of Printed Materials” reporting categories.

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Eight of the 11 test items (72.7%) had a depth-of-knowledge level at or above that expressed in the related standards.
2. Demonstrate Comprehension of Printed Materials: Fifteen of the 29 items (51.7%) associated with this reporting category were in agreement with the cognitive demand of the related standards.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each Grade 5 SOL within a given reporting category was measured by at least one test item.

1. Use of Word Analysis Strategies and Information Resources: Both standards (100%) comprising this reporting category, had at least three corresponding test items.
2. Demonstrate Comprehension of Printed Materials: All four standards comprising this reporting category (100%) had at least one corresponding test item.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance-of representation index value for each reporting category. As shown, the values for each reporting category exceeded Webb’s minimum criteria of .7 suggesting that the items are fairly evenly distributed, although the value for the “Demonstrate Comprehension of Printed Materials” marginally met the threshold.

1. Use of Word Analysis Strategies and Information Resources: .77
2. Demonstrate Comprehension of Printed Materials: .70

*Summary:* As shown, the Grade 5 Reading test was well aligned. All four alignment criteria were met by both reporting categories. Reviewer comments substantiate the results; 83.3 percent indicated that the “alignment was acceptable and no changes were needed” or “slight modifications were necessary”.

## Grade 6

Table 15 provides a summary of the extent to which the four alignment criteria were met for the Grade 6 Reading SOL test by reporting category

Table 15. Grade 6 Reading SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range-of-knowledge	Balance of Representation
Use of Word Analysis Strategies and Information Resources	YES	YES	YES	YES
Demonstrate Comprehension of Printed Materials	YES	YES	YES	YES

*Categorical Concurrence:* This characteristic is a general indicator of alignment and refers to the number of test items that measure the content knowledge of each reporting category. Webb’s criteria include a minimum of six test items for each reporting category is necessary for a reasonable and reliable measure of student understanding of a particular content domain. The alignment study review indicated that this requirement was exceeded for both of the reporting categories. Further, results of the alignment study indicated that the same number of test items that were associated with each reporting category was in *exact agreement* with the number specified in the test blueprint (Use of Word Analysis Strategies and Information Resources n = 11; Demonstrate Comprehension of Printed Materials n =34).

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Ten of the 11 test items (90.9%) had a DOK level at or above that expressed in the related standards.
2. Demonstrate Comprehension of Printed Materials: Twenty of the 34 items (58.8%) associated with this reporting category were in agreement with the cognitive demand of the related standards.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each Grade 6 SOL within a given reporting category was measured by at least one test item.

1. Use of Word Analysis Strategies and Information Resources: Both standards (100%) comprising this reporting category had at least three corresponding test items.

2. Demonstrate Comprehension of Printed Materials: All three standards comprising this reporting category (100%) had at least one corresponding test item.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance-of-representation index value for each reporting category. As shown, the values for each reporting category exceeded Webb’s minimum criteria of .7 suggesting that the items are fairly evenly distributed.

- 1. Use of Word Analysis Strategies and Information Resources: .77
- 2. Demonstrate Comprehension of Printed Materials: .97

*Summary:* As shown, the Grade 6 Reading test was well aligned. All four alignment criteria were met by both reporting categories. Reviewer comments substantiate the results; 81.8 percent indicated that the alignment was “acceptable, however, slight improvements are necessary.”

**Grade 7**

Table 16 provides a summary of the extent to which the four alignment criteria were met for the Grade 7 Reading SOL test by reporting category

Table 16. Grade 7 Reading SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range-of-knowledge	Balance of Representation
Use of Word Analysis Strategies and Information Resources	YES	YES	YES	YES
Demonstrate Comprehension of Printed Materials	YES	YES	YES	YES

*Categorical Concurrence:* This characteristic is a general indicator of alignment and refers to the number of test items that measure the content knowledge of each reporting category. Webb’s criteria include a minimum of six test items for each reporting category is necessary for a reasonable and reliable measure of student understanding of a particular content domain. The alignment study review indicated that this requirement was exceeded for both of the reporting categories. However, results of the alignment study indicated that the number of test items associated with each reporting category differed slightly from the number specified in the test blueprint (Use of Word Analysis Strategies and Information Resources n = 11; Demonstrate Comprehension of Printed Materials n =34). According to results of the alignment review, eight

test items were associated with “Use of Word Analysis Strategies and Information Resources” and 35 were related to SOLs comprising the Demonstrate Comprehension of Printed Materials” reporting categories. Further, reviewers indicated that two test items were related to a Grade 7 SOLs excluded from the test.

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Seven of the eight test items (87.5%) had a DOK level at or above that expressed in the related standards.
2. Demonstrate Comprehension of Printed Materials: Twenty-three of the 35 items (65.7%) associated with this reporting category were in agreement with the cognitive demand of the related standards.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each Grade 7 SOL within a given reporting category was measured by at least one test item.

1. Use of Word Analysis Strategies and Information Resources: Both standards (100%) comprising this reporting category had at least three corresponding test items.
2. Demonstrate Comprehension of Printed Materials: All four standards comprising this reporting category (100%) had at least one corresponding test item.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance-of representation index value for each reporting category. As shown, the values for each reporting category exceeded Webb’s minimum criteria of .7 suggesting that the items are fairly evenly distributed.

1. Use of Word Analysis Strategies and Information Resources: .88
2. Demonstrate Comprehension of Printed Materials: .84

*Summary:* As shown, the Grade 7 Reading test was well aligned. All four alignment criteria were met by both reporting categories. In addition 45.5 percent of the reviewers indicated that the “alignment was acceptable, but needs some slight improvement”. However, a majority (54.5%) indicated that the “alignment was unacceptable,” which seems contradictory to the Grade 7 Reading test alignment findings. Reviewers’ perceptions may be due in part to the frequent comments on the lack of recall questions.

## Grade 8

Table 17 provides a summary of the extent to which the four alignment criteria were met for the Grade 8 Reading SOL test by reporting category

Table 17. Grade 8 Reading SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range-of-knowledge	Balance of Representation
Use of Word Analysis Strategies and Information Resources	YES	YES	YES	YES
Demonstrate Comprehension of Printed Materials	YES	NO	YES	YES

*Categorical Concurrence:* This characteristic is a general indicator of alignment and refers to the number of test items that measure the content knowledge of each reporting category. Webb’s criteria include a minimum of six test items for each reporting category is necessary for a reasonable and reliable measure of student understanding of a particular content domain. The alignment study review indicated that this requirement was exceeded for both of the reporting categories. However, results of the alignment study indicated that the number of test items associated with each reporting category differed slightly from the number specified in the test blueprint (Use of Word Analysis Strategies and Information Resources n = 11; Demonstrate Comprehension of Printed Materials n =34). According to results of the alignment review, 10 test items were associated with “Use of Word Analysis Strategies and Information Resources” and 33 were related to SOLs comprising the “Demonstrate Comprehension of Printed Materials” reporting categories. Further, reviewers indicated that one test item was related to a Grade 8 SOL excluded from the test and another to content not measured by the test.

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Nine of the 10 test items (90%) had a DOK level at or above that expressed in the related standards.
2. Demonstrate Comprehension of Printed Materials: Nine of the 33 items (27.3%) associated with this reporting category were in agreement with the cognitive demand of the related standards. The cognitive demand of the SOL test items aligned with this reporting category included five (15.2%) at the comprehension level, 21 (63.6%) at the application level, and seven (21.2%) that targeted higher-order thinking. By comparison, reviewers indicated that 9.1 percent of the related standards targeted application-level knowledge, whereas a sizable percentage

(90.9%) addressed higher-order thinking. Consequently, this criterion was not met. Shifting the emphasis of the number of test items that required comprehension and application cognitive process to a focus on higher-order thinking would enhance the alignment of this reporting category.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each Grade 8 SOL within a given reporting category was measured by at least one test item.

1. Use of Word Analysis Strategies and Information Resources: This reporting category included one standard; consequently, the results for the related objectives will be reported to provide an indicator of the range-of-knowledge. Each of the two objectives (100%) was measured by at least two corresponding test items.

2. Demonstrate Comprehension of Printed Materials: The two standards included in this reporting category (100%) had at least 15 corresponding test items.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance-of-representation index value for each reporting category. As shown, the values for each reporting category exceeded Webb’s minimum criteria of .7 suggesting that the items are fairly evenly distributed, although the valued for “Use of Word Analysis Strategies and Information Resources” marginally met the threshold.

1. Use of Word Analysis Strategies and Information Resources: .70
2. Demonstrate Comprehension of Printed Materials: .96

*Summary:* As shown, the Grade 8 Reading test was fairly well aligned. All four alignment criteria were met by the “Use of Word Analysis Strategies and Information Resources” reporting category. The “Demonstrate Comprehension and Printed Materials” met all of the criteria with the exception of DOK consistency which was not met. Reviewers’ comments indicated that improvement in the alignment was necessary – 60 percent indicated that “significant improvements to the alignment were necessary”. However, a slightly smaller percentage (40%) reported that the “alignment was acceptable although some slight revisions were necessary.”

