## Smarter Balanced Summative Assessments

## Testing Procedures for Adaptive Item-Selection Algorithm

2014-2015 Test Administrations English Language Arts/Literacy Grades 3-8, 11 Mathematics Grades 3-8, 11

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## Introduction

In the 2014-15 school year, the Smarter Balanced Summative Assessments are being administered operationally for the first time. The summative assessment consists of two parts: a computer adaptive test and performance tasks. The performance tasks are taken on a computer but are not computer adaptive. Each student is allowed a single opportunity to take the summative assessment. For the computer adaptive test, prior to the operational testing window, AIR conducts simulations to evaluate and ensure the implementation and quality of the adaptive item-selection algorithm and the scoring algorithm. The simulation tool enables us to manipulate key blueprint and configuration settings to match the blueprint and minimize measurement error. The adaptive tests are administered in one segment in English language arts/literacy and mathematics grades $3-5$, and in two segments in mathematics grades $6-8$ and 11 , including calculator and no calculator segments, each of which is configured separately.

The Smarter Balanced summative test blueprints describe the content of the English language arts/literacy (ELA/L) and mathematics summative assessments for all grades tested and how that content will be assessed. The summative test blueprints reflect the depth and breadth of the performance expectations of the Common Core State Standards. The test blueprints include critical information about the number of items and depth of knowledge for items associated with each assessment target.

For the Smarter Balanced item pool, all items are developed in English. To accommodate students who use Braille and students who need tests in Spanish, a portion of the English item pool was transcribed in Braille or translated into Spanish. This report summarizes simulation results of the Smarter Balanced computer adaptive test administrations in the English language for English language arts/literacy and mathematics for grades 3-8 and 11.

## Testing Plan

Our testing plan begins by generating a sample of examinees with true thetas from a Normal $(\mu, \sigma)$ distribution for each grade and subject. The parameters for the normal distribution are based on students' field-test scores in the 2014 online field-test conducted by the Smarter Balanced Assessment Consortium. Each simulated examinee is administered one test opportunity for English language arts/literacy and mathematics. Because no prior information about the examinee is available, the initial ability is drawn from a uniform distribution within the range of true theta plus or minus 1 . The initial ability is used to initiate the test by choosing the first few items. Table 1 provides the means and standard deviations used to generate a sample of student abilities in the simulation by grade and subject.

Table 1. Population Parameters Used to Generate Ability Distributions for Simulated Test Administrations

| Grade | ELA/Literacy |  | Mathematics |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Mean | SD | Mean | SD |
| 3 | -1.240 | 1.06 | -1.285 | 0.97 |
| 4 | -0.748 | 1.11 | -0.708 | 1.00 |
| 5 | -0.310 | 1.10 | -0.345 | 1.08 |
| 6 | -0.055 | 1.11 | -0.100 | 1.19 |
| 7 | 0.114 | 1.13 | 0.010 | 1.33 |
| 8 | 0.382 | 1.13 | 0.176 | 1.42 |
| 11 | 0.529 | 1.19 | 0.506 | 1.52 |

## Statistical Summaries

The statistics computed include the following: the statistical bias of the estimated theta parameter; mean squared error (MSE); significance of the bias; average standard error of the estimated theta; the standard error of theta at the 5th, 25th, 75th, and 95th percentiles; and the percentage of students' estimated theta falling outside the $95 \%$ and $99 \%$ confidence intervals. Statistical bias refers to whether test scores systematically underestimate or overestimate the student's true ability.

Computational details of each statistic are provided below.

$$
\begin{align*}
& \text { bias }=N^{-1} \sum_{i=1}^{N}\left(\theta_{i}-\hat{\theta}_{i}\right)  \tag{1}\\
& M S E=N^{-1} \sum_{i=1}^{N}\left(\theta_{i}-\hat{\theta}_{i}\right)^{2}
\end{align*}
$$

where $\theta_{i}$ is the true score and $\hat{\theta}_{i}$ is the estimated (observed) score. For the variance of the bias, a first-order Taylor series of Equation (1) is used as:

$$
\begin{aligned}
& \operatorname{var}(\text { bias })=\sigma^{2} * g^{\prime}\left(\hat{\theta}_{i}\right)^{2} \\
& =\frac{1}{N(N-1)} \sum_{i=1}^{N}\left(\theta_{i}-\overline{\hat{\theta}}_{i}\right)^{2}
\end{aligned}
$$

where, $\overline{\hat{\theta}}_{i}$ is an average of the estimated theta.
Significance of the bias is then tested as:

$$
z=\text { bias } / \sqrt{\operatorname{var}(\text { bias })}
$$

A p-value for the significance of the bias is reported from this $z$ test.
The average standard error is computed as:

$$
\operatorname{mean}(s e)=\sqrt{N^{-1} \sum_{i=1}^{N} s e_{i}^{2}}
$$

where $\operatorname{se}\left(\hat{\theta}_{i}\right)^{2}$ is the standard error of the estimated $\theta$ for individual $i$.
To determine the number of students falling outside the $95 \%$ and $99 \%$ confidence interval coverage, a t-test is performed as follows:

$$
t=\frac{\theta_{i}-\hat{\theta}_{i}}{\operatorname{se}\left(\hat{\theta}_{i}\right)}
$$

where $\hat{\theta}$ is the ability estimate for individual $i$, and $\theta$ is the true score for individual $i$. The percentage of students' estimated theta falling outside the coverage is determined by comparing the absolute value of the $t$-statistic to a critical value of 1.96 for the $95 \%$ coverage and to 2.58 for the $99 \%$ coverage.

## Summary of Statistical Analyses

This section summarizes the results of the statistics computed to examine the robustness of the item-selection algorithm. For each grade and subject, 1,000 tests are simulated. The tables in the appendices provide details for each grade and subject area tested.

## Operational Item Pool for Adaptive Tests

Tables $2-3$ provide a summary of the adaptive operational item pool by claim. In ELA/L, the items in Claim 1 and 3 are associated with passages while the items in Claim 2 and 4 are discrete items. A summary of the adaptive item pool for Braille and Spanish is included in Appendix A.

Table 2. Number of Items in the ELA/L Adaptive Item Pool

|  | Number of Items |  |  |  | Number of Passages |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Grade | Total | Claim 1 | Claim 2 | Claim 3 | Claim 4 | Claim 1 <br> Literary | Claim 1 <br> Information | Claim 3 <br> Listening |
| 3 | 607 | 217 | 175 | 118 | 97 | 18 | 17 | 47 |
| 4 | 620 | 177 | 194 | 127 | 122 | 15 | 11 | 47 |
| 5 | 580 | 194 | 185 | 108 | 93 | 16 | 13 | 42 |
| 6 | 589 | 175 | 192 | 116 | 106 | 7 | 21 | 46 |
| 7 | 552 | 183 | 183 | 117 | 69 | 5 | 24 | 45 |
| 8 | 535 | 161 | 177 | 131 | 66 | 6 | 18 | 49 |
| 11 | 1476 | 499 | 389 | 334 | 254 | 29 | 59 | 121 |

Table 3. Number of Items in the Mathematics Adaptive Item Pool

| Grade | Cal/NoCal | Total | Claim 1 | Claim 2 | Claim 3 | Claim 4 |
| :---: | :--- | :---: | :---: | :---: | :---: | :---: |
| 3 | No Calculator | 858 | 554 | 90 | 128 | 86 |
|  | No Calculator | 861 | 551 | 95 | 119 | 96 |
| 5 | No Calculator | 884 | 517 | 90 | 154 | 123 |
| 6 | Calculator | 375 | 156 | 71 | 89 | 59 |
|  | No Calculator | 393 | 382 | 0 | 11 | 0 |
| 7 | Calculator | 469 | 241 | 67 | 102 | 59 |
|  | No Calculator | 221 | 221 | 0 | 0 | 0 |
| 8 | Calculator | 496 | 268 | 54 | 113 | 61 |
|  | No Calculator | 171 | 171 | 0 | 0 | 0 |
| 11 | Calculator | 1625 | 904 | 166 | 386 | 169 |
|  | No Calculator | 162 | 122 | 0 | 40 | 0 |

## Summary Statistics on Test Blueprints

In the adaptive item-selection algorithm, item selection takes place in two discrete stages: blueprint satisfaction and match-to-ability. The Smarter Balanced blueprints (Smarter Balanced Assessment Consortium, 2015) specify a range of items to be administered in each claim, content domain/standards, and targets. Moreover, blueprints constrain Depth of Knowledge (DOK) and item and passage types. In blueprints, all content blueprint elements are configured to obtain a strictly-enforced range of items administered. The algorithm also seeks to satisfy target level constraints, but these ranges are not strictly enforced. In ELA/L, the blueprint also specifies the number of passages in reading and listening claims.

Tables 4-7 present the percentages of tests aligned with the test blueprints for ELA/L and mathematics. The blueprint match rates are summarized for claims and the number of passage requirements in ELA/L and for claims and domains in mathematics. In ELA/L, all tests met the blueprint constraints for claims and passages with the following exceptions: one test in grade 6 and six tests in grade 7 in claim 2 writing. These tests administered one more item than the maximum item requirement. Similarly, almost all tests met the blueprint requirements for claims and domains in mathematics. Few tests administered one item fewer or more than the minimum and maximum item requirements. The blueprint match rates for Braille and Spanish tests are included in Appendix B.

For the target level constraints, the blueprint violations are administering one item fewer or more than the minimum or maximum item requirements in both ELA/L and mathematics. The tables in Appendix C provide a list of blueprint violations for all blueprint specifications for each grade and subject and for all languages. The simulator output tables show, by grade, the content level blueprint element, the number of items by which the blueprint element missed the specification, and the number of administrations in the simulation in which this blueprint violation occurred.

Table 4. Percentage of ELA/L Test Administrations Meeting Blueprint Requirements for Each Claim and the Number of Passages Administered

| Grade | Claim | Min | Max | \% BP Match for <br> Item Requirement | \% BP Match Passage <br> Requirement |
| :---: | :--- | :---: | :---: | :---: | :---: |
| 3 | 1-LT | 7 | 8 | $100 \%$ | $100 \%$ |
| 3 | 1-IT | 7 | 8 | $100 \%$ | $100 \%$ |
| 3 | 2-W | 10 | 10 | $100 \%$ |  |
| 3 | 3-L | 8 | 8 | $100 \%$ | $100 \%$ |
| 3 | 4-CR | 6 | 6 | $100 \%$ |  |
| 4 | 1-LT | 7 | 8 | $100 \%$ | $100 \%$ |
| 4 | 1-IT | 7 | 8 | $100 \%$ | $100 \%$ |
| 4 | 2-W | 10 | 10 | $100 \%$ | $100 \%$ |
| 4 | 3-L | 8 | 8 | $100 \%$ |  |
| 4 | 4-CR | 6 | 6 | $100 \%$ |  |
| 5 | 1-LT | 7 | 8 | $100 \%$ | $100 \%$ |
| 5 | 1-IT | 7 | 8 | $100 \%$ | $100 \%$ |
| 5 | 2-W | 10 | 10 | $100 \%$ |  |
| 5 | 3-L | 8 | 9 | $100 \%$ | $100 \%$ |
| 5 | 4-CR | 6 | 6 | $100 \%$ |  |
| 6 | 1-LT | 4 | 4 | $100 \%$ | $100 \%$ |
| 6 | 1-IT | 10 | 12 | $100 \%$ | $100 \%$ |
| 6 | 2-W | 10 | 10 | $99.9 \%$ |  |
| 6 | 3-L | 8 | 9 | $100 \%$ | $100 \%$ |
| 6 | 4-CR | 6 | 6 | $100 \%$ |  |
| 7 | 1-LT | 4 | 4 | $100 \%$ | $100 \%$ |
| 7 | 1-IT | 10 | 12 | $100 \%$ | $100 \%$ |
| 7 | 2-W | 10 | 10 | $99.4 \%$ |  |
| 7 | 3-L | 8 | 9 | $100 \%$ | $100 \%$ |
| 7 | 4-CR | 6 | 6 | $100 \%$ |  |
| 8 | 1-LT | 4 | 4 | $100 \%$ |  |
| 8 | 1-IT | 12 | 12 | $100 \%$ | $100 \%$ |
| 8 | 2-W | 10 | 10 | $100 \%$ | $100 \%$ |
| 8 | 3-L | 8 | 9 | $100 \%$ | $100 \%$ |
| 8 | 4-CR | 6 | 6 | $100 \%$ |  |
| 11 | 1-LT | 4 | 4 | $100 \%$ | $100 \%$ |
| 11 | 1-IT | 11 | 12 | $100 \%$ | $100 \%$ |
| 11 | 2-W | 10 | 10 | $100 \%$ | $100 \%$ |
| 11 | 3-L | 8 | 9 | $100 \%$ |  |
| 11 | 4-CR | 6 | 6 | $100 \%$ |  |
|  |  |  |  |  |  |

Table 5. Percentage of Test Administrations Meeting Blueprint Requirements for Each Claim and Content Domain: Grade 3-5 Mathematics

| Claim | Content <br> Domain | Grade 3 |  |  | Grade 4 |  |  | Grade 5 |  |  |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Min | Max | \%BP <br> Match | Min | Max | \%BP <br> Match | Min | Max | \%BP <br> Match |
| 1 | ALL | 20 | 20 | $100 \%$ | 20 | 20 | $100 \%$ | 20 | 20 | $100 \%$ |
| 1 | P | 15 | 15 | $100 \%$ | 15 | 15 | $100 \%$ | 15 | 15 | $100 \%$ |
| 1 | S | 5 | 5 | $100 \%$ | 5 | 5 | $100 \%$ | 5 | 5 | $100 \%$ |
| 2 | ALL | 3 | 3 | $100 \%$ | 3 | 3 | $100 \%$ | 3 | 3 | $100 \%$ |
| 2 | G | 0 | 2 | $100 \%$ | 0 | 2 | $100 \%$ | 0 | 2 | $100 \%$ |
| 2 | MD | 0 | 2 | $100 \%$ | 0 | 2 | $100 \%$ | 0 | 2 | $100 \%$ |
| 2 | NBT | 0 | 2 | $100 \%$ | 0 | 2 | $100 \%$ | 0 | 2 | $100 \%$ |
| 2 | NF | 0 | 2 | $100 \%$ | 1 | 3 | $100 \%$ | 1 | 3 | $100 \%$ |
| 2 | OA | 0 | 2 | $100 \%$ | 0 | 2 | $100 \%$ | 0 | 2 | $100 \%$ |
| 3 | All | 8 | 8 | $100 \%$ | 8 | 8 | $100 \%$ | 8 | 8 | $100 \%$ |
| 3 | G |  |  |  |  |  |  | 0 | 3 | $100 \%$ |
| 3 | MD | 0 | 4 | $99.7 \%$ |  |  |  | 0 | 4 | $100 \%$ |
| 3 | NBT |  |  |  | 0 | 4 | $100 \%$ | 0 | 4 | $100 \%$ |
| 3 | NF | 2 | 6 | $100 \%$ | 2 | 6 | $97 \%$ | 2 | 6 | $100 \%$ |
| 3 | OA | 0 | 4 | $100 \%$ | 0 | 4 | $100 \%$ |  |  |  |
| 4 | All | 3 | 3 | $100 \%$ | 3 | 3 | $100 \%$ | 3 | 3 | $100 \%$ |
| 4 | G | 0 | 1 | $100 \%$ | 0 | 1 | $100 \%$ | 0 | 1 | $100 \%$ |
| 4 | MD | 1 | 2 | $100 \%$ | 0 | 2 | $100 \%$ | 1 | 2 | $100 \%$ |
| 4 | NBT | 0 | 1 | $100 \%$ | 0 | 1 | $100 \%$ | 0 | 1 | $100 \%$ |
| 4 | NF | 0 | 1 | $100 \%$ | 0 | 2 | $100 \%$ | 1 | 2 | $100 \%$ |
| 4 | OA | 1 | 2 | $100 \%$ | 0 | 2 | $100 \%$ | 0 | 1 | $100 \%$ |

