

Predicting Proficiency on the Michigan State Assessment System based on NWEA MAP Growth Scores

May 2023

NWEA Psychometric Solutions

Linking Study Updates

Date	Description
2012-04	Initial linking study conducted for Michigan Mathematics and Reading using Spring 2011 data.
2016-12	Updated linking study using Spring 2016 data for Mathematics & ELA in Grades 3–8.
2020-12-22	Incorporated the 2020 MAP Growth norms using Spring 2019 data for Mathematics & ELA/Reading in Grades 3–8.
2023-05-24	Updated linking study results for Science in Grades 5 and 8 using Spring 2022 data to provide MAP Growth cut scores corresponding to the new M-STEP Science summative assessment administered for the first operational test in Spring 2022. Removed the “Read by Grade 3 Program” section because the retention law was recently repealed.

Acknowledgements: This report benefited from the project management and editorial assistance of Debbie Bauman, the data analysis of Sarah-Truclinh Tran, psychometric analysis of Yuhong Ji, and the psychometric leadership of Ann Hu. We appreciate our colleagues at NWEA who assisted in partner recruitment and are grateful to all our partners who provided data for the study.

© 2023 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.

Table of Contents

Executive Summary	4
1. Introduction	7
1.1. Purpose of the Study.....	7
1.2. Assessment Overview.....	7
2. Methods	9
2.1. Data Collection.....	9
2.2. Post-Stratification Weighting	9
2.3. Descriptive Statistics	9
2.4. MAP Growth Cut Scores	10
2.5. Classification Accuracy	11
2.6. Proficiency Projections.....	11
3. Results.....	13
3.1. Study Sample.....	13
3.2. Descriptive Statistics	17
3.3. MAP Growth Cut Scores	17
3.4. Classification Accuracy	21
3.5. Proficiency Projections.....	22
4. References.....	32

List of Tables

Table 2.1. Description of Classification Accuracy Summary Statistics	11
Table 3.1. Linking Study Sample Demographics (Unweighted)	13
Table 3.2. Michigan Student Population Demographics	14
Table 3.3. Linking Study Sample Demographics (Weighted).....	16
Table 3.4. Descriptive Statistics of Test Scores.....	17
Table 3.5. MAP Growth Cut Scores—Mathematics.....	19
Table 3.6. MAP Growth Cut Scores—ELA/Reading	20
Table 3.7. MAP Growth Cut Scores—Science	21
Table 3.8. Classification Accuracy Results	22
Table 3.9. Proficiency Projections based on RIT Scores—Mathematics.....	23
Table 3.10. Proficiency Projections based on RIT Scores—ELA/Reading.....	27
Table 3.11. Proficiency Projections based on RIT Scores—Science	31

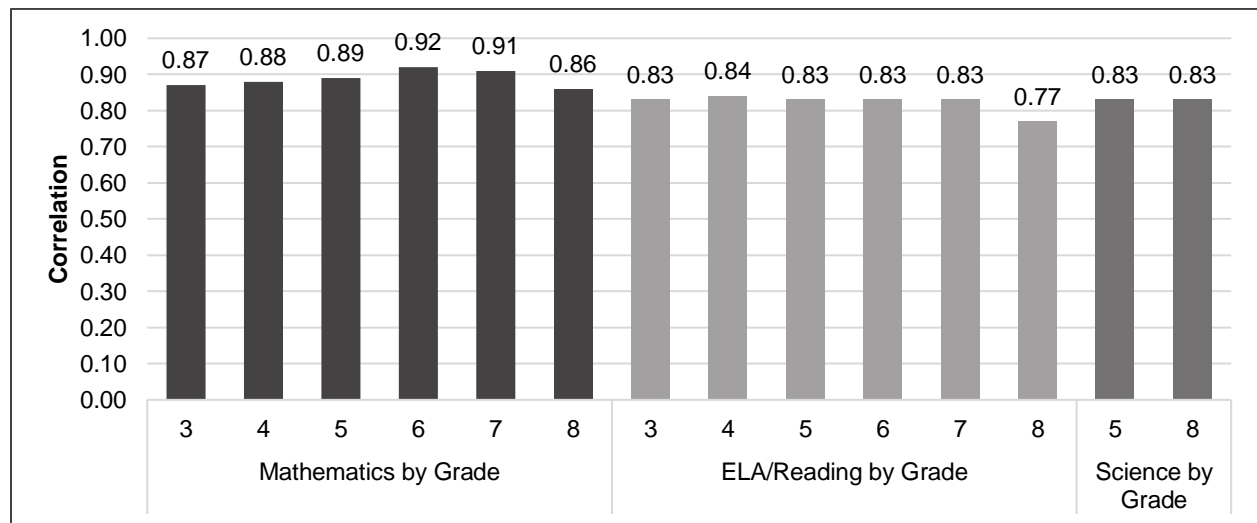
Executive Summary

Linking studies allow partners to use MAP® Growth™ Rasch Unit (RIT) scores throughout the year to predict their students’ likely performance levels on the state summative assessment. This is accomplished through statistical analyses that produce RIT cut scores that correspond to the state summative performance levels. A *cut score* is the minimum score a student must get on a test to be placed in a certain performance level. The linking study for the Michigan state assessment system described in this report provides RIT cut scores for the fall, winter, and spring MAP Growth administrations that correspond to performance levels for the Michigan Student Test of Education Progress (M-STEP) Mathematics and English Language Arts (ELA) in Grades 3–7 and PSAT™ 8/9 in Grade 8 and for M-STEP Science in Grades 5 and 8.

The linking study is based on test scores from students who took both the MAP Growth and the Michigan state assessments in Mathematics and ELA/Reading in Spring 2019 and Science in Spring 2022 for the targeted grades. The linking study sample for Mathematics and ELA/Reading in 2019 included 44,013 students across 37 districts and 153 schools in Michigan, and the linking study sample for Science in 2022 included 4,759 students across 27 districts and 55 schools in Michigan. Scores from the state and MAP Growth tests were used as the basis for linking the two assessments together.

Before the linking analyses began, NWEA confirmed that the MAP Growth and Michigan’s state assessments are aligned on the same or similar set of content standards to warrant a connection. The link between the two tests was further investigated by calculating the Pearson correlation coefficients that describe the relationship between the specific MAP Growth and M-STEP or PSAT test scores. At NWEA, we consider a correlation of $r \geq 0.70$ as “high” correlation and acceptable for publishing. This indicates that students who perform well on one assessment also tend to perform well on the other, and vice versa. A perfect positive correlation is 1.00. The correlations between the MAP Growth and Michigan’s state test scores from Spring 2019 and Spring 2022, shown below, are consistent with our expectations that MAP Growth is a good assessment for predicting performance on Michigan’s state assessments.

Figure E.1. Correlations between MAP Growth and Michigan’s State Test Scores



The equipercentile linking method and the 2020 MAP Growth norms (Thum & Kuhfeld, 2020) were then used to produce the RIT cut scores that correspond to performance on Michigan’s state assessment for every subject and grade. While RIT cut scores were generated for every performance level on Michigan’s state assessment, Table E.1 presents the *Proficient* cut scores that indicate the minimum score a student must get to be considered *Proficient* or higher.