## End-of-Course Reading

The End-of-Course Reading SOL test includes reading standards for Grades 9 -11. Table 18 provides a summary of the extent to which the four alignment criteria were met for the End-of-Course Reading SOL test by reporting category

Table 18. End-of-Course Reading SOL: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria			
	Categorical Concurrence	Depth-of-Knowledge Consistency	Range-of-knowledge	Balance of Representation
Use of Word Analysis Strategies and Information Resources	YES	YES	YES	WEAK
Demonstrate Comprehension of Printed Materials	YES	YES	YES	NO

*Categorical Concurrence:* This characteristic is a general indicator of alignment and refers to the number of test items that measure the content knowledge of each reporting category. Webb’s criteria include a minimum of six test items for each reporting category is necessary for a reasonable and reliable measure of student understanding of a particular content domain. The alignment study review indicated that this requirement was exceeded for both of the reporting categories. However, results of the alignment study indicated that the number of test items associated with each reporting category differed slightly from the number specified in the test blueprint (Use of Word Analysis Strategies and Information Resources n = 12; Demonstrate Comprehension of Printed Materials n =38). According to results of the alignment review, 11 test items were associated with “Use of Word Analysis Strategies and Information Resources” and 39 were related to SOLs comprising the “Demonstrate Comprehension of Printed Materials” reporting categories.

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: All 11 test items (100%) related to this category had a DOK level at or above that expressed in the related standards.
2. Demonstrate Comprehension of Printed Materials: Thirty-four of the 39 items (87.2%) associated with this reporting category were in agreement with the cognitive demand of the related standards.

*Range-of-Knowledge:* This alignment characteristic refers to the degree to which each End-of-Course Reading SOL within a given reporting category was measured by at least one test item.

1. Use of Word Analysis Strategies and Information Resources: Five of the seven standards (71.4%) included in this reporting category was measured by at least one corresponding test item.

2. Demonstrate Comprehension of Printed Materials: Six of the 14 standards included in this reporting category (42.8%) had at least one corresponding test item.

*Balance of Representation:* This alignment criterion refers to the distribution of test items or the emphasis of each standard on the assessment. This characteristic accounts for the number of standards and the number of related test items for a given reporting category. Below is the balance-of-representation index value for each reporting category. As shown, the values for each reporting category did not meet Webb's minimum criteria of .7 suggesting that the items are not distributed evenly across the standards. The End-of-Course Reading test measures reading standards for Grades 9-11. The balance-of-representation values are most likely due to the lack of coverage of certain SOLs and that the different grade level standards overlap due to the cumulative nature of the test.

1. Use of Word Analysis Strategies and Information Resources: .64

2. Demonstrate Comprehension of Printed Materials: .41

*Summary:* As shown, the End-of-Course Reading test was fairly well aligned. Both reporting categories met three of the four alignment criteria, with the exception of the balance of representation criterion. This criterion was "weakly" met by "Use of Word Analysis Strategies and Information Resources" but not met by the "Demonstrate Comprehension and Printed Materials" reporting category. However, 100 percent of the reviewers indicated that the alignment of the End-of-Course Reading SOL test was "acceptable and that no changes were needed." The disparity between the balance of representation results and the reviewers' overall perceptions may be due in part to the cumulative nature of the exam and that not all SOLs from each grade level were equally emphasized. One reviewer indicated, "I am pleased with the test. Although most questions are from 9<sup>th</sup> grade, I believe this is fair and these skills are subsumed in standards at [grades] 10 and 11."

## Virginia Grade Level Alternative (VGLA) Alignment Review

The VGLA, first implemented in 2004-2005, is designed to provide students with disabilities with an alternative to the state test while maintaining the same high expectations required of the standard format of the SOL tests. The blueprint for the standard forms and the VGLA is the same; therefore, students who complete the VGLA are required to demonstrate that they have met the same on-grade level SOLs as those who take the standard version of the SOL test. To complete the VGLA assessment, qualifying students “compile a collection of work samples to demonstrate performance on any and all on-grade level SOLs on which they have received instruction” (Virginia Department of Education, 2005). Student collections can include the following types of evidence: work sample, audiotape, videotape, anecdotal record, interview, photograph, as well as charts/graphs that demonstrate performance. The vast majority of the VGLA portfolios reviewed were comprised largely of student work samples such as worksheets, tests, quizzes, writing samples, as well as projects.

As described in the methodology section, reviewers of the VGLA engaged in a similar process to those who completed the alignment review for the standard forms of the mathematics and reading assessments. However, reviewers of the VGLA collections examined sources of evidence rather than the standard form test items. During their analysis they completed a review sheet that in which they identified the DOK demonstrated in the student work and the extent to which the evidence was aligned with the identified standard (i.e. fully, adequately, minimally). Since each piece of student evidence was labeled with the related SOL it was not feasible, from a measurement perspective, for reviewers to identify the SOL match. As a result, it was determined that reviewers would make an assessment of the extent to which the source of evidence was identified with the content and/or skills described in the related SOL (see Appendix E for an example of the VGLA student collection review sheet). Each review team was provided with a collection of approximately ten VGLA portfolios per grade. These portfolios were randomly selected from those submitted for the 2005-2006 academic year. Each reviewer completed one review sheet per portfolio. On average, each participant was able to review two to three portfolios per grade during the time allotted (approximately 2.5 hours).

### *Application of Webb’s Four Alignment Criteria to the VGLA*

Each student VGLA portfolio functions as an SOL test; similarly within each collection of evidence each exhibit functions as a test item – it demonstrates the extent to which the student achieved the related SOL objectives. There are several guidelines for the submission of evidence that have a direct bearing on how the alignment criteria are applied to the VGLA: (1) “the evidence submitted must demonstrate knowledge and/or skill in the SOL addressed,” and (2) “Students will be allowed to submit evidence for all or some of the Standards of Learning assessed on the VGLA. Should a student have no evidence for one or more standards contained in the blueprint, the student may simply indicate that no evidence is beginning submitted for that particular standard of learning,” and (3) “Evidence submitted may prove more than one standard addressed” (Virginia Department of Education, 2005). The results of the VGLA alignment review are reported slightly differently from those of the standard form of the mathematics and reading SOL tests. The intent of the analysis of the VGLA portfolio collections was to provide a holistic assessment of the extent to which the DOK levels of the portfolio evidence and the

related SOLs were similar, as well as assess the extent to which the portfolios, on average, measured the range of SOLs within each reporting category.

### *Categorical Concurrence*

According to Webb, the criterion of categorical concurrence provides a general measure of the alignment between the standards and the assessment. This criterion is reflected in the following question that information in the alignment reviews: *To what extent is the content measured in the SOL tests aligned with the content expressed in Standards of Learning?* Webb (2005) indicates that the criterion is met “if the same or consistent categories of content appear in both documents” (p. 110). For the standard form of the test, this criterion was judged by determining if the test included items measuring content from each reporting category. The analysis was based on the number of test items per reporting category, since students were not required to submit a specific number of exhibits for each standard, but could choose the standards for which they supplied evidence as well as chose the number of exhibits per standard that they included in the collection is it difficult to translate this criterion to the VGLA at the portfolio level since a minimum number of exhibits per SOL is not required. Consequently, results for categorical concurrence will not be reported. However, it is important to note that at an aggregate level, evidence was demonstrated for each SOL reporting category for each grade level and subject area. The extent to which the SOLs were represented in the collections will be addressed more fully with regard to the range-of-knowledge and balance of representation categories.

### *Depth-of-Knowledge Consistency*

This criterion of alignment addresses the similarity in the cognitive demand specified in the SOL and the sources of evidenced supplied to demonstrate mastery of the SOL. The question, *“To what extent is the depth-of-knowledge reflected in the VGLA evidence aligned with the depth-of-knowledge expressed in the related Standard of Learning?”* addresses the notion of DOK consistency. According to Webb (2005), “depth-of-knowledge consistency between standards and assessment indicates alignment if what is elicited from students on the assessment is as demanding cognitively as what students are expected to know and do as stated in the standards” (p. 111). Webb indicates that for consistency to exist between the assessment and the reporting category, at least 50% of targeted standards should be “hit” by items of the appropriate complexity. Webb’s cut point is based on the “assumption that a minimal passing score for any one [reporting category] of greater than 50% would require the student to successfully answer at least some items at or above the depth-of-knowledge level of the corresponding [SOL]” (p. 111).

Similar to the analyses conducted for the standard versions of the SOL tests, the DOK level of portfolio exhibits was determined by a percent agreement threshold to limit the influence of outliers. A determination of the depth-of-knowledge level was made if greater than 65% of reviewers reported a similar DOK level for the evidence relating to a particular SOL. However, if a clear majority was not present, responses were averaged, similar to Webb’s methodology. The DOK results for the student exhibits were then matched with the DOK level of the related content standard to determine the percent agreement.

Using Webb’s criterion, the DOK consistency category was met if more than 50% of the exhibits had DOK levels that were at or above the DOK level of the corresponding SOL within each

reporting category. This standard was “weakly” met if a reporting category had between 40% and 50% DOK agreement between the test items and the standards. Percentages below 40% indicated that the criterion was not met.