Table 6. Percentage of Test Administrations Meeting Blueprint Requirements for Each Claim and Content Domain: Grade 6-7 Mathematics

| Claim | Content <br> Domain | Segment | Grade 6 |  |  | Grade 7 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Min | Max | $\begin{gathered} \text { \%BP } \\ \text { Match } \end{gathered}$ | Min | Max | $\begin{gathered} \text { \%BP } \\ \text { Match } \end{gathered}$ |
| 1 | ALL | Calc | 6 | 6 | 100\% | 10 | 10 | 100\% |
| 1 | P | Calc | 3 | 3 | 100\% | 6 | 6 | 100\% |
| 1 | S | Calc | 3 | 3 | 100\% | 4 | 4 | 100\% |
| 1 | ALL | NoCalc | 13 | 13 | 100\% | 10 | 10 | 100\% |
| 1 | P | NoCalc | 11 | 11 | 100\% | 9 | 9 | 100\% |
| 1 | S | NoCalc | 2 | 2 | 100\% | 1 | 1 | 100\% |
| 2 | ALL | Calc | 3 | 3 | 100\% | 3 | 3 | 100\% |
| 2 | EE | Calc | 0 | 2 | 100\% | 0 | 2 | 100\% |
| 2 | G | Calc | 0 | 2 | 100\% | 0 | 2 | 100\% |
| 2 | NS | Calc | 0 | 2 | 100\% | 0 | 2 | 100\% |
| 2 | RP | Calc | 0 | 2 | 100\% | 0 | 2 | 100\% |
| 2 | SP | Calc | 0 | 2 | 100\% | 0 | 2 | 100\% |
| 2 | OTHER | Calc | 0 | 2 | 100\% | 0 | 2 | 100\% |
| 3 | All | Calc | 7 | 7 | 100\% | 8 | 8 | 100\% |
| 3 | EE | Calc | 0 | 5 | 100\% | 1 | 5 | 100\% |
| 3 | NS | Calc | 2 | 6 | 100\% | 1 | 5 | 100\% |
| 3 | RP | Calc | 0 | 5 | 100\% | 1 | 5 | 100\% |
| 3 | All | NoCalc | 1 | 1 | 100\% |  |  |  |
| 3 | EE | NoCalc | 0 | 1 | 100\% |  |  |  |
| 3 | NS | NoCalc | 0 | 1 | 100\% |  |  |  |
| 3 | RP | NoCalc | 0 | 1 | 100\% |  |  |  |
| 4 | All | Calc | 3 | 3 | 100\% | 3 | 3 | 100\% |
| 4 | EE | Calc | 0 | 1 | 98.9\% | 0 | 1 | 99.3\% |
| 4 | G | Calc | 0 | 1 | 100\% | 0 | 1 | 100\% |
| 4 | NS | Calc | 0 | 1 | 98.8\% | 0 | 1 | 100\% |
| 4 | RP | Calc | 0 | 1 | 99.7\% | 0 | 1 | 99.6\% |
| 4 | SP | Calc | 0 | 1 | 99.6\% | 0 | 1 | 99.9\% |
| 4 | OTHER | Calc | 0 | 1 | 100\% | 0 | 1 | 100\% |

Table 7. Percentage of Test Administrations Meeting Blueprint Requirements for Each Claim and Content Domain: Grade 8, 11 Mathematics

| Grade 8 |  |  |  |  |  | Grade 11 |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Claim | Content Domain | Segment | Min | Max | $\begin{gathered} \text { \% BP } \\ \text { Match } \end{gathered}$ | Claim | Content <br> Domain | Segment | Min | Max | $\begin{gathered} \hline \text { \%BP } \\ \text { Match } \end{gathered}$ |
| 1 | ALL | Calc | 14 | 14 | 100\% | 1 | ALL | Calc | 11 | 11 | 100\% |
| 1 | P | Calc | 11 | 11 | 100\% | 1 | P | Calc | 8 | 8 | 100\% |
| 1 | S | Calc | 3 | 3 | 100\% | 1 | S | Calc | 3 | 3 | 100\% |
| 1 | ALL | NoCalc | 6 | 6 | 100\% | 1 | ALL | NoCalc | 11 | 11 | 100\% |
| 1 | P | NoCalc | 4 | 4 | 100\% | 1 | P | NoCalc | 8 | 8 | 100\% |
| 1 | S | NoCalc | 2 | 2 | 100\% | 1 | S | NoCalc | 3 | 3 | 100\% |
| 2 | ALL | Calc | 3 | 3 | 100\% | 2 | ALL | Calc | 3 | 3 | 100\% |
| 2 | EE | Calc | 0 | 2 | 100\% | 2 | A | Calc | 1 | 2 | 100\% |
| 2 | F | Calc | 0 | 2 | 100\% | 2 | F | Calc | 0 | 2 | 100\% |
| 2 | G | Calc | 0 | 2 | 100\% | 2 | G | Calc | 0 | 2 | 100\% |
| 2 | NS | Calc | 0 | 2 | 100\% | 2 | N | Calc | 0 | 2 | 100\% |
| 2 | SP | Calc | 0 | 2 | 100\% | 2 | S | Calc | 0 | 2 | 100\% |
| 2 | OTHER | Calc | 0 | 2 | 100\% | 2 | O | Calc | 0 | 2 | 100\% |
| 3 | ALL | Calc | 8 | 8 | 100\% | 3 | All | Calc | 7 | 7 | 100\% |
| 3 | EE | Calc |  | 5 | 98.3\% | 3 | A | Calc | 1 | 4 | 100\% |
| 3 | F | Calc | , | 5 | 100\% | 3 | F | Calc | 0 | 4 | 100\% |
| 3 | G | Calc | 1 | 5 | 100\% | 3 | G | Calc | 1 | 4 | 100\% |
|  |  |  |  |  |  | 3 | N | Calc | 0 | 4 | 100\% |
|  |  |  |  |  |  | 3 | All | NoCalc | 1 | 1 | 100\% |
|  |  |  |  |  |  | 3 | A | NoCalc | 0 | 1 | 100\% |
|  |  |  |  |  |  | 3 | F | NoCalc | 0 | 1 | 100\% |
|  |  |  |  |  |  | 3 | G | NoCalc | 0 | 1 | 100\% |
|  |  |  |  |  |  | 3 | N | NoCalc | 0 | 1 | 100\% |
| 4 | ALL | Calc | 3 | 3 | 100\% | 4 | All | Calc | 3 | 3 | 100\% |
| 4 | EE | Calc | 1 | 2 | 99\% | 4 | A | Calc | 0 | 2 | 100\% |
| 4 | F | Calc | 0 | 1 | 98.8\% | 4 | F | Calc | 0 |  | 99.0\% |
| 4 | G | Calc | 0 | 1 | 100\% | 4 | G | Calc | 0 | 1 | 94.2\% |
| 4 | NS | Calc | 0 | 1 | 100\% | 4 | N | Calc | 0 | 2 | 100\% |
| 4 | SP | Calc | 0 | 1 | 100\% | 4 | S | Calc | 0 | 2 | 100\% |
| 4 | OTHER | Calc | 0 |  | 100\% | 4 | O | Calc | 0 | 1 | 100\% |

## Target Coverage

Table 8 presents a summary of the number of unique targets administered in each simulated test by claim. The table includes the number of targets specified in the blueprints, and the mean and the range of the number of targets administered to students. The blueprints require to cover a few targets in a claim; therefore, the number targets covered in each test are expected to vary across tests. The blueprint match results demonstrate the fact that all test forms conform to the same content target, thus providing evidence of content comparability. In other words, while each form is unique with respect to its items, all forms align with the same curricular expectations set forth in the test blueprints.

Table 8. Number of Unique Targets Assessed Within Each Claim

| Grade | Total Targets in BP |  |  |  | Mean |  |  |  | Range (Minimum - Maximum) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | C1 | C2 | C3 | C4 | C1 | C2 | C3 | C4 | C1 | C2 | C3 | C4 |
| English Language Arts/Literacy |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | 14 | 5 | 1 | 3 | 11.1 | 4.0 | 1 | 3 | 8-14 | 3-5 | 1-1 | 3-3 |
| 4 | 14 | 5 | 1 | 3 | 10.4 | 4.0 | 1 | 3 | 8-13 | 3-5 | 1-1 | 3-3 |
| 5 | 14 | 5 | 1 | 3 | 11.2 | 4.8 | 1 | 3 | 9-13 | 4-5 | 1-1 | 3-3 |
| 6 | 14 | 5 | 1 | 3 | 9.8 | 5.0 | 1 | 3 | 8-11 | 4-5 | 1-1 | 3-3 |
| 7 | 14 | 5 | 1 | 3 | 9.6 | 4.0 | 1 | 3 | 8-11 | 3-5 | 1-1 | 3-3 |
| 8 | 14 | 5 | 1 | 3 | 10.4 | 4.0 | 1 | 3 | 8-11 | 3-5 | 1-1 | 3-3 |
| 11 | 14 | 5 | 1 | 3 | 8.7 | 5.0 | 1 | 3 | 7-11 | 4-5 | 1-1 | 3-3 |
| Mathematics |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | 11 | 4 | 6 | 6 | 10.1 | 2 | 5.3 | 3 | 8-11 | 2-2 | 3-6 | 3-3 |
| 4 | 12 | 4 | 6 | 6 | 10.0 | 2 | 5.4 | 3 | 9-10 | 2-2 | 3-6 | 3-3 |
| 5 | 11 | 4 | 6 | 6 | 9.0 | 2 | 5.3 | 3 | 9-9 | 2-2 | 3-6 | 3-3 |
| 6 | 10 | 4 | 7 | 6 | 9.9 | 2 | 4.4 | 3 | 9-10 | 2-2 | 3-6 | 3-3 |
| 7 | 10 | 3 | 7 | 6 | 8.0 | 2 | 5.0 | 3 | 8-8 | 2-2 | 3-6 | 3-3 |
| 8 | 10 | 4 | 7 | 6 | 10.0 | 2 | 5.2 | 3 | 10-10 | 2-2 | 3-6 | 3-3 |
| 11 | 16 | 4 | 7 | 6 | 15.4 | 2 | 4.5 | 3 | 15-16 | 2-2 | 3-7 | 3-3 |

## Summary Statistics of the Ability Estimation

Statistical summaries of the ability estimation are also provided. Table 9 presents the mean of the biases, which is the average of the biases of estimated abilities across all students, the standard error of the mean bias, and the p -value for the significance of the estimated bias reported from the $z$ test. Table 9 also provides the mean square error and the percentage of students' estimated theta falling outside the $95 \%$ coverage and $99 \%$ coverage. All statistics computed in these tables are described in detail in the Statistical Summaries section of this document.

In all cases, the mean bias of the estimated abilities is very small and statistically insignificant, except for mathematics grades 8 and 11 , providing the evidence needed to demonstrate that the true score is adequately recovered in the estimated score. In mathematics grades 8 and 11, the significant bias is in the lower ability range. In the lower ability range, the true abilities are larger than the estimated abilities because the item pool is too difficult to adapt to low performing students. The distribution of bias across the estimated ability range is provided in Appendix D. The vertical dashed lines indicate Lowest Obtainable Theta (LOT) and Highest Obtainable Theta (HOT), specified by the Smarter Balanced.

Table 9. Mean Bias of the Ability Estimates (True Score - Observed Score)

| Grade | Mean of the <br> Biases | SE of <br> the Biases | P-value for <br> the Z-Test | MSE | 95\% <br> Coverage | 99\% <br> Coverage |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| English Language Arts/Literacy |  |  |  |  |  |  |
| 3 | 0.01 | 0.01 | 0.55 | 0.09 | $4.1 \%$ | $0.6 \%$ |
| 5 | -0.01 | 0.01 | 0.65 | 0.11 | $5.0 \%$ | $0.9 \%$ |
| 6 | -0.01 | 0.01 | 0.32 | 0.11 | $5.3 \%$ | $0.3 \%$ |
| 7 | 0.02 | 0.01 | 0.14 | 0.16 | $4.9 \%$ | $1.0 \%$ |
| 8 | 0.01 | 0.01 | 0.40 | 0.14 | $3.9 \%$ | $0.9 \%$ |
| 11 | 0.00 | 0.01 | 0.87 | 0.14 | $4.0 \%$ | $1.0 \%$ |
|  | 0.02 | 0.01 | 0.19 | 0.15 | $3.2 \%$ | $0.6 \%$ |
| 3 | 0.00 | 0.01 | Mathematics |  |  |  |
| 4 | 0.00 | 0.01 | 0.84 | 0.06 | $5.3 \%$ | $1.0 \%$ |
| 5 | 0.02 | 0.01 | 0.67 | 0.07 | $4.8 \%$ | $1.2 \%$ |
| 6 | 0.02 | 0.01 | 0.05 | 0.11 | $6.1 \%$ | $0.8 \%$ |
| 7 | 0.02 | 0.01 | 0.16 | 0.12 | $4.4 \%$ | $0.8 \%$ |
| 8 | 0.03 | 0.01 | 0.09 | 0.16 | $3.6 \%$ | $1.3 \%$ |
| 11 | 0.03 | 0.02 | 0.02 | 0.18 | $3.8 \%$ | $0.5 \%$ |

Table 10 presents the mean standard error of the ability estimate across 1,000 simulated test administrations, as well as the standard error across the ability distribution. The standard errors are large in the low ability range in both ELA/L and mathematics - an indication that the item pool is too difficult for students, shortage of easy items. In ELA/L, the standard error is greatest at the very low end of the ability range, decreasing somewhat to maintain similar standard error through much of the range of the ability distribution. In mathematics, the standard error is greatest at the very low end of the ability range and smallest at the very high end of the ability range, except for grade 3. The standard error curves are included in Appendix E.

Table 10. Mean Standard Error of the Ability Estimates Across the Ability Distribution

| Grade | $\begin{gathered} \hline \text { Average } \\ \text { SE } \end{gathered}$ | SE at 5 Percentile | SE at Bottom Quartile | SE at Top Quartile | SE at 95 Percentile |
| :---: | :---: | :---: | :---: | :---: | :---: |
| English Language Arts/Literacy |  |  |  |  |  |
| 3 | 0.31 | 0.40 | 0.31 | 0.33 | 0.33 |
| 4 | 0.33 | 0.36 | 0.28 | 0.34 | 0.35 |
| 5 | 0.33 | 0.37 | 0.31 | 0.35 | 0.34 |
| 6 | 0.38 | 0.48 | 0.36 | 0.35 | 0.35 |
| 7 | 0.38 | 0.47 | 0.39 | 0.35 | 0.36 |
| 8 | 0.37 | 0.48 | 0.38 | 0.32 | 0.35 |
| 11 | 0.40 | 0.54 | 0.41 | 0.38 | 0.38 |
| Mathematics |  |  |  |  |  |
| 3 | 0.25 | 0.32 | 0.23 | 0.25 | 0.24 |
| 4 | 0.25 | 0.32 | 0.28 | 0.23 | 0.22 |
| 5 | 0.30 | 0.47 | 0.32 | 0.27 | 0.23 |
| 6 | 0.34 | 0.49 | 0.39 | 0.28 | 0.28 |
| 7 | 0.39 | 0.73 | 0.43 | 0.29 | 0.25 |
| 8 | 0.42 | 0.65 | 0.42 | 0.33 | 0.28 |
| 11 | 0.50 | 0.84 | 0.55 | 0.37 | 0.28 |

Table 11 provides the average item difficulty for the pool and the average estimated ability for the simulated students. As shown in Table 11, the average item difficulties are much higher than the average student abilities, difficult to select items that maximize assessment information near the student's estimated ability while meeting the blueprint requirements. The distribution of item difficulties and student abilities can be found in Appendix F.