Table E.1. MAP Growth RIT Cut Scores for Michigan’s State Assessment Proficiency

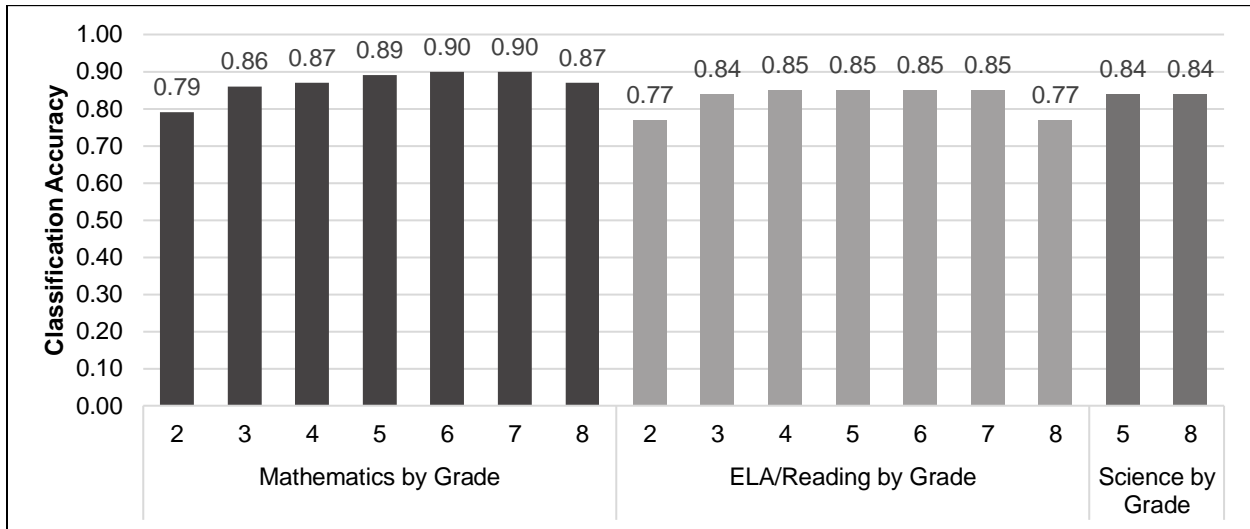
Assessment		Proficient Cut Scores by Grade						
		2	3	4	5	6	7	8*
Mathematics								
M-STEP/PSAT Spring		–	1300	1400	1500	1600	1700	430
MAP Growth Mathematics	Fall	179	192	204	217	221	226	229
	Winter	188	199	211	223	226	230	232
	Spring	193	204	215	227	229	233	234
ELA/Reading								
M-STEP/PSAT Spring		–	1300	1400	1500	1600	1700	390
MAP Growth Reading	Fall	181	193	201	208	215	219	221
	Winter	189	200	207	212	219	222	223
	Spring	193	203	209	214	220	223	224
Science								
M-STEP Spring		–	–	–	1500	–	–	1800
MAP Growth Science	Fall	–	–	–	206	–	–	217
	Winter	–	–	–	210	–	–	219
	Spring	–	–	–	211	–	–	220

*Data for Mathematics and ELA/Reading are from the PSAT 8/9.

Educators can use these cut scores to determine whether students are on track for proficiency on the state assessment. For example, the *Proficient* cut score on the Grade 3 M-STEP Mathematics test is 1300. A Grade 3 student with a MAP Growth Mathematics RIT score of 192 in the fall is likely to meet proficiency on the M-STEP Mathematics test in the spring, whereas a Grade 3 student with a RIT score lower than 192 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 M-STEP assessment by Grade 3.

As further evidence that MAP Growth scores can be used to predict students’ proficiency on the state test, NWEA calculated classification accuracy statistics that show how well the RIT scores can correctly classify, or predict, students as proficient on the state tests. For example, the Grade 3 MAP Growth Mathematics cut score correctly classified students’ proficiency (*Proficient* or higher) on the M-STEP Mathematics test 86% of the time. A high statistic indicates high accuracy. Overall, MAP Growth scores have a high accuracy rate of identifying student proficiency on the M-STEP tests, as illustrated below.

Figure E.2. Accuracy of MAP Growth Classifications



*Data for Grade 8 in Mathematics and ELA/Reading are from the PSAT 8/9.

Please note that the purpose of this report is to explain NWEA’s linking study methodology. It is not meant as the main reference for determining a student’s likely performance on the state summative assessment. The cut scores in this report are based on the default instructional weeks most encountered for each term (i.e., Weeks 4, 20, and 32 for fall, winter, and spring), whereas instructional weeks often vary by district. The cut scores in this report may therefore differ from the results in the NWEA reporting system that reflect the specific instructional weeks set by partners. Partners should therefore reference their MAP Growth score reports instead.

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 to statistically connect Rasch Unit (RIT) scores from the MAP Growth assessments with scores from the Michigan state assessment system including the Michigan Student Test of Education Progress (M-STEP) Mathematics and English Language Arts (ELA) in Grades 3–7 and PSAT™ 8/9 in Grade 8 taken during the Spring 2019 term and for M-STEP Science in Grades 5 and 8 taken during the Spring 2022 term.¹ MAP Growth cut scores are also included for Grade 2 in Mathematics and ELA/Reading so educators can track early learners' progress toward proficiency on the M-STEP test by Grade 3. Specifically, this report presents the following results:

1. Student sample demographics
2. Descriptive statistics of test scores
3. MAP Growth cut scores from fall, winter, and spring that correspond to the performance levels on the spring Michigan state assessments
4. Classification accuracy statistics to determine the degree to which MAP Growth accurately predicts student proficiency status on the Michigan state assessments
5. The probability of achieving grade-level proficiency on the Michigan state assessments based on MAP Growth RIT scores from fall, winter, and spring

The linking study has been updated since the previous version published in December 2020 to provide MAP Growth cut scores corresponding to the new M-STEP Science summative assessment administered for the first operational test in Spring 2022.

1.2. Assessment Overview

The M-STEP assessments are administered to students in Grades 3–7 for Mathematics and ELA, and in Grades 5 and 8 for Science to measure their knowledge of Michigan's academic standards. The PSAT 8/9 measures performance in Grade 8 for Mathematics and ELA. Based on their test scores, students are placed into one of four performance levels: *Not Proficient*, *Partially Proficient*, *Proficient*, and *Advanced*. The *Proficient* cut score demarks the minimum level of achievement considered to be proficient for accountability purposes.

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 to 350. NWEA conducts norming studies of student and school performance

¹ This study provides MAP Growth cut scores that predict proficiency on the M-STEP for Grades 2–8 only. They represent a higher level of achievement than universal screening cut scores designed to identify students with the most severe learning difficulties who may need intensive intervention. MAP Growth universal screening cut scores for Grades K–8 in Mathematics and Reading are available in a separate report (He & Meyer, 2021).

on MAP Growth assessments to aid the interpretation of scores. Growth norms provide expected score gains for a test from term to term, such as from fall to spring terms. 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 Michigan state assessments in Spring 2019 administrations of the MAP Growth and M-STEP or PSAT Mathematics and ELA/Reading assessments and Spring 2022 administrations of the MAP Growth and M-STEP Science assessments. NWEA recruited Michigan districts to participate in the study by sharing their student and score data for the target term. Districts also gave NWEA permission to use their students' MAP Growth scores from the NWEA in-house database. Once state score information was received by NWEA, each student's state testing record was matched to their MAP Growth score based on 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 Michigan's state assessments in Spring 2019 for Mathematics and ELA or Spring 2022 for Science 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's test-taking student population in terms of race, sex, and performance level. These variables were selected because they are known to be correlated with students' academic achievement and are often available in state summative assessment reports. The weighted sample will match the target population as closely as possible on the key demographics and performance characteristics as defined by the state.

A raking procedure was used to calculate the post-stratification weights that either compensate for the underrepresentation of certain groups or attenuate the overrepresentation of certain groups. Raking uses iterative procedures to obtain weights that match sample marginal distributions to known population margins. The following steps were taken during this process:

1. Calculate marginal distributions of race, sex, and performance level for the sample and population.
2. Calculate post-stratification weights with the rake function from the survey package in R (Lumley, 2019).
3. Trim the weights that are outside the range of 0.3 to 3.0.
4. Apply the weights to the sample before conducting the linking study analyses.

2.3. Descriptive Statistics

Descriptive statistics are provided to summarize the test scores for both the MAP Growth and Michigan's state assessments, including the test score mean, standard deviation (SD), minimum, and maximum. The mean presents the average test scores across all students in the study sample, and the SD indicates the variability of test scores, revealing how students' scores are distributed around the average score, or mean. Correlation coefficients between the MAP Growth RIT scores and Michigan's state test scores are also provided to answer the question, "How well do the test scores from MAP Growth that reference the RIT scale correlate to the scores obtained from the Michigan state test that references some other scale in the same subject?" The correlations were calculated as follows:

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}} \quad (1)$$

where r is the correlation coefficient, x_i and y_i are the values of the x- and y-variables in a sample, and \bar{x} and \bar{y} are the mean of the values of the x- and y-variables.

2.4. MAP Growth Cut Scores

MAP Growth cut scores that predict student achievement on the Michigan assessments are reported for Grades 3–8, as well as for Grade 2 so educators can track early learners' progress toward proficiency on the M-STEP test by Grade 3. Percentile ranks based on the 2020 NWEA norms are also provided. These are useful for understanding how students' scores compare to peers nationwide and the relative rigor of a state's performance level designations for its summative assessment.