### *Range-of-Knowledge Correspondence*

This criterion addresses the extent to which the scope of knowledge required by the SOLs are consistent with that demonstrated in the VGLA portfolio collections. The question, “*To what extent is the range-of-knowledge demonstrated in the VGLA portfolios aligned with the range-of-knowledge expressed in the Standards of Learning?*” addresses the range-of-knowledge correspondence criterion. Webb (2005) uses the “range-of-knowledge criterion to judge whether a comparable span of knowledge expected of students by a standard is the same as, or corresponds to, the span of knowledge that students need in order to correctly answer the assessment items” (p. 112). Applying this definition to the VGLA would require a judgment about the span of knowledge demonstrated in each portfolio collection. For the standard form of the test, this criterion addresses the number of standards within a reporting category that have at least one related assessment item. Similarly for the VGLA, this criterion addresses the number of standards within a reporting category that have at least one related source of evidence.

Since the VGLA relies on the same test blueprint as the standard forms of the SOL tests, Webb’s range-of-knowledge criterion translates well to the VGLA portfolio collections. This criterion provides a measure of the extent to which the SOLs are demonstrated in the sources of evidence. According to Webb’s criterion, 50% of the SOLs in a reporting category should have at least one related source of evidence in order for alignment on this criterion to be determined “acceptable.” Similarly alignment on this criterion is determined “weakly” met if 41%- 49% of the SOLs for a reporting category had at least one source of evidence and not met if less than 41% of the standards had at least one corresponding source of evidence. To determine range-of-knowledge, frequency counts of the SOLs measured within each portfolio collection were calculated and then averaged to provide for an aggregate measure of the grade-level collection. Given the averaging process, the percent value for the range-of-knowledge criterion also provides an indicator of the extent to which the standards within each reporting category were emphasized in the different portfolio collections and as a result conceptually captures the balance-of-representation criterion.

### *Balance of Representation*

The balance of representation criterion extends the idea of range-of-knowledge alignment by focusing on the distribution of test items corresponding to the different reporting categories. Webb (2005) indicates “the balance-of-representation criterion is used to indicate the degree to which one objective is given more emphasis on the assessment than another” (p.112). The question, “*To what extent are the SOLs emphasized on the corresponding SOL test?*” addresses the balance of representation criterion. To determine the relative emphasis placed on individual SOLs, Webb uses a mathematical equation to derive an index that measures the distribution of test items across the different SOLs that comprise a reporting category. The index is “computed by considering the difference in the proportion of [SOLs] and the proportion of related assessment items for that objective. Given that a minimum number of exhibits is not required for each SOL, it is not possible to apply Webb’s formula to the VGLA at an aggregate level; and therefore these data are not reported for the VGLA.

## VGLA Mathematics Grades 3-8 Alignment Review Results

This section summarizes the extent to which each of VGLA Mathematics portfolio collections was aligned with the SOLs. Alignment was determined by applying two criteria developed by Webb: (1) depth-of-knowledge consistency and (2) range-of-knowledge. The results for each grade level are presented by reporting category. These categories are the same for Grades 3-8 and include: (1) Number and Number Sense, (2) Computation and Estimation, (3) Measurement and Geometry, Probability and Statistics, as well as (4) Patterns, Functions, and Algebra. The reliability of reviewers’ ratings was reasonably sufficient; 90 percent of all DOK ratings were within 1 point of each other.

The results from the alignment review committee are presented for each grade and first include a summary table of the two alignment criteria. A “yes” indicates that the criterion was met; “weak” indicates that the criterion was weakly met, and “no” indicates that the criterion was not met according to the criteria established by Webb (see Table 1). In addition, quantitative results are discussed for each criterion following the summary table. Reviewers’ verbatim comments regarding the general alignment of the Mathematics VGLA at each grade level can be found in Appendix H.

### Grade 3

The Grade 3 Mathematics VGLA measures SOLs for grades K-3 organized into five different reporting categories. Table 19 provides a summary of the extent to which the two alignment criteria were met for the collection of Grade 3 Mathematics VGLA portfolios.

Table 19. Grade 3 Mathematics VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Number and Number Sense	YES	YES
Computation and Estimation	YES	YES
Measurement and Geometry	YES	YES
Probability and Statistics	YES	YES
Patterns, Functions, and Algebra	NO	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the five reporting categories:

1. Number and Number Sense: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOL was 93.3 percent.
2. Computation and Estimation: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOL was 76 percent.

3. Measurement and Geometry: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOL was 81.8 percent.

4. Probability and Statistics: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOL was 54.5 percent.

5. Patterns, Functions, and Algebra: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOL was 11.1 percent. Generally, the majority of student evidence was at the comprehension (55.6%) or the application (44.4%) levels. In contrast, the related standards targeted application (22.2%) and higher-order thinking (77.8%) cognitive processes. Consequently, this criterion was not met.

*Range-of- Knowledge:*

1. Number and Number Sense: Of the portfolios in the Grade 3 VGLA Mathematics collection, 77 percent contained evidence related to all 23 SOLs included in this reporting category.

2. Computation and Estimation: Of the portfolios in the Grade 3 VGLA Mathematics collection, 66 percent contained evidence related to all 14 SOLs included in this reporting category.

3. Measurement and Geometry: Of the portfolios in the Grade 3 VGLA Mathematics collection, 72 percent contained evidence related to all 35 SOLs included in this reporting category.

4. Probability and Statistics: Of the portfolios in the Grade 3 VGLA Mathematics collection, 66 percent contained evidence related to all 10 SOLs included in this reporting category.

5. Patterns, Functions, and Algebra: Of the portfolios in the Grade 3 VGLA Mathematics collection, 69 percent contained evidence related to all 8 SOLs included in this reporting category.

## Grade 4

Table 20 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 4 Mathematics VGLA portfolios.

Table 20. Grade 4 Mathematics VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Number and Number Sense	YES	YES
Computation and Estimation	YES	YES
Measurement and Geometry	YES	YES
Probability and Statistics	NO	YES
Patterns, Functions, and Algebra	YES	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the five reporting categories:

1. Number and Number Sense: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 80 percent.
2. Computation and Estimation: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in the exhibits at or above that of the related SOLs was 100 percent.
3. Measurement and Geometry: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in the exhibits at or above that of the related SOLs was 94.7 percent.
4. Probability and Statistics: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in the exhibits at or above that of the related SOLs was 33.3 percent. As a result this criterion was not met according to Webb's cut-off of 50 percent. Reviewers indicated that 66.7 percent of the evidence was at the comprehension level and 33.3 percent was at the application level. However, the related SOLs targeted comprehension, application, and higher-order-thinking cognitive process.
5. Patterns, Functions, and Algebra: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in the exhibits at or above that of the related SOLs was 100 percent.

*Range-of- Knowledge:*

1. Number and Number Sense: Of the portfolios in the Grade 4 VGLA Mathematics collection, 83 percent contained evidence related to all four SOLs included in this reporting category.
2. Computation and Estimation: Of the portfolios in the Grade 4 VGLA Mathematics collection, 87 percent contained evidence related to all five SOLs included in this reporting category.
3. Measurement and Geometry: Of the portfolios in the Grade 4 VGLA Mathematics collection, 78 percent contained evidence related to all nine SOLs included in this reporting category.
4. Probability and Statistics: Of the portfolios in the Grade 4 VGLA Mathematics collection, 73 percent contained evidence related to the two SOLs included in this reporting category.
5. Patterns, Functions, and Algebra: Of the portfolios in the Grade 4 VGLA Mathematics collection, 68 percent contained evidence related to the two SOLs included in this reporting category.

**Grade 5**

Table 21 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 5 Mathematics VGLA portfolios.

Table 21. Grade 5 Mathematics VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Number and Number Sense	YES	YES
Computation and Estimation	YES	YES
Measurement and Geometry	NO	YES
Probability and Statistics	NO	YES
Patterns, Functions, and Algebra	YES	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the five reporting categories:

1. Number and Number Sense: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 100 percent.
2. Computation and Estimation: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 80 percent.

3. Measurement and Geometry: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 47.1 percent. Consequently, this criterion was not met. The depth-of knowledge levels demonstrated included 11.8 percent at the knowledge level, 58.8 percent at the comprehension level, and 29.4 percent targeted application-focused cognitive processes. By comparison 20 percent of the related standards were at the comprehension and 20 percent at the application levels and 60 percent focused on higher-order thinking processes.

4. Probability and Statistics: Of the evidence provided for this reporting category, there was 40 percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs. On average, the cognitive level of student evidence provided for standards in this reporting category was at the application level. As a result, the cognitive processes demonstrated in the evidence matched with the comprehension and application levels of 40 percent of the related standards. However, the remaining standards targeted higher-order thinking skills; consequently, the criterion was not met.

5. Patterns, Functions, and Algebra: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 60 percent.

*Range-of- Knowledge:*

1. Number and Number Sense: Of the portfolios in the Grade 5 VGLA Mathematics collection, 83 percent contained evidence related to all four SOLs included in this reporting category.

2. Computation and Estimation: Of the portfolios in the Grade 5 VGLA Mathematics collection, 87 percent contained evidence related to all five SOLs included in this reporting category.

3. Measurement and Geometry: Of the portfolios in the Grade 5 VGLA Mathematics collection, 78 percent contained evidence related to all nine SOLs included in this reporting category.

4. Probability and Statistics: Of the portfolios in the Grade 5 VGLA Mathematics collection, 73 percent contained evidence related to the two SOLs included in this reporting category.

5. Patterns, Functions, and Algebra: Of the portfolios in the Grade 5 VGLA Mathematics collection, 68 percent contained evidence related to the two SOLs included in this reporting category.

