

Linking Study Report: Predicting Performance on Ohio's State Tests (OST) in Grades 3–8 based on NWEA MAP Growth Scores

July 2020

NWEA Psychometric Solutions

© 2020 NWEA. NWEA and MAP Growth are registered trademarks of NWEA in the U.S. and in other countries. All rights reserved. No part of this document may be modified or further distributed without written permission from NWEA.

Suggested citation: NWEA. (2020). *Linking study report: Predicting performance on Ohio's State Tests (OST) in grades 3–8 based on NWEA MAP Growth scores*. Portland, OR: Author.

Table of Contents

Executive Summary	4
1. Introduction	7
1.1. Purpose of the Study	7
1.2. Assessment Overview	7
2. Methods	8
2.1. Data Collection	8
2.2. Post-Stratification Weighting.....	8
2.3. MAP Growth Cut Scores.....	8
2.4. Classification Accuracy	9
2.5. Proficiency Projection	10
3. Results	11
3.1. Study Sample	11
3.2. Descriptive Statistics.....	14
3.3. MAP Growth Cut Scores.....	15
3.4. Third Grade Reading Guarantee	18
3.5. Classification Accuracy.....	20
3.6. Proficiency Projection	21
References.....	31

List of Tables

Table 2.1. Description of Classification Accuracy Summary Statistics	10
Table 3.1. Linking Study Sample Demographics (Unweighted).....	11
Table 3.2. Spring 2017 OST 3–8 Student Population Demographics.....	12
Table 3.3. Linking Study Sample Demographics (Weighted)	13
Table 3.4. Descriptive Statistics of Test Scores.....	15
Table 3.5. MAP Growth Cut Scores—ELA/Reading	16
Table 3.6. MAP Growth Cut Scores—Mathematics.....	17
Table 3.7. MAP Growth Cut Scores—Science	18
Table 3.8. MAP Growth Reading Grade 3 Cut Scores for Ohio’s TGRG Program	18
Table 3.9. MAP Growth Reading Grade 3 Cut Scores for Ohio’s TGRG Program Extended Above and Below the Current Promotion Cuts—OST ELA.....	19
Table 3.10. MAP Growth Reading Grade 3 Cut Scores for Ohio’s TGRG Program Extended Above and Below the Current Promotion Cuts—OST Reading	20
Table 3.11. Classification Accuracy Results	21
Table 3.12. Proficiency Projection based on RIT Scores—ELA/Reading	22
Table 3.13. Proficiency Projection based on RIT Scores—Mathematics.....	26
Table 3.14. Proficiency Projection based on RIT Scores—Science	30

Executive Summary

To predict student achievement on Ohio's State Tests (OST) in Grades 3–8 English Language Arts (ELA) and Mathematics and Grades 5 and 8 Science, NWEA® conducted a linking study using Spring 2017 data to derive Rasch Unit (RIT) cut scores on the MAP® Growth™ assessments that correspond to the OST performance levels. With this information, educators can identify students at risk of failing to meet state proficiency standards early in the year and provide tailored educational interventions. The linking study has been updated since the previous version published in March 2018 to incorporate the new 2020 NWEA MAP Growth norms (Thum & Kuhfeld, 2020).

Table E.1 presents the OST *Proficient* performance level cut scores and the corresponding MAP Growth RIT cut scores that allow teachers to identify students who are on track for proficiency on the state summative test and those who are not. For example, the *Proficient* cut score on the OST Grade 3 ELA test is 700. A Grade 3 student with a MAP Growth Reading RIT score of 189 in the fall is likely to meet proficiency on the OST ELA assessment in the spring, whereas a Grade 3 student with a MAP Growth Reading RIT score lower than 189 in the fall is in jeopardy of not meeting proficiency. MAP Growth cut scores for Grade 2 are also provided so educators can track early learners' progress toward proficiency on the OST by Grade 3. These cut scores were derived based on the Grade 3 cuts and the 2020 NWEA growth norms the adjacent grade (i.e., Grades 2 to 3).

Table E.1. MAP Growth Cut Scores for OST Proficiency

Assessment		Proficient Cut Scores by Grade						
		2	3	4	5	6	7	8
ELA/Reading								
OST Spring		–	700	700	700	700	700	700
MAP Growth	Fall	175	189	198	203	211	215	222
	Winter	184	196	204	208	214	218	224
	Spring	188	199	206	210	216	219	225
Mathematics								
OST Spring		–	700	700	700	700	700	700
MAP Growth	Fall	170	184	195	209	215	221	225
	Winter	179	192	202	215	220	225	228
	Spring	185	197	206	219	223	228	230
Science								
OST Spring		–	–	–	700	–	–	700
MAP Growth	Fall	–	–	–	199	–	–	208
	Winter	–	–	–	203	–	–	211
	Spring	–	–	–	205	–	–	212

Please note that the results in this report may differ from those found in the NWEA reporting system for individual districts. The typical growth scores from fall to spring or winter to spring used in this report are based on the default instructional weeks most commonly encountered for each term (i.e., Weeks 4, 20, and 32 for fall, winter, and spring, respectively). However, instructional weeks often vary by district, so the cut scores in this report may differ slightly from the MAP Growth score reports that reflect spring instructional weeks set by partners.

E.1. Assessment Overview

The OST Grades 3–8 ELA and Mathematics and Grades 5 and 8 Science tests are Ohio’s state summative assessments aligned to Ohio’s Learning Standards. Based on their test scores, students are placed into one of five performance levels: *Limited*, *Basic*, *Proficient*, *Accelerated*, and *Advanced*. These tests are used to provide evidence of student achievement in ELA, Mathematics, and Science for various intended test score uses such as meeting the school accountability requirements. The *Proficient* cut score demarks the minimum level of achievement considered to be proficient. MAP Growth tests are adaptive interim assessments aligned to state-specific content standards and administered in the fall, winter, and spring. Scores are reported on the RIT vertical scale with a range of 100–350.

E.2. Linking Methods

Based on scores from the Spring 2017 test administration, the equipercentile linking method was used to identify the spring MAP Growth scores that correspond to the spring OST performance level cut scores. Spring cuts for Grade 2 were derived based on the cuts for Grade 3 and the 2020 NWEA growth norms. MAP Growth fall and winter cut scores that predict proficiency on the spring OST test were then projected using the 2020 NWEA growth norms that provide expected score gains across test administrations.

E.3. Student Sample

Only students who took both the MAP Growth and OST assessments in Spring 2017 were included in the study sample. Table E.2 presents the weighted number of Ohio students from 33 districts and 272 schools who were included in the linking study. The linking study sample is voluntary and can only include student scores from partners who share their data. Also, not all students in a state take MAP Growth. The sample may therefore not represent the general student population as well as it should. To ensure that the linking study sample represents the state student population in terms of race, sex, and performance level, weighting (i.e., a statistical method that matches the distributions of the variables of interest to those of the target population) was applied to the sample. As a result, the RIT cuts derived from the study sample can be generalized to any student from the target population. All analyses in this study for Grades 3–8 were conducted based on the weighted sample.

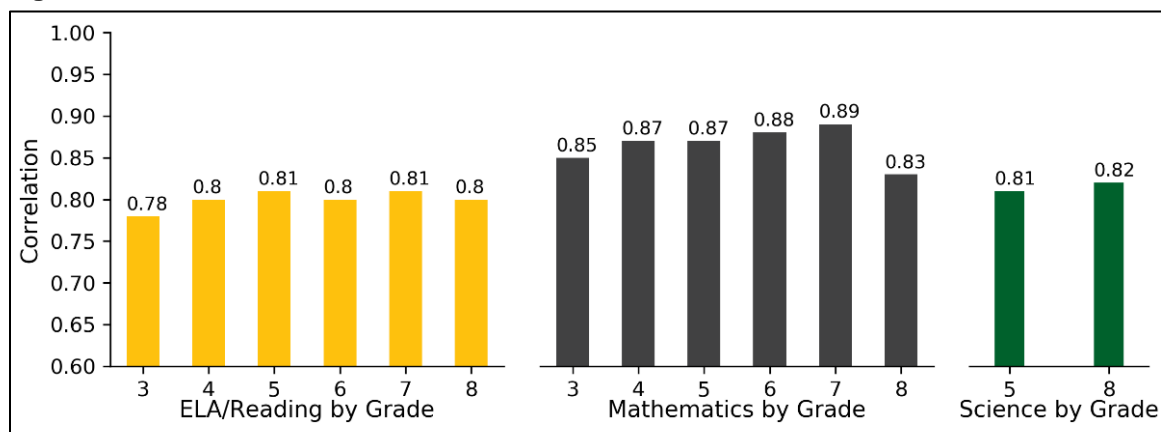
Table E.2. Linking Study Sample

Grade	#Students		
	ELA/Reading	Mathematics	Science
3	13,746	13,268	–
4	13,285	13,074	–
5	13,258	12,609	1,153
6	12,013	11,351	–
7	11,191	10,360	–
8	11,219	8,714	1,105

E.4. Test Score Relationships

Correlations between MAP Growth RIT scores and OST scores range from 0.78 to 0.89 across all content areas, as shown in Figure E.1. These values indicate a strong relationship among the scores, which is important validity evidence for the claim that MAP Growth scores are good predictors of performance on the OST assessments.