Table 11. Average Difficulty of Item Pool and
Average Observed Student Performance for Simulated Test Administrations

| Grade | English Language Arts/Literacy |  |  | Mathematics |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Items |  | Ability |  | Items |  | Ability |  |
|  | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| 3 | -0.413 | 1.141 | -1.298 | 1.021 | -0.811 | 1.071 | -1.335 | 0.952 |
| 4 | 0.099 | 1.280 | -0.756 | 0.971 | -0.139 | 1.115 | -0.701 | 1.016 |
| 5 | 0.492 | 1.208 | -0.335 | 1.021 | 0.489 | 1.238 | -0.440 | 1.044 |
| 6 | 0.979 | 1.316 | -0.135 | 1.116 | 0.976 | 1.313 | -0.142 | 1.225 |
| 7 | 1.111 | 1.324 | 0.074 | 1.113 | 1.743 | 1.234 | 0.018 | 1.256 |
| 8 | 1.298 | 1.328 | 0.379 | 1.118 | 2.186 | 1.552 | 0.196 | 1.368 |
| 11 | 1.694 | 1.351 | 0.492 | 1.173 | 2.691 | 1.572 | 0.470 | 1.486 |

Table 12 presents the correlation between the true ability and the estimated ability, and the correlation between the estimated ability and the average item difficulty (form difficulty) administered to each student. The higher the correlations are, the more adaptive the assessment is. The high correlations demonstrate that the algorithm adapted to student ability efficiently while matching to the blueprint specifications.

Table 12. Correlations Between True Ability and Estimated Ability, and Between Estimated Ability and Average Item Difficulty for Simulated Test Administrations

| Grade | True Ability and <br> Estimated Ability <br> English Language Arts/Literacy <br> Average Item Difficulty |  |
| :---: | :---: | :---: |
| 3 | 0.96 | 0.81 |
| 4 | 0.94 | 0.88 |
| 5 | 0.95 | 0.88 |
| 6 | 0.94 | 0.83 |
| 7 | 0.94 | 0.84 |
| 8 | 0.94 | 0.87 |
| 11 | 0.94 | 0.87 |
| Mathematics |  |  |
| 3 | 0.96 | 0.95 |
| 4 | 0.97 | 0.93 |
| 5 | 0.95 | 0.91 |
| 6 | 0.96 | 0.87 |
| 7 | 0.95 | 0.84 |
| 8 | 0.95 | 0.85 |
| 11 | 0.94 | 0.86 |

The summary statistics of the estimated abilities show that for all examinees in all grades, the item selection algorithm is choosing items that are optimized conditional on each examinee's ability. Essentially, this shows that the examinee-ability estimates generated on the basis of the items chosen are optimal in the sense that the final score for each examinee almost always recovers that true score. In other words, given that we know the true score for each examinee in a simulation, these data show that the true score is virtually always recovered-an indication that the algorithm is working exactly as expected for a computer-adaptive test.

## Global Item Exposure

The simulator output also reports the degree to which the constraints set forth in the blueprints may yield greater exposure of items to students. This is reported by examining the percentage of test administrations in which an item appears. In an adaptive test with a sufficiently large item pool where the items are distributed proportional to the blueprint constraints, we would expect that most of the items would appear in only a relatively small percentage of the test administrations. When this condition holds, it suggests that test administrations between students are more or less unique. Therefore, we calculated the item exposure rate for each item by dividing the total number of test administrations in which an item appears by the total number of tests administered. Then, we reported the distribution of the item exposure rate (r) in six bins. The bins are $r=0 \%$ (unused), $0 \%<r \leq 20 \%, 20 \%<r \leq 40 \%, 40 \%<r \leq 60 \%, 60 \%<r \leq 80 \%$ and $80 \%<r \leq 100 \%$. If global item exposure is minimal, we would expect the largest portion of items to appear in the $0 \%<\mathrm{r} \leq 20 \%$ bin, an indication that most of the items appear on a very small percentage of the test forms.

Table 13 presents the percentage of items that fall into each exposure bin by subject and grade. The distribution of exposure rates is as expected given the number of items in the blueprint constraints. Most test items are administered in $20 \%$ or fewer test administrations. Few items with exposure rates $60 \%-100 \%$ are because the pool has too few items to meet some blueprint constraints. The unused items will be administered when the number of students increases.

Table 13. Percent of Pool Items Classified at each Exposure Rate

| Grade | Total Items | Exposure Rate |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Unused | 0\%-20\% | 21\%-40\% | 41\%-60\% | 61\%-80\% | 81\%-100\% |
| English Language Arts/Literacy |  |  |  |  |  |  |  |
| 3 | 607 | 6.12 | 84.96 | 7.27 | 1.32 | 0.17 | 0.17 |
| 4 | 620 | 13.06 | 78.06 | 7.26 | 1.29 | 0.16 | 0.16 |
| 5 | 580 | 9.14 | 80.52 | 6.55 | 3.28 | 0.17 | 0.34 |
| 6 | 589 | 12.90 | 78.78 | 4.41 | 2.72 | 1.02 | 0.00 |
| 7 | 552 | 12.14 | 76.45 | 7.61 | 2.17 | 1.45 | 0.00 |
| 8 | 535 | 6.92 | 79.81 | 11.96 | 0.93 | 0.19 | 0.19 |
| 11 | 1476 | 20.39 | 76.36 | 2.37 | 0.81 | 0.00 | 0.00 |
| Mathematics |  |  |  |  |  |  |  |
| 3 | 858 | 3.85 | 94.17 | 1.75 | 0.23 | 0 | 0 |
| 4 | 861 | 3.14 | 94.66 | 1.74 | 0.46 | 0 | 0 |
| 5 | 884 | 4.86 | 92.87 | 2.15 | 0.11 | 0 | 0 |
| 6 | 768 | 2.86 | 94.53 | 2.21 | 0.39 | 0 | 0 |
| 7 | 690 | 2.03 | 91.16 | 5.65 | 1.16 | 0 | 0 |
| 8 | 666 | 3.30 | 90.69 | 5.71 | 0.30 | 0 | 0 |
| 11 | 1789 | 14.98 | 83.73 | 0.73 | 0.11 | 0.11 | 0.34 |

## Summary Statistics on Unique Items Administered Across Tests

In a computer adaptive test, students are always first presented with a starting item or an item group. Their responses to that item or item group determine pathways to subsequent items or groups. Appendix H contains plots of the number of unique items administered by item position for the Smarter Balanced adaptive simulations. For ease of interpretation, test positions with more than 300 unique items have been capped at 300 . We can note that the first position uses most items, values over 300. Appendix I contains tables that show the number of items for each position.

## Off-Grade Item Selection

For students who are performing very well or very poorly on the test, if an item pool does not include a wide enough range of item difficulties for every test blueprint constraint, the item banks may run out of items that measure the student's proficiency sufficiently. This could potentially result in imprecise measurement for students in the tails of the proficiency distribution.

Constraints enforced in administering off-grade items are:

- Re-align off-grade items to the on-grade blueprint.
- Administer after a student responds to two-thirds of the operational items.
- The system should make it extremely unlikely that students could achieve a "proficient" determination based on below-grade content or could be denied a "proficient" determination based on above-grade content.
- The system should not allow off-grade items while a student maintains a non-trivial possibility of achieving proficiency (or dropping below it) based on on-grade items.

Off-grade items are added to the on-grade item pool at the two-thirds of the test length, depending on a student's performance. At or after the two-thirds of the test, when a student's performance reaches below the standard (not proficient) with a probability $(p)<0.0000001$, the below-grade items are added to the on-grade item pool. Likewise, if a student's performance is above the standard (proficient) with a probability $(p)<0.0000001$, the above-grade items are added to the on-grade item pool. More detailed statistical criteria for expanding the item pool can be found in the off-grade item selection approach document (Cohen, C., \& Albright, L., 2014).

Smarter Balanced selected off-grade items, one grade above and one grade below in ELA/L and two grades below in mathematics, realigned the off-grade items to the on-grade blueprints. The off-grade item selection criteria for item contents and item difficulties are preliminary and needs thorough review and quality control. Tables 14 and 15 present the average and the range of the item difficulties for on-grade and off-grade items.

Table 14. ELA/L: Average Difficulty for the On-Grade and Off-Grade Item Pools

| Grade | On/OFFGrade | Item Difficulty |  |  |  |  |
| :---: | :--- | :---: | :---: | :---: | :---: | :---: |
|  | Number of <br> Items | Min | Max | Average | SD |  |
| 3 | Above Grade | 16 | -1.42 | 1.38 | -0.05 | 0.94 |
|  | On Grade | 591 | -2.90 | 3.82 | -0.42 | 1.14 |
| 4 | Above Grade | 26 | -1.53 | 1.71 | -0.02 | 0.97 |
|  | Below Grade | 27 | -2.06 | 2.18 | -0.34 | 0.99 |
|  | On Grade | 567 | -3.25 | 4.25 | 0.13 | 1.30 |
| 5 | Above Grade | 18 | -1.62 | 3.01 | 0.51 | 1.28 |
|  | Below Grade | 15 | -2.75 | 1.39 | -0.13 | 1.22 |
|  | On Grade | 547 | -2.53 | 4.95 | 0.51 | 1.20 |
| 6 | Above Grade | 20 | -1.44 | 2.60 | 0.55 | 0.99 |
|  | Below Grade | 21 | -1.24 | 2.23 | 0.68 | 0.95 |
|  | On Grade | 548 | -2.72 | 4.92 | 1.01 | 1.34 |
| 7 | Above Grade | 21 | -0.67 | 3.58 | 0.96 | 1.35 |
|  | Below Grade | 22 | -1.13 | 3.17 | 1.33 | 1.23 |
|  | On Grade | 509 | -1.98 | 5.52 | 1.11 | 1.33 |
| 8 | Above Grade | 20 | -0.89 | 3.66 | 1.03 | 1.14 |
|  | Below Grade | 16 | -1.17 | 3.87 | 1.54 | 1.23 |
|  | On Grade | 499 | -3.01 | 5.57 | 1.30 | 1.34 |
| 11 | Below Grade | 21 | 0.12 | 3.37 | 2.02 | 1.03 |
|  | On Grade | 1,455 | -1.88 | 5.93 | 1.69 | 1.35 |

Table 15. Mathematics: Average Difficulty for the On-Grade and Off-Grade Item Pools

| Grade | Cal/NoCalc | On/OFFGrade | Number of Items | Item Difficulty |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Min | Max | Average | SD |
| 3 | No Calculator | Above Grade | 3 | -2.00 | -1.88 | -1.93 | 0.06 |
|  | No Calculator | On Grade | 855 | -3.38 | 3.46 | -0.81 | 1.07 |
| 4 | No Calculator | Below Grade | 27 | -3.15 | -2.15 | -2.72 | 0.26 |
|  | No Calculator | On Grade | 834 | -3.26 | 4.11 | -0.06 | 1.03 |
| 5 | No Calculator | Below Grade | 56 | -3.26 | -1.69 | -2.38 | 0.44 |
|  | No Calculator | On Grade | 828 | -2.53 | 5.28 | 0.68 | 1.01 |
| 6 | Calculator | On Grade | 375 | -3.93 | 5.10 | 1.21 | 1.33 |
|  | No Calculator | Below Grade | 19 | -3.14 | -1.21 | -2.19 | 0.40 |
|  | No Calculator | On Grade | 374 | -1.81 | 4.32 | 0.90 | 1.09 |
| 7 | Calculator | On Grade | 469 | -1.79 | 6.17 | 1.80 | 1.22 |
|  | No Calculator | Below Grade | 10 | -1.70 | -0.93 | -1.41 | 0.26 |
|  | No Calculator | On Grade | 211 | -1.28 | 5.64 | 1.76 | 1.10 |
| 8 | Calculator | Above Grade | 2 | -1.69 | -1.60 | -1.65 | 0.06 |
|  | Calculator | Below Grade | 5 | -1.79 | -1.09 | -1.45 | 0.32 |
|  | Calculator | On Grade | 489 | -1.54 | 6.70 | 2.33 | 1.45 |
|  | No Calculator | Below Grade | 11 | -1.70 | -0.93 | -1.33 | 0.30 |
|  | No Calculator | On Grade | 160 | -1.30 | 6.32 | 2.16 | 1.46 |
| 11 | Calculator | Below Grade | 8 | -1.54 | -0.85 | -1.09 | 0.25 |
|  | Calculator | On Grade | 1,619 | -3.36 | 7.30 | 2.72 | 1.56 |
|  | No Calculator | On Grade | 162 | -2.12 | 6.55 | 2.64 | 1.47 |

Table 16 below provides the number of off-grade items that are administered, the number of students who responded to off-grade items, the number of proficient students who took abovegrade items, and the number of not-proficient students who took below-grade items. As specified in the algorithm, above-grade items are administered to students who are proficient on their overall test performance. Below-grade items are administered to students who are not proficient on their overall test performance.

Table 16. Number of Off-Grade Items Administered and Number of Tests in which Off-Grade Items are Administered

| Grade | Number of <br> Administered Off- <br> Grade Items | Number of <br> Students who <br> Responded to Off <br> Grade Items | Number of <br> Proficient Students <br> with Above Grade <br> Items | Number of not- <br> Proficient Students <br> with Below Grade <br> Items |
| :---: | :---: | :---: | :---: | :---: |
| English Language Arts/Literacy |  |  |  |  |

## Embedded Field-Test Item Exposure

In the spring 2015 operational Summative Adaptive Assessments, Smarter Balanced embedded 5,953 field-test items in English language arts/literacy assessments and 4,814 field-test items in mathematics assessments.

Field-test items are administered with the following rules:

- On both assessments, embedded field-test (EFT) items may appear at any position between at or after the fifth item on the test and at or before the fifth-from-last item on the test.
- Within the allowable field-test positions, each item or group will be administered in randomly selected positions.
- Item groups (such as items following a passage) will be administered intact.
- The number of field-test items administered to individual students will never exceed the intended maximum nor fall short of the intended minimum.

In mathematics, all field-test items are independent, stand-alone items. Each student will be administered exactly two field-test items, embedded in the allowable field-test positions.

While the design for the mathematics assessment is straightforward, the ELA/L assessment poses more challenges, including the following:

- Most items are embedded in groups (blocks), and those groups vary in size.
- Each stimulus will appear with multiple blocks of items.

The time it takes to answer an item group is not proportional to the number of items but rather depends more heavily on the type of stimulus. Each student will see a minimum of three and a maximum of six EFT items. Reading sets of items will be constructed with a minimum of three associated items. With this construction, any reading passage will satisfy the minimum requirement and prevent further selections, thereby ensuring that no student receives more than one field-test reading passage. Listening items are associated with stimuli, three items per stimulus.