## Grade 6

Table 22 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 6 Mathematics VGLA portfolios.

Table 22. Grade 6 Mathematics VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Number and Number Sense	YES	YES
Computation and Estimation	YES	YES
Measurement and Geometry	YES	YES
Probability and Statistics	YES	YES
Patterns, Functions, and Algebra	YES	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the five reporting categories:

1. Number and Number Sense: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 85.7 percent.
2. Computation and Estimation: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 100 percent.
3. Measurement and Geometry: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 84.6 percent.
4. Probability and Statistics: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 66.7 percent.
5. Patterns, Functions, and Algebra: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 100 percent.

*Range-of- Knowledge:*

1. Number and Number Sense: Of the portfolios in the Grade 6 VGLA Mathematics collection, 84 percent contained evidence related to all five SOLs included in this reporting category.

2. Computation and Estimation: Of the portfolios in the Grade 6 VGLA Mathematics collection, 94 percent contained evidence related to all three SOLs included in this reporting category.
3. Measurement and Geometry: Of the portfolios in the Grade 6 VGLA Mathematics collection, 80 percent contained evidence related to all eight SOLs included in this reporting category.
4. Probability and Statistics: Of the portfolios in the Grade 6 VGLA Mathematics collection, 87 percent contained evidence related to the three SOLs included in this reporting category.
5. Patterns, Functions, and Algebra: Of the portfolios in the Grade 6 VGLA Mathematics collection, 71 percent contained evidence related to the three SOLs included in this reporting category.

## Grade 7

Table 23 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 7 Mathematics VGLA portfolios.

Table 23. Grade 7 Mathematics VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Number and Number Sense	NO	YES
Computation and Estimation	YES	YES
Measurement and Geometry	YES	YES
Probability and Statistics	NO	YES
Patterns, Functions, and Algebra	YES	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the five reporting categories:

1. Number and Number Sense: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 28.6 percent. Consequently, this criterion was not met. The DOK levels demonstrated in the VGLA collections of student evidence included an average of 14.3 percent at the knowledge level, 71.4 percent at the comprehension level, and 14.3 percent at the application level. By comparison 14.3 percent of the related standards were at the recall-knowledge level and 85.7 percent targeted application-level cognitive processes.
2. Computation and Estimation: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 75 percent.

3. Measurement and Geometry: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 62.5 percent.

4. Probability and Statistics: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 40 percent. Consequently, this criterion was not met. The DOK levels demonstrated in the VGLA collections of student evidence included an average of 70 percent at the comprehension, 20 percent at the application, and 10 percent at the higher-order-thinking levels. By comparison, 10 percent of the related standards were at the comprehension, 80 percent at the application, and 10 percent targeted high-order cognitive processes.

5. Patterns, Functions, and Algebra: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 80 percent.

*Range-of- Knowledge:*

1. Number and Number Sense: Of the portfolios in the Grade 7 VGLA Mathematics collection, 98 percent contained evidence related to all three SOLs included in this reporting category.

2. Computation and Estimation: Of the portfolios in the Grade 7 VGLA Mathematics collection, 86 percent contained evidence related to all three SOLs included in this reporting category.

3. Measurement and Geometry: Of the portfolios in the Grade 7 VGLA Mathematics collection, 82 percent contained evidence related to all seven SOLs included in this reporting category.

4. Probability and Statistics: Of the portfolios in the Grade 7 VGLA Mathematics collection, 80 percent contained evidence related to the five SOLs included in this reporting category.

5. Patterns, Functions, and Algebra: Of the portfolios in the Grade 7 VGLA Mathematics collection, 80 percent contained evidence related to the four SOLs included in this reporting category.

## Grade 8

Table 24 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 8 Mathematics VGLA portfolios.

Table 24. Grade 8 Mathematics VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Number and Number Sense	YES	YES
Computation and Estimation	YES	YES
Measurement and Geometry	YES	YES
Probability and Statistics	NO	YES
Patterns, Functions, and Algebra	YES	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the five reporting categories:

1. Number and Number Sense: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 75 percent.
2. Computation and Estimation: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 100 percent.
3. Measurement and Geometry: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 66.7 percent.
4. Probability and Statistics: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 33 percent. On average the cognitive level of student evidence provided for standards in this reporting category was at the application level. As a result, the cognitive processes demonstrated in the evidence matched with the comprehension levels of 33 percent of the related standards. However, the remaining standards (66.7%) targeted higher-order thinking skills; consequently, the criterion was not met.
5. Patterns, Functions, and Algebra: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 83.3 percent.

### *Range-of- Knowledge:*

1. Number and Number Sense: Of the portfolios in the Grade 7 VGLA Mathematics collection, 100 percent contained evidence related to the two SOLs included in this reporting category.
2. Computation and Estimation: Of the portfolios in the Grade 7 VGLA Mathematics collection, 100 percent contained evidence related to all three SOLs included in this reporting category.
3. Measurement and Geometry: Of the portfolios in the Grade 7 VGLA Mathematics collection, 100 percent contained evidence related to all five SOLs included in this reporting category.
4. Probability and Statistics: Of the portfolios in the Grade 7 VGLA Mathematics collection, 100 percent contained evidence related to the three SOLs included in this reporting category.
5. Patterns, Functions, and Algebra: Of the portfolios in the Grade 7 VGLA Mathematics collection, 100 percent contained evidence related to the five SOLs included in this reporting category.

### **Summary**

The review of the sample of VGLA Mathematics portfolio collections indicated that generally the student assessment submissions were aligned with the SOLs. The results suggest that the vast majority of the portfolios addressed the range of SOLs at each grade level. The DOK alignment was generally good as well; Grade 6 met the criterion for all five reporting categories, Grades 3, 4, and 8 met the criterion for four of the five reporting categories, while Grades 5 and 7 met the criterion in three of the five reporting categories. The DOK alignment seemed most problematic for the “Probability and Statistics” reporting category – the DOK criterion was not met by four of the six grade levels. The inclusion of more evidence at the higher DOK levels (i.e. application and higher-order thinking) would improve the alignment of this reporting category across the different grade levels. Reviewers consistently reported that the alignment of the VGLA Mathematics portfolios was “acceptable with some slight improvements necessary”.

## VGLA Reading Grades 3-8 Alignment Review Results

The yearly SOL Reading assessments are administered in Grades 3-8. This section summarizes the extent to which each of the Grades 3-8 Reading VGLA portfolio collections was aligned with the related SOLs. Alignment was determined by applying two of the criteria developed by Webb: (1) depth-of-knowledge consistency and (2) range-of-knowledge. The results for each grade level/subject area test are presented by reporting category. The two categories are the same the Reading SOL alternative assessments and include: (1) Use of Word Analysis Strategies and Information Resources and (2) Demonstrate Comprehension of Printed Materials. The reliability among reviewers was reasonably sufficient; 90 percent of all DOK ratings were within one point of each other.

The results from the alignment review committee are presented for each grade and first include a summary table of the two alignment criteria. A “yes” indicates that the criterion was met; “weak” indicates that the criterion was weakly met, and “no” indicates that the criterion was not met according to the criteria established by Webb (see Table 1). In addition, quantitative results are discussed for each criterion following the summary table. Reviewers’ verbatim narrative comments regarding the general alignment of each portfolio collection at each grade level can be found in Appendix I.

### Grade 3

The Grade 3 Reading VGLA measures SOLs for Grades 2-3 organized into two different reporting categories. Table 25 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 3 Reading VGLA portfolios.

Table 25. Grade 3 Reading VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Use of Word Analysis Strategies and Information Resources	NO	YES
Demonstrate Comprehension of Printed Materials	YES	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 18.2 percent. On average, the DOK level of the portfolio evidence was 9.1 percent at the recall level, 72.7 percent at the comprehension level and 18.2 at the application level. By comparison, the standards comprising this reporting category were at the application DOK level. Consequently, this criterion was not met.

2. Demonstrate Comprehension of Printed Materials: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 52.9 percent.

*Range-of- Knowledge:*

1. Use of Word Analysis Strategies and Information Resources: Of the portfolios in the Grade 3 VGLA Reading collection, 100 percent contained evidence related to the five SOLs included in this reporting category.

2. Demonstrate Comprehension of Printed Materials: Of the portfolios in the Grade 3 VGLA Reading collection, 93 percent contained evidence related to the seven SOLs included in this reporting category.

**Grade 4**

Table 26 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 4 Reading VGLA portfolios.

Table 26. Grade 4 Reading VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Use of Word Analysis Strategies and Information Resources	YES	YES
Demonstrate Comprehension of Printed Materials	YES	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 80 percent

2. Demonstrate Comprehension of Printed Materials: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 53.8 percent.

*Range-of- Knowledge:*

1. Use of Word Analysis Strategies and Information Resources: Of the portfolios in the Grade 4 VGLA Reading collection, 93 percent contained evidence related to the two SOLs included in this reporting category.

2. Demonstrate Comprehension of Printed Materials: Of the portfolios in the Grade 4 VGLA Reading collection 92 percent contained evidence related to the four SOLs included in this reporting category.

**Grade 5**

Table 27 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 5 Reading VGLA portfolios.