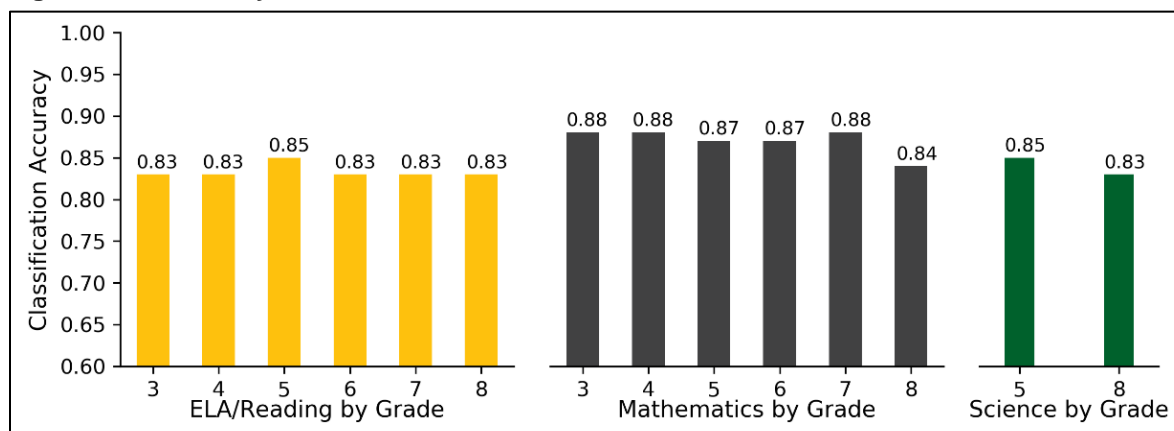
Figure E.1. Correlations between MAP Growth and OST



E.5. Accuracy of MAP Growth Classifications

Figure E.2 presents the classification accuracy statistics that show the proportion of students correctly classified by their RIT scores as proficient or not proficient on the OST assessments. For example, the MAP Growth Reading Grade 3 *Proficient* cut score has a 0.83 accuracy rate, meaning it accurately classified student achievement on the state test for 83% of the sample. The results range from 0.83 to 0.88 across all content areas, indicating that RIT scores have a high accuracy rate of identifying student proficiency on the OST assessments.

Figure E.2. Accuracy of MAP Growth Classifications



1. Introduction

1.1. Purpose of the Study

NWEA® is committed to providing partners with useful tools to help make inferences about student learning from MAP® Growth™ test scores. One important use of MAP Growth results is to predict a student's performance on the state summative assessment at different times throughout the year. This allows educators and parents to determine if a student is on track in their learning to meet state standards by the end of the year or, given a student's learning profile, is on track to obtain rigorous, realistic growth in their content knowledge and skills.

This document presents results from a linking study conducted by NWEA in July 2020 to statistically connect the scores of Ohio's State Tests (OST) in Grades 3–8 English Language Arts (ELA) and Mathematics and Grades 5 and 8 Science with Rasch Unit (RIT) scores from the MAP Growth assessments taken during the Spring 2017 term. The linking study has been updated since the previous version published in March 2018 to incorporate the new 2020 NWEA MAP Growth norms (Thum & Kuhfeld, 2020). In this updated study, MAP Growth cut scores are also included for Grade 2 so educators can track early learners' progress toward proficiency on the OST assessment by Grade 3. This report presents the following results:

1. Student sample demographics
2. Descriptive statistics of test scores
3. MAP Growth cut scores that correspond to the OST performance levels and Ohio's Third Grade Reading Guarantee (TGRG) program using the equipercntile linking procedure for the spring results and the 2020 norms for the fall and winter results
4. Classification accuracy statistics to determine the degree to which MAP Growth accurately predicts student proficiency status on the OST assessments
5. The probability of achieving grade-level proficiency on the OST assessment based on MAP Growth RIT scores from fall, winter, and spring using the 2020 norms

1.2. Assessment Overview

The OST Grades 3–8 ELA and Mathematics and Grades 5 and 8 Science summative assessments are aligned to Ohio's Learning Standards. Each assessment has four cut scores (i.e., the minimum score a student must get on a test to be placed in a certain performance level) that distinguish between the following performance levels: *Limited*, *Basic*, *Proficient*, *Accelerated*, and *Advanced*. The *Proficient* cut score demarks the minimum level of performance considered to be proficient for accountability purposes.

MAP Growth interim assessments from NWEA are computer adaptive and aligned to state-specific content standards. Scores are reported on the RIT vertical scale with a range of 100–350. Each content area has its own scale. To aid the interpretation of scores, NWEA periodically conducts norming studies of student and school performance on MAP Growth. Achievement status norms show how well a student performed on the MAP Growth test compared to students in the norming group by associating the student's performance on the MAP Growth test, expressed as a RIT score, with a percentile ranking. Growth norms provide expected score gains across test administrations (e.g., the relative evaluation of a student's growth from fall to spring). The most recent norms study was conducted in 2020 (Thum & Kuhfeld, 2020).

2. Methods

2.1. Data Collection

This linking study is based on data from the Spring 2017 administrations of the MAP Growth and OST assessments. NWEA recruited Ohio districts to participate in the study by sharing their student and score data for the target term. Districts also gave NWEA permission to access students' associated MAP Growth scores from the NWEA in-house database. Once Ohio state score information was received by NWEA, each student's state testing record was matched to their MAP Growth score by using the student's first and last names, date of birth, student ID, and other available identifying information. Only students who took both the MAP Growth and OST assessments in Spring 2017 were included in the study sample.

2.2. Post-Stratification Weighting

Post-stratification weights were applied to the calculations to ensure that the linking study sample represented the state population in terms of race, sex, and performance level. These variables were selected because they are correlated with the student's academic achievement within this study and are often provided in the data for the state population. The weighted sample matches the target population as closely as possible on the key demographics and test score characteristics. Specifically, a raking procedure was used to calculate the post-stratification weights and improve the representativeness of the sample. Raking uses iterative procedures to obtain weights that match sample marginal distributions to known population margins. The following steps were taken during this process:

- Calculate marginal distributions of race, sex, and performance level for the sample and population.
- Calculate post-stratification weights with the rake function from the survey package in R (Lumley, 2019).
- Trim the weight if it is not in the range of 0.3 to 3.0.
- Apply the weights to the sample before conducting the linking study analyses.

2.3. MAP Growth Cut Scores

The equipercentile linking method (Kolen & Brennan, 2004) was used to identify the spring MAP Growth RIT scores that correspond to the spring OST performance level cut scores. Spring cuts for Grade 2 were derived based on the cuts for Grade 3 and the 2020 NWEA growth norms. MAP Growth fall and winter cut scores that predict proficiency on the spring OST test were then projected using the 2020 growth norms. Percentile ranks are also provided that show how a nationally representative sample of students in the same grade scored on MAP Growth for each administration, which is an important interpretation of MAP Growth test scores. This is useful for understanding (1) how a student scores compared to peers nationwide and (2) the relative rigor of a state's performance level designations for its summative assessment.

The MAP Growth spring cut scores for Grades 3–8 could be calculated using the equipercentile linking method because that data are directly connected to the OST spring data used in the study. The equipercentile linking procedure matches scores on the two scales that have the same percentile rank (i.e., the proportion of tests at or below each score). For example, let x represent a score on Test X (e.g., OST). Its equipercentile equivalent score on Test Y (e.g., MAP Growth), $e_y(x)$, can be obtained through a cumulative-distribution-based linking function defined in Equation 1:

$$e_y(x) = G^{-1}[P(x)] \quad (1)$$

where $e_y(x)$ is the equipercentile equivalent of score x on OST on the scale of MAP Growth, $P(x)$ is the percentile rank of a given score on OST, and G^{-1} is the inverse of the percentile rank function for MAP Growth that indicates the score on MAP Growth corresponding to a given percentile. Polynomial loglinear pre-smoothing was applied to reduce irregularities of the score distributions and equipercentile linking curve.

The MAP Growth conditional growth norms provide students' expected score gains across terms, such as growth from fall or winter to spring within the same grade or from spring of a lower grade to the spring of the adjacent higher grade. This information can be used to calculate the fall and winter cut scores for Grades 3–8 and the fall, winter, and spring cut scores for Grade 2. Equation 2 was used to determine the previous term's or grade's MAP Growth score needed to reach the spring cut score, considering the expected growth associated with the previous RIT score:

$$RIT_{PredSpring} = RIT_{previous} + g \quad (2)$$

where:

- $RIT_{PredSpring}$ is the predicted MAP Growth spring score.
- $RIT_{previous}$ is the previous term's or grade's RIT score.
- g is the expected growth from the previous RIT (e.g., fall or winter) to the spring RIT.

To derive the spring cut scores from Grade 2, the growth score from spring of one year to the next was used (i.e., the growth score from spring Grade 2 to spring Grade 3). The calculation of fall and winter cuts for Grade 2 followed the same process as the other grades. For example, the growth score from fall to spring in Grade 2 was used to calculate the fall cuts for Grade 2.

2.4. Classification Accuracy

The degree to which MAP Growth predicts student proficiency status on the OST assessments can be described using classification accuracy statistics based on the MAP Growth RIT spring cut scores that show the proportion of students correctly classified by their RIT scores as proficient (*Proficient*, *Accelerated*, or *Advanced*) or not proficient (*Limited* or *Basic*). Table 2.1 describes the classification accuracy statistics provided in this report (Pommerich, Hanson, Harris, & Sconing, 2004). The results are based on the Spring 2017 MAP Growth and OST data for the *Proficient* cut score.