The equipercentile linking method (Kolen & Brennan, 2004) was used to identify the spring MAP Growth RIT scores for Grades 3–8 that correspond to the spring Michigan state summative assessment performance level cut scores. 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., Michigan's state assessment). 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 2:

$$e_y(x) = G^{-1}[P(x)] \quad (2)$$

where $e_y(x)$ is the equipercentile equivalent of score x on M-STEP or PSAT on the scale of MAP Growth, $P(x)$ is the percentile rank of a given score on Michigan's state assessments, 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 to spring within the same grade or from spring of a lower grade to spring of the adjacent higher grade. This information was used to calculate the fall and winter cut scores for Grades 3–8. Equation 3 was used to determine the previous term's MAP Growth score needed to reach the spring cut score, considering the expected growth associated with the previous RIT score:

$$RIT_{PredSpring} = RIT_{previous} + g \quad (3)$$

where:

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

Students do not take the M-STEP assessment in Grade 2. Therefore, the MAP Growth conditional growth norms were also used to estimate the fall, winter, and spring cuts in Grade 2 that are needed to meet M-STEP proficiency in Grade 3. To derive the Grade 2 spring cut scores, the growth score from spring of one year to the next was used (i.e., the growth score from spring of Grade 2 to spring of Grade 3). The estimations of fall and winter cuts followed the same process as above for Grades 3–8. For example, the projected growth from fall to spring in Grade 2 was used to calculate the fall cuts for Grade 2.

2.5. Classification Accuracy

The degree to which MAP Growth predicts student proficiency status on the Michigan state tests can be described using classification accuracy statistics based on the MAP Growth spring RIT cut scores. The results show the proportion of students correctly classified by their RIT scores as proficient or not proficient on the state test. The classification accuracy statistics for Grade 2 were calculated by obtaining current Grade 3 students' MAP Growth scores from the previous year. Thus, the classification accuracy statistics for Grade 2 represent how well these estimated RIT cuts predict proficiency in the M-STEP assessments in Grades 3 for our study sample. Table 2.1 describes the classification accuracy statistics provided in this report (Pommerich et al., 2004).

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.

2.6. Proficiency Projections

Given that all test scores contain measurement errors, reaching the *Proficient* RIT cut does not guarantee that the student is proficient at the state test. Instead, we can claim that a student with the RIT cut score has a 50% chance of reaching proficiency on the state test, with their chances increasing the greater their score is from the cut. The proficiency projections indicate these probabilities for various RIT scores throughout the year.

In addition to calculating the MAP Growth fall and winter cut scores (and the projected Grade 2 cut scores), the MAP Growth conditional growth norms data were also used to calculate the probability of reaching proficiency on the M-STEP test in the spring based on a student's RIT scores from fall and winter (see Equation 4).

$$Pr(\text{Achieving Proficient in spring} | \text{starting RIT}) = \Phi \left(\frac{RIT_{previous} + g - RIT_{SpringCut}}{SD} \right) \quad (4)$$

where:

- Φ is the standard normal cumulative distribution function.
- $RIT_{previous}$ 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 cut score associated with state proficiency in 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 5 was used to estimate the probability of a student achieving *Proficient* performance on the Michigan state test based on their spring RIT score (RIT_{Spring}):

$$Pr(\text{Achieving Proficient in spring} \mid \text{spring RIT}) = \Phi\left(\frac{RIT_{Spring} - RIT_{SpringCut}}{SE}\right) \quad (5)$$

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 the Michigan state assessments in Spring 2019 or Spring 2022 for the target subjects were included in the sample. Data for the Mathematics and ELA/Reading in 2019 were collected from 37 districts and 153 schools, and data for the Science in 2022 from 27 districts and 55 schools in Michigan. Table 3.1 presents the distributions of student race, sex, and performance level in the original unweighted study sample. Table 3.2 presents the distributions of the target population of students who took the Michigan state tests in Spring 2019 or Spring 2022. Since the original study sample is different from the target Michigan student population, post-stratification weights were applied. Table 3.3 presents the demographic distributions of the final analytic sample after weighting, which are almost identical to the Michigan student population distributions.

Table 3.1. Linking Study Sample Demographics (Unweighted)

Linking Study Sample (Unweighted)							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
Mathematics							
	Total N	7,528	7,702	7,633	8,057	6,903	5,483
Race*	AI/AN	0.3	0.4	0.4	0.3	0.4	0.4
	Asian	2.8	2.7	2.6	2.7	2.1	2.5
	Black	13.2	13.3	11.6	12.6	14.6	13.8
	Hispanic	5.1	5.3	5.1	5.4	5.7	5.7
	Multi-Race	4.0	3.6	3.9	3.3	3.6	3.6
	NH/PI	0.1	0.2	0.1	0.2	0.2	0.1
	White	74.3	74.4	76.3	75.4	73.4	73.8
Sex	Female	50.2	49.6	50.3	49.9	49.3	49.5
	Male	49.8	50.4	49.7	50.1	50.7	50.5
Performance Level	<i>Not Proficient</i>	24.1	22.2	31.8	30.6	34.8	23.3
	<i>Partially Proficient</i>	26.2	34.9	30.4	31.3	30.5	34.6
	<i>Proficient</i>	29.7	26.4	19.9	20.8	19.7	27.5
	<i>Advanced</i>	20.0	16.5	17.8	17.4	15.0	14.6
ELA/Reading							
	Total N	7,503	7,636	7,653	8,031	6,860	5,733
Race*	AI/AN	0.3	0.4	0.4	0.3	0.4	0.5
	Asian	2.8	2.7	2.5	2.7	2.1	2.5
	Black	13.3	13.5	11.6	12.7	14.4	14.1
	Hispanic	5.1	5.3	5.1	5.3	5.7	5.6
	Multi-Race	4.0	3.5	4.0	3.3	3.5	3.5
	NH/PI	0.1	0.2	0.1	0.2	0.2	0.1
	White	74.3	74.4	76.3	75.4	73.6	73.8
Sex	Female	50.2	49.6	50.3	49.8	49.0	49.4
	Male	49.8	50.4	49.7	50.2	51.0	50.6

Linking Study Sample (Unweighted)							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
Performance Level	<i>Not Proficient</i>	27.8	31.7	29.8	29.5	31.0	20.5
	<i>Partially Proficient</i>	25.4	20.9	21.3	26.2	27.5	14.3
	<i>Proficient</i>	23.8	23.0	29.9	29.4	30.3	22.8
	<i>Advanced</i>	23.0	24.4	19.0	14.8	11.3	42.4
Science							
Total N		–	–	1,583	–	–	3,176
Race*	AI/AN	–	–	0.6	–	–	1.5
	Asian and NH/PI	–	–	1.5	–	–	1.2
	Black or African American	–	–	16.9	–	–	11.5
	Hispanic	–	–	7.0	–	–	8.7
	Two or More	–	–	5.4	–	–	5.4
	White	–	–	68.6	–	–	71.7
Sex	Female	–	–	48.6	–	–	47.7
	Male	–	–	51.4	–	–	52.3
Performance Level	<i>Not Proficient</i>	–	–	33.1	–	–	35.8
	<i>Partially Proficient</i>	–	–	34.1	–	–	33.4
	<i>Proficient</i>	–	–	20.5	–	–	23.8
	<i>Advanced</i>	–	–	12.3	–	–	7.0

*AI/AN = American Indian/Alaska Native. NH/PI = Native Hawaiian or Other Pacific Islander The race categories reflect the Michigan state test performance reports from each testing term. As such, the categories for Science based on Spring 2022 data differ slightly from those reported for Mathematics and ELA based on Spring 2019 data.

Table 3.2. Michigan Student Population Demographics

Michigan Student Population							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
Mathematics (Spring 2019)							
Total N		101,019	102,602	105,272	109,108	109,072	107,591
Race*	AI/AN	0.5	0.6	0.6	0.7	0.6	0.7
	Asian	3.6	3.5	3.4	3.4	3.4	3.5
	Black	18.8	18.5	17.8	17.4	17.3	16.8
	Hispanic	8.4	8.2	8.4	8.4	8.1	8.3
	Multi-Race	4.8	4.6	4.6	4.2	4.2	3.7
	NH/PI	0.1	0.1	0.1	0.1	0.1	0.1
	White	63.8	64.5	65.2	65.9	66.3	67.0
Sex	Female	49.0	49.0	49.0	49.0	49.3	49.2
	Male	51.0	51.0	51.0	51.0	50.7	50.8
Performance Levels	<i>Not Proficient</i>	27.5	24.7	36.5	34.3	35.9	27.0
	<i>Partially Proficient</i>	25.8	33.5	28.7	30.6	28.3	31.6
	<i>Proficient</i>	27.2	25.2	18.0	19.0	19.3	26.4
	<i>Advanced</i>	19.5	16.6	16.9	16.2	16.4	15.0