Table 27. Grade 5 Reading VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Use of Word Analysis Strategies and Information Resources	NO	YES
Demonstrate Comprehension of Printed Materials	YES	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 25 percent. On average, the DOK level of the portfolio evidence was 75 percent at the comprehension level and 25 at the application level. By comparison, 25 percent of the SOLs comprising this reporting category were at the comprehension and 50 percent were at the application levels. In addition, 25 percent targeted high-order-thinking processes. Consequently, this criterion was not met.

2. Demonstrate Comprehension of Printed Materials: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 53.8 percent.

*Range-of- Knowledge:*

1. Use of Word Analysis Strategies and Information Resources: Of the portfolios in the Grade 5 VGLA Reading collection, 100 percent contained evidence related to the two SOLs included in this reporting category.

2. Demonstrate Comprehension of Printed Materials: Of the portfolios in the Grade 5 VGLA Reading collection, 96 percent contained evidence related to the four SOLs included in this reporting category.

## Grade 6

Table 28 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 6 Reading VGLA portfolios.

Table 28. Grade 6 Reading VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Use of Word Analysis Strategies and Information Resources	NO	YES
Demonstrate Comprehension of Printed Materials	NO	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 33.3 percent. On average, the DOK level of the portfolio evidence was 83.3 percent at the comprehension level and 16.7 at the application level. By comparison, 16.7 percent of the SOLs comprising this reporting category were at the comprehension level and 83.3 percent were at the application level. Consequently, this criterion was not met.
2. Demonstrate Comprehension of Printed Materials: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 16.7 percent. The average DOK rating for student evidence in this category included 83.3 percent at the comprehension level and the remaining 16.7 percent demonstrated application DOK levels. By comparison, greater percentages of the SOLs were at the application (50%) and higher-order-thinking (33.3%) DOK levels. In addition, a small percentage of SOLs (16.7%) targeted the comprehension level.

*Range-of- Knowledge:*

1. Use of Word Analysis Strategies and Information Resources: Of the portfolios in the Grade 6 VGLA Reading collection, 97 percent contained evidence related to the two SOLs included in this reporting category.
2. Demonstrate Comprehension of Printed Materials: Of the portfolios in the Grade 4 VGLA Reading collection, 87 percent contained evidence related to all three SOLs included in this reporting category.

## Grade 7

Table 29 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 7 Reading VGLA portfolios.

Table 29. Grade 7 Reading VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Use of Word Analysis Strategies and Information Resources	YES	YES
Demonstrate Comprehension of Printed Materials	YES	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 100 percent.
2. Demonstrate Comprehension of Printed Materials: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 58.3 percent.

*Range-of- Knowledge:*

1. Use of Word Analysis Strategies and Information Resources: Of the portfolios in the Grade 7 VGLA Reading collection, 100 percent contained evidence related to the two SOLs included in this reporting category.
2. Demonstrate Comprehension of Printed Materials: Of the portfolios in the Grade 7 VGLA Reading collection, 96 percent contained evidence related to all four SOLs included in this reporting category.

## Grade 8

Table 30 provides a summary of the extent to which the two alignment criteria were met for the collection of the Grade 8 Reading VGLA portfolios.

Table 30. Grade 8 Reading VGLA: Alignment Criteria by Reporting Category

Reporting Categories	Alignment Criteria	
	Depth-of-Knowledge Consistency	Range-of-Knowledge
Use of Word Analysis Strategies and Information Resources	WEAK	YES
Demonstrate Comprehension of Printed Materials	NO	YES

*Depth-of-Knowledge Consistency:* This alignment characteristic refers to the agreement between the cognitive demand expressed in the standards and that required of the corresponding test items. The following details the specific results for each of the two reporting categories:

1. Use of Word Analysis Strategies and Information Resources: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 50 percent. Consequently, this criterion was “weakly” met. The average DOK rating for student evidence in this category included 50 percent at the comprehension level and the remaining 50 percent reflected application DOK levels. By comparison, the related SOLs targeted application DOK levels.

2. Demonstrate Comprehension of Printed Materials: Of the evidence provided for this reporting category, the percent agreement of the cognitive demand demonstrated in exhibits at or above that of the related SOLs was 10 percent. The average DOK rating for student evidence in this category included 70 percent at the comprehension level and the remaining 30 percent reflected application DOK levels. By comparison, a smaller percentage of the SOLs were at the application (20%) and a substantially greater percentage targeted higher-order-thinking (80%) DOK levels. Consequently, this criterion was not met.

*Range-of- Knowledge:*

1. Use of Word Analysis Strategies and Information Resources: Of the portfolios in the Grade 8 VGLA Reading collection, 100 percent contained evidence related to the SOL included in this reporting category. Further, this SOL included two objectives for which all of the portfolios in the Grade 8 Reading collection contained evidence.

2. Demonstrate Comprehension of Printed Materials: Of the portfolios in the Grade 8 VGLA Reading collection, 85 percent contained evidence related to the two SOLs included in this reporting category.

## Summary

The alignment of the VGLA Reading grade level collections was good with regard to the range of SOL content coverage. The vast majority of the portfolios demonstrated evidence related to almost all of the grade level SOLs. With regard to the DOK alignment, two of the six grade levels (Grades 4 and 7) met the DOK alignment criterion for both reporting categories. The evidence provided at other grade levels generally was at a lower cognitive level than that expressed in the SOLs, particularly with regard to the SOLs comprising the “Use of Word Analysis Strategies and Information Resources” – the DOK alignment criterion was not met for this reporting category in three of the six grades and was weakly met in Grade 8. Increasing the cognitive level demonstrated in the evidence, especially for those SOLs in the “Use of Word Analysis Strategies and Information Resources” reporting categories and more generally for Grades 6 and 8 would enhance the alignment of the VGLA portfolio submissions. Reviewers generally indicated however that the alignment of the VGLA portfolios with the SOLs was acceptable with slight improvements needed.

## Conclusions

The results of the fall 2006 Alignment Review Committee Meeting indicate that Virginia's state Mathematics and Reading tests and the Standards of Learning are *well aligned* according to the four alignment criteria: categorical concurrence, depth-of-knowledge, range-of-knowledge, and balance of representation. Generally, any lack of alignment was associated with a lack of agreement between the DOK levels of the test items and the related SOLs. The inconsistency between the cognitive match was more common at the higher grade levels in both the Mathematics and the Reading assessments. Further, the review of a sample of Virginia Grade VGLA submissions indicates that portfolio collections are *well aligned* with the content domain of the SOLs. However, greater attention to the depth-of-knowledge agreement with the SOLs is warranted at some grade levels, of the Reading assessment.

With regard to the Mathematics SOL tests, the results of the alignment review indicate that the alignment is reasonably good. Occasionally, the DOK required of the test items was lower than that expressed in the state standards. At the lower grades, the DOK criterion is generally satisfied for the different SOL reporting categories. However, there was some inconsistency between the cognitive demand of the tests and that of the SOLs for the End-of-Course tests in Algebra I, Geometry, and Algebra II.

The alignment of the Reading SOL tests is quite good, and suggests that the SOL tests generally mirror the content and cognitive processes of the SOLs. At the lower grades, the alignment results indicated that SOL tests emphasize some SOLs more than others. However, the disproportionate emphasis on certain SOLs was more significant for the EOC Reading test. The depth-of-knowledge between the SOL tests and the SOLs was generally comparable at the different grade levels. However, there was a lack of agreement between the cognitive demand required by the tests and the SOLs for Grade 8 especially – which generally included items at a lower cognitive level than the standards. Increasing the number of items that addressed higher-order-thinking skills would improve the alignment.

The results of the VGLA Mathematics Grades 3-8 review indicated that generally the alternative portfolio assessments were aligned with the SOLs. The results suggest that range of SOLs demonstrated in the portfolio collections at each grade level accurately reflected the SOLs. The agreement between the DOK levels of the portfolios and that of the SOLs was generally consistent for Grades 3-8.

The alignment of the VGLA Reading Grades 3-8 portfolio collections was also quite good with regard to the coverage of the SOLs or range-of-knowledge. The evidence included in the portfolios generally addressed all of the SOLs at the specified grade levels. However, the inconsistency between the DOK levels demonstrated in the portfolios and those expressed in the SOLs, is a concern at Grades 3, 5, 6, and 8. The evidence included in these collections was generally at a lower cognitive level than that expressed in the related SOLs.

Overall, the preponderance of evidence from this review indicates substantive alignment, in terms of both the content and cognitive processes required. There were few areas that require attention to bring the SOL tests into full alignment with the standards.