The item exposure rates for field-test items are presented in Tables 17 and 18. In ELA/L, the item exposure rate is computed by group size because one or more blocks will be selected per student. Block size is defined as: 1 for discrete items, 2 for a stimulus with two items, 3 for a stimulus with three items, and so on. In mathematics grades 6-8 and 11, the item exposure rate is computed by calculator and no-calculator segments. The expected sample size for each item can be estimated by multiplying the exposure rate to the population count. For example, in grade 3 ELA/L block size 1, if the total population is 100,000 , the expected sample size for discrete items is $100,000 * 0.67 \%=670$.

Table 17. ELA/L: Summary of Field-Test Item Exposure Rates

| Grade | Block Size | Average Number of FT Items Administered per Student | Total Field-Test Items | Exposure Rate |
| :---: | :---: | :---: | :---: | :---: |
| 3 | 1 | 3.85 | 259 | 0.67\% |
|  | 3 | 3.85 | 123 | 0.68\% |
|  | 4 | 3.85 | 112 | 0.65\% |
|  | 5 | 3.85 | 10 | 0.35\% |
|  | 6 | 3.85 | 156 | 0.32\% |
| 4 | 1 | 3.87 | 248 | 0.68\% |
|  | 3 | 3.87 | 123 | 0.70\% |
|  | 4 | 3.87 | 104 | 0.72\% |
|  | 5 | 3.87 | 30 | 0.45\% |
|  | 6 | 3.87 | 132 | 0.33\% |
| 5 | 1 | 3.84 | 246 | 0.69\% |
|  | 3 | 3.84 | 123 | 0.70\% |
|  | 4 | 3.84 | 112 | 0.66\% |
|  | 5 | 3.84 | 15 | 0.46\% |
|  | 6 | 3.84 | 150 | 0.31\% |
| 6 | 1 | 3.86 | 243 | 0.72\% |
|  | 2 | 3.86 | 2 | 0.60\% |
|  | 3 | 3.86 | 120 | 0.70\% |
|  | 4 | 3.86 | 104 | 0.72\% |
|  | 5 | 3.86 | 15 | 0.53\% |


|  | 6 | 3.86 | 150 | $0.30 \%$ |
| :--- | :--- | ---: | ---: | :--- |
| 7 | 1 | 3.77 | 247 | $0.73 \%$ |
|  | 3 | 3.77 | 138 | $0.67 \%$ |
|  | 4 | 3.77 | 80 | $0.71 \%$ |
|  | 5 | 3.77 | 162 | $0.44 \%$ |
|  | 6 | 3.77 | 239 | $0.27 \%$ |
| 8 | 1 | 3.89 | 126 | $0.71 \%$ |
|  | 3 | 3.89 | 96 | $0.71 \%$ |
|  | 4 | 3.89 | 10 | $0.86 \%$ |
|  | 5 | 3.89 | 138 | $0.45 \%$ |
|  | 6 | 3.84 | 787 | $0.31 \%$ |
| 11 | 1 | 3.84 | 365 | $0.21 \%$ |
|  | 3 | 3.84 | 25 | $0.21 \%$ |
|  | 4 | 3.84 | 528 | $0.218 \%$ |
|  | 5 |  | $0.09 \%$ |  |

Table 18. Mathematics: Summary of Field-Test Item Exposure Rates

| Grade | Calculator/No <br> Calculator Segment | Average Number of <br> FT Items <br> Administered per <br> Student | Total Field-Test <br> Items | Exposure Rate |
| :---: | :--- | :---: | :---: | :---: |
|  | No Calculator | 2 | 564 | $0.35 \%$ |
| 3 | 2 | 659 | $0.30 \%$ |  |
| 4 | No Calculator | 2 | 616 | $0.32 \%$ |
| 5 | No Calculator | 1 | 446 | $0.22 \%$ |
| 6 | Calculator | 1 | 230 | $0.43 \%$ |
|  | No Calculator | 1 | 529 | $0.19 \%$ |
| 7 | Calculator | 1 | 153 | $0.65 \%$ |
|  | No Calculator | 1 | 467 | $0.21 \%$ |
| 8 | Calculator | 1 | 225 | $0.44 \%$ |
|  | No Calculator | 1 | 618 | $0.16 \%$ |
| 11 | Calculator | 1 | 307 | $0.33 \%$ |

## Summary

Overall, the diagnostics on the item-selection algorithm provide evidence to support the following: scores are comparable with respect to the targeted content; scores at various ranges of the score distribution are measured with good precision, given the item contents and the item difficulty distributions in the pool; global item exposure is minimized; and off-grade items are administered according to the criteria. Moreover, the field-test items are distributed equally within a block as intended.

## References

Cohen, J., \& Albright, L. (2014). Smarter Balanced adaptive item selection algorithm design report, Washington, D.C, http://www.smarterapp.org/documents/AdaptiveAlgorithm-Preview-v3.pdf.

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Smarter Balanced Assessment Consortium. (2015). ELA/Literacy Smarter Balanced Summative Assessment Blueprint, http://www.smarterbalanced.org/wordpress/wpcontent/uploads/2015/02/ELA Blueprint.pdf.

Smarter Balanced Assessment Consortium. (2015). Mathematics Smarter Balanced Summative Assessment Blueprint http://www.smarterbalanced.org/wordpress/wpcontent/uploads/2015/02/Mathematics_Blueprint.pdf.

## Appendix A

## Adaptive Test Operational Item Pool in Braille and Spanish

Table A1. ELA/L: Computer Adaptive Operational Item Pool (Braille)

| Grade | Number of Items |  |  |  |  | Number of Passages |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Total | Claim 1 | Claim 2 | Claim 3 | Claim 4 | Literary | Information | Listening |
| 3 | 309 | 117 | 83 | 69 | 40 | 9 | 10 | 28 |
| 4 | 332 | 98 | 96 | 76 | 62 | 7 | 8 | 29 |
| 5 | 332 | 119 | 88 | 71 | 54 | 10 | 8 | 28 |
| 6 | 306 | 105 | 83 | 75 | 43 | 4 | 12 | 30 |
| 7 | 296 | 102 | 85 | 76 | 33 | 3 | 14 | 29 |
| 8 | 268 | 103 | 72 | 61 | 32 | 3 | 12 | 22 |
| 11 | 533 | 210 | 118 | 135 | 70 | 10 | 23 | 49 |

Table A2. Mathematics: Computer Adaptive Operational Item Pool (Braille)

| Grade | Cal/NoCal | Total | Claim 1 | Claim 2 | Claim 3 | Claim 4 |
| :---: | :--- | :---: | :---: | :---: | :---: | :---: |
| 3 | No Calculator | 335 | 208 | 42 | 44 | 41 |
| 4 | No Calculator | 276 | 170 | 38 | 32 | 36 |
| 5 | No Calculator | 351 | 208 | 39 | 52 | 52 |
| 6 | Calculator | 193 | 92 | 39 | 39 | 23 |
|  | No Calculator | 175 | 173 | 0 | 2 | 0 |
| 7 | Calculator | 237 | 136 | 35 | 41 | 25 |
|  | No Calculator | 93 | 93 | 0 | 0 | 0 |
| 8 | Calculator | 200 | 125 | 17 | 45 | 13 |
|  | No Calculator | 80 | 80 | 0 | 0 | 0 |
| 11 | Calculator | 323 | 162 | 34 | 83 | 44 |
|  | No Calculator | 46 | 33 | 0 | 13 | 0 |

Table A3. Mathematics: Computer Adaptive Operational Item Pool (Spanish)

| Grade | Cal/NoCalc | Total | Claim 1 | Claim 2 | Claim 3 | Claim 4 |
| :---: | :--- | :---: | :---: | :---: | :---: | :---: |
| 3 | No Calculator | 368 | 224 | 55 | 49 | 40 |
| 4 | No Calculator | 378 | 225 | 47 | 57 | 49 |
| 5 | No Calculator | 404 | 222 | 48 | 72 | 62 |
| 6 | Calculator | 195 | 85 | 32 | 49 | 29 |
|  | No Calculator | 186 | 180 | 0 | 6 | 0 |
| 7 | Calculator | 225 | 130 | 24 | 45 | 26 |
|  | No Calculator | 86 | 86 | 0 | 0 | 0 |
| 8 | Calculator | 232 | 137 | 17 | 51 | 27 |
|  | No Calculator | 84 | 84 | 0 | 0 | 0 |
| 11 | Calculator | 365 | 178 | 45 | 98 | 44 |
|  | No Calculator | 51 | 39 | 0 | 12 | 0 |

## Appendix B

## Blueprint Summary for Claims and Content Domains for Adaptive Tests in Braille and Spanish

Table B1. ELA/L: Percentage of Students Meeting Blueprint Requirements for Claims and Passages (Braille)

| Grade | Claim | Item <br> Requirement | Passage <br> Requirement | Grade | Claim | Item <br> Requirement | Passage <br> Requirement |
| :---: | :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | 1-LT | $100 \%$ | $100 \%$ | 7 | 1-LT | $100 \%$ | $100 \%$ |
| 3 | 1-IT | $100 \%$ | $99.5 \%$ | 7 | 1-IT | $100 \%$ | $100 \%$ |
| 3 | 2-W | $99.8 \%$ |  | 7 | 2-W | $95.6 \%$ |  |
| 3 | 3-L | $100 \%$ | $100 \%$ | 7 | $3-\mathrm{L}$ | $100 \%$ | $100 \%$ |
| 3 | 4-CR | $99.9 \%$ |  | 7 | 4-CR | $99.9 \%$ |  |
| 4 | 1-LT | $100 \%$ | $100 \%$ | 8 | $1-\mathrm{LT}$ | $99.9 \%$ | $99.9 \%$ |
| 4 | 1-IT | $100 \%$ | $100 \%$ | 8 | $1-\mathrm{IT}$ | $100 \%$ | $100 \%$ |
| 4 | 2-W | $100 \%$ |  | 8 | 2-W | $98.9 \%$ |  |
| 4 | 3-L | $100 \%$ | $100 \%$ | 8 | $3-\mathrm{L}$ | $100 \%$ | $98.9 \%$ |
| 4 | 4-CR | $100 \%$ |  | 8 | 4-CR | $100 \%$ |  |
| 5 | 1-LT | $100 \%$ | $100 \%$ | 11 | $1-\mathrm{LT}$ | $99.8 \%$ | $99.3 \%$ |
| 5 | 1-IT | $100 \%$ | $100 \%$ | 11 | $1-\mathrm{IT}$ | $100 \%$ | $100 \%$ |
| 5 | 2-W | $92.5 \%$ |  | 11 | 2-W | $100 \%$ | $100 \%$ |
| 5 | 3-L | $99.8 \%$ | $99.7 \%$ | 11 | 3-L | $100 \%$ |  |
| 5 | 4-CR | $100 \%$ |  | 11 | 4-CR | $100 \%$ |  |
| 6 | 1-LT | $100 \%$ | $100 \%$ |  |  |  |  |
| 6 | 1-IT | $100 \%$ | $100 \%$ |  |  |  |  |
| 6 | 2-W | $100 \%$ |  |  |  |  |  |
| 6 | 3-L | $100 \%$ | $100 \%$ |  |  |  |  |
| 6 | 4-CR | $100 \%$ |  |  |  |  |  |

Table B2. Mathematics Grades 3-5:
Percentage of Students Meeting Blueprint Requirements for Claims and Content Domains (Braille Test)

| Claim | Content <br> Category | \%BP Match |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Grade 3 | Grade 4 | Grade 5 |
| 1 | ALL | $99.6 \%$ | $97.4 \%$ | $100 \%$ |
| 1 | P | $97.7 \%$ | $80.1 \%$ | $100 \%$ |
| 1 | S | $97.7 \%$ | $81.3 \%$ | $100 \%$ |
| 2 | ALL | $99.9 \%$ | $100 \%$ | $100 \%$ |
| 2 | G | $100 \%$ | $100 \%$ | $100 \%$ |
| 2 | MD | $100 \%$ | $100 \%$ | $100 \%$ |
| 2 | NBT | $100 \%$ | $100 \%$ | $100 \%$ |
| 2 | NF | $100 \%$ | $99.8 \%$ | $100 \%$ |
| 2 | OA | $99.8 \%$ | $100 \%$ | $100 \%$ |
| 3 | All | $98.2 \%$ | $97.9 \%$ | $99.7 \%$ |
| 3 | G |  |  | $100 \%$ |
| 3 | MD | $98.5 \%$ |  | $100 \%$ |
| 3 | NBT |  | $97.8 \%$ | $100 \%$ |
| 3 | NF | $100 \%$ | $100 \%$ | $98.7 \%$ |
| 3 | OA | $99.9 \%$ | $100 \%$ |  |
| 4 | All | $98.5 \%$ | $99.5 \%$ | $99.7 \%$ |
| 4 | G | $100 \%$ | $100 \%$ | $100 \%$ |
| 4 | MD | $96.4 \%$ | $100 \%$ | $99.7 \%$ |
| 4 | NBT | $100 \%$ | $100 \%$ | $100 \%$ |
| 4 | NF | $100 \%$ | $100 \%$ | $100 \%$ |
| 4 | OA | $98.0 \%$ | $90.2 \%$ | $100 \%$ |

Table B3. Mathematics Grades 6-7:
Percentage of Students Meeting Blueprint Requirements for Claims and Content Domains (Braille Test)

| Claim | Content <br> Category | \% BP Match |  |
| :---: | :---: | :---: | :---: |
|  |  | Grade 6 | Grade 7 |
| 1 | ALL | $98.5 \%$ | $100 \%$ |
| 1 | P | $98.2 \%$ | $100 \%$ |
| 1 | S | $99.7 \%$ | $100 \%$ |
| 2 | ALL | $100 \%$ | $100 \%$ |
| 2 | EE | $100 \%$ | $100 \%$ |
| 2 | G | $100 \%$ | $100 \%$ |
| 2 | NS | $100 \%$ | $100 \%$ |
| 2 | RP | $99.8 \%$ | $100 \%$ |
| 2 | SP | $100 \%$ | $100 \%$ |
| 2 | OTHER | $100 \%$ | $100 \%$ |
| 3 | All | $98.4 \%$ | $100 \%$ |
| 3 | EE | $100 \%$ | $100 \%$ |
| 3 | NS | $99.9 \%$ | $100 \%$ |
| 3 | RP | $100 \%$ | $99.9 \%$ |
| 4 | All | $99.9 \%$ | $100 \%$ |
| 4 | EE | $96.4 \%$ | $95.1 \%$ |
| 4 | G | $100 \%$ | $100 \%$ |
| 4 | NS | $98.3 \%$ | $100 \%$ |
| 4 | RP | $99.9 \%$ | $93.4 \%$ |
| 4 | SP | $98.5 \%$ | $98.9 \%$ |
| 4 | OTHER | $100 \%$ | $100 \%$ |