Michigan Student Population							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
ELA (Spring 2019)							
Total N		100,793	102,327	105,078	108,948	108,975	107,518
Race*	AI/AN	0.5	0.6	0.6	0.7	0.6	0.7
	Asian	3.5	3.4	3.3	3.3	3.4	3.5
	Black	18.8	18.5	17.8	17.4	17.3	16.8
	Hispanic	8.4	8.2	8.3	8.3	8.1	8.3
	Multi-Race	4.9	4.6	4.6	4.2	4.2	3.7
	NH/PI	0.1	0.1	0.1	0.1	0.1	0.1
	White	63.8	64.6	65.3	66.0	66.3	67.0
Sex	Female	49.0	49.1	49.0	49.0	49.3	49.2
	Male	51.0	50.9	51.0	51.0	50.7	50.8
Performance Level	<i>Not Proficient</i>	30.4	33.4	32.3	31.7	29.7	22.4
	<i>Partially Proficient</i>	24.5	20.8	21.5	26.6	27.6	15.7
	<i>Proficient</i>	22.4	21.6	28.5	28.2	30.2	22.0
	<i>Advanced</i>	22.7	24.3	17.7	13.5	12.5	39.9
Science (Spring 2022)							
Total N		–	–	98,246	–	–	101,585
Race*	AI/AN	–	–	0.5	–	–	0.6
	Asian and NH/PI	–	–	3.7	–	–	3.6
	Black or African American	–	–	18.0	–	–	16.8
	Hispanic	–	–	8.9	–	–	8.8
	Two or More	–	–	5.1	–	–	4.8
	White	–	–	63.7	–	–	65.5
Sex	Female	–	–	48.9	–	–	49.0
	Male	–	–	51.1	–	–	51.0
Performance Level	<i>Not Proficient</i>	–	–	30.8	–	–	32.2
	<i>Partially Proficient</i>	–	–	31.0	–	–	31.5
	<i>Proficient</i>	–	–	21.3	–	–	26.5
	<i>Advanced</i>	–	–	16.9	–	–	9.8

*AI/AN = American Indian/Alaska Native. NH/PI = Native Hawaiian or Other Pacific Islander. Asian and NH/PI racial groups were combined for Science due to their low counts in the data.

Table 3.3. Linking Study Sample Demographics (Weighted)

Linking Study Sample (Weighted)							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
Mathematics							
Total N		7,529	7,702	7,633	8,056	6,903	5,483
Race*	AI/AN	0.5	0.6	0.6	0.7	0.6	0.7
	Asian	3.6	3.5	3.4	3.4	3.4	3.5
	Black	18.8	18.5	17.8	17.4	17.3	16.8
	Hispanic	8.4	8.2	8.4	8.4	8.1	8.3
	Multi-Race	4.8	4.6	4.6	4.2	4.2	3.7
	NH/PI	0.1	0.1	0.1	0.1	0.1	0.1
	White	63.8	64.5	65.2	65.9	66.3	67.0
Sex	Female	49.0	49.0	49.0	49.0	49.3	49.2
	Male	51.0	51.0	51.0	51.0	50.7	50.8
Performance Level	<i>Not Proficient</i>	27.5	24.7	36.5	34.3	35.9	27.0
	<i>Partially Proficient</i>	25.8	33.5	28.7	30.6	28.3	31.6
	<i>Proficient</i>	27.2	25.2	18.0	19.0	19.3	26.4
	<i>Advanced</i>	19.5	16.6	16.8	16.2	16.4	15.0
ELA/Reading							
Total N		7,503	7,636	7,652	8,030	6,860	5,733
Race*	AI/AN	0.5	0.6	0.6	0.7	0.6	0.7
	Asian	3.5	3.4	3.4	3.3	3.4	3.5
	Black	18.8	18.5	17.8	17.4	17.3	16.8
	Hispanic	8.4	8.2	8.3	8.3	8.1	8.3
	Multi-Race	4.9	4.6	4.6	4.2	4.2	3.7
	NH/PI	0.1	0.1	0.1	0.1	0.1	0.1
	White	63.8	64.6	65.3	66.0	66.3	67.0
Sex	Female	49.0	49.1	49.0	49.0	49.3	49.2
	Male	51.0	50.9	51.0	51.0	50.7	50.8
Performance Level	<i>Not Proficient</i>	30.4	33.4	32.3	31.7	29.7	22.4
	<i>Partially Proficient</i>	24.5	20.8	21.5	26.6	27.6	15.7
	<i>Proficient</i>	22.4	21.5	28.5	28.2	30.2	22.0
	<i>Advanced</i>	22.7	24.3	17.7	13.5	12.5	39.9
Science							
Total N		–	–	1,583	–	–	3,176
Race*	AI/AN	–	–	0.5	–	–	0.6
	Asian and NH/PI	–	–	3.7	–	–	3.6
	Black or African American	–	–	18.0	–	–	16.8
	Hispanic	–	–	8.9	–	–	8.8
	Two or More	–	–	5.1	–	–	4.8
	White	–	–	63.7	–	–	65.5
Sex	Female	–	–	48.9	–	–	49.0
	Male	–	–	51.1	–	–	51.0

Linking Study Sample (Weighted)							
Demographic Subgroup		%Students by Grade					
		3	4	5	6	7	8
Performance Level	<i>Not Proficient</i>	–	–	30.8	–	–	32.2
	<i>Partially Proficient</i>	–	–	31.0	–	–	31.5
	<i>Proficient</i>	–	–	21.3	–	–	26.5
	<i>Advanced</i>	–	–	16.9	–	–	9.8

*AI/AN = American Indian/Alaska Native. NH/PI = Native Hawaiian or Other Pacific Islander. Asian and NH/PI racial groups were combined for Science due to their low counts in the data.

3.2. Descriptive Statistics

Table 3.4 presents descriptive statistics of the MAP Growth and Michigan’s state test scores from Spring 2019 and Spring 2022, including the correlation coefficient (r) between them. The correlations between the scores range from 0.86 to 0.92 for Mathematics, 0.77 to 0.84 for ELA/Reading, and 0.83 for Science. These values indicate a high positive correlation among the scores, which is important validity evidence for the claim that MAP Growth scores are good predictors of performance on the Michigan state summative assessments.

Table 3.4. Descriptive Statistics of Test Scores

Grade	N	r	Michigan State Tests				MAP Growth*			
			Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
Mathematics										
3	7,529	0.87	1296.8	27.1	1217	1361	201.6	13.7	141	255
4	7,702	0.88	1393.8	24.9	1310	1455	211.1	14.6	139	269
5	7,633	0.89	1487.7	26.0	1409	1550	218.7	16.8	148	288
6	8,056	0.92	1588.0	25.4	1518	1650	221.0	16.7	147	291
7	6,903	0.91	1688.4	25.9	1621	1752	225.9	17.5	159	294
8*	5,483	0.86	415.8	85.6	120	720	229.2	18.8	144	291
ELA/Reading										
3	7,503	0.83	1295.3	25.9	1218	1357	198.4	15.0	148	237
4	7,636	0.84	1395.6	25.9	1317	1454	205.4	14.4	148	250
5	7,652	0.83	1496.1	27.0	1409	1560	210.6	14.4	151	251
6	8,030	0.83	1592.9	26.1	1508	1655	215.4	14.1	161	260
7	6,860	0.83	1693.9	26.2	1618	1753	218.4	14.6	159	265
8*	5,733	0.77	423.4	82.8	120	710	220.4	15.3	160	267
Science										
5	1,583	0.83	1491.9	25.1	1429	1563	206.2	12.6	163	244
8	3,176	0.83	1790.6	25.1	1727	1868	213.5	14.3	166	263

*SD = standard deviation. Min. = minimum. Max. = maximum. Grade 8 Mathematics and ELA/Reading are from the PSAT 8/9.

3.3. MAP Growth Cut Scores

Table 3.5, Table 3.6, and Table 3.7 present the Michigan summative assessments scale score ranges and the corresponding MAP Growth RIT cut scores and percentile ranges by content area and grade. Bolded numbers highlight the cut scores considered to be proficient for accountability purposes. These tables can be used to gauge a student’s likely performance level

on the Michigan spring assessment when MAP Growth is taken in the fall, winter, or spring. For example, a Grade 3 student who obtained a MAP Growth Mathematics RIT score of 192 in the fall is likely to achieve *Proficient* performance on the M-STEP Mathematics test. The same is true for a Grade 3 student who obtained a MAP Growth Mathematics RIT score of 204 in the spring. The spring cut score is higher than the fall cut score because of expected growth during the school year as students receive more instruction.

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 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 substantially from the default ones, a student's expected performance level could be different from the projections presented in this report. Partners are therefore encouraged to use the projected performance level in students' score reports since they reflect the specific instructional weeks set by partners.