## References

- Council of Chief State School Officers (2002). *Models for alignment analysis and assistance to states*. Retrieved August 17, 2006 from [http://www.ccsso.org/Federal\\_Programs/nclb/3350.cfm](http://www.ccsso.org/Federal_Programs/nclb/3350.cfm)
- Webb, N. (2005). *Web alignment tool (WAT) training manual*. Madison, WI: University of Wisconsin, Wisconsin Center for Education Research.
- Virginia Department of Education (2005). Virginia grade level alternative. Retrieved August 17, 2006 from <http://www.pen.k12.va.us/VDOE/Assessment/home.shtml#VGLA>

Appendix A

Superintendent's Memorandum and Application for Participations in the Alignment Review  
Committee Meeting

COMMONWEALTH OF VIRGINIA  
DEPARTMENT OF EDUCATION  
P.O. BOX 2120  
RICHMOND, VIRGINIA 23218-2120

SUPTS. MEMO NO. 179  
September 8, 2006

INFORMATIONAL

TO: Division Superintendents

FROM: Billy K. Cannaday, Jr.  
Superintendent of Public Instruction

SUBJECT: Alignment Review Committee Nominations

Under the federal *No Child Left Behind Act* states are required to conduct studies documenting the alignment of the assessments used for Adequate Yearly Progress with the state content standards. To meet this requirement, the Virginia Department of Education is convening committees of Virginia educators to review the Standards of Learning (SOL) assessments and the Virginia Grade Level Alternative (VGLA) assessments in the areas of reading and mathematics to determine the degree of alignment between these assessments and the SOL content standards. The Division of Assessment and Reporting is seeking nominations for membership on the SOL and VGLA Alignment Review Committees for reading and mathematics for grades 3 through 5, grades 6 through 8, and SOL end-of-course. Approximately twelve educators will be selected to serve on each of the ten committees (six for SOL assessment and four for the VGLA assessment). School divisions are encouraged to nominate one representative for each committee.

The Alignment Review Committee meetings will be conducted October 16-17, 2006, at the Virginia Crossings Resort, Richmond, Virginia. Committee members will be chosen according to the following criteria:

- expertise and instructional/supervisory experience in general and/or special education and in the content areas of reading and/or mathematics; and
- balanced regional representation.

Committee members will be provided the following:

- reimbursement for meals and travel expenses in accordance with state travel policy and procedures;
- lodging; and
- a certificate for recertification points.

Individuals may initiate the application process for the Alignment Review Committees or may be nominated. In either case, all nominees must complete the attached application and obtain written approval

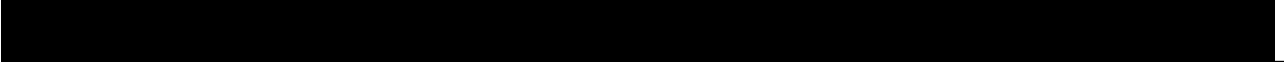
from their division superintendent. Completed applications must be received by the Virginia Department of Education by September 25, 2006.

If you have questions, please contact the Division of Assessment and Reporting at [darfax@doe.virginia.gov](mailto:darfax@doe.virginia.gov) or by phone at (804) 225-2102.

BKC/SLR/jc

Attachment

<http://www.doe.virginia.gov/VDOE/suptsmemos/2006/inf179a.doc>



**Alignment Review Committees**  
**(Reading and Mathematics Assessments)**

**Virginia Standards of Learning**  
**Virginia Grade Level Alternative**

**APPLICATION**  
**Due Date: September 25, 2006**

Virginia Department of Education  
Division of Assessment and Reporting  
P.O. Box 2120  
Richmond, Virginia 23218-2120  
Fax: 804/371-8978

Virginia Department of Education  
Division of Assessment and Reporting

**Application for  
Alignment Review Committees**

Applications for Alignment Review Committees must be faxed or mailed to the Virginia Department of Education by **September 25, 2006**, to:

Ronald L. Sutton, Assessment Specialist  
Division of Assessment and Reporting  
Virginia Department of Education  
P. O. Box 2120  
Richmond, VA 23218-2120  
Fax: (804) 371-8978 Phone: (804) 225-2107

1. **PROVIDE CONTACT INFORMATION** (Type or Print Clearly)

Last Name \_\_\_\_\_ First Name \_\_\_\_\_ MI \_\_\_\_\_  
Position \_\_\_\_\_ Content \_\_\_\_\_ Grade \_\_\_\_\_  
Title \_\_\_\_\_ Area \_\_\_\_\_ Level \_\_\_\_\_  
School Division \_\_\_\_\_  
School \_\_\_\_\_  
Principal, if applicable \_\_\_\_\_

**WORK**

Street Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_  
Phone ( ) \_\_\_\_\_ Fax ( ) \_\_\_\_\_  
E-mail \_\_\_\_\_

**HOME**

Street Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_  
Phone ( ) \_\_\_\_\_ ( ) \_\_\_\_\_  
E-mail \_\_\_\_\_

2. **Optional, If you wish, please indicate your gender and ethnicity:**

**Gender:**

- Female
- Male

**Ethnicity:**

- American Indian or Alaska Native
- Asian
- Black (Not of Hispanic Origin)
- Native Hawaiian/Other Pacific Islander
- Hispanic
- White (Not of Hispanic Origin)
- Unspecified

3. **Check the *committee* for which you are applying:**

<b>Committees</b>	<b>Dates</b>
<b>Standards of Learning Assessments</b>	
<input type="checkbox"/> Grades 3-5 Reading	October 16-17, 2006
<input type="checkbox"/> Grades 6-8 Reading	October 16-17, 2006
<input type="checkbox"/> End-of-Course English: Reading	October 16-17, 2006
<input type="checkbox"/> Grades 3-5 Mathematics	October 16-17, 2006
<input type="checkbox"/> Grades 6-8 Mathematics	October 16-17, 2006
<input type="checkbox"/> End-of-Course Mathematics (Algebra I, Geometry, Algebra II)	October 16-17, 2006
<b>Virginia Grade Level Alternative Assessments</b>	
<input type="checkbox"/> Grades 3-5 Reading	October 16-17, 2006
<input type="checkbox"/> Grades 6-8 Reading	October 16-17, 2006
<input type="checkbox"/> Grades 3-5 Mathematics	October 16-17, 2006
<input type="checkbox"/> Grades 6-8 Mathematics	October 16-17, 2006

4. **Briefly describe your college training and expertise as it relates to general and/or special education in the content areas of reading and/or mathematics. List your college degree(s) including major and certification(s)/license.**

5. **Briefly describe your teaching/supervisory responsibilities for the last three years. Please include grade(s) taught or supervised and your experience with students with disabilities.**

2005-2006

2004-2005



## Alignment Review Committees

Please complete the following information. The completed application must be sent to the applicant's division superintendent for approval. The approved application must be received at the Virginia Department of Education by **September 25, 2006**.

Name of Applicant \_\_\_\_\_ Committee \_\_\_\_\_

Principal or Supervisor \_\_\_\_\_

School \_\_\_\_\_ School Division \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_ E-mail Address \_\_\_\_\_

I have direct contact with the applicant on a regular basis in regards to his/her current instructional/supervisory assignment. This individual is highly qualified to serve on the Alignment Review Committee for which he/she has applied.

I have reviewed this application and support the nomination.

\_\_\_\_\_  
(Signature) \_\_\_\_\_ Date \_\_\_\_\_

### Optional

You may attach additional information about the applicant, such as a letter of recommendation.

## Alignment Review Committees

Each nomination for an Alignment Review Committee must be approved by the applicant's division superintendent.

*Name of Applicant* \_\_\_\_\_ *Committee* \_\_\_\_\_

Approval of Nomination:

\_\_\_\_\_ Date \_\_\_\_\_  
(Signature, Division Superintendent or Designee)

The completed application for the Alignment Review Committees must be submitted to the Virginia Department of Education by **September 25, 2006**.

All applications should be faxed or mailed to:

**Ronald L. Sutton, Assessment Specialist**

**Division of Assessment and Reporting**

Virginia Department of Education

P. O. Box 2120

Richmond, VA 23218-2120

Fax: (804) 371-8978

Phone: (804) 225-2107

Appendix B

Alignment Review Committee Meeting Participant List

## SOL Alignment Review Committee- Mathematics

### Grades 3-5 Mathematics

<b>Title</b>	<b>School Division</b>	<b>Region</b>
K-5 Math Resource Teacher	Chesterfield	1
Math Specialist	Caroline County	3
Teacher	Smyth County	7
Math Facilitator	Petersburg	1
Teacher	Buchanan County	7
Data Resource Teacher	Hanover County	1
Instructor Tech. Specialist	Halifax County	8
Math Specialist	Portsmouth	2
Math Specialist	Spotsylvania	3
Math Specialist	Virginia Beach	2
Teacher	Fairfax County	4
Teacher	Lee County	7
Educator	Bedford County	5

### Grades 6-8 Mathematics

<b>Title</b>	<b>School Division</b>	<b>Region</b>
Teacher Leader	Tazewell County	7
Lead Teacher	Hopewell City	1
Math Specialist	Virginia Beach	2
Teacher	Mecklenburg	8
Math Specialist	Spotsylvania	3
Dept. of Instruction	Caroline County	3
Educational Specialist	Henrico County	1
Teacher	Russell County	7
Division Coordinator	Charlottesville	5
Teacher	Buchanan	7
Teacher	Bedford County	5
Math Resource Teacher	Fairfax County	4
Special Education Teacher	Frederick County	4

### EOC Mathematics (Algebra I, Geometry, Algebra II)

<b>Title</b>	<b>School Division</b>	<b>Region</b>
Math Coordinator	Spotsylvania County	3
Math Teacher	Pittsylvania County	6
Teacher	Amherst	5
Math Teacher	Nottoway County	8
Instructor Math Specialist	Portsmouth City	2
Teacher	Fairfax County	4