Table B4. Mathematics Grades 8, 11:
Percentage of Students Meeting Blueprint Requirements for Claims and Content Domains (Braille Test)

| Grade 8 |  |  | Grade 11 |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Claim | Content <br> Category | \% BP <br> Match | Claim | Content <br> Category | \% BP <br> Match |  |  |  |  |  |
| 1 | ALL | $100 \%$ | 1 | ALL | $98.9 \%$ |  |  |  |  |  |
| 1 | P | $77.4 \%$ | 1 | P | $71.6 \%$ |  |  |  |  |  |
| 1 | S | $77.4 \%$ | 1 | S | $72.1 \%$ |  |  |  |  |  |
| 2 | ALL | $100 \%$ | 2 | ALL | $100 \%$ |  |  |  |  |  |
| 2 | EE | $99.1 \%$ | 2 | A | $97.8 \%$ |  |  |  |  |  |
| 2 | F | $100 \%$ | 2 | F | $100 \%$ |  |  |  |  |  |
| 2 | G | $100 \%$ | 2 | G | $100 \%$ |  |  |  |  |  |
| 2 | NS | $100 \%$ | 2 | N | $100 \%$ |  |  |  |  |  |
| 2 | SP | $100 \%$ | 2 | S | $100 \%$ |  |  |  |  |  |
| 2 | OTHER | $100 \%$ | 2 | O | $100 \%$ |  |  |  |  |  |
| 3 | ALL | $98.9 \%$ | 3 | All | $100 \%$ |  |  |  |  |  |
| 3 | EE | $99.8 \%$ | 3 | A | $100 \%$ |  |  |  |  |  |
| 3 | F | $100 \%$ | 3 | F | $100 \%$ |  |  |  |  |  |
| 3 | G | $100 \%$ | 3 | G | $100 \%$ |  |  |  |  |  |
| 4 | ALL | $98.9 \%$ | 3 | N | $100 \%$ |  |  |  |  |  |
| 4 | EE | $99.0 \%$ | 4 | All | $98.9 \%$ |  |  |  |  |  |
| 4 | F | $80.3 \%$ | 4 | A | $100 \%$ |  |  |  |  |  |
| 4 | G | $100 \%$ | 4 | F | $98.9 \%$ |  |  |  |  |  |
| 4 | NS | $100 \%$ | 4 | G | $99.4 \%$ |  |  |  |  |  |
| 4 | SP | $100 \%$ | 4 | N | $99.9 \%$ |  |  |  |  |  |
| 4 | OTHER | $100 \%$ | 4 | S | $100 \%$ |  |  |  |  |  |
|  |  |  |  |  |  |  |  | 4 | O | $100 \%$ |

Table B5. Mathematics Grades 3-5:
Percentage of Students Meeting Blueprint Requirements for Claims and Content Domains (Spanish Test)

| Claim | Content <br> Category | \% BP Match |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Grade 4 | Grade 5 |  |
| 1 | ALL | $100 \%$ | $100 \%$ | $100 \%$ |
| 1 | P | $100 \%$ | $100 \%$ | $100 \%$ |
| 1 | S | $100 \%$ | $100 \%$ | $100 \%$ |
| 2 | ALL | $99.7 \%$ | $100 \%$ | $100 \%$ |
| 2 | G | $100 \%$ | $100 \%$ | $100 \%$ |
| 2 | MD | $100 \%$ | $100 \%$ | $100 \%$ |
| 2 | NBT | $100 \%$ | $100 \%$ | $100 \%$ |
| 2 | NF | $100 \%$ | $98.9 \%$ | $100 \%$ |
| 2 | OA | $99.0 \%$ | $100 \%$ | $100 \%$ |
| 3 | All | $99.2 \%$ | $100 \%$ | $100 \%$ |
| 3 | G |  |  | $100 \%$ |
| 3 | MD | $100 \%$ |  | $100 \%$ |
| 3 | NBT |  | $100 \%$ | $100 \%$ |
| 3 | NF | $99.8 \%$ | $100 \%$ | $99.0 \%$ |
| 3 | OA | $100 \%$ | $100 \%$ |  |
| 4 | All | $99.5 \%$ | $100 \%$ | $100 \%$ |
| 4 | G | $100 \%$ | $100 \%$ | $100 \%$ |
| 4 | MD | $99.5 \%$ | $100 \%$ | $100 \%$ |
| 4 | NBT | $100 \%$ | $100 \%$ | $100 \%$ |
| 4 | NF | $100 \%$ | $100 \%$ | $100 \%$ |
| 4 | OA | $99.8 \%$ | $100 \%$ | $100 \%$ |

Table B6. Mathematics Grades 6-7:
Percentage of Students Meeting Blueprint Requirements for Claims and Content Domains (Spanish Test)

| Claim | Content <br> Category | \%BP Match |  |
| :---: | :---: | :---: | :---: |
|  |  | Grade 6 | Grade 7 |
| 1 | P | $99.3 \%$ | $100 \%$ |
| 1 | S | $99.6 \%$ | $100 \%$ |
| 1 | ALL | $100 \%$ | $100 \%$ |
| 2 | EE | $100 \%$ | $100 \%$ |
| 2 | G | $100 \%$ | $99.9 \%$ |
| 2 | NS | $100 \%$ | $100 \%$ |
| 2 | RP | $100 \%$ | $100 \%$ |
| 2 | SP | $100 \%$ | $100 \%$ |
| 2 | OTHER | $100 \%$ | $100 \%$ |
| 2 | All | $99.7 \%$ | $100 \%$ |
| 3 | EE | $100 \%$ | $100 \%$ |
| 3 | NS | $100 \%$ | $100 \%$ |
| 3 | RP | $100 \%$ | $99.9 \%$ |
| 3 | All | $100 \%$ | $100 \%$ |
| 4 | EE | $98.5 \%$ | $94.1 \%$ |
| 4 | G | $100 \%$ | $100 \%$ |
| 4 | NS | $99.7 \%$ | $100 \%$ |
| 4 | RP | $100 \%$ | $90.2 \%$ |
| 4 | SP | $100 \%$ | $99.4 \%$ |
| 4 | OTHER | $100 \%$ | $100 \%$ |
| 4 |  |  |  |

Table B7. Mathematics Grades 8, 11:
Percentage of Students Meeting Blueprint Requirements for Claims and Content Domains (Spanish Test)

| Grade 8 |  |  | Grade 11 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Claim | Content <br> Category | \% BP <br> Match | Claim | Content <br> Category | \%BP <br> Match |
| 1 | ALL | $100 \%$ | 1 | ALL | $100 \%$ |
| 1 | P | $83.6 \%$ | 1 | P | $100 \%$ |
| 1 | S | $83.6 \%$ | 1 | S | $100 \%$ |
| 2 | ALL | $100 \%$ | 2 | ALL | $100 \%$ |
| 2 | EE | $98.9 \%$ | 2 | A | $99.1 \%$ |
| 2 | F | $100 \%$ | 2 | F | $100 \%$ |
| 2 | G | $100 \%$ | 2 | G | $100 \%$ |
| 2 | NS | $100 \%$ | 2 | N | $100 \%$ |
| 2 | SP | $100 \%$ | 2 | S | $100 \%$ |
| 2 | OTHER | $100 \%$ | 2 | O | $100 \%$ |
| 3 | ALL | $100 \%$ | 3 | All | $100 \%$ |
| 3 | EE | $98.0 \%$ | 3 | A | $100 \%$ |
| 3 | F | $100 \%$ | 3 | F | $100 \%$ |
| 3 | G | $100 \%$ | 3 | G | $100 \%$ |
| 4 | ALL | $100 \%$ | 3 | N | $100 \%$ |
| 4 | EE | $99.9 \%$ | 4 | All | $100 \%$ |
| 4 | F | $99.8 \%$ | 4 | A | $99.9 \%$ |
| 4 | G | $100 \%$ | 4 | F | $99.9 \%$ |
| 4 | NS | $100 \%$ | 4 | G | $95.7 \%$ |
| 4 | SP | $99.5 \%$ | 4 | N | $100 \%$ |
| 4 | OTHER | $100 \%$ | 4 | S | $100 \%$ |
|  |  |  | 4 | O | $100 \%$ |

## Appendix C

## Blueprint Violations for Adaptive Tests in English, Braille, and Spanish

Table C1. Adaptive Blueprint Summary for ELA/L

| Grade | Content Level | $\begin{gathered} \text { Items } \\ \text { Under/Over } \\ \text { min/max } \\ \hline \end{gathered}$ | $\# \text { of }$ Tests | Grade | Content Level | Items Under/Over min/max | $\begin{gathered} \text { \# of } \\ \text { Tests } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | Claim1_DOK3+ | 1 | 2 | 7 | Claim1_DOK2 | 1 | 46 |
| 3 | Claim2_DOK2 | -1 | 10 | 7 | Claim1_DOK3+ | 1 | 471 |
| 3 | 1-IT\|11 | 1 | 6 | 7 | Claim1_DOK3+ | 2 | 37 |
| 3 | 1-IT\|9 | 1 | 281 | 7 | Claim2_DOK2 | -1 | 41 |
| 3 | 1-LT\|1 | 1 | 9 | 7 | 1-IT\|11 | 1 | 114 |
| 3 | 1-LT\|2 | -1 | 2 | 7 | 1-IT\|8 | 1 | 11 |
| 3 | 1-LT\|3 | 1 | 16 | 7 | 1-IT ${ }^{\text {9 }}$ | 1 | 532 |
| 3 | 2 -W\|8 | 1 | 511 | 7 | 1-IT\|9 | 2 | 54 |
| 3 | 2-W\|9 | 1 | 176 | 7 | 1-LT\|2 | -1 | 5 |
| 4 | Claim1_DOK3+ | 1 | 2 | 7 | 2-W | 1 | 6 |
| 4 | 1-IT\|10 | 1 | 17 | 7 | $2-\mathrm{W} \mid 8$ | 1 | 602 |
| 4 | 1-IT\|9 | 1 | 12 | 7 | 2-W\|8 | 2 | 2 |
| 4 | 1-LT\|2 | 1 | 255 | 7 | 2-W\|9 | -1 | 25 |
| 4 | 2-W\|8 | 1 | 14 | 8 | Claim1_DOK2 | 1 | 41 |
| 4 | 2-W\|9 | 1 | 18 | 8 | Claim1_DOK3+ | 1 | 684 |
| 5 | Claim1_DOK2 | 1 | 11 | 8 | Claim1_DOK3+ | 2 | 266 |
| 5 | Claim1_DOK3+ | 1 | 2 | 8 | Claim2_DOK2 | -1 | 1 |
| 5 | Claim3_DOK2+ | 1 | 451 | 8 | Claim3_DOK2+ | 1 | 96 |
| 5 | Claim3_DOK2+ | 2 | 69 | 8 | Claim3_DOK2+ | 2 | 17 |
| 5 | 1-LT\| 2 | 1 | 5 | 8 | Claim3_DOK2+ | 3 | 1 |
| 5 | 1-LT\|4 | 1 | 2 | 8 | 1-IT\|11 | 1 | 11 |
| 5 | 2-W\|8 | 1 | 121 | 8 | 1-IT\|8 | 1 | 18 |
| 5 | 2-W\|9 | -1 | 135 | 8 | 1-IT\|9 | 1 | 423 |
| 6 | Claim1_DOK2 | 1 | 10 | 8 | 1-IT\|9 | 2 | 2 |
| 6 | Claim1_DOK3+ | 1 | 407 | 8 | 1-LT\|2 | -1 | 3 |
| 6 | Claim1_DOK3+ | 2 | 23 | 8 | 1-LT\|3 | 1 | 5 |
| 6 | 1-IT\|10 | 1 | 3 | 8 | 1-LT ${ }^{4}$ | -1 | 5 |
| 6 | 1-IT\|11 | 1 | 227 | 8 | 2-W\|8 | 1 | 75 |
| 6 | 1-IT\|11 | 2 | 21 | 11 | Claim1_DOK3+ | 1 | 43 |
| 6 | 1-IT\|8 | 1 | 13 | 11 | Claim1_DOK3+ | 2 | 1 |
| 6 | 1-IT\|9 | 1 | 513 | 11 | Claim3_DOK2+ | 1 | 311 |
| 6 | 1-IT\|9 | 2 | 196 | 11 | Claim3_DOK2+ | 2 | 45 |
| 6 | 1-IT\|9 | 3 | 2 | 11 | Claim3_DOK2+ | 3 | 1 |
| 6 | 1-LT\|2 | -1 | 7 | 11 | 1-IT\|10 | 1 | 752 |
| 6 | 1-LT\|4 | -1 | 4 | 11 | 1-IT\|10 | 2 | 1 |
| 6 | 2-W | 1 | 1 | 11 | 1-IT\|11 | 1 | 47 |
| 6 | 2-W\|8 | 1 | 78 | 11 | 1-IT\|8 | 1 | 29 |
| 6 | 2-W\|9 | -1 | 52 | 11 | 1-IT\|9 | 1 | 172 |
|  |  |  |  | 11 | 1-IT\|9 | 2 | 1 |
|  |  |  |  | 11 | 1-LT\|2 | -1 | 11 |
|  |  |  |  | 11 | 1-LT ${ }^{4}$ | -1 | 5 |
|  |  |  |  | 11 | 1-LT ${ }^{5}$ | 1 | 1 |
|  |  |  |  | 11 | 2-W\|8 | 1 | 2 |
|  |  |  |  | 11 | $2-\mathrm{W} \mid 9$ | 1 | 11 |