Since Ohio students do not begin taking the OST assessment until Grade 3, longitudinal data were collected for the Grade 3 cohort in order to link the OST assessment to MAP Growth for Grade 2 to calculate the classification accuracy statistics. To accomplish this, 2016–2017 OST Grade 3 results were linked to MAP Growth data from Grade 3 students in 2016–2017 and Grade 2 students in 2015–2016. In this way, the data came from the same cohort of students beginning when they were in Grade 2 and continuing through Grade 3.

Table 2.1. Description of Classification Accuracy Summary Statistics

Statistic	Description*	Interpretation
Overall Classification Accuracy Rate	$(TP + TN) / (\text{total sample size})$	Proportion of the study sample whose proficiency classification on the state test was correctly predicted by MAP Growth cut scores
False Negative (FN) Rate	$FN / (FN + TP)$	Proportion of not-proficient students identified by MAP Growth in those observed as proficient on the state test
False Positive (FP) Rate	$FP / (FP + TN)$	Proportion of proficient students identified by MAP Growth in those observed as not proficient on the state test
Sensitivity	$TP / (TP + FN)$	Proportion of proficient students identified by MAP Growth in those observed as such on the state test
Specificity	$TN / (TN + FP)$	Proportion of not-proficient students identified by MAP Growth in those observed as such on the state test
Precision	$TP / (TP + FP)$	Proportion of observed proficient students on the state test in those identified as such by the MAP Growth test
Area Under the Curve (AUC)	Area under the receiver operating characteristics (ROC) curve	How well MAP Growth cut scores separate the study sample into proficiency categories that match those from the state test cut scores. An AUC at or above 0.80 is considered “good” accuracy.

*FP = false positives. FN = false negatives. TP = true positives. TN = true negatives.

2.5. Proficiency Projection

In addition to calculating the MAP Growth fall and winter cut scores, the MAP Growth conditional growth norms data were also used to calculate the probability of reaching proficiency on the OST assessments based on a student’s RIT scores from fall, winter, and spring. Equation 3 was used to calculate the probability of a student achieving *Proficient* on the OST test based on their fall or winter RIT score:

$$Pr(\text{Achieving Proficient in spring} | \text{starting RIT}) = \Phi \left(\frac{RIT_{previous} + g - RIT_{SpringCut}}{SD} \right) \quad (3)$$

where:

- Φ is a standardized normal cumulative distribution.
- $RIT_{previous}$ is the student’s RIT score in fall or winter (or in spring of Grade 2).
- g is the expected growth from the previous RIT (e.g., fall or winter) to the spring RIT.
- $RIT_{SpringCut}$ is the MAP Growth *Proficient* cut score for spring. For Grade 2, this is the Grade 3 cut score for spring.
- SD is the conditional standard deviation of the expected growth, g .

Equation 4 was used to estimate the probability of a student achieving *Proficient* on the OST test based on their spring RIT score (RIT_{Spring}):

$$Pr(\text{Achieving Proficient in spring} | \text{spring RIT}) = \Phi \left(\frac{RIT_{Spring} - RIT_{SpringCut}}{SE} \right) \quad (4)$$

where SE is the standard error of measurement for MAP Growth.

3. Results

3.1. Study Sample

Only students who took both the MAP Growth and OST Grades 3–8 assessments in Spring 2017 were included in the study sample. Data used in this study were collected from 33 districts and 272 schools in Ohio. Table 3.1 presents the demographic distributions of race, sex, and performance level in the original unweighted study sample. Table 3.2 presents the distributions of the student population that took the Spring 2017 OST assessments (ODE, 2017). Since the unweighted data are different from the general OST population, post-stratification weights were applied to the linking study sample to improve its representativeness. Table 3.3 presents the demographic distributions of the sample after weighting, which are almost identical to the OST student population distributions. The analyses in this study were therefore conducted based on the weighted sample.

Table 3.1. Linking Study Sample Demographics (Unweighted)

Linking Study Sample (Unweighted)							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
ELA/Reading							
Total N		13,746	13,419	13,127	12,013	11,191	11,219
Race	Asian	5.2	4.8	4.9	4.9	3.5	3.3
	Black	27.1	25.9	25.9	25.0	27.2	28.2
	Hispanic	6.5	6.3	6.1	5.8	5.7	5.0
	Other	6.0	6.9	6.7	7.4	8.0	8.0
	White	55.3	56.2	56.4	57.0	55.7	55.4
Sex	Female	49.1	48.4	48.9	49.4	49.4	49.5
	Male	50.9	51.6	51.1	50.6	50.6	50.5
Performance Level	<i>Limited</i>	22.7	22.5	20.4	19.5	22.1	37.0
	<i>Basic</i>	17.8	20.1	16.1	24.3	24.9	18.1
	<i>Proficient</i>	18.0	19.0	18.9	22.2	22.7	24.7
	<i>Accelerated</i>	17.3	21.0	18.8	20.1	17.0	12.7
	<i>Advanced</i>	24.1	17.4	25.9	13.8	13.2	7.6
Mathematics							
Total N		13,268	12,945	12,609	11,351	10,360	8,628
Race	Asian	5.3	4.8	4.9	4.8	3.2	2.7
	Black	26.7	25.4	25.6	24.7	27.8	32.6
	Hispanic	6.5	6.2	6.2	5.9	6.0	5.7
	Other	6.0	6.9	6.7	7.4	7.8	8.9
	White	55.6	56.8	56.6	57.2	55.3	50.2
Sex	Female	49.3	48.6	49.0	49.6	49.8	48.8
	Male	50.7	51.4	51.0	50.4	50.2	51.2
Performance Level	<i>Limited</i>	21.2	23.0	32.1	25.7	34.8	41.7
	<i>Basic</i>	11.6	8.1	9.8	17.5	15.7	11.5
	<i>Proficient</i>	19.8	17.8	22.5	23.9	19.5	30.8
	<i>Accelerated</i>	21.8	22.7	16.6	13.7	18.9	10.7
	<i>Advanced</i>	25.6	28.4	19.0	19.2	11.2	5.3

Linking Study Sample (Unweighted)							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
Science							
Total N		–	–	1,165	–	–	1,094
Race	Asian	–	–	1.5	–	–	1.6
	Black	–	–	17.5	–	–	16.1
	Hispanic	–	–	1.5	–	–	1.7
	Other	–	–	4.0	–	–	3.4
	White	–	–	75.5	–	–	77.1
Sex	Female	–	–	48.8	–	–	49.9
	Male	–	–	51.2	–	–	50.1
Performance Level	<i>Limited</i>	–	–	9.4	–	–	14.6
	<i>Basic</i>	–	–	23.4	–	–	15.7
	<i>Proficient</i>	–	–	22.2	–	–	18.1
	<i>Accelerated</i>	–	–	22.7	–	–	32.6
	<i>Advanced</i>	–	–	22.2	–	–	18.9

Table 3.2. Spring 2017 OST 3–8 Student Population Demographics

Spring 2017 OST 3–8 Population							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
ELA							
Total N		128,552	127,322	126,308	123,618	126,974	125,992
Race	Asian	2.3	2.4	2.3	2.4	2.3	2.2
	Black	17.5	16.8	16.5	15.4	15.4	15.3
	Hispanic	4.2	3.9	3.9	3.7	3.5	3.4
	Other	7.4	7.1	6.7	6.5	6.6	6.3
	White	68.6	69.9	70.6	72.0	72.2	72.7
Sex	Female	49.0	49.1	49.0	49.1	48.9	48.6
	Male	51.0	50.9	51.0	50.9	51.1	51.4
Performance Level	<i>Limited</i>	19.0	17.0	16.0	15.0	16.0	30.0
	<i>Basic</i>	18.0	20.0	17.0	25.0	25.0	20.0
	<i>Proficient</i>	19.0	21.0	20.0	25.0	25.0	28.0
	<i>Accelerated</i>	19.0	23.0	22.0	22.0	20.0	14.0
	<i>Advanced</i>	25.0	18.0	26.0	13.0	14.0	8.0
Mathematics							
Total N		129,447	126,885	125,433	121,929	122,788	97,782
Race	Asian	2.3	2.3	2.2	2.3	2.1	1.8
	Black	17.5	16.8	16.6	15.5	15.8	16.9
	Hispanic	4.1	3.9	3.9	3.8	3.5	3.9
	Other	7.4	7.1	6.7	6.5	6.6	6.7
	White	68.7	69.9	70.5	72.0	71.9	70.7

Spring 2017 OST 3–8 Population							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
Sex	Female	49.0	49.1	49.1	49.2	48.9	48.0
	Male	51.0	50.9	50.9	50.8	51.1	52.0
Performance Level	<i>Limited</i>	18.0	19.0	28.0	21.0	28.0	33.0
	<i>Basic</i>	11.0	9.0	11.0	18.0	16.0	12.0
	<i>Proficient</i>	21.0	20.0	26.0	26.0	21.0	36.0
	<i>Accelerated</i>	24.0	25.0	18.0	16.0	22.0	13.0
	<i>Advanced</i>	26.0	28.0	17.0	19.0	13.0	7.0
Science							
Total N		–	–	126,311	–	–	127,528
Race	Asian	–	–	2.3	–	–	2.2
	Black	–	–	16.4	–	–	15.2
	Hispanic	–	–	3.9	–	–	3.4
	Other	–	–	6.7	–	–	6.3
	White	–	–	70.6	–	–	72.9
Sex	Female	–	–	49.0	–	–	48.7
	Male	–	–	51.0	–	–	51.3
Performance Level	<i>Limited</i>	–	–	9.0	–	–	17.0
	<i>Basic</i>	–	–	22.0	–	–	17.0
	<i>Proficient</i>	–	–	23.0	–	–	21.0
	<i>Accelerated</i>	–	–	22.0	–	–	33.0
	<i>Advanced</i>	–	–	23.0	–	–	13.0