Table 3.5. MAP Growth Cut Scores—Mathematics

Michigan Mathematics State Test								
Grade	Not Proficient		Partially Proficient		Proficient		Advanced	
3	1217–1280		1281–1299		1300–1320		1321–1361	
4	1310–1375		1376–1399		1400–1419		1420–1455	
5	1409–1477		1478–1499		1500–1514		1515–1550	
6	1518–1578		1579–1599		1600–1613		1614–1650	
7	1621–1678		1679–1699		1700–1715		1716–1752	
8*	120–369		370–429		430–509		510–720	
MAP Growth Mathematics								
Grade	Not Proficient		Partially Proficient		Proficient		Advanced	
	RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile
Fall								
2	100–167	1–28	168–178	29–61	179–188	62–85	189–350	86–99
3	100–181	1–31	182–191	32–59	192–200	60–81	201–350	82–99
4	100–189	1–24	190–203	25–61	204–214	62–85	215–350	86–99
5	100–202	1–33	203–216	34–69	217–225	70–86	226–350	87–99
6	100–206	1–31	207–220	32–64	221–229	65–82	230–350	83–99
7	100–213	1–35	214–225	36–62	226–236	63–82	237–350	83–99
8	100–214	1–29	215–228	30–58	229–244	59–85	245–350	86–99
Winter								
2	100–176	1–28	177–187	29–61	188–196	62–83	197–350	84–99
3	100–189	1–31	190–198	32–57	199–207	58–80	208–350	81–99
4	100–196	1–26	197–210	27–62	211–221	63–85	222–350	86–99
5	100–208	1–35	209–222	36–69	223–231	70–85	232–350	86–99
6	100–211	1–32	212–225	33–64	226–234	65–81	235–350	82–99
7	100–216	1–34	217–229	35–62	230–240	63–82	241–350	83–99
8	100–218	1–31	219–231	32–57	232–247	58–84	248–350	85–99
Spring								
2	100–182	1–31	183–192	32–60	193–201	61–82	202–350	83–99
3	100–194	1–32	195–203	33–57	204–212	58–79	213–350	80–99
4	100–200	1–26	201–214	27–60	215–225	61–83	226–350	84–99
5	100–212	1–36	213–226	37–68	227–235	69–84	236–350	85–99
6	100–214	1–32	215–228	33–63	229–237	64–80	238–350	81–99
7	100–219	1–35	220–232	36–62	233–243	63–81	244–350	82–99
8	100–220	1–31	221–233	32–56	234–249	57–83	250–350	84–99

*Grade 8 Mathematics is from the PSAT 8/9.

Table 3.6. MAP Growth Cut Scores—ELA/Reading

Michigan ELA State Test									
Grade	Not Proficient		Partially Proficient		Proficient		Advanced		
3	1203–1279		1280–1299		1300–1316		1317–1357		
4	1301–1382		1383–1399		1400–1416		1417–1454		
5	1409–1480		1481–1499		1500–1523		1524–1560		
6	1508–1577		1578–1599		1600–1623		1624–1655		
7	1618–1678		1679–1699		1700–1725		1726–1753		
8*	120–359		360–389		390–439		440–720		

MAP Growth Reading									
Grade	Not Proficient		Partially Proficient		Proficient		Advanced		
	RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile	
Fall									
2	100–163	1–28	164–180	29–71	181–190	72–88	191–350	89–99	
3	100–178	1–31	179–192	32–64	193–202	65–83	203–350	84–99	
4	100–190	1–36	191–200	37–59	201–210	60–79	211–350	80–99	
5	100–197	1–34	198–207	35–58	208–218	59–80	219–350	81–99	
6	100–202	1–32	203–214	33–61	215–226	62–84	227–350	85–99	
7	100–206	1–32	207–218	33–60	219–231	61–85	232–350	86–99	
8	100–207	1–27	208–220	28–56	221–232	57–80	233–350	81–99	
Winter									
2	100–172	1–28	173–188	29–69	189–197	70–86	198–350	87–99	
3	100–186	1–32	187–199	33–64	200–207	65–80	208–350	81–99	
4	100–196	1–36	197–206	37–60	207–214	61–77	215–350	78–99	
5	100–202	1–34	203–211	35–56	212–222	57–80	223–350	81–99	
6	100–206	1–32	207–218	33–62	219–228	63–82	229–350	83–99	
7	100–209	1–32	210–221	33–61	222–232	62–83	233–350	84–99	
8	100–210	1–27	211–222	28–55	223–233	56–78	234–350	79–99	
Spring									
2	100–177	1–30	178–192	31–67	193–201	68–85	202–350	86–99	
3	100–190	1–34	191–202	35–63	203–210	64–79	211–350	80–99	
4	100–199	1–37	200–208	38–59	209–216	60–76	217–350	77–99	
5	100–204	1–34	205–213	35–56	214–223	57–78	224–350	79–99	
6	100–208	1–34	209–219	35–60	220–229	61–81	230–350	82–99	
7	100–211	1–34	212–222	35–60	223–233	61–82	234–350	83–99	
8	100–212	1–29	213–223	30–55	224–234	56–78	235–350	79–99	

*Grade 8 ELA/Reading is from the PSAT 8/9.

Table 3.7. MAP Growth Cut Scores—Science

Michigan Science State Test									
Grade	Not Proficient		Partially Proficient		Proficient		Advanced		
5	1427–1476		1477–1499		1500–1516		1517–1579		
8	1727–1777		1778–1799		1800–1824		1825–1877		
MAP Growth Science									
Grade	Not Proficient		Partially Proficient		Proficient		Advanced		
	RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile	
Fall									
5	100–191	1–23	192–205	24–68	206–214	69–89	215–350	90–99	
8	100–201	1–27	202–216	28–70	217–229	71–93	230–350	94–99	
Winter									
5	100–195	1–23	196–209	24–68	210–217	69–87	218–350	88–99	
8	100–205	1–30	206–218	31–68	219–230	69–91	231–350	92–99	
Spring									
5	100–198	1–27	199–210	28–64	211–218	65–85	219–350	86–99	
8	100–206	1–31	207–219	32–67	220–231	68–90	232–350	91–99	

3.4. Classification Accuracy

Table 3.8 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 Michigan state tests, providing insight into the predictive validity of MAP Growth. The overall classification accuracy rate ranges from 0.79 to 0.90 for Mathematics, 0.77 to 0.85 for ELA/Reading, and 0.84 for Science. These values suggest that the RIT cut scores are good at classifying students as proficient or not proficient on the Michigan state assessments. For Grade 2, the classification accuracy rate refers to how well the MAP Growth cuts can predict students' proficiency status on M-STEP in Grade 3.

Although the results show that MAP Growth scores can be used to predict student proficiency with relatively high accuracy on the Michigan's state tests, there is a notable limitation to how these results should be used and interpreted. The Michigan state summative assessments 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 3.8. Classification Accuracy Results

Grade	N	Cut Score		Class. Accuracy*	Rate*		Sensitivity	Specificity	Precision	AUC*
		MAP Growth	Michigan		FP	FN				
Mathematics										
2	4,961	193	1300	0.79	0.24	0.18	0.82	0.76	0.77	0.88
3	7,529	204	1300	0.86	0.15	0.14	0.86	0.85	0.84	0.94
4	7,702	215	1400	0.87	0.12	0.14	0.86	0.88	0.84	0.95
5	7,633	227	1500	0.89	0.08	0.18	0.82	0.92	0.85	0.96
6	8,056	229	1600	0.90	0.07	0.16	0.84	0.93	0.87	0.97
7	6,903	233	1700	0.90	0.08	0.13	0.87	0.92	0.86	0.97
8	5,483	234	430	0.87	0.11	0.17	0.83	0.89	0.85	0.95
ELA/Reading										
2	5,027	193	1300	0.77	0.11	0.37	0.63	0.89	0.82	0.86
3	7,503	203	1300	0.84	0.12	0.19	0.81	0.88	0.84	0.93
4	7,636	209	1400	0.85	0.13	0.16	0.84	0.87	0.84	0.93
5	7,652	214	1500	0.85	0.15	0.16	0.84	0.85	0.83	0.93
6	8,030	220	1600	0.85	0.12	0.18	0.82	0.88	0.83	0.93
7	6,860	223	1700	0.85	0.12	0.19	0.81	0.88	0.84	0.93
8	5,733	224	390	0.77	0.07	0.33	0.67	0.93	0.94	0.90
Science										
5	1,583	211	1500	0.84	0.11	0.22	0.78	0.89	0.81	0.92
8	3,176	220	1800	0.84	0.11	0.24	0.76	0.89	0.80	0.93

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

3.5. Proficiency Projections

Table 3.9, Table 3.10, and Table 3.11 present the estimated probability of achieving *Proficient* performance on the Michigan state tests based on RIT scores from fall, winter, or spring. Due to measurement error in all test scores, the *Proficient* MAP Growth cuts do not guarantee that a student will reach proficiency on Michigan’s state assessments. They instead indicate a 50% chance that a student will reach a particular performance level. Therefore, these projections further elucidate the *Proficient* cut scores by providing the likelihood of reaching proficiency on the Michigan state tests in the spring at a given percentile throughout the year.