## SOL Alignment Review Committee- Reading

### Grades 3-5 Reading

<b>Title</b>	<b>School Division</b>	<b>Region</b>
Director Elementary Education/Title I	Dinwiddie	1
Reading Specialist	Chesterfield	1
Reading Specialist	King William	3
Instructional Technology Specialist	Halifax	8
Literacy Coordinator	Charlottesville	5
Teacher	Virginia Beach	2
Reading Resource Teacher	Wise	7
Teacher	Buchanan	7
Literacy Development Specialist	Bedford	5
Language Arts Specialist	Fairfax	4
Reading Resource Teacher	Caroline	3

### Grades 6-8 Reading

<b>Title</b>	<b>School Division</b>	<b>Region</b>
English Specialist	Charlottesville	5
Benchmark Assessment Specialist	Hampton	2
Teacher	Wythe County	7
English Specialist	Hopewell City	1
Reading Specialist	Fluvanna	5
Reading Teacher	Fairfax County	4
Assistant Principal	Mecklenburg	8
Teacher	Pittsylvania	6
Reading Specialist	Fauquier County	4
Language Arts Specialist	Buckingham	8
Language Arts Resource Teacher	Virginia Beach	2
Language Arts Teacher	Bedford County	5

### EOC English: Reading

<b>Title</b>	<b>School Division</b>	<b>Region</b>
Teacher, 10-12	Fairfax County	4
Department Chair/Teacher	Caroline County	3
Coordinator	Virginia Beach	2
Instructional Specialist	Bedford County	5
Teacher	Fairfax County	4
Language Arts Curriculum Specialist	Petersburg City	1
Teacher	Wise County	7

## VGLA Alignment Review Committee – Mathematics

### Grades 3-5 Mathematics

<b>Title</b>	<b>School Division</b>	<b>Region</b>
Special Education Teacher	Wise County	7
Special Education Teacher	Bedford County	5
Special Education Teacher	Danville City	6
Math Resource	Henrico County	1
Special Education Teacher	Albemarle County	5
Teacher	Nottoway County	8

### Grades 6-8 Mathematics

<b>Title</b>	<b>School Division</b>	<b>Region</b>
Teacher	Buckingham	8
Assistant Principal	Washington	7
Secondary IEP Specialist	Frederick	4
Teacher	Greensville	8
Teacher	Russell County	7
Special Education Teacher	Smythe County	7
Teacher	Mecklenburg County	8
Mathematics Supervisor	Portsmouth City	2
Teacher	Southampton	2
Teacher	Buckingham	8
Coordinator	Virginia Beach	2
None Listed	Mecklenburg County	8

## VGLA Alignment Review Committee – Reading

### Grades 3-5 Reading

<b>Title</b>	<b>School Division</b>	<b>Region</b>
Teacher	Nottoway County	8
Special Education Teacher	Bedford County	5
Special Education Teacher	Northampton	2
Instructional Specialist	Virginia Beach	2
Special Education Teacher	Wise County	7
Reading Specialist	Louisa County	5
Special Education Teacher	Greenville County	8

### Grades 6-8 Reading

<b>Title</b>	<b>School Division</b>	<b>Region</b>
Special Education Teacher	Smyth County	7
Teacher	Buckingham	8
English Chair/Teacher	Roanoke City	6
Instructional. Specialist	York County	2
Special Education Teacher	Middlesex County	3
None Listed	Mecklenburg County	8
Remedial Reading Teacher	Pittsylvania	8
Teacher	Bedford County	5
English Supervisor	Portsmouth City	2

## Appendix C

### SOL Depth-of-Knowledge Example Review Sheet

Virginia Standards of Learning Depth-of-Knowledge Review Sheet

Virginia Grade 5 Math Standards

Reviewer # \_\_\_\_\_

Reporting Category	SOL	Specific Virginia Standard of Learning	Recall Knowledge	Comprehension	Application	Higher Order Thinking
RC 1	5.1	The student will				
		a) read, write, and identify the place values of decimals through thousandths;				
		b) round decimal numbers to the nearest tenth or hundredth; and				
		c) compare the values of two decimals through thousandths, using the symbols $>$ , $<$ , or $=$ .				
RC 1	5.2	The student will				
		a) recognize and name commonly used fractions (halves, fourths, fifths, eighths, and tenths) in their equivalent decimal form and vice versa; and				
		b) order a given set of fractions and decimals from least to greatest. Fractions will include like and unlike denominators limited to 12 or less, and mixed numbers.				
RC 2	5.3	The student will create and solve problems involving addition, subtraction, multiplication, and division of whole numbers, using paper and pencil, estimation, mental computation, and calculators.				
RC 2	5.4	The student will find the sum, difference, and product of two numbers expressed as decimals through thousandths, using an appropriate method of calculation, including paper and pencil, estimation, mental computation, and calculators.				
RC 2	5.5	The student, given a dividend of four digits or fewer and a divisor of two digits fewer, will find the quotient and remainder.				
RC 2	5.6	The student, given a dividend expressed as a decimal through thousandths and a single-digit divisor, will find the quotient.				
RC 2	5.7	The student will add and subtract with fractions and mixed numbers, with and without regrouping, and express answers in simplest form. Problems will include like and unlike denominators limited to 12 or less.				
RC 3	5.8	The student will describe and determine the perimeter of a polygon and the area of a square, rectangle, and right triangle, given the appropriate measures.				
RC 3	5.9	The student will identify and describe the diameter, radius, chord, and circumference of a circle.				

Virginia Standards of Learning Depth-of-Knowledge Review Sheet

Virginia Grade 5 Math Standards

Reviewer # \_\_\_\_\_

Reporting Category	SOL	Specific Virginia Standard of Learning	Recall Knowledge	Comprehension	Application	Higher Order Thinking
RC 3	5.10	The student will differentiate between perimeter, area, and volume and identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation.				
RC 3	5.11	The student will choose an appropriate measuring device and unit of measure to solve problems involving measurement of				
		a) length – part of an inch (1/2, 1/4, and 1/8) inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers.				
		b) weight/mass – ounces, pounds, tons, grams, and kilograms.				
		c) liquid volume – cups, pints, quarts, gallons, milliliters, and liters;				
		d) area – square units; and				
		e) temperature – Celsius and Fahrenheit units. Problems also will include estimating the conversion of Celsius and Fahrenheit units relative to familiar situations (water freezes at 0°C and 32°F, water boils at 100°C and 212°F, normal body temperature is about 37°C and 98.6°F).				
RC 3	5.12	The student will determine an amount of elapsed time in hours and minutes within a 24-hour period.				
RC 3	5.13	The student will measure and draw right, acute, obtuse angles and triangles, using appropriate tools.				
RC 3	5.14	The student will classify angles and triangles as right, acute, or obtuse.				

Virginia Standards of Learning Depth-of-Knowledge Review Sheet

Virginia Grade 5 Math Standards

Reviewer # \_\_\_\_\_

Reporting Category	SOL	Specific Virginia Standard of Learning	Recall Knowledge	Comprehension	Application	Higher Order Thinking
RC 3	5.15	The student, using two-dimensional (plane) figures, (square, rectangle, triangle, parallelogram, rhombus, kite, and trapezoid) will				
		a) recognize, identify, describe, and analyze their properties in order to develop definitions of these figures.				
		b) identify and explore congruent, noncongruent, and similar figures;				
		c) investigate and describe the results of combining and subdividing shapes;				
		d) identify and describe a line of symmetry; and				
		e) recognize the images of figures resulting from geometric transformations such as translation (slide), reflection (flip), or rotation (turn).				
RC 3	5.16	The student will identify, compare, and analyze properties of three-dimensional (solid) geometric shapes (cylinder, cone, cube, square pyramid, and rectangular prism).				
RC 4	5.17	The student will				
		a) solve problems involving the probability of a single event by using tree diagrams or by constructing a sample space representing all possible results;				
		b) predict the probability of outcomes of simple experiments, representing it with fractions or decimals from 0 to 1, and test the prediction; and				
		c) create a problem statement involving probability and based on information from a given problem situation. Students will not be required to solve the created problem statement.				
RC 4	5.18	The student will, given a problem situation, collect, organize, and display a set of numerical data in a variety of forms, using bar graphs, stem-and-leaf plots, and line graphs, to draw conclusions and make predictions.				
RC 4	5.19	The student will find the mean, median, mode and range of a set of data.				
RC 5	5.20	The student will analyze the structure of numerical and geometric patterns (how they change or grow) and express the relationship, using words, tables, graphs, or a mathematical sentence. Concrete materials and calculators will be used.				

Virginia Standards of Learning Depth-of-Knowledge Review Sheet

Virginia Grade 5 Math Standards

Reviewer # \_\_\_\_\_

Reporting Category	SOL	Specific Virginia Standard of Learning	Recall Knowledge	Comprehension	Application	Higher Order Thinking
RC 5	5.21	The student will				
		a) investigate and describe the concept of variable;				
		b) use a variable expression to represent a given verbal quantitative expression, involving one operation; and				
		c) write an open sentence to represent a given mathematical relationship, using a variable.				
RC 5	5.22	The student will create a problem situation based on a given open sentence using a single variable.				

## Appendix D

### SOL Test Example Review Sheet

**GRADE 5 MATH: SOL STANDARD TEST ITEM REVIEW SHEET**

**Directions:** Review each test item to determine the level of knowledge required of test takers and the SOL content standard (s) to which the item is aligned. Place an “X” in the appropriate column for the primary DOK level of the test item; then identify the primary and secondary (if applicable) SOL standards and objectives assessed by the item. Each item may only be assigned one DOK level even if two SOL standards or objectives are aligned with the item. If a series of X’s appears next to the item; this means the question is a field test item and you do not need to review it.