Table 3.3. Linking Study Sample Demographics (Weighted)

Linking Study Sample (Weighted)							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
ELA/Reading							
Total N		13,746	13,285	13,258	12,013	11,191	11,219
Race	Asian	2.3	2.4	2.3	2.4	2.3	2.2
	Black	17.5	16.8	16.5	15.4	15.4	15.3
	Hispanic	4.2	3.9	3.9	3.7	3.5	3.4
	Other	7.4	7.1	6.7	6.5	6.6	6.3
	White	68.6	69.8	70.6	72.0	72.2	72.8
Sex	Female	49.0	49.1	49.0	49.1	48.9	48.6
	Male	51.0	50.9	51.0	50.9	51.1	51.4
Performance Level	<i>Limited</i>	19.0	17.2	15.8	15.0	16.0	30.0
	<i>Basic</i>	18.0	20.2	16.8	25.0	25.0	20.0
	<i>Proficient</i>	19.0	21.2	19.8	25.0	25.0	28.0
	<i>Accelerated</i>	19.0	23.2	21.8	22.0	20.0	14.0
	<i>Advanced</i>	25.0	18.2	25.7	13.0	14.0	8.0

Linking Study Sample (Weighted)							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
Mathematics							
Total N		13,268	13,074	12,609	11,351	10,360	8,714
Race	Asian	2.3	2.3	2.2	2.3	2.1	1.8
	Black	17.5	16.8	16.6	15.5	15.8	16.9
	Hispanic	4.1	3.9	3.9	3.8	3.5	3.9
	Other	7.4	7.1	6.7	6.5	6.6	6.7
	White	68.7	69.9	70.6	71.9	72.0	70.7
Sex	Female	49.0	49.1	49.1	49.2	48.9	48.0
	Male	51.0	50.9	50.9	50.8	51.1	52.0
Performance Level	<i>Limited</i>	18.0	18.8	28.0	21.0	28.0	32.7
	<i>Basic</i>	11.0	8.9	11.0	18.0	16.0	11.9
	<i>Proficient</i>	21.0	19.8	26.0	26.0	21.0	35.6
	<i>Accelerated</i>	24.0	24.8	18.0	16.0	22.0	12.9
	<i>Advanced</i>	26.0	27.7	17.0	19.0	13.0	6.9
Science							
Total N		–	–	1,153	–	–	1,105
Race	Asian	–	–	2.3	–	–	2.2
	Black	–	–	16.3	–	–	15.2
	Hispanic	–	–	3.9	–	–	3.4
	Other	–	–	6.7	–	–	6.3
	White	–	–	70.8	–	–	72.8
Sex	Female	–	–	49.0	–	–	48.7
	Male	–	–	51.0	–	–	51.3
Performance Level	<i>Limited</i>	–	–	9.1	–	–	16.8
	<i>Basic</i>	–	–	22.2	–	–	16.8
	<i>Proficient</i>	–	–	23.2	–	–	20.8
	<i>Accelerated</i>	–	–	22.2	–	–	32.7
	<i>Advanced</i>	–	–	23.2	–	–	12.9

3.2. Descriptive Statistics

Table 3.4 presents descriptive statistics of the MAP Growth and OST test scores from Spring 2017, including the correlation coefficient (r) between them. The correlation coefficients between the scores range from 0.78 to 0.81 for ELA/Reading, 0.83 to 0.89 for Mathematics, and 0.81 to 0.82 for Science. These values indicate a strong relationship among the scores, which is important validity evidence for the claim that MAP Growth scores are good predictors of performance on the OST Grades 3–8 assessments.

Table 3.4. Descriptive Statistics of Test Scores

Grade	N	r	OST*				MAP Growth*			
			Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
ELA/Reading										
3	13,746	0.78	715.0	51.1	545	863	201.5	15.3	135	245
4	13,285	0.80	712.6	44.6	549	846	208.1	15.5	139	255
5	13,258	0.81	718.5	50.9	552	848	214.0	15.3	139	255
6	12,013	0.80	706.8	40.0	555	851	217.7	14.5	143	269
7	11,191	0.81	706.5	39.2	568	833	220.3	15.4	141	262
8	11,219	0.80	697.5	33.4	586	805	223.2	15.6	139	267
Mathematics										
3	13,268	0.85	722.9	44.2	587	818	203.3	13.8	134	263
4	13,074	0.87	727.7	50.1	605	835	213.3	15.5	130	267
5	12,609	0.87	710.5	38.3	624	804	222.0	17.5	135	284
6	11,351	0.88	709.9	35.5	616	790	225.5	16.5	141	271
7	10,360	0.89	706.7	41.3	605	806	229.4	17.8	130	288
8	8,714	0.83	701.8	27.3	633	774	229.9	17.6	137	279
Science										
5	1,153	0.81	718.7	40.8	595	845	209.4	11.1	161	239
8	1,105	0.82	717.9	43.0	597	868	216.0	11.9	158	252

*SD = standard deviation. Min. = minimum. Max. = maximum.

3.3. MAP Growth Cut Scores

Table 3.5, Table 3.6, and Table 3.7 present the OST scale score ranges and the corresponding MAP Growth RIT cut scores and percentile ranges by content area and grade. These tables can be used to predict a student's likely performance level on the OST Grades 3–8 spring assessment when MAP Growth is taken in the fall, winter, or spring. For example, a Grade 3 student who obtained a MAP Growth Reading RIT score of 189 in the fall is likely to reach *Proficient* on the OST ELA assessment. A Grade 3 student who obtained a MAP Growth Reading RIT score of 199 in the spring is also likely to reach *Proficient* on the OST assessment. The spring cut score is higher than the fall cut score because growth is expected between fall and spring as students receive more instruction during the school year.

Within this report, the cut scores for fall and winter are derived from the spring cuts and the typical growth scores from fall-to-spring or winter-to-spring. The typical growth scores are based on the default instructional weeks most commonly encountered for each term (Weeks 4, 20, and 32 for fall, winter, and spring, respectively). Since instructional weeks often vary by district, the cut scores in this report may differ slightly from the MAP Growth score reports that reflect instructional weeks set by partners. If the actual instructional weeks deviate from the default ones, a student's projected performance level could be different from the generic projection presented in this document. Partners are therefore encouraged to use the projected performance level in students' profile, classroom, and grade reports in the NWEA reporting system since they reflect the specific instructional weeks set by partners.

Table 3.5. MAP Growth Cut Scores—ELA/Reading

OST ELA										
Grade	Limited		Basic		Proficient		Accelerated		Advanced	
3	545–671		672–699		700–724		725–751		752–863	
4	549–673		674–699		700–724		725–752		753–846	
5	552–668		669–699		700–724		725–754		755–848	
6	555–667		668–699		700–724		725–750		751–851	
7	568–669		670–699		700–724		725–748		749–833	
8	586–681		682–699		700–724		725–743		744–805	
MAP Growth Reading*										
Grade	Limited		Basic		Proficient		Accelerated		Advanced	
	RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile
Fall										
2	100–163	1–28	164–174	29–56	175–183	57–77	184–192	78–90	193–350	91–99
3	100–178	1–31	179–188	32–55	189–196	56–72	197–203	73–84	204–350	85–99
4	100–185	1–25	186–197	26–52	198–206	53–72	207–214	73–85	215–350	86–99
5	100–192	1–23	193–202	24–45	203–210	46–64	211–220	65–83	221–350	84–99
6	100–197	1–22	198–210	23–51	211–219	52–71	220–228	72–86	229–350	87–99
7	100–202	1–24	203–214	25–51	215–224	52–73	225–233	74–87	234–350	88–99
8	100–213	1–40	214–221	41–58	222–232	59–80	233–240	81–90	241–350	91–99
Winter										
2	100–172	1–28	173–183	29–56	184–191	57–75	192–199	76–88	200–350	89–99
3	100–186	1–32	187–195	33–54	196–202	55–70	203–208	71–82	209–350	83–99
4	100–192	1–27	193–203	28–53	204–211	54–71	212–218	72–84	219–350	85–99
5	100–198	1–25	199–207	26–46	208–214	47–63	215–223	64–82	224–350	83–99
6	100–202	1–24	203–213	25–49	214–222	50–71	223–230	72–85	231–350	86–99
7	100–205	1–24	206–217	25–51	218–226	52–72	227–234	73–86	235–350	87–99
8	100–216	1–41	217–223	42–57	224–233	58–78	234–241	79–89	242–350	90–99
Spring										
2	100–177	1–30	178–187	31–55	188–195	56–74	196–203	75–87	204–350	88–99
3	100–190	1–34	191–198	35–54	199–205	55–70	206–211	71–81	212–350	82–99
4	100–195	1–28	196–205	29–52	206–213	53–70	214–220	71–83	221–350	84–99
5	100–200	1–26	201–209	27–47	210–216	48–64	217–224	65–80	225–350	81–99
6	100–204	1–25	205–215	26–51	216–223	52–70	224–231	71–84	232–350	85–99
7	100–207	1–25	208–218	26–51	219–227	52–71	228–235	72–85	236–350	86–99
8	100–217	1–40	218–224	41–57	225–234	58–78	235–242	79–89	243–350	90–99

*Cut scores for fall and winter are derived from the spring cuts and growth norms based on the typical instructional weeks. Spring cut scores for Grade 2 were derived from the Grade 3 cuts using the growth norms. Bolded numbers indicate the cut scores considered to be at least proficient for accountability purposes.