For example, the spring Grade 3 *Proficient* RIT cut score for Mathematics is 204, which indicates a 50% chance of achieving proficiency in the spring, as shown in Table 3.9. An educator can also use the table to estimate that a Grade 3 student who obtained a MAP Growth Mathematics score of 188 in the fall has a 15% probability of reaching *Proficient* or higher on the M-STEP test in the spring.

Table 3.9. Proficiency Projections 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	193	154	No	<0.01	163	No	<0.01	167	No	<0.01
	10	193	158	No	<0.01	167	No	<0.01	172	No	<0.01
	15	193	162	No	0.01	171	No	<0.01	175	No	<0.01
	20	193	164	No	0.01	173	No	<0.01	178	No	<0.01
	25	193	166	No	0.03	175	No	0.01	180	No	<0.01
	30	193	168	No	0.06	177	No	0.02	182	No	<0.01
	35	193	170	No	0.11	179	No	0.05	184	No	<0.01
	40	193	172	No	0.18	181	No	0.07	186	No	0.01
	45	193	173	No	0.22	182	No	0.10	188	No	0.04
	50	193	175	No	0.27	184	No	0.20	189	No	0.08
	55	193	177	No	0.38	186	No	0.34	191	No	0.25
	60	193	178	No	0.44	187	No	0.42	193	Yes	0.50
	65	193	180	Yes	0.56	189	Yes	0.58	195	Yes	0.75
	70	193	182	Yes	0.68	191	Yes	0.74	196	Yes	0.85
	75	193	184	Yes	0.78	193	Yes	0.85	198	Yes	0.96
	80	193	186	Yes	0.82	195	Yes	0.93	201	Yes	>0.99
	85	193	188	Yes	0.89	198	Yes	0.98	203	Yes	>0.99
90	193	192	Yes	0.97	201	Yes	>0.99	207	Yes	>0.99	
95	193	196	Yes	0.99	205	Yes	>0.99	212	Yes	>0.99	
3	5	204	166	No	<0.01	174	No	<0.01	178	No	<0.01
	10	204	171	No	<0.01	179	No	<0.01	183	No	<0.01
	15	204	175	No	<0.01	182	No	<0.01	186	No	<0.01
	20	204	177	No	0.01	185	No	<0.01	189	No	<0.01
	25	204	179	No	0.03	187	No	0.01	192	No	<0.01
	30	204	181	No	0.05	189	No	0.02	194	No	<0.01
	35	204	183	No	0.10	191	No	0.04	196	No	<0.01
	40	204	185	No	0.17	193	No	0.10	198	No	0.02
	45	204	187	No	0.26	195	No	0.20	199	No	0.04
	50	204	188	No	0.31	196	No	0.26	201	No	0.15
	55	204	190	No	0.44	198	No	0.42	203	No	0.37
	60	204	192	Yes	0.50	200	Yes	0.58	205	Yes	0.63
	65	204	194	Yes	0.63	201	Yes	0.67	207	Yes	0.85
	70	204	196	Yes	0.74	203	Yes	0.80	208	Yes	0.92
	75	204	198	Yes	0.83	205	Yes	0.90	211	Yes	0.99
	80	204	200	Yes	0.90	208	Yes	0.97	213	Yes	>0.99
	85	204	202	Yes	0.95	210	Yes	0.99	216	Yes	>0.99
90	204	206	Yes	0.99	214	Yes	>0.99	219	Yes	>0.99	
95	204	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	215	176	No	<0.01	182	No	<0.01	185	No	<0.01
	10	215	181	No	<0.01	187	No	<0.01	191	No	<0.01
	15	215	185	No	<0.01	191	No	<0.01	194	No	<0.01
	20	215	187	No	<0.01	194	No	<0.01	197	No	<0.01
	25	215	190	No	0.01	196	No	<0.01	200	No	<0.01
	30	215	192	No	0.03	198	No	<0.01	202	No	<0.01
	35	215	194	No	0.05	200	No	0.01	205	No	<0.01
	40	215	196	No	0.10	202	No	0.03	207	No	<0.01
	45	215	198	No	0.17	204	No	0.07	209	No	0.02
	50	215	200	No	0.26	206	No	0.14	211	No	0.08
	55	215	201	No	0.32	208	No	0.26	212	No	0.15
	60	215	203	No	0.44	210	No	0.42	214	No	0.37
	65	215	205	Yes	0.56	212	Yes	0.58	217	Yes	0.75
	70	215	207	Yes	0.68	214	Yes	0.74	219	Yes	0.92
	75	215	209	Yes	0.79	216	Yes	0.86	221	Yes	0.98
	80	215	212	Yes	0.90	219	Yes	0.96	224	Yes	>0.99
85	215	214	Yes	0.95	221	Yes	0.98	227	Yes	>0.99	
90	215	218	Yes	0.99	225	Yes	>0.99	230	Yes	>0.99	
95	215	223	Yes	>0.99	231	Yes	>0.99	236	Yes	>0.99	
5	5	227	184	No	<0.01	189	No	<0.01	191	No	<0.01
	10	227	190	No	<0.01	194	No	<0.01	197	No	<0.01
	15	227	193	No	<0.01	198	No	<0.01	201	No	<0.01
	20	227	196	No	<0.01	201	No	<0.01	205	No	<0.01
	25	227	199	No	<0.01	204	No	<0.01	207	No	<0.01
	30	227	201	No	0.01	206	No	<0.01	210	No	<0.01
	35	227	203	No	0.02	209	No	<0.01	212	No	<0.01
	40	227	205	No	0.03	211	No	0.01	215	No	<0.01
	45	227	207	No	0.06	213	No	0.02	217	No	<0.01
	50	227	209	No	0.11	215	No	0.05	219	No	<0.01
	55	227	211	No	0.18	217	No	0.10	221	No	0.02
	60	227	213	No	0.27	219	No	0.20	223	No	0.08
	65	227	215	No	0.38	221	No	0.34	225	No	0.25
	70	227	217	Yes	0.50	223	Yes	0.50	228	Yes	0.63
	75	227	219	Yes	0.62	225	Yes	0.66	230	Yes	0.85
	80	227	222	Yes	0.78	228	Yes	0.85	233	Yes	0.98
85	227	225	Yes	0.89	231	Yes	0.95	236	Yes	>0.99	
90	227	229	Yes	0.97	235	Yes	0.99	240	Yes	>0.99	
95	227	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	229	188	No	<0.01	192	No	<0.01	194	No	<0.01
	10	229	194	No	<0.01	198	No	<0.01	200	No	<0.01
	15	229	198	No	<0.01	202	No	<0.01	205	No	<0.01
	20	229	201	No	<0.01	205	No	<0.01	208	No	<0.01
	25	229	204	No	<0.01	208	No	<0.01	211	No	<0.01
	30	229	206	No	0.01	211	No	<0.01	214	No	<0.01
	35	229	209	No	0.03	213	No	<0.01	216	No	<0.01
	40	229	211	No	0.06	215	No	0.01	218	No	<0.01
	45	229	213	No	0.10	217	No	0.03	221	No	<0.01
	50	229	215	No	0.17	220	No	0.10	223	No	0.02
	55	229	217	No	0.27	222	No	0.20	225	No	0.08
	60	229	219	No	0.38	224	No	0.34	227	No	0.25
	65	229	221	Yes	0.50	226	Yes	0.50	230	Yes	0.63
	70	229	223	Yes	0.62	228	Yes	0.66	232	Yes	0.85
	75	229	226	Yes	0.78	231	Yes	0.86	235	Yes	0.98
	80	229	228	Yes	0.86	234	Yes	0.96	238	Yes	>0.99
85	229	231	Yes	0.94	237	Yes	0.99	241	Yes	>0.99	
90	229	235	Yes	0.99	241	Yes	>0.99	245	Yes	>0.99	
95	229	241	Yes	>0.99	247	Yes	>0.99	252	Yes	>0.99	
7	5	233	192	No	<0.01	194	No	<0.01	196	No	<0.01
	10	233	198	No	<0.01	201	No	<0.01	203	No	<0.01
	15	233	202	No	<0.01	205	No	<0.01	207	No	<0.01
	20	233	206	No	<0.01	209	No	<0.01	211	No	<0.01
	25	233	208	No	<0.01	212	No	<0.01	214	No	<0.01
	30	233	211	No	<0.01	215	No	<0.01	217	No	<0.01
	35	233	213	No	0.01	217	No	<0.01	220	No	<0.01
	40	233	216	No	0.04	219	No	0.01	222	No	<0.01
	45	233	218	No	0.10	222	No	0.04	224	No	<0.01
	50	233	220	No	0.17	224	No	0.10	227	No	0.02
	55	233	222	No	0.26	226	No	0.20	229	No	0.08
	60	233	225	No	0.44	229	No	0.42	231	No	0.25
	65	233	227	Yes	0.56	231	Yes	0.58	234	Yes	0.63
	70	233	229	Yes	0.69	233	Yes	0.74	236	Yes	0.85
	75	233	232	Yes	0.83	236	Yes	0.90	239	Yes	0.98
	80	233	235	Yes	0.93	239	Yes	0.97	242	Yes	>0.99
85	233	238	Yes	0.97	243	Yes	>0.99	246	Yes	>0.99	
90	233	243	Yes	>0.99	247	Yes	>0.99	251	Yes	>0.99	
95	233	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	234	194	No	<0.01	196	No	<0.01	197	No	<0.01
	10	234	201	No	<0.01	203	No	<0.01	205	No	<0.01
	15	234	205	No	<0.01	208	No	<0.01	210	No	<0.01
	20	234	209	No	<0.01	212	No	<0.01	214	No	<0.01
	25	234	212	No	0.01	215	No	<0.01	217	No	<0.01
	30	234	215	No	0.03	218	No	<0.01	220	No	<0.01
	35	234	218	No	0.06	221	No	0.01	223	No	<0.01
	40	234	220	No	0.10	223	No	0.03	225	No	<0.01
	45	234	223	No	0.19	226	No	0.11	228	No	0.02
	50	234	225	No	0.28	228	No	0.20	230	No	0.08
	55	234	227	No	0.39	231	No	0.42	233	No	0.37
	60	234	230	Yes	0.56	233	Yes	0.58	235	Yes	0.63
	65	234	232	Yes	0.67	236	Yes	0.80	238	Yes	0.92
	70	234	235	Yes	0.81	238	Yes	0.89	241	Yes	0.99
	75	234	238	Yes	0.90	241	Yes	0.97	244	Yes	>0.99
	80	234	241	Yes	0.96	244	Yes	0.99	247	Yes	>0.99
	85	234	245	Yes	0.99	248	Yes	>0.99	251	Yes	>0.99
90	234	249	Yes	>0.99	253	Yes	>0.99	256	Yes	>0.99	
95	234	256	Yes	>0.99	260	Yes	>0.99	263	Yes	>0.99	