Table C2. Adaptive Blueprint Summary for ELA/L - Braille

| Grade | Content Level | Items Under/Over min/max | \# of <br> Tests | Grade | Content Level | Items Under/Over min/max | \# of <br> Tests |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | Claim2_OP_T136 | 1 | 1 | 7 | Claim2_OP_T136 | 1 | 1 |
| 3 | LongInfo | -1 | 3 | 7 | Claim1_DOK2 | 1 | 88 |
| 3 | Claim1_DOK2 | 1 | 92 | 7 | Claim1_DOK3+ | 1 | 714 |
| 3 | Claim1_DOK3+ | 1 | 77 | 7 | Claim1_DOK3+ | 2 | 171 |
| 3 | Claim2_DOK2 | -1 | 4 | 7 | Claim1_DOK3+ | 3 | 10 |
| 3 | 1-IT\|13 | 1 | 27 | 7 | Claim2_DOK2 | -1 | 40 |
| 3 | 1-IT\|9 | 1 | 687 | 7 | 1-IT\|11 | 1 | 345 |
| 3 | 1-LT\|3 | 1 | 2 | 7 | 1-IT\|11 | 2 | 3 |
| 3 | 2-W | 1 | 2 | 7 | 1-IT\|8 | 1 | 23 |
| 3 | 2-W\|8 | 1 | 671 | 7 | 1-IT\|9 | 1 | 408 |
| 3 | 2-W\|9 | 1 | 258 | 7 | 1-IT\|9 | 2 | 22 |
| 3 | 4-CR | -1 | 1 | 7 | 1-LT\|1 | 1 | 5 |
| 4 | Claim1_DOK3+ | 1 | 50 | 7 | 1-LT\|2 | -1 | 41 |
| 4 | Claim1_DOK3+ | 2 | 1 | 7 | 2-W | 1 | 44 |
| 4 | Claim2_DOK2 | -1 | 3 | 7 | 2 -W\|8 | 1 | 962 |
| 4 | LongInfo | -1 | 6 | 7 | $2-\mathrm{W} \mid 8$ | 2 | 11 |
| 4 | 1-IT\|10 | 1 | 22 | 7 | 2-W\|9 | -1 | 1 |
| 4 | 1-IT\|9 | 1 | 108 | 7 | 4-CR | -1 | 1 |
| 4 | 1-LT\|1 | 1 | 7 | 7 | 4-CR\|4 |7.W. 9 | 1 | 397 |
| 4 | 1-LT\|2 | 1 | 282 | 8 | Claim2_EE_T136 | 1 | 1 |
| 4 | 2-W\|8 | 1 | 573 | 8 | Claim1_DOK2 | 1 | 6 |
| 4 | 2-W\|9 | 1 | 315 | 8 | Claim1_DOK3+ | 1 | 576 |
| 5 | Claim2_EE_T136 | 1 | 17 | 8 | Claim1_DOK3+ | 2 | 233 |
| 5 | Claim2_OP_T136 | 1 | 58 | 8 | Claim1_DOK3+ | 3 | 39 |
| 5 | Brief Write | -1 | 13 | 8 | Claim1_DOK3+ | 4 | 2 |
| 5 | Claim1_DOK2 | 1 | 14 | 8 | Claim2_DOK2 | -1 | 53 |
| 5 | Claim1_DOK3+ | 1 | 16 | 8 | Claim3_DOK2+ | 1 | 16 |
| 5 | Claim2_DOK2 | -1 | 176 | 8 | Claim3_DOK2+ | 2 | 3 |
| 5 | Claim2_DOK3+ | -1 | 13 | 8 | 1-IT\|11 | 1 | 21 |
| 5 | Claim3_DOK2+ | 1 | 441 | 8 | 1-IT\|8 | 1 | 24 |
| 5 | Claim3_DOK2+ | 2 | 71 | 8 | 1-IT\|9 | 1 | 478 |
| 5 | Claim3_DOK2+ | 3 | 9 | 8 | 1-IT\|9 | 2 | 30 |
| 5 | 1-LT\| 2 | 1 | 1 | 8 | 1-IT\|9 | 3 | 1 |
| 5 | 2-W | 1 | 73 | 8 | 1-LT | 1 | 1 |
| 5 | 2-W | 2 | 2 | 8 | 1-LT\|2 | -1 | 140 |
| 5 | 2-W\|1 | 1 | 11 | 8 | 1-LT\|3 | 1 | 5 |
| 5 | $2-\mathrm{W} \mid 3$ | 1 | 1 | 8 | 1-LT\|4 | -1 | 1 |
| 5 | $2-\mathrm{W} \mid 6$ | 1 | 8 | 8 | 2-W | 1 | 11 |
| 5 | 2-W\|8 | 1 | 3 | 8 | 2-W\|8 | 1 | 327 |
| 5 | 2-W\|9 | -2 | 10 | 11 | Claim1_DOK2 | 1 | 4 |
| 5 | 2-W\|9 | -1 | 931 | 11 | Claim1_DOK3+ | 1 | 251 |
| 5 | 3-L | -1 | 2 | 11 | Claim1_DOK3+ | 2 | 5 |
| 5 | 3-L\|4 | -1 | 2 | 11 | Claim3_DOK2+ | 1 | 484 |
| 6 | Claim1_DOK2 | 1 | 94 | 11 | Claim3_DOK2+ | 2 | 235 |


| 6 | Claim1_DOK2 | 2 | 29 | 11 | Claim3_DOK2+ | 3 | 31 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 6 | Claim1_DOK3+ | 1 | 775 | 11 | 1-IT\|10 | 1 | 433 |
| 6 | Claim1_DOK3+ | 2 | 108 | 11 | 1-IT\|11 | 1 | 1 |
| 6 | Claim1_DOK3+ | 3 | 1 | 11 | 1-IT\|8 | 1 | 59 |
| 6 | 1-IT\|10 | 1 | 243 | 11 | 1-IT\|9 | 1 | 208 |
| 6 | 1-IT\|11 | 1 | 101 | 11 | 1-LT | 1 | 2 |
| 6 | 1-IT\|11 | 2 | 12 | 11 | 1-LT\|2 | -1 | 9 |
| 6 | 1-IT\|8 | 1 | 59 | 11 | 1-LT\|4 | -1 | 2 |
| 6 | 1-IT ${ }^{\text {9 }}$ | 1 | 555 | 11 | $2-\mathrm{W} \mid 8$ | 1 | 30 |
| 6 | 1-IT\|9 | 2 | 153 | 11 | $2-\mathrm{W} \mid 9$ | -1 | 34 |
| 6 | 1-LT\|2 | -1 | 8 |  |  |  |  |
| 6 | 2-W | 1 | 16 |  |  |  |  |
| 6 | 2-W\|8 | 1 | 91 |  |  |  |  |
| 6 | 2-W\|9 | -1 | 46 |  |  |  |  |

Table C3. Adaptive Blueprint Summary for Mathematics

| Grade | Content Level | Items <br> Under/Over min/max | \# of Tests | Grade | Content Level | Items <br> Under/Over min/max | $\begin{gathered} \text { \# of } \\ \text { Tests } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | ${ }_{1}\|\mathrm{P}\|$ TS01\|G | 1 | 495 | 8 | ${ }_{1} \mathrm{P}^{\text {P TS }} 01$ | 1 | 191 |
| 3 | ${ }_{1 / \mathrm{P}} \mathrm{TSSO}^{\text {d }}$ \|I | 1 | 415 | 8 | ${ }_{1 / \mathrm{P} \mid \text { TS01 }}$ C | 1 | 191 |
| 3 | ${ }_{1 / \mathrm{P}}$ \|TS01|I | 2 | 8 | 8 | ${ }_{1} \mathrm{P}^{\text {\|TS }}$ 02 | -1 | 191 |
| 3 | $3\|\mathrm{MD}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 32 | 8 | ${ }_{1} \mid$ P $\mid$ TS02 ${ }^{\text {P }}$ | -1 | 191 |
| 3 | $4 \mid \mathrm{MD}$ | -1 | 3 | 8 | $3 \mid \mathrm{EE}$ | 1 | 17 |
| 3 | 4\|MD|NA | -1 | 3 | 8 | 3 3\|EE|NA | 1 | 17 |
| 4 | 3 \|NBT|NA|C | 1 | 7 | 8 | $3\|\mathrm{EE}\| \mathrm{NA} \mid \mathrm{D}$ | 1 | 1 |
| 4 | $3 \mid \mathrm{NF}$ | 1 | 30 | 8 | $3\|\mathrm{EE}\| \mathrm{NA} \mid \mathrm{E}$ | 1 | 23 |
| 4 | $3\|\mathrm{NF}\| \mathrm{NA}$ | 1 | 30 | 8 | $3\|\mathrm{EE}\| \mathrm{NA} \mid \mathrm{G}$ | 1 | 1 |
| 4 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{A}$ | 1 | 102 | 8 | $3\|\mathrm{G}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 54 |
| 4 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 75 | 8 | $4 \mid E E$ | 1 | 10 |
| 5 | $3\|\mathrm{MD}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 1 | 8 | $4\|\mathrm{EE}\| \mathrm{NA}$ | 1 | 10 |
| 5 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{B}$ | 1 | 1 | 8 | $4 \mid \mathrm{F}$ | 1 | 12 |
| 5 | 3\|NF|NA|E | 1 | 35 | 8 | 4\|F|NA | 1 | 12 |
| 6 | 3\|NS|NA|F | 1 | 12 | 11 | ${ }_{1} \mathrm{P}^{\text {PTS}} 05$ | -1 | 9 |
| 6 | 4\|EE | 1 | 11 | 11 | ${ }_{1} \mid$ P\|TS05|K | -1 | 9 |
| 6 | 4\|EE|NA | 1 | 11 | 11 | ${ }_{1 / \mathrm{P} \mid \text { TS06 }}$ | 1 | 9 |
| 6 | 4\|NS | 1 | 12 | 11 | ${ }_{1} 1 \mathrm{~S} \mid$ TS 08 | -1 | 436 |
| 6 | 4\|NS|NA | 1 | 12 | 11 | ${ }_{1} \mid$ S $\mid$ TS08 ${ }^{\text {P }}$ | -1 | 436 |
| 6 | $4{ }^{\text {\|RP }}$ | 1 | 3 | 11 | $1\|\mathrm{~S}\| \mathrm{TS} 09$ | 1 | 435 |
| 6 | $4\|\mathrm{RP}\|$ NA | 1 | 3 | 11 | $4 \mid \mathrm{F}$ | 1 | 10 |
| 6 | 4\|SP | 1 | 4 | 11 | $4\|\mathrm{~F}\|$ NA | 1 | 10 |
| 6 | 4\|SP|NA | 1 | 4 | 11 | 4\|G | 1 | 58 |
| 7 | $3\|\mathrm{NS}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 11 | 11 | 4\|G|NA | 1 | 58 |
| 7 | $3\|\mathrm{NS}\| \mathrm{NA} \mid \mathrm{G}$ | 1 | 28 |  |  |  |  |
| 7 | $3\|\mathrm{RP}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 5 |  |  |  |  |
| 7 | $3\|\mathrm{RP}\| \mathrm{NA} \mid \mathrm{G}$ | 1 | 3 |  |  |  |  |
| 7 | $4 \mid \mathrm{EE}$ | 1 | 7 |  |  |  |  |
| 7 | 4\|EE|NA | 1 | 7 |  |  |  |  |
| 7 | $4{ }^{\text {\|RP }}$ | 1 | 4 |  |  |  |  |
| 7 | $4\|\mathrm{RP}\|$ NA | 1 | 4 |  |  |  |  |
| 7 | 4\|SP | 1 | 1 |  |  |  |  |
| 7 | 4\|SP|NA | 1 | 1 |  |  |  |  |

Table C4. Adaptive Blueprint Summary for Mathematics - Braille

| Grade | Content Level | Items <br> Under/Over min/max | $\begin{gathered} \text { \# of } \\ \text { Tests } \end{gathered}$ | $\underset{\mathrm{e}}{\mathrm{Grad}}$ | Content Level | Items <br> Under/Ove <br> r min/max | $\begin{gathered} \text { \# of } \\ \text { Tests } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | Claim1_DOK1 | 1 | 160 | 6 | 1\|P|TS04|D | 1 | 52 |
| 3 | Claim2/4_DOK3+ | -1 | 65 | 6 | ${ }_{1 / S}$ | -1 | 3 |
| 3 | Claim2_TA | 1 | 1 | 6 | ${ }_{1}$ \|S|TS05 | -1 | 3 |
| 3 | Claim3_TAD | -1 | 9 | 6 | ${ }_{1 / S\|T S 05\| C}$ | -1 | 3 |
| 3 | Claim3_TBE | -1 | 8 | 6 | $2 \mid \mathrm{RP}$ | 1 | 2 |
| 3 | Claim3_TCF | -1 | 1 | 6 | $2 \mid$ RP\|NA | 1 | 2 |
| 3 | Claim4_TAD | 1 | 11 | 6 | 3 | -1 | 16 |
| 3 | Claim4_TBE | 1 | 6 | 6 | 3\|NS | 1 | 1 |
| 3 | Claim4_TCF | -1 | 4 | 6 | $3\|\mathrm{NS}\| \mathrm{NA}$ | 1 | 1 |
| 3 | 1 | 1 | 4 | 6 | 3\|NS|NA|E | 1 | 1 |
| 3 | ${ }_{1 / \mathrm{P}}$ | 1 | 23 | 6 | 4 | 1 | 1 |
| 3 | ${ }_{1} \mathrm{P}^{\text {\| }} \mathrm{TS} 01$ | -1 | 4 | 6 | 4\|EE | 1 | 36 |
| 3 | ${ }_{1}\|\mathrm{P}\|$ TS01 | 1 | 3 | 6 | 4\|EE|NA | 1 | 36 |
| 3 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 01 \mid \mathrm{G}$ | 1 | 604 | 6 | $4 \mid \mathrm{NS}$ | 1 | 17 |
| 3 | ${ }_{1 / \mathrm{P}\|\mathrm{TS} 01\| \mathrm{G}}$ | 2 | 120 | 6 | $4 \mid$ NS $\mid$ NA | 1 | 17 |
| 3 | ${ }_{1} \mid$ P\|TS01|G | 3 | 1 | 6 | $4 \mid$ RP | 1 | 1 |
| 3 | ${ }_{1 / \mathrm{P}\|\mathrm{TS} 01\| \mathrm{I}}$ | 1 | 623 | 6 | $4 \mid$ RP ${ }^{\text {NA }}$ | 1 | 1 |
| 3 | ${ }_{1 / \mathrm{P}\|\mathrm{TS} 01\| \mathrm{I}}$ | 2 | 190 | 6 | 4\|SP | 1 | 15 |
| 3 | ${ }_{1 / \mathrm{P}\|\mathrm{TS} 01\| \mathrm{I}}$ | 3 | 2 | 6 | $4 \mid$ SP\|NA | 1 | 15 |
| 3 | ${ }_{1} \mathrm{P}^{\text {PTS }} 02$ | 1 | 29 | 7 | Claim3_DOK3+ | 1 | 4 |
| 3 | ${ }_{1} \mid$ P\|TS02|D | 1 | 2 | 7 | Claim3_TCFG | 1 | 2 |
| 3 | ${ }_{1} \mathrm{P}^{\text {\|TS }} 03$ | -1 | 5 | 7 | Claim1_DOK1 | 1 | 81 |
| 3 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 03 \mid \mathrm{A}$ | -1 | 5 | 7 | ${ }_{1}\|\mathrm{P}\|$ TS01 | -1 | 52 |
| 3 | ${ }_{1}^{1 / S}$ | -1 | 21 | 7 | ${ }_{1}{ }_{1} \mathrm{P} \mid$ TS02 | 1 | 52 |
| 3 | ${ }_{1 \mid S}$ | 1 | 2 | 7 | ${ }_{1 / \mathrm{P} \mid \text { TS02 }}$ C | 1 | 2 |
| 3 | ${ }_{1} 1 \mathrm{~S} \mid \mathrm{TS} 04$ | -1 | 45 | 7 | ${ }_{1 / \mathrm{P}\|\mathrm{TS} 02\| \mathrm{C}}$ | 2 | 1 |
| 3 | ${ }_{1} \mid$ S $\mid$ TS04\|E | 1 | 17 | 7 | 3\|EE|NA|B | 1 | 1 |
| 3 | ${ }_{1 / \mathrm{S}\|\mathrm{TS} 04\| \mathrm{J}}$ |  | 7 | 7 | $3\|\mathrm{EE}\| \mathrm{NA} \mid \mathrm{E}$ | 1 | 3 |
| 3 | ${ }_{1} \mathrm{~S} \mid$ TS05 | 1 | 26 | 7 | $3\|\mathrm{NS}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 61 |
| 3 | $1 \mid$ S ${ }^{\text {TS }} 05 \mid \mathrm{H}$ | 1 | 26 | 7 | 3\|RP | 1 | 1 |
| 3 | 2 | 1 | 1 | 7 | $3\|\mathrm{RP}\| \mathrm{NA}$ | 1 | 1 |
| 3 | $2 \mid \mathrm{OA}$ | 1 | 2 | 7 | $3\|\mathrm{RP}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 15 |
| 3 | $2\|\mathrm{OA}\| \mathrm{NA}$ | 1 | 2 | 7 | 4\|EE | 1 | 49 |
| 3 | 3 | -1 | 18 | 7 | 4\|EE|NA | 1 | 49 |
| 3 | 3\|MD | 1 | 15 | 7 | 4\|RP | 1 | 66 |
| 3 | $3\|\mathrm{MD}\| \mathrm{NA}$ | 1 | 15 | 7 | $4\|\mathrm{RP}\| \mathrm{NA}$ | 1 | 66 |
| 3 | $3\|\mathrm{MD}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 6 | 7 | 4\|SP | 1 | 11 |
| 3 | $3\|\mathrm{MD}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 110 | 7 | 4\|SP|NA | 1 | 11 |
| 3 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{E}$ | 1 | 52 | 8 | Claim3_TBE | -1 | 2 |
| 3 | $3 \mid \mathrm{OA}$ | 1 | 1 | 8 | Claim4_TBE | 1 | 16 |
| 3 | $3\|\mathrm{OA}\| \mathrm{NA}$ | 1 | 1 | 8 | Claim4_TCF | -1 | 5 |
| 3 | $3\|\mathrm{OA}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 4 | 8 | ${ }_{1}$ P | 1 | 222 |