Table 3.6. MAP Growth Cut Scores—Mathematics

OST Mathematics										
Grade	Limited		Basic		Proficient		Accelerated		Advanced	
3	587–682		683–699		700–724		725–752		753–818	
4	605–685		686–699		700–724		725–758		759–835	
5	624–686		687–699		700–724		725–748		749–804	
6	616–681		682–699		700–724		725–743		744–790	
7	605–683		684–699		700–724		725–754		755–806	
8	633–689		690–699		700–724		725–743		744–774	
MAP Growth Mathematics*										
Grade	Limited		Basic		Proficient		Accelerated		Advanced	
	RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile
Fall										
2	100–164	1–21	165–169	22–34	170–178	35–61	179–187	62–83	188–350	84–99
3	100–178	1–23	179–183	24–36	184–191	37–59	192–199	60–79	200–350	80–99
4	100–190	1–27	191–194	28–37	195–201	38–56	202–211	57–80	212–350	81–99
5	100–202	1–33	203–208	34–49	209–218	50–73	219–227	74–88	228–350	89–99
6	100–205	1–28	206–214	29–50	215–224	51–73	225–231	74–85	232–350	86–99
7	100–215	1–39	216–220	40–51	221–230	52–72	231–240	73–87	241–350	88–99
8	100–218	1–37	219–224	38–49	225–238	50–76	239–248	77–89	249–350	90–99
Winter										
2	100–173	1–21	174–178	22–34	179–187	35–61	188–195	62–81	196–350	82–99
3	100–186	1–24	187–191	25–37	192–198	38–57	199–206	58–78	207–350	79–99
4	100–197	1–28	198–201	29–38	202–208	39–57	209–218	58–80	219–350	81–99
5	100–208	1–35	209–214	36–50	215–224	51–73	225–233	74–88	234–350	89–99
6	100–210	1–29	211–219	30–50	220–229	51–72	230–236	73–84	237–350	85–99
7	100–218	1–38	219–224	39–51	225–234	52–72	235–244	73–87	245–350	88–99
8	100–221	1–37	222–227	38–49	228–241	50–75	242–251	76–88	252–350	89–99
Spring										
2	100–179	1–23	180–184	24–36	185–192	37–60	193–200	61–80	201–350	81–99
3	100–191	1–25	192–196	26–38	197–203	39–57	204–211	58–77	212–350	78–99
4	100–201	1–28	202–205	29–38	206–212	39–55	213–222	56–78	223–350	79–99
5	100–212	1–36	213–218	37–50	219–228	51–72	229–237	73–87	238–350	88–99
6	100–213	1–30	214–222	31–49	223–232	50–71	233–239	72–83	240–350	84–99
7	100–221	1–39	222–227	40–52	228–237	53–72	238–247	73–86	248–350	87–99
8	100–223	1–37	224–229	38–48	230–243	49–74	244–253	75–87	254–350	88–99

*Cut scores for fall and winter are derived from the spring cuts and growth norms based on the typical instructional weeks. Spring cut scores for Grade 2 were derived from the Grade 3 cuts using the growth norms. Bolded numbers indicate the cut scores considered to be at least proficient for accountability purposes.

Table 3.7. MAP Growth Cut Scores—Science

OST Science										
Grade	Limited		Basic		Proficient		Accelerated		Advanced	
5	559–663		664–699		700–724		725–752		753–845	
8	575–673		674–699		700–724		725–765		766–868	
MAP Growth Science*										
Grade	Limited		Basic		Proficient		Accelerated		Advanced	
	RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile
Fall										
5	100–185	1–10	186–198	11–45	199–206	46–71	207–214	72–89	215–350	90–99
8	100–198	1–20	199–207	21–44	208–215	45–67	216–226	68–89	227–350	90–99
Winter										
5	100–190	1–12	191–202	13–45	203–210	46–71	211–217	72–87	218–350	88–99
8	100–201	1–20	202–210	21–45	211–217	46–65	218–227	66–87	228–350	88–99
Spring										
5	100–193	1–15	194–204	16–45	205–211	46–67	212–218	68–85	219–350	86–99
8	100–203	1–23	204–211	24–45	212–218	46–65	219–228	66–86	229–350	87–99

*Cut scores for fall and winter are derived from the spring cuts and growth norms based on the typical instructional weeks. Bolded numbers indicate the cut scores considered to be at least proficient for accountability purposes.

3.4. Third Grade Reading Guarantee

The purpose of Ohio's Third Grade Reading Guarantee (TGRG) program is to identify K–3 students who are behind in reading, allowing schools to provide additional support to help students achieve reading success by the end of Grade 3. The TGRG promotion score on the OST ELA assessment for the 2019–2020 school year was 683. As an alternative, Grade 3 students who obtained an ELA Reading subscore of 46 or higher on the OST would also be eligible for promotion at the end of Grade 3 (ODE, 2020). Table 3.8 presents the MAP Growth Reading RIT cut scores corresponding to the TGRG promotion cuts, including the MAP Growth classification accuracy results.

Table 3.8. MAP Growth Reading Grade 3 Cut Scores for Ohio's TGRG Program

Grade	OST Cut Score	MAP Growth Cut		Class. Accuracy*
		RIT	Percentile	
OST ELA				
3	683	194	42	0.86
OST Reading				
3	46	194	42	0.85

*Class. Accuracy = overall classification accuracy rate.

Given the promotion cuts may change in a given year, Table 3.9 and Table 3.10 provide additional RIT scores corresponding to the OST ELA and Reading scores below and above the current promotion cuts to extend the range of cut scores to cover all possible future OST promotion cuts. For example, if the promotion cut for ELA changes to 684, the corresponding Reading RIT cut for a Grade 3 student in spring would be 195.

Table 3.9. MAP Growth Reading Grade 3 Cut Scores for Ohio’s TGRG Program Extended Above and Below the Current Promotion Cuts—OST ELA

OST ELA	MAP Growth	
	RIT	Percentile
672	191	35
673	191	35
674	191	35
675	192	38
676	192	38
677	192	38
678	193	40
679	193	40
680	193	40
681	194	42
682	194	42
683	194	42
684	195	45
685	195	45
686	195	45
687	195	45
688	196	47
689	196	47
690	196	47
691	197	50
692	197	50
693	197	50
694	197	50
695	198	52
696	198	52
697	198	52
698	199	55
699	199	55
700	199	55

*The current OST ELA promotion cut as of 2019–2020 for the TGRG program is 683, as shown in bold.

Table 3.10. MAP Growth Reading Grade 3 Cut Scores for Ohio's TGRG Program Extended Above and Below the Current Promotion Cuts—OST Reading

OST Reading	MAP Growth	
	RIT	Percentile
43	189	31
44	191	35
45	192	38
46	194	42
47	195	45
48	197	50
49	198	52
50	199	55
51	200	57
52	202	62
53	203	64
54	204	66
55	205	69
56	207	73

*The current OST Reading promotion cut as of 2019–2020 for the TGRG program is 46, as shown in bold.

3.5. Classification Accuracy

Table 3.11 presents the classification accuracy summary statistics, including the overall classification accuracy rate. These results indicate how well MAP Growth spring RIT scores predict proficiency on the OST assessments, providing insight into the predictive validity of MAP Growth. The overall classification accuracy rate ranges from 0.79 to 0.85 for ELA/Reading, 0.84 to 0.88 for Mathematics, and 0.83 to 0.85 for Science. These values suggest that the RIT cut scores are good at classifying students as proficient or not proficient on the OST assessment. For Grade 2, the classification accuracy rate refers to how well the MAP Growth cuts shown can predict students' proficiency status on OST in Grade 3.

Although the results show that MAP Growth scores can be used to accurately classify students as likely to be proficient on the OST assessments, there is a notable limitation to how these results should be used and interpreted. OST and MAP Growth assessments are designed for different purposes and measure slightly different constructs even within the same content area. Therefore, scores on the two tests cannot be assumed to be interchangeable. MAP Growth may not be used as a substitute for the state tests and vice versa.

Table 3.11. Classification Accuracy Results

Grade	N	Cut Score		Class. Accuracy*	Rate*		Sensitivity	Specificity	Precision	AUC*
		MAP Growth	OST		FP	FN				
ELA/Reading										
2	11,165	188	700	0.79	0.16	0.24	0.76	0.84	0.89	0.88
3	13,746	199	700	0.83	0.27	0.12	0.88	0.73	0.85	0.90
4	13,285	206	700	0.83	0.22	0.14	0.86	0.78	0.87	0.91
5	13,258	210	700	0.85	0.22	0.12	0.88	0.78	0.89	0.92
6	12,013	216	700	0.83	0.24	0.13	0.87	0.76	0.84	0.90
7	11,191	219	700	0.83	0.23	0.14	0.86	0.77	0.84	0.91
8	11,219	225	700	0.83	0.19	0.15	0.85	0.81	0.82	0.91
Mathematics										
2	10,773	185	700	0.84	0.31	0.10	0.90	0.69	0.87	0.88
3	13,268	197	700	0.88	0.23	0.07	0.93	0.77	0.91	0.94
4	13,074	206	700	0.88	0.20	0.09	0.91	0.80	0.92	0.95
5	12,609	219	700	0.87	0.16	0.11	0.89	0.84	0.90	0.95
6	11,351	223	700	0.87	0.16	0.11	0.89	0.84	0.90	0.95
7	10,360	228	700	0.88	0.16	0.09	0.91	0.84	0.88	0.95
8	8,714	230	700	0.84	0.17	0.15	0.85	0.83	0.86	0.92
Science										
5	1,153	205	700	0.85	0.24	0.11	0.89	0.76	0.89	0.92
8	1,105	212	700	0.83	0.27	0.11	0.89	0.73	0.87	0.90

*Class. Accuracy = overall classification accuracy rate. FP = false positives. FN = false negatives. AUC = area under the ROC curve.