Reviewer # \_\_\_\_\_ Tested Grade \_\_\_\_\_ Tested Content \_\_\_\_\_ Date \_\_\_\_\_

Item Number	Recall Knowledge	Comprehension	Application	Higher Order Thinking	Primary Standard	Secondary Standard	Secondary Standard
<b>Example</b>		X			5.1a	5.1 b	None
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
14	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
15							
16							
17							
18							
19							
20							
21							
22							
23	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
24	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
25							
26							

**GRADE 5 MATH: SOL STANDARD TEST ITEM REVIEW SHEET**

**Directions:** Review each test item to determine the level of knowledge required of test takers and the SOL content standard (s) to which the item is aligned. Place an “X” in the appropriate column for the primary DOK level of the test item; then identify the primary and secondary (if applicable) SOL standards and objectives assessed by the item. Each item may only be assigned one DOK level even if two SOL standards or objectives are aligned with the item. If a series of X’s appears next to the item; this means the question is a field test item and you do not need to review it.

Item Number	Recall Knowledge	Comprehension	Application	Higher Order Thinking	Primary Standard	Secondary Standard	Secondary Standard
<b>Example</b>		X			5.1a	5.1 b	None
27							
28							
29							
30							
31							
32							
33							
34							
35							
36							
37	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
38	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
39							
40							
41							
42							
43							
44							
45							
46							
47	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
48	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
49							
50							
51							
52							
53							
54							
55							

**GRADE 5 MATH: SOL STANDARD TEST ITEM REVIEW SHEET**

**Directions:** Review each test item to determine the level of knowledge required of test takers and the SOL content standard (s) to which the item is aligned. Place an “X” in the appropriate column for the primary DOK level of the test item; then identify the primary and secondary (if applicable) SOL standards and objectives assessed by the item. Each item may only be assigned one DOK level even if two SOL standards or objectives are aligned with the item. If a series of X’s appears next to the item; this means the question is a field test item and you do not need to review it.

Item Number	Recall Knowledge	Comprehension	Application	Higher Order Thinking	Primary Standard	Secondary Standard	Secondary Standard
<b>Example</b>		X			5.1a	5.1 b	None
56							
57							
58							
59	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX
60	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX

Appendix E

VGLA Portfolio Example Review Sheet



### VGLA Grade 5 Math Alignment Review Sheet

**Directions:** Each student work exhibit is tabbed with teacher reported information about the SOL standard and objective to which the exhibit is aligned. Review the collection of exhibits for each SOL to determine the primary and secondary (if applicable) level(s) of knowledge demonstrated in the exhibit(s) and the extent to which the exhibit(s) are aligned with the SOL. After you complete reviewing the grade-level and content area set of portfolios, please answer the questions about the relationship of the VGLA collection to the SOL's. Note that the SOL's are organized by reporting category and are not ordered numerically.

DOK Levels– Recall Knowledge, Comprehension, Application, Higher-Order Thinking

REVIEWER #: \_\_\_\_\_ PORTFOLIO VADOE# \_\_\_\_\_ (this number is on the label with the colored dot)

SOL Identified on Student Exhibits		Primary DOK Level	Secondary DOK Level (if applicable)	To what extent were the student exhibits aligned with the teacher identified SOL?		
				Fully	Adequately	Minimally → What SOL would have been more appropriate?
5.1	The student will a) read, write, and identify the place values of decimals through thousandths;					
	b) round decimal numbers to the nearest tenth or hundredth; and					
	c) compare the values of two decimals through thousandths, using the symbols $>$ , $<$ , or $=$ .					
5.2	The student will a) recognize and name commonly used fractions (halves, fourths, fifths, eighths, and tenths) in their equivalent decimal form and vice versa; and					
	b) order a given set of fractions and decimals from least to greatest. Fractions will include like and unlike denominators limited to 12 or less, and mixed numbers.					
5.3	The student will create and solve problems involving addition, subtraction, multiplication, and division of whole numbers, using paper and pencil, estimation, mental computation, and calculators.					
5.4	The student will find the sum, difference, and product of two numbers expressed as decimals through thousandths, using an appropriate method of calculation, including paper and pencil, estimation, mental computation, and calculators.					

### VGLA Grade 5 Math Alignment Review Sheet

**Directions:** Each student work exhibit is tabbed with teacher reported information about the SOL standard and objective to which the exhibit is aligned. Review the collection of exhibits for each SOL to determine the primary and secondary (if applicable) level(s) of knowledge demonstrated in the exhibit(s) and the extent to which the exhibit(s) are aligned with the SOL. After you complete reviewing the grade-level and content area set of portfolios, please answer the questions about the relationship of the VGLA collection to the SOL's. Note that the SOL's are organized by reporting category and are not ordered numerically.

DOK Levels– Recall Knowledge, Comprehension, Application, Higher-Order Thinking

SOL Identified on Student Exhibits		Primary DOK Level	Secondary DOK Level  (if applicable)	To what extent were the student exhibits aligned with the teacher identified SOL?		
				Fully	Adequately	Minimally → What SOL would have been more appropriate?
5.5	The student, given a dividend of four digits or fewer and a divisor of two digits fewer, will find the quotient and remainder.					
5.6	The student, given a dividend expressed as a decimal through thousandths and a single-digit divisor, will find the quotient.					
5.7	The student will add and subtract with fractions and mixed numbers, with and without regrouping, and express answers in simplest form. Problems will include like and unlike denominators limited to 12 or less.					
5.8	The student will describe and determine the perimeter of a polygon and the area of a square, rectangle, and right triangle, given the appropriate measures.					
5.9	The student will identify and describe the diameter, radius, chord, and circumference of a circle.					
5.10	The student will differentiate between perimeter, area, and volume and identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation.					
5.11	The student will choose an appropriate measuring device and unit of measure to solve problems involving measurement of					
	a) length – part of an inch (1/2, 1/4, and 1/8) inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers. b) weight/mass – ounces, pounds, tons, grams, and kilograms.					

### VGLA Grade 5 Math Alignment Review Sheet

**Directions:** Each student work exhibit is tabbed with teacher reported information about the SOL standard and objective to which the exhibit is aligned. Review the collection of exhibits for each SOL to determine the primary and secondary (if applicable) level(s) of knowledge demonstrated in the exhibit(s) and the extent to which the exhibit(s) are aligned with the SOL. After you complete reviewing the grade-level and content area set of portfolios, please answer the questions about the relationship of the VGLA collection to the SOL's. Note that the SOL's are organized by reporting category and are not ordered numerically.

DOK Levels– Recall Knowledge, Comprehension, Application, Higher-Order Thinking

SOL Identified on Student Exhibits		Primary DOK Level	Secondary DOK Level (if applicable)	To what extent were the student exhibits aligned with the teacher identified SOL?		
				Fully	Adequately	Minimally → What SOL would have been more appropriate?
5.11	c) liquid volume – cups, pints, quarts, gallons, milliliters, and liters;					
	d) area – square units; and					
	e) temperature – Celsius and Fahrenheit units. Problems also will include estimating the conversion of Celsius and Fahrenheit units relative to familiar situations (water freezes at 0°C and 32°F, water boils at 100°C and 212°F, normal body temperature is about 37°C and 98.6°F).					
5.12	The student will determine an amount of elapsed time in hours and minutes within a 24-hour period.					
5.13	The student will measure and draw right, acute, obtuse angles and triangles, using appropriate tools.					
5.14	The student will classify angles and triangles as right, acute, or obtuse.					

### VGLA Grade 5 Math Alignment Review Sheet

**Directions:** Each student work exhibit is tabbed with teacher reported information about the SOL standard and objective to which the exhibit is aligned. Review the collection of exhibits for each SOL to determine the primary and secondary (if applicable) level(s) of knowledge demonstrated in the exhibit(s) and the extent to which the exhibit(s) are aligned with the SOL. After you complete reviewing the grade-level and content area set of portfolios, please answer the questions about the relationship of the VGLA collection to the SOL's. Note that the SOL's are organized by reporting category and are not ordered numerically.

DOK Levels– Recall Knowledge, Comprehension, Application, Higher-Order Thinking

SOL	Specific Virginia Standard of Learning	Primary DOK Level	Secondary DOK Level (if applicable)	To what extent were the student exhibits aligned with the teacher identified SOL?		
				Fully	Adequately	Minimally → What SOL would have been more appropriate?
5.15	The student, using two-dimensional (plane) figures, (square, rectangle, triangle, parallelogram, rhombus, kite, and trapezoid) will					
	a) recognize, identify, describe, and analyze their properties in order to develop definitions of these figures.					
	b) identify and explore congruent, noncongruent, and similar figures;					
	c) investigate and describe the results of combining and subdividing shapes;					
	d) identify and describe a line of symmetry; and					
	e) recognize the images of figures resulting from geometric transformations such as translation (slide), reflection (flip), or rotation (turn).					
5.16	The student will identify, compare, and analyze properties of three-dimensional (solid) geometric shapes (cylinder, cone, cube, square pyramid, and rectangular prism).					
5.17	The student will					
	a) solve problems involving the probability of a single event by using tree diagrams or by constructing a sample space representing all possible results;					