*%tile = Percentile.

Table 3.10. Proficiency Projections 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	193	147	No	<0.01	156	No	<0.01	160	No	<0.01
	10	193	153	No	<0.01	162	No	<0.01	166	No	<0.01
	15	193	157	No	<0.01	166	No	<0.01	170	No	<0.01
	20	193	160	No	0.01	169	No	<0.01	173	No	<0.01
	25	193	162	No	0.01	171	No	<0.01	175	No	<0.01
	30	193	164	No	0.02	173	No	<0.01	177	No	<0.01
	35	193	166	No	0.04	175	No	0.01	180	No	<0.01
	40	193	168	No	0.07	177	No	0.02	182	No	<0.01
	45	193	170	No	0.09	179	No	0.03	184	No	<0.01
	50	193	172	No	0.15	181	No	0.07	186	No	0.01
	55	193	174	No	0.21	183	No	0.13	188	No	0.06
	60	193	176	No	0.30	185	No	0.23	189	No	0.11
	65	193	178	No	0.40	187	No	0.35	192	No	0.38
	70	193	180	No	0.45	189	Yes	0.50	194	Yes	0.62
	75	193	183	Yes	0.60	191	Yes	0.65	196	Yes	0.83
	80	193	185	Yes	0.70	194	Yes	0.83	199	Yes	0.97
	85	193	188	Yes	0.79	197	Yes	0.93	202	Yes	>0.99
90	193	192	Yes	0.91	200	Yes	0.98	205	Yes	>0.99	
95	193	197	Yes	0.97	206	Yes	>0.99	211	Yes	>0.99	
3	5	203	159	No	<0.01	167	No	<0.01	170	No	<0.01
	10	203	165	No	<0.01	173	No	<0.01	176	No	<0.01
	15	203	169	No	<0.01	177	No	<0.01	180	No	<0.01
	20	203	173	No	0.01	180	No	<0.01	183	No	<0.01
	25	203	175	No	0.02	183	No	<0.01	186	No	<0.01
	30	203	178	No	0.04	185	No	<0.01	189	No	<0.01
	35	203	180	No	0.05	188	No	0.02	191	No	<0.01
	40	203	182	No	0.09	190	No	0.03	193	No	<0.01
	45	203	185	No	0.17	192	No	0.07	195	No	0.01
	50	203	187	No	0.21	194	No	0.13	197	No	0.03
	55	203	189	No	0.30	196	No	0.23	199	No	0.11
	60	203	191	No	0.39	198	No	0.35	201	No	0.27
	65	203	193	Yes	0.50	200	Yes	0.50	203	Yes	0.50
	70	203	195	Yes	0.55	202	Yes	0.65	206	Yes	0.83
	75	203	198	Yes	0.70	205	Yes	0.83	208	Yes	0.94
	80	203	201	Yes	0.83	207	Yes	0.91	211	Yes	0.99
	85	203	204	Yes	0.89	211	Yes	0.97	214	Yes	>0.99
90	203	208	Yes	0.96	215	Yes	>0.99	218	Yes	>0.99	
95	203	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	209	169	No	<0.01	176	No	<0.01	178	No	<0.01
	10	209	175	No	<0.01	182	No	<0.01	184	No	<0.01
	15	209	179	No	<0.01	186	No	<0.01	188	No	<0.01
	20	209	183	No	0.01	189	No	<0.01	191	No	<0.01
	25	209	185	No	0.03	192	No	<0.01	194	No	<0.01
	30	209	188	No	0.05	194	No	0.01	196	No	<0.01
	35	209	190	No	0.08	196	No	0.03	199	No	<0.01
	40	209	192	No	0.13	198	No	0.06	201	No	0.01
	45	209	195	No	0.20	200	No	0.09	203	No	0.03
	50	209	197	No	0.29	202	No	0.17	205	No	0.11
	55	209	199	No	0.39	205	No	0.35	207	No	0.27
	60	209	201	Yes	0.50	207	Yes	0.50	209	Yes	0.50
	65	209	203	Yes	0.56	209	Yes	0.65	211	Yes	0.73
	70	209	205	Yes	0.66	211	Yes	0.78	213	Yes	0.89
	75	209	208	Yes	0.80	213	Yes	0.87	216	Yes	0.99
	80	209	211	Yes	0.87	216	Yes	0.96	219	Yes	>0.99
85	209	214	Yes	0.94	219	Yes	0.99	222	Yes	>0.99	
90	209	218	Yes	0.97	223	Yes	>0.99	226	Yes	>0.99	
95	209	224	Yes	>0.99	229	Yes	>0.99	232	Yes	>0.99	
5	5	214	178	No	<0.01	183	No	<0.01	185	No	<0.01
	10	214	183	No	<0.01	189	No	<0.01	191	No	<0.01
	15	214	187	No	0.01	193	No	<0.01	194	No	<0.01
	20	214	191	No	0.02	196	No	<0.01	198	No	<0.01
	25	214	193	No	0.04	198	No	<0.01	200	No	<0.01
	30	214	196	No	0.08	201	No	0.02	203	No	<0.01
	35	214	198	No	0.11	203	No	0.04	205	No	<0.01
	40	214	200	No	0.17	205	No	0.09	207	No	0.01
	45	214	202	No	0.24	207	No	0.17	209	No	0.06
	50	214	204	No	0.34	209	No	0.28	211	No	0.17
	55	214	207	No	0.44	211	No	0.42	213	No	0.38
	60	214	209	Yes	0.56	213	Yes	0.58	215	Yes	0.62
	65	214	211	Yes	0.66	215	Yes	0.72	217	Yes	0.83
	70	214	213	Yes	0.71	217	Yes	0.78	219	Yes	0.94
	75	214	216	Yes	0.83	220	Yes	0.91	222	Yes	0.99
	80	214	218	Yes	0.89	222	Yes	0.96	224	Yes	>0.99
85	214	221	Yes	0.94	226	Yes	0.99	228	Yes	>0.99	
90	214	225	Yes	0.98	229	Yes	>0.99	231	Yes	>0.99	
95	214	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	220	183	No	<0.01	188	No	<0.01	189	No	<0.01
	10	220	189	No	<0.01	193	No	<0.01	195	No	<0.01
	15	220	193	No	<0.01	197	No	<0.01	199	No	<0.01
	20	220	196	No	0.01	200	No	<0.01	202	No	<0.01
	25	220	199	No	0.02	203	No	<0.01	205	No	<0.01
	30	220	202	No	0.04	205	No	0.01	207	No	<0.01
	35	220	204	No	0.08	208	No	0.03	209	No	<0.01
	40	220	206	No	0.13	210	No	0.06	211	No	<0.01
	45	220	208	No	0.16	212	No	0.12	213	No	0.01
	50	220	210	No	0.24	214	No	0.22	215	No	0.06
	55	220	212	No	0.33	216	No	0.28	217	No	0.17
	60	220	214	No	0.44	218	No	0.42	219	No	0.38
	65	220	217	Yes	0.56	220	Yes	0.58	222	Yes	0.73
	70	220	219	Yes	0.67	222	Yes	0.72	224	Yes	0.89
	75	220	221	Yes	0.76	225	Yes	0.88	226	Yes	0.97
	80	220	224	Yes	0.84	227	Yes	0.94	229	Yes	>0.99
85	220	227	Yes	0.92	230	Yes	0.98	232	Yes	>0.99	
90	220	231	Yes	0.98	234	Yes	>0.99	236	Yes	>0.99	
95	220	237	Yes	>0.99	240	Yes	>0.99	242	Yes	>0.99	
7	5	223	187	No	<0.01	190	No	<0.01	191	No	<0.01
	10	223	193	No	<0.01	196	No	<0.01	197	No	<0.01
	15	223	197	No	<0.01	200	No	<0.01	201	No	<0.01
	20	223	200	No	0.01	203	No	<0.01	205	No	<0.01
	25	223	203	No	0.02	206	No	<0.01	207	No	<0.01
	30	223	206	No	0.04	209	No	0.01	210	No	<0.01
	35	223	208	No	0.08	211	No	0.03	212	No	<0.01
	40	223	210	No	0.12	213	No	0.04	214	No	<0.01
	45	223	212	No	0.16	215	No	0.09	216	No	0.01
	50	223	214	No	0.24	217	No	0.17	218	No	0.06
	55	223	216	No	0.33	219	No	0.28	220	No	0.17
	60	223	218	No	0.44	221	No	0.42	223	Yes	0.50
	65	223	221	Yes	0.56	223	Yes	0.58	225	Yes	0.73
	70	223	223	Yes	0.67	226	Yes	0.78	227	Yes	0.89
	75	223	225	Yes	0.76	228	Yes	0.88	229	Yes	0.97
	80	223	228	Yes	0.88	231	Yes	0.96	232	Yes	>0.99
85	223	231	Yes	0.92	234	Yes	0.99	235	Yes	>0.99	
90	223	235	Yes	0.98	238	Yes	>0.99	239	Yes	>0.99	
95	223	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	224	190	No	<0.01	193	No	<0.01	194	No	<0.01
	10	224	196	No	<0.01	199	No	<0.01	200	No	<0.01
	15	224	200	No	0.01	203	No	<0.01	204	No	<0.01
	20	224	204	No	0.02	206	No	<0.01	207	No	<0.01
	25	224	207	No	0.05	209	No	0.01	210	No	<0.01
	30	224	209	No	0.08	212	No	0.02	213	No	<0.01
	35	224	211	No	0.11	214	No	0.04	215	No	<0.01
	40	224	214	No	0.20	216	No	0.09	217	No	0.01
	45	224	216	No	0.29	218	No	0.17	220	No	0.11
	50	224	218	No	0.39	221	No	0.35	222	No	0.27
	55	224	220	No	0.45	223	Yes	0.50	224	Yes	0.50
	60	224	222	Yes	0.55	225	Yes	0.65	226	Yes	0.73
	65	224	225	Yes	0.71	227	Yes	0.78	228	Yes	0.89
	70	224	227	Yes	0.80	229	Yes	0.87	231	Yes	0.99
	75	224	230	Yes	0.87	232	Yes	0.96	233	Yes	>0.99
	80	224	232	Yes	0.92	235	Yes	0.99	236	Yes	>0.99
85	224	236	Yes	0.97	238	Yes	>0.99	239	Yes	>0.99	
90	224	240	Yes	0.99	242	Yes	>0.99	243	Yes	>0.99	
95	224	246	Yes	>0.99	248	Yes	>0.99	249	Yes	>0.99	