3.6. Proficiency Projection

Table 3.12, Table 3.13, and Table 3.14 present the estimated probability of achieving *Proficient* performance on the OST assessment based on RIT scores from fall, winter, or spring. For example, a Grade 3 student who obtained a MAP Growth Reading score of 201 in the fall has a 93% chance of reaching *Proficient* or higher on the OST ELA assessment. “Prob.” indicates the probability of obtaining proficient status on OST in the spring.

Table 3.12. Proficiency Projection based on RIT Scores—ELA/Reading

ELA/Reading											
Grade	Start %ile	Spring Cut	Fall			Winter			Spring		
			Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		Proficient	Prob.		Proficient	Prob.
2	5	188	147	No	<0.01	156	No	<0.01	160	No	<0.01
	10	188	153	No	<0.01	162	No	<0.01	166	No	<0.01
	15	188	157	No	0.02	166	No	<0.01	170	No	<0.01
	20	188	160	No	0.04	169	No	<0.01	173	No	<0.01
	25	188	162	No	0.06	171	No	0.01	175	No	<0.01
	30	188	164	No	0.09	173	No	0.03	177	No	<0.01
	35	188	166	No	0.15	175	No	0.07	180	No	0.01
	40	188	168	No	0.21	177	No	0.13	182	No	0.03
	45	188	170	No	0.25	179	No	0.17	184	No	0.11
	50	188	172	No	0.35	181	No	0.29	186	No	0.27
	55	188	174	No	0.45	183	No	0.43	188	Yes	0.50
	60	188	176	Yes	0.55	185	Yes	0.57	189	Yes	0.62
	65	188	178	Yes	0.65	187	Yes	0.71	192	Yes	0.89
	70	188	180	Yes	0.70	189	Yes	0.83	194	Yes	0.97
	75	188	183	Yes	0.82	191	Yes	0.90	196	Yes	0.99
	80	188	185	Yes	0.88	194	Yes	0.97	199	Yes	>0.99
	85	188	188	Yes	0.93	197	Yes	0.99	202	Yes	>0.99
	90	188	192	Yes	0.98	200	Yes	>0.99	205	Yes	>0.99
	95	188	197	Yes	0.99	206	Yes	>0.99	211	Yes	>0.99
3	5	199	159	No	<0.01	167	No	<0.01	170	No	<0.01
	10	199	165	No	<0.01	173	No	<0.01	176	No	<0.01
	15	199	169	No	0.01	177	No	<0.01	180	No	<0.01
	20	199	173	No	0.03	180	No	<0.01	183	No	<0.01
	25	199	175	No	0.05	183	No	0.01	186	No	<0.01
	30	199	178	No	0.11	185	No	0.03	189	No	<0.01
	35	199	180	No	0.14	188	No	0.09	191	No	0.01
	40	199	182	No	0.21	190	No	0.13	193	No	0.03
	45	199	185	No	0.34	192	No	0.23	195	No	0.11
	50	199	187	No	0.39	194	No	0.35	197	No	0.27
	55	199	189	Yes	0.50	196	Yes	0.50	199	Yes	0.50
	60	199	191	Yes	0.61	198	Yes	0.65	201	Yes	0.73
	65	199	193	Yes	0.70	200	Yes	0.77	203	Yes	0.89
	70	199	195	Yes	0.75	202	Yes	0.87	206	Yes	0.99
	75	199	198	Yes	0.86	205	Yes	0.95	208	Yes	>0.99
	80	199	201	Yes	0.93	207	Yes	0.98	211	Yes	>0.99
	85	199	204	Yes	0.96	211	Yes	>0.99	214	Yes	>0.99
	90	199	208	Yes	0.99	215	Yes	>0.99	218	Yes	>0.99
	95	199	214	Yes	>0.99	220	Yes	>0.99	224	Yes	>0.99

ELA/Reading											
Grade	Start %ile	Spring Cut	Fall			Winter			Spring		
			Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		Proficient	Prob.		Proficient	Prob.
4	5	206	169	No	<0.01	176	No	<0.01	178	No	<0.01
	10	206	175	No	<0.01	182	No	<0.01	184	No	<0.01
	15	206	179	No	0.01	186	No	<0.01	188	No	<0.01
	20	206	183	No	0.04	189	No	<0.01	191	No	<0.01
	25	206	185	No	0.06	192	No	0.02	194	No	<0.01
	30	206	188	No	0.11	194	No	0.04	196	No	<0.01
	35	206	190	No	0.17	196	No	0.09	199	No	0.01
	40	206	192	No	0.24	198	No	0.17	201	No	0.06
	45	206	195	No	0.34	200	No	0.22	203	No	0.17
	50	206	197	No	0.44	202	No	0.35	205	No	0.38
	55	206	199	Yes	0.56	205	Yes	0.58	207	Yes	0.62
	60	206	201	Yes	0.66	207	Yes	0.72	209	Yes	0.83
	65	206	203	Yes	0.71	209	Yes	0.83	211	Yes	0.94
	70	206	205	Yes	0.80	211	Yes	0.91	213	Yes	0.99
	75	206	208	Yes	0.89	213	Yes	0.96	216	Yes	>0.99
	80	206	211	Yes	0.94	216	Yes	0.99	219	Yes	>0.99
	85	206	214	Yes	0.97	219	Yes	>0.99	222	Yes	>0.99
	90	206	218	Yes	0.99	223	Yes	>0.99	226	Yes	>0.99
	95	206	224	Yes	>0.99	229	Yes	>0.99	232	Yes	>0.99
5	5	210	178	No	<0.01	183	No	<0.01	185	No	<0.01
	10	210	183	No	0.01	189	No	<0.01	191	No	<0.01
	15	210	187	No	0.03	193	No	<0.01	194	No	<0.01
	20	210	191	No	0.06	196	No	0.02	198	No	<0.01
	25	210	193	No	0.11	198	No	0.03	200	No	<0.01
	30	210	196	No	0.2	201	No	0.09	203	No	0.01
	35	210	198	No	0.24	203	No	0.17	205	No	0.06
	40	210	200	No	0.34	205	No	0.28	207	No	0.17
	45	210	202	No	0.44	207	No	0.42	209	No	0.38
	50	210	204	Yes	0.56	209	Yes	0.58	211	Yes	0.62
	55	210	207	Yes	0.66	211	Yes	0.72	213	Yes	0.83
	60	210	209	Yes	0.76	213	Yes	0.83	215	Yes	0.94
	65	210	211	Yes	0.83	215	Yes	0.91	217	Yes	0.99
	70	210	213	Yes	0.87	217	Yes	0.94	219	Yes	>0.99
	75	210	216	Yes	0.94	220	Yes	0.98	222	Yes	>0.99
	80	210	218	Yes	0.96	222	Yes	0.99	224	Yes	>0.99
	85	210	221	Yes	0.98	226	Yes	>0.99	228	Yes	>0.99
	90	210	225	Yes	>0.99	229	Yes	>0.99	231	Yes	>0.99
	95	210	231	Yes	>0.99	235	Yes	>0.99	237	Yes	>0.99

ELA/Reading											
Grade	Start %ile	Spring Cut	Fall			Winter			Spring		
			Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		Proficient	Prob.		Proficient	Prob.
6	5	216	183	No	<0.01	188	No	<0.01	189	No	<0.01
	10	216	189	No	<0.01	193	No	<0.01	195	No	<0.01
	15	216	193	No	0.01	197	No	<0.01	199	No	<0.01
	20	216	196	No	0.03	200	No	<0.01	202	No	<0.01
	25	216	199	No	0.08	203	No	0.02	205	No	<0.01
	30	216	202	No	0.13	205	No	0.04	207	No	<0.01
	35	216	204	No	0.19	208	No	0.12	209	No	0.01
	40	216	206	No	0.28	210	No	0.22	211	No	0.06
	45	216	208	No	0.33	212	No	0.35	213	No	0.17
	50	216	210	No	0.44	214	Yes	0.50	215	No	0.38
	55	216	212	Yes	0.56	216	Yes	0.58	217	Yes	0.62
	60	216	214	Yes	0.67	218	Yes	0.72	219	Yes	0.83
	65	216	217	Yes	0.76	220	Yes	0.83	222	Yes	0.97
	70	216	219	Yes	0.84	222	Yes	0.91	224	Yes	0.99
	75	216	221	Yes	0.90	225	Yes	0.97	226	Yes	>0.99
	80	216	224	Yes	0.94	227	Yes	0.99	229	Yes	>0.99
	85	216	227	Yes	0.98	230	Yes	>0.99	232	Yes	>0.99
	90	216	231	Yes	>0.99	234	Yes	>0.99	236	Yes	>0.99
	95	216	237	Yes	>0.99	240	Yes	>0.99	242	Yes	>0.99
7	5	219	187	No	<0.01	190	No	<0.01	191	No	<0.01
	10	219	193	No	<0.01	196	No	<0.01	197	No	<0.01
	15	219	197	No	0.01	200	No	<0.01	201	No	<0.01
	20	219	200	No	0.03	203	No	<0.01	205	No	<0.01
	25	219	203	No	0.06	206	No	0.02	207	No	<0.01
	30	219	206	No	0.12	209	No	0.06	210	No	<0.01
	35	219	208	No	0.19	211	No	0.12	212	No	0.01
	40	219	210	No	0.28	213	No	0.17	214	No	0.06
	45	219	212	No	0.33	215	No	0.28	216	No	0.17
	50	219	214	No	0.44	217	No	0.42	218	No	0.38
	55	219	216	Yes	0.56	219	Yes	0.58	220	Yes	0.62
	60	219	218	Yes	0.67	221	Yes	0.72	223	Yes	0.89
	65	219	221	Yes	0.76	223	Yes	0.83	225	Yes	0.97
	70	219	223	Yes	0.84	226	Yes	0.94	227	Yes	0.99
	75	219	225	Yes	0.90	228	Yes	0.97	229	Yes	>0.99
	80	219	228	Yes	0.96	231	Yes	0.99	232	Yes	>0.99
	85	219	231	Yes	0.98	234	Yes	>0.99	235	Yes	>0.99
	90	219	235	Yes	>0.99	238	Yes	>0.99	239	Yes	>0.99
	95	219	241	Yes	>0.99	244	Yes	>0.99	245	Yes	>0.99