| 3 | 4 | -1 | 1 | 8 | 1\|P | 2 | 4 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | 4 | 1 | 14 | 8 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 01$ | 1 | 353 |
| 3 | 4\|MD | -1 | 36 | 8 | ${ }_{1}\|\mathrm{P}\|$ TS01 | 2 | 10 |
| 3 | $4\|\mathrm{MD}\| \mathrm{NA}$ | -1 | 36 | 8 | ${ }_{1}$ \|P|TS01|C | 1 | 353 |
| 3 | $4 \mid \mathrm{OA}$ | 1 | 20 | 8 | ${ }_{1}\|\mathrm{P}\|$ TS01\| C | 2 | 10 |
| 3 | 4\|OA|NA | 1 | 20 | 8 | ${ }_{1} \mathrm{P} \mid$ TS02 | -1 | 143 |
| 3 | 4\|OA|NA|E | 1 | 1 | 8 | ${ }_{1}\|\mathrm{P}\|$ TS02\|B | -1 | 143 |
| 4 | Claim1_DOK1 | 1 | 75 | 8 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 02 \mid \mathrm{E}$ | 1 | 10 |
| 4 | Claim3_TAD | -1 | 17 | 8 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 03 \mid \mathrm{H}$ | 1 | 1 |
| 4 | Claim3_TBE | -1 | 2 | 8 | ${ }_{1}$ \|S | -2 | 4 |
| 4 | Claim3_TCF | -1 | 2 | 8 | ${ }_{1}^{1 / S}$ | -1 | 222 |
| 4 | Claim4_TAD | -1 | 5 | 8 | ${ }_{1} \mathrm{~S} \mid$ \|SS04 | -2 | 4 |
| 4 | 1 | 1 | 26 | 8 | 1\|S|TS04 | -1 | 222 |
| 4 | ${ }_{1}$ P P | 1 | 172 | 8 | 1\|S|TS04|A | -2 | 4 |
| 4 | ${ }_{1}$ P P | 2 | 26 | 8 | 1\|S|TS04|A | -1 | 222 |
| 4 | ${ }_{1} \mathrm{P}$ | 3 | 1 | 8 | 2\|EE | 1 | 9 |
| 4 | $1\|\mathrm{P}\| \mathrm{TS} 01$ | 1 | 173 | 8 | $2\|\mathrm{EE}\| \mathrm{NA}$ | 1 | 9 |
| 4 | ${ }_{1} \mathrm{P} \mid$ TS01 | 2 | 26 | 8 | 3 | -1 | 11 |
| 4 | ${ }_{1 / \mathrm{P} \mid \text { TS01\|E }}$ | 1 | 4 | 8 | 3\|EE | 1 | 2 |
| 4 | $1 \mathrm{P} \mid$ TS04 | 1 | 2 | 8 | 3\|EE|NA | 1 | 2 |
| 4 | ${ }_{1} \mathrm{P} \mid$ TS04\|H | 1 | 2 | 8 | $3\|\mathrm{EE}\| \mathrm{NA} \mid \mathrm{B}$ | 1 | 3 |
| 4 | ${ }_{1}$ \|S | -3 | 1 | 8 | $3\|\mathrm{EE}\| \mathrm{NA} / \mathrm{C}$ | 1 | 5 |
| 4 | ${ }_{1}$ \|S | -2 | 20 | 8 | $3\|\mathrm{EE}\| \mathrm{NA} \mid \mathrm{E}$ | 1 | 23 |
| 4 | ${ }_{1}$ \|S | -1 | 162 | 8 | $3\|\mathrm{EE}\| \mathrm{NA} \mid \mathrm{G}$ | 1 | 6 |
| 4 | ${ }_{1}$ \|S | 1 | 4 | 8 | $3\|\mathrm{~F}\| \mathrm{NA} \mid \mathrm{G}$ | 1 | 22 |
| 4 | ${ }_{1}$ \|S|TS05 | -2 | 3 | 8 | $3\|\mathrm{G}\| \mathrm{NA} \mid \mathrm{D}$ | 1 | 4 |
| 4 | $1\|\mathrm{~S}\| \mathrm{TS} 05$ | -1 | 148 | 8 | $3\|\mathrm{G}\| \mathrm{NA} \mid \mathrm{G}$ | 1 | 1 |
| 4 | $1\|\mathrm{~S}\| \mathrm{TS} 05$ | 1 | 18 | 8 | $3 \mid \mathrm{O}$ | 1 | 390 |
| 4 | ${ }_{1} \mid$ S $\mid$ TS05\|I | 1 | 97 | 8 | $3 \mid \mathrm{O}$ NA | 1 | 390 |
| 4 | $1 \mid$ S\|TS06 | -1 | 10 | 8 | $3\|\mathrm{O}\| \mathrm{NA} \mid \mathrm{A}$ | 1 | 390 |
| 4 | ${ }_{1}$ \|S|TS06 | 1 | 27 | 8 | 4 | 1 | 11 |
| 4 | ${ }_{1} \mid$ S $\mid$ TS06\|B | 1 | 1 | 8 | 4\|EE | -1 | 10 |
| 4 | $1\|\mathrm{~S}\| \mathrm{TS} 07$ | -1 | 82 | 8 | 4\|EE|NA | -1 | 10 |
| 4 | 1 \|S|TS07|L | -1 | 82 | 8 | $4 \mid \mathrm{F}$ | 1 | 195 |
| 4 | 2\|NF | -1 | 2 | 8 | $4 \mid \mathrm{F}$ | 2 | 2 |
| 4 | $2\|\mathrm{NF}\| \mathrm{NA}$ | -1 | 2 | 8 | $4 \mid$ F\|NA | 1 | 195 |
| 4 | 3 | -1 | 21 | 8 | 4\|F|NA | 2 | 2 |
| 4 | $3 \mid$ NBT | 1 | 22 | 11 | Claim1_DOK1 | 1 | 150 |
| 4 | 3\|NBT|NA | 1 | 22 | 11 | Claim4_TAD | -1 | 4 |
| 4 | $3\|\mathrm{NBT}\|$ NA\|B | 1 | 3 | 11 | Claim4_TBE | -1 | 6 |
| 4 | $3\|\mathrm{NBT}\|$ NA\|C | 1 | 130 | 11 | Claim4_TCF | -1 | 1 |
| 4 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 35 | 11 | 1 | 1 | 11 |
| 4 | SBAC -4 | -1 | 5 | 11 | ${ }_{1}$ P P | -1 | 276 |
| 4 | SBAC -4\|OA | 1 | 98 | 11 | ${ }_{1} \mathrm{P}^{\text {P }}$ | 1 | 8 |
| 4 | 4 \|OA|NA | 1 | 98 | 11 | $1 \mathrm{P} \mid$ TS03 | -1 | 1000 |
| 5 | Claim2/4_DOK3+ | -1 | 36 | 11 | ${ }_{1} \mathrm{P} \mid$ TS05 | -1 | 12 |


| 5 | Claim3_TAD | -1 | 2 | 11 | 1\|P|TS05 | 1 | 702 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5 | Claim3_TBE | -1 | 1 | 11 | ${ }_{1 / \mathrm{P}\|\mathrm{TS} 05\| \mathrm{K}}$ | -1 | 12 |
| 5 | Claim4_TBE | 1 | 3 | 11 | 1\|P|TS05|K | 1 | 702 |
| 5 | 1\|S|TS04|K | 1 | 1 | 11 | 1\|P|TS06 | 1 | 42 |
| 5 | 3 | -1 | 3 | 11 | 1\|S | 1 | 279 |
| 5 | $3\|\mathrm{MD}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 7 | 11 | 1\|S|TS07 | 1 | 27 |
| 5 | $3 \mid \mathrm{NF}$ | 1 | 13 | 11 | 1\|S|TS07|O | 1 | 27 |
| 5 | $3\|\mathrm{NF}\| \mathrm{NA}$ | 1 | 13 | 11 | 1\|S|TS08 | -1 | 970 |
| 5 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 1 | 11 | 1\|S|TS08|P | -1 | 970 |
| 5 | $3\|\mathrm{NF}\| \mathrm{NA}$ \|D | 1 | 4 | 11 | 1\|S|TS09 | 1 | 778 |
| 5 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{E}$ | 1 | 89 | 11 | 1\|S|TS09 | 2 | 222 |
| 5 | 4 | 1 | 3 | 11 | 1\|S|TS09|A | 1 | 222 |
| 5 | 4\|MD | -1 | 3 | 11 | 2\|A | 1 | 22 |
| 5 | $4\|\mathrm{MD}\| \mathrm{NA}$ | -1 | 3 | 11 | $2\|\mathrm{~A}\| \mathrm{NA}$ | 1 | 22 |
| 5 | 4\|NF|NA|E |  |  | 11 | 4 | -1 | 11 |
| 6 | Claim2/4_DOK3+ | -1 | 1 | 11 | 4\|F | 1 | 11 |
| 6 | Claim3_TAD | -1 | 504 | 11 | $4\|\mathrm{~F}\|$ NA | 1 | 11 |
| 6 | Claim3_TCFG | -2 | 1 | 11 | 4\|G | 1 | 6 |
| 6 | Claim3_TCFG | -1 | 11 | 11 | $4\|\mathrm{G}\| \mathrm{NA}$ | 1 | 6 |
| 6 | Claim4_TAD | 1 | 1 | 11 | $4 \mid \mathrm{N}$ | 1 | 1 |
| 6 | MG6_Test3_S2_Claim1_DOK1 | 1 | 11 | 11 | $4\|\mathrm{~N}\| \mathrm{NA}$ | 1 | 1 |
| 6 | 1 | 1 | 15 |  |  |  |  |
| 6 | ${ }_{1 / P}$ | 1 | 18 |  |  |  |  |
| 6 | ${ }_{1}\|\mathrm{P}\|$ TS01 | -1 | 80 |  |  |  |  |
| 6 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 01$ | 1 | 4 |  |  |  |  |
| 6 | 1\|P|TS01|F | 1 | 1 |  |  |  |  |
| 6 | ${ }_{1}\|\mathrm{P}\|$ TSO2 | -1 | 1 |  |  |  |  |
| 6 | ${ }_{1}$ PP\|TS02|A | -1 | 1 |  |  |  |  |
| 6 | $1\|\mathrm{P}\|$ TS03 | 1 | 43 |  |  |  |  |
| 6 | 1\|P|TS03|B | 1 | 43 |  |  |  |  |
| 6 | 1\|P|TS04 | 1 | 52 |  |  |  |  |

Table C5. Adaptive Blueprint Summary for Mathematics - Spanish

| Grade | Content Level | Items Under/Over min/max | $\begin{gathered} \text { \# of } \\ \text { Tests } \end{gathered}$ | Grade | Content Level | Items Under/Over min/max | $\begin{gathered} \text { \# of } \\ \text { Tests } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3 | Claim1_DOK1 | 1 | 2 | 7 | Claim2/4_DOK3+ | -1 | 1 |
| 3 | Claim2/4_DOK3+ | -1 | 29 | 7 | Claim1_DOK1 | 1 | 134 |
| 3 | Claim2_TA | 1 | 3 | 7 | ${ }_{1} \mathrm{P} \mid$ TSO1 | -1 | 64 |
| 3 | Claim3_TAD | -1 | 5 | 7 | ${ }_{1}{ }_{1} \mathrm{P} \mid$ TS02 | 1 | 64 |
| 3 | Claim3_TBE | -1 | 3 | 7 | ${ }_{1 / \mathrm{P} \mid \text { TS02 }}$ [ B | 1 | 93 |
| 3 | Claim4_TAD | 1 | 2 | 7 | ${ }_{1 / \mathrm{P} \mid \text { TS02 }}$ \| ${ }^{\text {P }}$ | 2 | 3 |
| 3 | Claim4_TBE | 1 | 3 | 7 | ${ }_{1 / \mathrm{P}\|\mathrm{TS} 02\| \mathrm{C}}$ | 1 | 5 |
| 3 | ${ }_{1} \mathrm{P} \mid$ TS 01 | -1 | 1 | 7 | ${ }_{1 / \mathrm{P}\|\mathrm{TS} 02\| \mathrm{C}}$ | 2 | 1 |
| 3 | ${ }_{1 / \mathrm{P} \mid \text { TS01\|G }}$ | 1 | 350 | 7 | $2 \mid \mathrm{EE}$ | 1 | 1 |
| 3 | ${ }_{1}\|\mathrm{P}\|$ TS $01 \mid \mathrm{G}$ | 2 | 28 | 7 | $2\|\mathrm{EE}\| \mathrm{NA}$ | 1 | 1 |
| 3 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 01 \mid \mathrm{I}$ | 1 | 485 | 7 | 3\|RP | 1 | 1 |
| 3 | ${ }_{1}$ \|P|TS01|I | 2 | 12 | 7 | $3\|\mathrm{RP}\|$ NA | 1 | 1 |
| 3 | ${ }_{1} \mathrm{P} \mid$ TS02 | 1 | 2 | 7 | 3\|RP|NA|C | 1 | 15 |
| 3 | ${ }_{1 / \mathrm{P} \mid \text { TS02\|F }}$ | 1 | 2 | 7 | 4\|EE | 1 | 59 |
| 3 | ${ }_{1} \mathrm{P}^{\text {\|TS }}$ 03 | -1 | 1 | 7 | 4\|EE|NA | 1 | 59 |
| 3 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 03 \mid \mathrm{A}$ | -1 | 1 | 7 | 4\|RP | 1 | 98 |
| 3 | 2 | 1 | 3 | 7 | 4\|RP|NA | 1 | 98 |
| 3 | $2 \mid \mathrm{OA}$ | 1 | 10 | 7 | $4 \mid$ SP | 1 | 6 |
| 3 | $2\|\mathrm{OA}\| \mathrm{NA}$ | 1 | 10 | 7 | 4\|SP|NA | 1 | 6 |
| 3 | 3 | -1 | 8 | 8 | ${ }_{1}$ \|P | 1 | 164 |
| 3 | $3\|\mathrm{MD}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 7 | 8 | ${ }_{1} \mathrm{P} \mid \mathrm{TS} 01$ | 1 | 322 |
| 3 | $3 \mid \mathrm{NF}$ | 1 | 2 | 8 | ${ }_{1} \mathrm{P} \mid$ TS 01 | 2 | 11 |
| 3 | $3\|\mathrm{NF}\| \mathrm{NA}$ | 1 | 2 | 8 | ${ }_{1} \mid$ P\|TS01|C | 1 | 322 |
| 3 | 3\|NF|NA|E | 1 | 143 | 8 | ${ }_{1 / \mathrm{P} \mid \text { TS01 }}$ C | 2 | 11 |
| 3 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 2 | 8 | ${ }_{1} \mathrm{P}^{\text {P TSO }}$ 02 | -1 | 180 |
| 3 | 4 | 1 | 5 | 8 | ${ }_{1 / \mathrm{P} \mid \text { TS02 }}$ [ B | -1 | 180 |
|  | $4 \mid \mathrm{MD}$ | -1 | 5 | 8 | ${ }_{1 / \mathrm{P} \mid \text { TS02 }}$ E | 1 | 1 |
| 3 | 4\|MD|NA | -1 | 5 | 8 | ${ }_{1}^{1 / S}$ | -1 | 164 |
| 3 | $4 \mid \mathrm{OA}$ | 1 | 2 | 8 | ${ }_{1} \mathrm{~S} \mid$ TS 04 | -1 | 164 |
| 3 | 4\|OA|NA | 1 | 2 | 8 | 1\|S|TS04|A | -1 | 164 |
| 4 | ${ }_{1}$ \|S|TS05|K | 1 | 9 | 8 | 2\|EE | 1 | 11 |
| 4 | 3 \|NBT ${ }^{\text {NA }}$ \|C | 1 | 6 | 8 | 2\|EE|NA | 1 | 11 |
| 4 | $3 \mid \mathrm{NF}$ | 1 | 11 | 8 | 3\|EE | 1 | 20 |
| 4 | $3\|\mathrm{NF}\| \mathrm{NA}$ | 1 | 11 | 8 | 3\|EE|NA | 1 | 20 |
| 4 | $3\|\mathrm{NF}\| \mathrm{NA} / \mathrm{C}$ | 1 | 16 | 8 | $3\|\mathrm{EE}\| \mathrm{NA} \mid \mathrm{A}$ | 1 | 5 |
| 4 | 3\|NF|NA|F | 1 | 76 | 8 | 3\|EE|NA|F | 1 | 3 |
| 5 | $3\|\mathrm{MD}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 7 | 8 | $3\|\mathrm{EE}\| \mathrm{NA} \mid \mathrm{G}$ | 1 | 5 |
| 5 | $3 \mid \mathrm{NF}$ | 1 | 10 | 8 | $3\|\mathrm{G}\| \mathrm{NA} \mid \mathrm{E}$ | 1 | 10 |
| 5 | $3\|\mathrm{NF}\| \mathrm{NA}$ | 1 | 10 | 8 | $3\|\mathrm{G}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 24 |
| 5 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{C}$ | 1 | 8 | 8 | $3\|\mathrm{G}\| \mathrm{NA} \mid \mathrm{G}$ | 1 | 1 |
| 5 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{E}$ | 1 | 85 | 8 | 4\|EE | -1 | 1 |
| 5 | $3\|\mathrm{NF}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 4 |  |  |  |  |
| 6 | Claim1_DOK1 | -1 | 6 |  |  |  |  |