*%tile = Percentile.

Table 3.11. Proficiency Projections 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	211	181	No	<0.01	185	No	<0.01	186	No	<0.01
	10	211	185	No	<0.01	189	No	<0.01	191	No	<0.01
	15	211	188	No	0.02	192	No	<0.01	194	No	<0.01
	20	211	190	No	0.03	194	No	0.01	196	No	<0.01
	25	211	192	No	0.04	196	No	0.02	198	No	<0.01
	30	211	194	No	0.08	198	No	0.02	200	No	<0.01
	35	211	196	No	0.13	200	No	0.05	202	No	<0.01
	40	211	197	No	0.13	201	No	0.08	203	No	0.01
	45	211	199	No	0.19	203	No	0.14	205	No	0.04
	50	211	200	No	0.24	204	No	0.18	206	No	0.07
	55	211	202	No	0.33	206	No	0.30	208	No	0.19
	60	211	203	No	0.39	207	No	0.36	209	No	0.28
	65	211	205	No	0.44	209	No	0.43	211	Yes	0.50
	70	211	206	Yes	0.50	210	Yes	0.50	213	Yes	0.72
	75	211	208	Yes	0.61	212	Yes	0.64	214	Yes	0.81
	80	211	210	Yes	0.67	214	Yes	0.76	216	Yes	0.93
	85	211	212	Yes	0.76	216	Yes	0.86	219	Yes	0.99
90	211	215	Yes	0.87	219	Yes	0.95	222	Yes	>0.99	
95	211	220	Yes	0.96	224	Yes	0.99	226	Yes	>0.99	
8	5	220	188	No	<0.01	191	No	<0.01	191	No	<0.01
	10	220	193	No	<0.01	196	No	<0.01	196	No	<0.01
	15	220	196	No	0.01	199	No	<0.01	199	No	<0.01
	20	220	198	No	0.01	201	No	<0.01	202	No	<0.01
	25	220	201	No	0.03	204	No	0.01	204	No	<0.01
	30	220	203	No	0.06	206	No	0.01	206	No	<0.01
	35	220	205	No	0.07	207	No	0.02	208	No	<0.01
	40	220	206	No	0.09	209	No	0.04	210	No	<0.01
	45	220	208	No	0.15	211	No	0.08	212	No	0.01
	50	220	210	No	0.21	212	No	0.11	213	No	0.02
	55	220	211	No	0.25	214	No	0.19	215	No	0.07
	60	220	213	No	0.30	216	No	0.30	217	No	0.19
	65	220	215	No	0.40	217	No	0.36	219	No	0.38
	70	220	217	Yes	0.50	219	Yes	0.50	221	Yes	0.62
	75	220	219	Yes	0.55	221	Yes	0.64	223	Yes	0.81
	80	220	221	Yes	0.65	223	Yes	0.76	225	Yes	0.93
	85	220	223	Yes	0.75	226	Yes	0.89	228	Yes	0.99
90	220	227	Yes	0.88	229	Yes	0.96	231	Yes	>0.99	
95	220	231	Yes	0.96	234	Yes	>0.99	236	Yes	>0.99	

*%tile = Percentile.

4. References

- He, W., & Meyer, J. (2021). *MAP Growth universal screening benchmarks: Establishing MAP Growth as an effective universal screener*. NWEA Research Report.
https://www.nwea.org/content/uploads/2021/05/MAP-Growth-Universal-Screening-Benchmarks-2021-03-12_NWEA_report.pdf
- Kolen, M. J., & Brennan, R. L. (2004). *Test equating, scaling, and linking*. Springer.
- Lumley, T. (2019). *Survey: Analysis of complex survey samples*. R package version 3.36.
<https://CRAN.R-project.org/package=survey>.
- 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.
<https://teach.mapnwea.org/impl/normsResearchStudy.pdf>