ELA/Reading											
Grade	Start %ile	Spring Cut	Fall			Winter			Spring		
			Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		Proficient	Prob.		Proficient	Prob.
8	5	225	190	No	<0.01	193	No	<0.01	194	No	<0.01
	10	225	196	No	<0.01	199	No	<0.01	200	No	<0.01
	15	225	200	No	<0.01	203	No	<0.01	204	No	<0.01
	20	225	204	No	0.01	206	No	<0.01	207	No	<0.01
	25	225	207	No	0.04	209	No	<0.01	210	No	<0.01
	30	225	209	No	0.06	212	No	0.01	213	No	<0.01
	35	225	211	No	0.08	214	No	0.03	215	No	<0.01
	40	225	214	No	0.17	216	No	0.06	217	No	0.01
	45	225	216	No	0.24	218	No	0.13	220	No	0.06
	50	225	218	No	0.34	221	No	0.28	222	No	0.17
	55	225	220	No	0.39	223	No	0.42	224	No	0.38
	60	225	222	Yes	0.50	225	Yes	0.58	226	Yes	0.62
	65	225	225	Yes	0.66	227	Yes	0.72	228	Yes	0.83
	70	225	227	Yes	0.76	229	Yes	0.83	231	Yes	0.97
	75	225	230	Yes	0.83	232	Yes	0.94	233	Yes	0.99
	80	225	232	Yes	0.89	235	Yes	0.98	236	Yes	>0.99
	85	225	236	Yes	0.96	238	Yes	>0.99	239	Yes	>0.99
	90	225	240	Yes	0.99	242	Yes	>0.99	243	Yes	>0.99
	95	225	246	Yes	>0.99	248	Yes	>0.99	249	Yes	>0.99

Table 3.13. Proficiency Projection based on RIT Scores—Mathematics

Mathematics											
Grade	Start %ile	Spring Cut	Fall			Winter			Spring		
			Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		Proficient	Prob.		Proficient	Prob.
2	5	185	154	No	0.01	163	No	<0.01	167	No	<0.01
	10	185	158	No	0.04	167	No	0.01	172	No	<0.01
	15	185	162	No	0.14	171	No	0.05	175	No	<0.01
	20	185	164	No	0.18	173	No	0.10	178	No	0.01
	25	185	166	No	0.27	175	No	0.20	180	No	0.04
	30	185	168	No	0.38	177	No	0.34	182	No	0.15
	35	185	170	Yes	0.50	179	Yes	0.50	184	No	0.37
	40	185	172	Yes	0.62	181	Yes	0.58	186	Yes	0.63
	45	185	173	Yes	0.68	182	Yes	0.66	188	Yes	0.85
	50	185	175	Yes	0.73	184	Yes	0.80	189	Yes	0.92
	55	185	177	Yes	0.82	186	Yes	0.90	191	Yes	0.98
	60	185	178	Yes	0.86	187	Yes	0.93	193	Yes	>0.99
	65	185	180	Yes	0.92	189	Yes	0.97	195	Yes	>0.99
	70	185	182	Yes	0.96	191	Yes	0.99	196	Yes	>0.99
	75	185	184	Yes	0.98	193	Yes	>0.99	198	Yes	>0.99
	80	185	186	Yes	0.99	195	Yes	>0.99	201	Yes	>0.99
	85	185	188	Yes	0.99	198	Yes	>0.99	203	Yes	>0.99
	90	185	192	Yes	>0.99	201	Yes	>0.99	207	Yes	>0.99
	95	185	196	Yes	>0.99	205	Yes	>0.99	212	Yes	>0.99
3	5	197	166	No	<0.01	174	No	<0.01	178	No	<0.01
	10	197	171	No	0.03	179	No	<0.01	183	No	<0.01
	15	197	175	No	0.07	182	No	0.02	186	No	<0.01
	20	197	177	No	0.13	185	No	0.07	189	No	<0.01
	25	197	179	No	0.21	187	No	0.14	192	No	0.04
	30	197	181	No	0.31	189	No	0.26	194	No	0.15
	35	197	183	No	0.44	191	No	0.42	196	No	0.37
	40	197	185	Yes	0.56	193	Yes	0.58	198	Yes	0.63
	45	197	187	Yes	0.69	195	Yes	0.74	199	Yes	0.75
	50	197	188	Yes	0.74	196	Yes	0.80	201	Yes	0.92
	55	197	190	Yes	0.83	198	Yes	0.90	203	Yes	0.98
	60	197	192	Yes	0.87	200	Yes	0.96	205	Yes	>0.99
	65	197	194	Yes	0.93	201	Yes	0.97	207	Yes	>0.99
	70	197	196	Yes	0.96	203	Yes	0.99	208	Yes	>0.99
	75	197	198	Yes	0.98	205	Yes	>0.99	211	Yes	>0.99
	80	197	200	Yes	0.99	208	Yes	>0.99	213	Yes	>0.99
	85	197	202	Yes	>0.99	210	Yes	>0.99	216	Yes	>0.99
	90	197	206	Yes	>0.99	214	Yes	>0.99	219	Yes	>0.99
	95	197	211	Yes	>0.99	219	Yes	>0.99	224	Yes	>0.99

Mathematics											
Grade	Start %ile	Spring Cut	Fall			Winter			Spring		
			Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		Proficient	Prob.		Proficient	Prob.
4	5	206	176	No	<0.01	182	No	<0.01	185	No	<0.01
	10	206	181	No	0.01	187	No	<0.01	191	No	<0.01
	15	206	185	No	0.05	191	No	0.02	194	No	<0.01
	20	206	187	No	0.10	194	No	0.07	197	No	<0.01
	25	206	190	No	0.21	196	No	0.10	200	No	0.02
	30	206	192	No	0.32	198	No	0.20	202	No	0.08
	35	206	194	No	0.44	200	No	0.33	205	No	0.37
	40	206	196	Yes	0.56	202	Yes	0.50	207	Yes	0.63
	45	206	198	Yes	0.68	204	Yes	0.67	209	Yes	0.85
	50	206	200	Yes	0.79	206	Yes	0.80	211	Yes	0.96
	55	206	201	Yes	0.83	208	Yes	0.90	212	Yes	0.98
	60	206	203	Yes	0.90	210	Yes	0.96	214	Yes	>0.99
	65	206	205	Yes	0.95	212	Yes	0.98	217	Yes	>0.99
	70	206	207	Yes	0.97	214	Yes	0.99	219	Yes	>0.99
	75	206	209	Yes	0.99	216	Yes	>0.99	221	Yes	>0.99
	80	206	212	Yes	>0.99	219	Yes	>0.99	224	Yes	>0.99
	85	206	214	Yes	>0.99	221	Yes	>0.99	227	Yes	>0.99
	90	206	218	Yes	>0.99	225	Yes	>0.99	230	Yes	>0.99
	95	206	223	Yes	>0.99	231	Yes	>0.99	236	Yes	>0.99
5	5	219	184	No	<0.01	189	No	<0.01	191	No	<0.01
	10	219	190	No	<0.01	194	No	<0.01	197	No	<0.01
	15	219	193	No	<0.01	198	No	<0.01	201	No	<0.01
	20	219	196	No	0.02	201	No	<0.01	205	No	<0.01
	25	219	199	No	0.05	204	No	0.01	207	No	<0.01
	30	219	201	No	0.11	206	No	0.03	210	No	<0.01
	35	219	203	No	0.18	209	No	0.10	212	No	0.01
	40	219	205	No	0.27	211	No	0.20	215	No	0.08
	45	219	207	No	0.38	213	No	0.34	217	No	0.25
	50	219	209	Yes	0.50	215	Yes	0.50	219	Yes	0.50
	55	219	211	Yes	0.62	217	Yes	0.66	221	Yes	0.75
	60	219	213	Yes	0.73	219	Yes	0.80	223	Yes	0.92
	65	219	215	Yes	0.82	221	Yes	0.90	225	Yes	0.98
	70	219	217	Yes	0.89	223	Yes	0.95	228	Yes	>0.99
	75	219	219	Yes	0.94	225	Yes	0.98	230	Yes	>0.99
	80	219	222	Yes	0.98	228	Yes	>0.99	233	Yes	>0.99
	85	219	225	Yes	0.99	231	Yes	>0.99	236	Yes	>0.99
	90	219	229	Yes	>0.99	235	Yes	>0.99	240	Yes	>0.99
	95	219	234	Yes	>0.99	241	Yes	>0.99	246	Yes	>0.99