| 6 | Claim3_TAD | -1 | 80 | 8 | 4\|EE|NA | -1 | 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 6 | Claim3_TCFG | -1 | 22 | 8 | 4\|F | 1 | 2 |
| 6 | 1 | 1 | 3 | 8 | $4\|\mathrm{~F}\|$ NA | 1 | 2 |
| 6 | ${ }_{1} \mathrm{P}$ | 1 | 7 | 8 | 4\|SP | 1 | 5 |
| 6 | ${ }_{1} \mathrm{P} \mid$ TS01 | -1 | 7 | 8 | 4\|SP|NA | 1 | 5 |
| 6 | ${ }_{1} \mathrm{P}^{\text {\|TS }}$ ( 01 | 1 | 5 | 11 | ${ }_{1} \mathrm{P} \mid$ TS02 | -1 | 1000 |
| 6 | ${ }_{1} \mathrm{P} \mid$ TS02 | 1 | 2 | 11 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 02 \mid \mathrm{F}$ | -1 | 1000 |
| 6 | ${ }_{1}\|\mathrm{P}\|$ TS02 ${ }^{\text {A }}$ | 1 | 2 | 11 | ${ }_{1 / \mathrm{P} \mid \mathrm{TS} 04}$ | 1 | 938 |
| 6 | ${ }_{1} \mathrm{P}^{\text {P TS }} 03$ | 1 | 2 | 11 | ${ }_{1} \mid$ P\|TS04 ${ }^{\text {J }}$ | 1 | 938 |
| 6 | ${ }_{1} \mid$ P\|TS03|B | 1 | 2 | 11 | ${ }_{1} \mathrm{P} \mid$ TS05 | -1 | 3 |
| 6 | ${ }_{1} \mathrm{P}^{\text {\|TS }}$ 04 | 1 | 5 | 11 | ${ }_{1 / \mathrm{P} \mid \text { TS05 }}$ | 1 | 38 |
| 6 | ${ }_{1} \mid$ P\|TS04|D | 1 | 5 | 11 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 05 \mid \mathrm{K}$ | -1 | 3 |
| 6 | ${ }_{1}^{1 / S}$ | -1 | 4 | 11 | ${ }_{1}\|\mathrm{P}\| \mathrm{TS} 05 \mid \mathrm{K}$ | 1 | 38 |
| 6 | ${ }_{1}^{1 / S} \mid$ TS05 | -1 | 4 | 11 | ${ }_{1} \mathrm{P} \mid$ TS06 | 1 | 27 |
| 6 | ${ }_{1} \mid$ S $\mid$ TS05 ${ }^{\text {C }}$ | -1 | 4 | 11 | $1\|\mathrm{~S}\|$ TS08 | -1 | 286 |
| 6 | 3 | -1 | 3 | 11 | ${ }_{1} \mid$ S $\mid$ TS08\|P | -1 | 286 |
| 6 | $3\|\mathrm{NS}\| \mathrm{NA} \mid \mathrm{F}$ | 1 | 28 | 11 | ${ }_{1}^{1 / S} \mid$ TS09 | 1 | 286 |
| 6 | $4 \mid \mathrm{EE}$ | 1 | 15 | 11 | $2 \mid \mathrm{A}$ | 1 | 9 |
| 6 | 4\|EE|NA | 1 | 15 | 11 | $2\|\mathrm{~A}\| \mathrm{NA}$ | 1 | 9 |
| 6 | 4\|NS | 1 | 3 | 11 | 4\|A | 1 | 1 |
| 6 | 4\|NS|NA | 1 | 3 | 11 | 4\|A|NA | 1 | 1 |
| 11 $4 \mid \mathrm{F}$ 1 1 <br> 11 $4\|\mathrm{~F}\| \mathrm{NA}$ 1 1 <br> 11 $4 \mid \mathrm{G}$ 1 43 <br> 11 $4\|G\| N A$ 1 43 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

## Appendix D

## Distribution of Bias Across Estimated Abilities

Figure D1. Distribution of Bias across Estimated Abilities for ELA/L Grades 3-6


Figure D2. Distribution of Bias across Estimated Abilities for ELA/L Grades 7-8, 11


Figure D3. Distribution of Bias across Estimated Abilities for Mathematics Grades 3-6


Figure D4. Distribution of Bias across Estimated Abilities for Mathematics Grades 7-8, 11


## Appendix E

## Standard Error of Measurements across Estimated Theta Range

Figure E1. Standard Error of Measurements across Estimated Theta Range: ELA/L Grades 3-6


Figure E2. Standard Error of Measurements across Estimated Theta Range:
ELA/L Grade 7-8, 11


Figure E3. Standard Error of Measurements across Estimated Theta Range:
Mathematics Grades 3-6


Figure E4. Standard Error of Measurements across Estimated Theta Range:
Mathematics Grades 7-8, 11


## Appendix F

## Student Ability-Item Difficulty Distribution

Figure F1. Student Ability-Item Difficulty Distribution for ELA/L Grades 3-5

Grade 3 ELA



Grade 4 ELA
Grade 5 ELA


Figure F2. Student Ability-Item Difficulty Distribution for ELA/L Grades 6-8, 11


Figure F3. Student Ability-Item Difficulty Distribution for Mathematics Grades 3-5
Grade 3 Math


> - Estimated Theta
> -- Item Difficulty

Grade 4 Math


Grade 5 Math


Figure E4. Student Ability-Item Difficulty Distribution for Mathematics Grades 6-8, 11


## Appendix H

## Number of Unique Items Administered by Position - Graphical Representation

Figure H1. Number of Unique Items Administered by Item Position for ELA/L Grade 3-6


Note: Test positions with more than 300 unique items have been capped at 300 .

Figure H2. Number of Unique Items Administered by Item Position for ELA/L Grade 7-8, 11


Note: Test positions with more than 300 unique items have been capped at 300 .

Figure H3. Number of Unique Items Administered by Item Position for Mathematics Grade 3-6


Note: Test positions with more than 300 unique items have been capped at 300 .

Figure H4. Number of Unique Items Administered by Item Position for Mathematics Grade 7-8, 11


Note: Test positions with more than 300 unique items have been capped at 300 .

## Appendix I

## Number of Unique Items Administered by Position - Table Representation

Table I1. Number of Unique Items Administered by Item Position for ELA/L

|  | Grade |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Position | 3 | 4 | 5 | 6 | 7 | 8 | 11 |
| 1 | 328 | 312 | 310 | 324 | 277 | 276 | 574 |
| 2 | 106 | 142 | 163 | 103 | 129 | 118 | 155 |
| 3 | 72 | 84 | 153 | 156 | 112 | 99 | 135 |
| 4 | 104 | 125 | 136 | 181 | 78 | 66 | 87 |
| 5 | 70 | 113 | 112 | 113 | 54 | 49 | 65 |
| 6 | 100 | 82 | 139 | 114 | 62 | 56 | 138 |
| 7 | 145 | 55 | 131 | 115 | 55 | 61 | 170 |
| 8 | 92 | 38 | 125 | 91 | 50 | 61 | 174 |
| 9 | 66 | 38 | 142 | 83 | 72 | 80 | 129 |
| 10 | 77 | 56 | 155 | 66 | 90 | 76 | 111 |
| 11 | 86 | 80 | 128 | 62 | 92 | 99 | 98 |
| 12 | 61 | 65 | 149 | 35 | 78 | 147 | 99 |
| 13 | 105 | 109 | 133 | 94 | 90 | 121 | 109 |
| 14 | 123 | 99 | 99 | 146 | 77 | 129 | 70 |
| 15 | 104 | 49 | 43 | 76 | 76 | 89 | 73 |
| 16 | 36 | 48 | 57 | 67 | 69 | 55 | 62 |
| 17 | 42 | 50 | 62 | 168 | 83 | 50 | 65 |
| 18 | 44 | 70 | 48 | 124 | 87 | 56 | 75 |
| 19 | 76 | 92 | 70 | 151 | 85 | 78 | 74 |
| 20 | 84 | 86 | 89 | 120 | 72 | 83 | 110 |
| 21 | 48 | 76 | 81 | 65 | 80 | 61 | 158 |
| 22 | 80 | 100 | 33 | 58 | 127 | 75 | 163 |
| 23 | 157 | 156 | 32 | 110 | 119 | 91 | 169 |
| 24 | 105 | 109 | 38 | 86 | 112 | 90 | 113 |
| 25 | 154 | 151 | 86 | 55 | 107 | 75 | 149 |
| 26 | 95 | 79 | 61 | 80 | 97 | 78 | 162 |
| 27 | 75 | 79 | 72 | 90 | 102 | 80 | 158 |
| 28 | 86 | 64 | 115 | 153 | 94 | 71 | 107 |
| 29 | 81 | 43 | 95 | 120 | 83 | 84 | 160 |
| 30 | 71 | 91 | 67 | 70 | 74 | 105 | 186 |
| 31 | 80 | 58 | 66 | 61 | 85 | 94 | 171 |
| 32 | 102 | 79 | 71 | 98 | 93 | 101 | 135 |
| 33 | 83 | 56 | 34 | 113 | 84 | 95 | 222 |
| 34 | 82 | 46 | 44 | 97 | 90 | 48 | 254 |
| 35 | 59 | 49 | 45 | 99 | 97 | 51 | 204 |
| 36 | 67 | 34 | 44 | 75 | 98 | 62 | 191 |
| 37 | 85 | 37 | 25 | 27 | 64 | 81 | 197 |
| 38 | 111 | 36 | 31 | 34 | 74 | 76 | 196 |
| 39 | 112 | 42 | 30 | 34 | 58 | 82 | 206 |
| 40 | 85 | 26 | 28 | 17 | 29 | 97 | 73 |
| 41 | 0 | 0 | 12 | 4 | 6 | 23 | 12 |

Table I2. Number of Unique Items Administered by Item Position for Mathematics

|  | Grade |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Position | 3 | 4 | 5 | 6 | 7 | 8 | 11 |
| 1 | 581 | 582 | 576 | 356 | 413 | 416 | 162 |
| 2 | 159 | 102 | 92 | 51 | 149 | 79 | 3 |
| 3 | 79 | 216 | 159 | 71 | 203 | 126 | 11 |
| 4 | 149 | 225 | 149 | 85 | 152 | 151 | 11 |
| 5 | 168 | 213 | 119 | 104 | 93 | 149 | 30 |
| 6 | 154 | 206 | 120 | 98 | 135 | 96 | 23 |
| 7 | 161 | 193 | 95 | 110 | 184 | 144 | 28 |
| 8 | 143 | 125 | 142 | 130 | 127 | 147 | 8 |
| 9 | 131 | 142 | 148 | 110 | 126 | 159 | 6 |
| 10 | 239 | 152 | 150 | 105 | 48 | 120 | 6 |
| 11 | 251 | 108 | 142 | 109 | 137 | 120 | 5 |
| 12 | 194 | 193 | 215 | 103 | 146 | 142 | 22 |
| 13 | 174 | 97 | 163 | 94 | 109 | 122 | 754 |
| 14 | 201 | 174 | 155 | 93 | 107 | 63 | 174 |
| 15 | 179 | 194 | 100 | 94 | 108 | 142 | 211 |
| 16 | 205 | 155 | 145 | 72 | 164 | 137 | 265 |
| 17 | 290 | 138 | 149 | 72 | 174 | 126 | 238 |
| 18 | 259 | 187 | 159 | 49 | 109 | 129 | 122 |
| 19 | 302 | 175 | 166 | 54 | 152 | 131 | 103 |
| 20 | 170 | 139 | 120 | 348 | 138 | 86 | 172 |
| 21 | 139 | 128 | 98 | 149 | 76 | 116 | 75 |
| 22 | 137 | 142 | 120 | 94 | 47 | 139 | 112 |
| 23 | 196 | 97 | 107 | 108 | 18 | 113 | 139 |
| 24 | 118 | 94 | 110 | 88 | 33 | 78 | 115 |
| 25 | 143 | 124 | 86 | 55 | 207 | 47 | 112 |
| 26 | 165 | 171 | 117 | 126 | 10 | 47 | 51 |
| 27 | 140 | 136 | 100 | 78 | 11 | 27 | 155 |
| 28 | 102 | 185 | 123 | 125 | 17 | 37 | 215 |
| 29 | 114 | 184 | 111 | 94 | 31 | 160 | 124 |
| 30 | 116 | 130 | 81 | 47 | 40 | 54 | 97 |
| 31 | 86 | 58 | 52 | 99 | 41 | 80 | 87 |
| 32 | 102 | 52 | 53 | 92 | 98 | 93 | 135 |
| 33 | 65 | 47 | 46 | 30 | 54 | 46 | 55 |
| 34 | 65 | 59 | 40 |  | 36 | 68 | 94 |
| 35 |  |  |  |  |  |  | 34 |
| 36 |  |  |  |  |  |  | 40 |


[^0]:    American Institutes for Research