Mathematics											
Grade	Start %ile	Spring Cut	Fall			Winter			Spring		
			Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		Proficient	Prob.		Proficient	Prob.
6	5	223	188	No	<0.01	192	No	<0.01	194	No	<0.01
	10	223	194	No	<0.01	198	No	<0.01	200	No	<0.01
	15	223	198	No	<0.01	202	No	<0.01	205	No	<0.01
	20	223	201	No	0.01	205	No	<0.01	208	No	<0.01
	25	223	204	No	0.04	208	No	0.01	211	No	<0.01
	30	223	206	No	0.08	211	No	0.03	214	No	<0.01
	35	223	209	No	0.17	213	No	0.07	216	No	0.01
	40	223	211	No	0.27	215	No	0.14	218	No	0.04
	45	223	213	No	0.38	217	No	0.26	221	No	0.25
	50	223	215	Yes	0.50	220	Yes	0.50	223	Yes	0.50
	55	223	217	Yes	0.62	222	Yes	0.66	225	Yes	0.75
	60	223	219	Yes	0.73	224	Yes	0.80	227	Yes	0.92
	65	223	221	Yes	0.83	226	Yes	0.90	230	Yes	0.99
	70	223	223	Yes	0.90	228	Yes	0.96	232	Yes	>0.99
	75	223	226	Yes	0.96	231	Yes	0.99	235	Yes	>0.99
	80	223	228	Yes	0.98	234	Yes	>0.99	238	Yes	>0.99
	85	223	231	Yes	0.99	237	Yes	>0.99	241	Yes	>0.99
	90	223	235	Yes	>0.99	241	Yes	>0.99	245	Yes	>0.99
	95	223	241	Yes	>0.99	247	Yes	>0.99	252	Yes	>0.99
7	5	228	192	No	<0.01	194	No	<0.01	196	No	<0.01
	10	228	198	No	<0.01	201	No	<0.01	203	No	<0.01
	15	228	202	No	<0.01	205	No	<0.01	207	No	<0.01
	20	228	206	No	<0.01	209	No	<0.01	211	No	<0.01
	25	228	208	No	0.01	212	No	<0.01	214	No	<0.01
	30	228	211	No	0.04	215	No	0.02	217	No	<0.01
	35	228	213	No	0.07	217	No	0.04	220	No	<0.01
	40	228	216	No	0.17	219	No	0.10	222	No	0.02
	45	228	218	No	0.31	222	No	0.26	224	No	0.08
	50	228	220	No	0.44	224	No	0.42	227	No	0.37
	55	228	222	Yes	0.56	226	Yes	0.58	229	Yes	0.63
	60	228	225	Yes	0.74	229	Yes	0.80	231	Yes	0.85
	65	228	227	Yes	0.83	231	Yes	0.90	234	Yes	0.98
	70	228	229	Yes	0.90	233	Yes	0.96	236	Yes	>0.99
	75	228	232	Yes	0.96	236	Yes	0.99	239	Yes	>0.99
	80	228	235	Yes	0.99	239	Yes	>0.99	242	Yes	>0.99
	85	228	238	Yes	>0.99	243	Yes	>0.99	246	Yes	>0.99
	90	228	243	Yes	>0.99	247	Yes	>0.99	251	Yes	>0.99
	95	228	249	Yes	>0.99	254	Yes	>0.99	257	Yes	>0.99

Mathematics											
Grade	Start %ile	Spring Cut	Fall			Winter			Spring		
			Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		Proficient	Prob.		Proficient	Prob.
8	5	230	194	No	<0.01	196	No	<0.01	197	No	<0.01
	10	230	201	No	<0.01	203	No	<0.01	205	No	<0.01
	15	230	205	No	<0.01	208	No	<0.01	210	No	<0.01
	20	230	209	No	0.02	212	No	<0.01	214	No	<0.01
	25	230	212	No	0.04	215	No	<0.01	217	No	<0.01
	30	230	215	No	0.10	218	No	0.02	220	No	<0.01
	35	230	218	No	0.16	221	No	0.07	223	No	0.01
	40	230	220	No	0.24	223	No	0.15	225	No	0.04
	45	230	223	No	0.39	226	No	0.34	228	No	0.25
	50	230	225	Yes	0.50	228	Yes	0.50	230	Yes	0.50
	55	230	227	Yes	0.61	231	Yes	0.73	233	Yes	0.85
	60	230	230	Yes	0.76	233	Yes	0.85	235	Yes	0.96
	65	230	232	Yes	0.84	236	Yes	0.95	238	Yes	>0.99
	70	230	235	Yes	0.93	238	Yes	0.98	241	Yes	>0.99
	75	230	238	Yes	0.97	241	Yes	>0.99	244	Yes	>0.99
	80	230	241	Yes	0.99	244	Yes	>0.99	247	Yes	>0.99
	85	230	245	Yes	>0.99	248	Yes	>0.99	251	Yes	>0.99
	90	230	249	Yes	>0.99	253	Yes	>0.99	256	Yes	>0.99
	95	230	256	Yes	>0.99	260	Yes	>0.99	263	Yes	>0.99

Table 3.14. Proficiency Projection based on RIT Scores—Science

Science											
Grade	Start %ile	Spring Cut	Fall			Winter			Spring		
			Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		Proficient	Prob.		Proficient	Prob.
5	5	205	181	No	0.02	185	No	<0.01	186	No	<0.01
	10	205	185	No	0.04	189	No	0.01	191	No	<0.01
	15	205	188	No	0.10	192	No	0.04	194	No	<0.01
	20	205	190	No	0.16	194	No	0.08	196	No	<0.01
	25	205	192	No	0.19	196	No	0.14	198	No	0.02
	30	205	194	No	0.28	198	No	0.18	200	No	0.07
	35	205	196	No	0.39	200	No	0.30	202	No	0.19
	40	205	197	No	0.39	201	No	0.36	203	No	0.28
	45	205	199	Yes	0.50	203	Yes	0.50	205	Yes	0.50
	50	205	200	Yes	0.56	204	Yes	0.57	206	Yes	0.62
	55	205	202	Yes	0.67	206	Yes	0.70	208	Yes	0.81
	60	205	203	Yes	0.72	207	Yes	0.76	209	Yes	0.88
	65	205	205	Yes	0.76	209	Yes	0.82	211	Yes	0.96
	70	205	206	Yes	0.81	210	Yes	0.86	213	Yes	0.99
	75	205	208	Yes	0.87	212	Yes	0.92	214	Yes	>0.99
	80	205	210	Yes	0.90	214	Yes	0.96	216	Yes	>0.99
	85	205	212	Yes	0.94	216	Yes	0.98	219	Yes	>0.99
	90	205	215	Yes	0.98	219	Yes	>0.99	222	Yes	>0.99
	95	205	220	Yes	>0.99	224	Yes	>0.99	226	Yes	>0.99
8	5	212	188	No	0.01	191	No	<0.01	191	No	<0.01
	10	212	193	No	0.04	196	No	0.01	196	No	<0.01
	15	212	196	No	0.09	199	No	0.03	199	No	<0.01
	20	212	198	No	0.12	201	No	0.06	202	No	<0.01
	25	212	201	No	0.21	204	No	0.15	204	No	0.01
	30	212	203	No	0.30	206	No	0.19	206	No	0.04
	35	212	205	No	0.35	207	No	0.24	208	No	0.12
	40	212	206	No	0.40	209	No	0.36	210	No	0.28
	45	212	208	Yes	0.50	211	Yes	0.50	212	Yes	0.50
	50	212	210	Yes	0.60	212	Yes	0.57	213	Yes	0.62
	55	212	211	Yes	0.65	214	Yes	0.70	215	Yes	0.81
	60	212	213	Yes	0.70	216	Yes	0.81	217	Yes	0.93
	65	212	215	Yes	0.79	217	Yes	0.85	219	Yes	0.98
	70	212	217	Yes	0.85	219	Yes	0.92	221	Yes	>0.99
	75	212	219	Yes	0.88	221	Yes	0.96	223	Yes	>0.99
	80	212	221	Yes	0.93	223	Yes	0.98	225	Yes	>0.99
	85	212	223	Yes	0.96	226	Yes	>0.99	228	Yes	>0.99
	90	212	227	Yes	0.99	229	Yes	>0.99	231	Yes	>0.99
	95	212	231	Yes	>0.99	234	Yes	>0.99	236	Yes	>0.99

References

- Kolen, M. J., & Brennan, R. L. (2004). *Test equating, scaling, and linking*. New York: Springer.
- Lumley, T. (2019). *Survey: Analysis of complex survey samples*. R package version 3.36. Retrieved from <https://CRAN.R-project.org/package=survey>.
- Ohio Department of Education (ODE). (2017, August). *Annual technical report: Ohio's State Tests in English language arts, mathematics, science, and social studies, 2016–2017 school year*. Retrieved from https://oh.portal.airast.org/core/fileparse.php/3094/urlt/OST_Annual_Technical_Report_Spring2017.pdf.
- Pommerich, M., Hanson, B., Harris, D., & Sconing, J. (2004). Issues in conducting linkage between distinct tests. *Applied Psychological Measurement*, 28(4), 247–273.
- Thum, Y. M., & Kuhfeld, M. (2020). *NWEA 2020 MAP Growth achievement status and growth norms for students and schools*. NWEA Research Report. Portland, OR: NWEA.