Predicting Proficiency on the Ohio's State Tests (OST) End-of-Course (EOC) Assessments based on NWEA MAP Growth Scores

July 2023

NWEA Psychometric Solutions

Linking Study Updates

Date	Description
2020-07-24	Initial study conducted for OST EOC in ELA 1, ELA 2, Algebra 1, and Geometry using Spring 2019 data.
2023-01-31	Updated results for the OST EOC ELA 2, Algebra 1, Geometry, and Biology assessments using Spring 2022 data.
2023-02-10	Added special section about high school graduation requirements.
2023-07-05	Updated all EOC subjects with new norms and added Biology.

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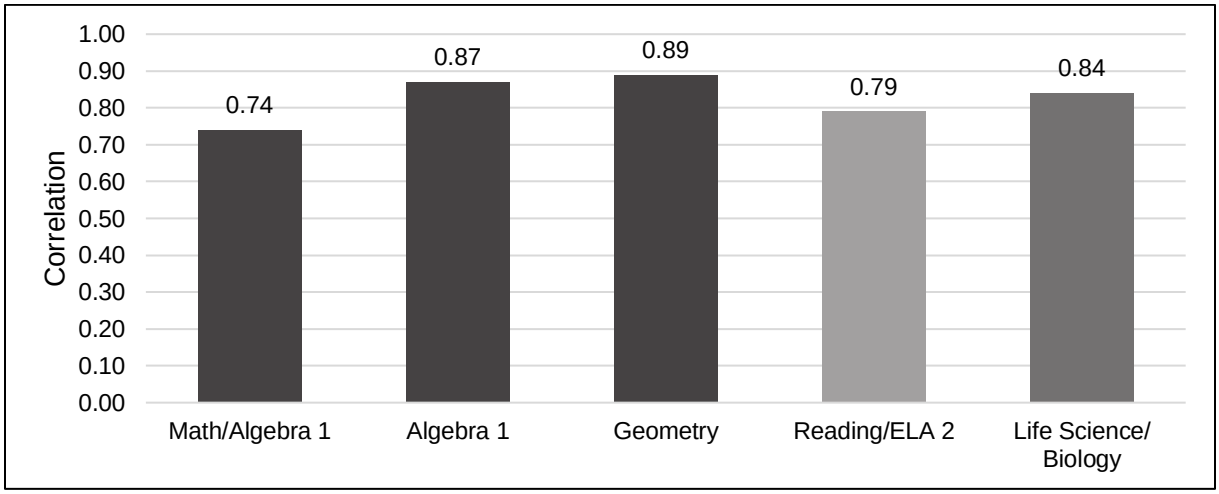
Executive Summary

Linking studies allow partners to use MAP® Growth™ 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 corresponding to the state summative performance levels. A *cut score* is the minimum score a student must get on a test to be placed at a certain performance level. The linking study for the Ohio's State Test (OST) End-of-Course (EOC) described in this report provides RIT cut scores for the fall, winter, and spring MAP Growth administrations that correspond to the OST EOC performance levels for each subject and grade.

The linking study is based on test scores from students who took both the MAP Growth and OST EOC assessments in Spring 2022 for targeted grades. The linking study sample included approximately 13,166 students across 39 districts and 101 schools in Ohio. Scores from both tests were used as the basis for linking the two assessments.

Before the linking analyses began, NWEA confirmed that the MAP Growth and OST EOC assessments are aligned to the same or similar set of content standards to warrant a connection. The test links were further investigated by calculating the Pearson correlation coefficients that describe the relationship between the specific MAP Growth and Ohio EOC test scores. At NWEA, we consider a correlation of $r \geq 0.70$ as "high" correlation. 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. Figure E.1 shows that the correlations between the MAP Growth and OST EOC test scores from Spring 2022 are good for predicting performance on the corresponding state test.

Figure E.1. Correlations between MAP Growth and OST EOC



The equipercentile linking method (Kolen & Brennan, 2004) and the NWEA 2022 MAP Growth course-specific norms (He, 2022) were then used to produce the RIT cut scores that correspond to performance on the OST EOC assessment for every subject and grade. While RIT cut scores were generated for every performance level on the OST EOC assessment, Table E.1 presents the *Proficient* cut scores that indicate the minimum score a student must get to be considered proficient (reaching *Proficient* or higher).

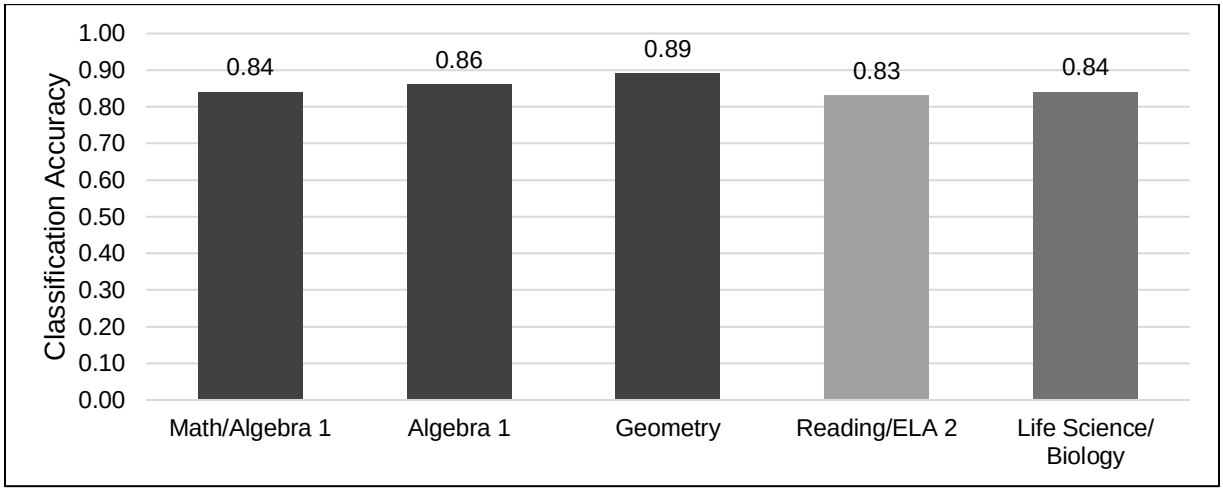
Table E.1. MAP Growth RIT Cut Scores for OST EOC Proficiency

Assessment		*Proficient* Cut Scores					
		7	**8**	**9**	**10**	**11**	**12**
OST Algebra 1				**700**			
MAP Growth Math 6+	Fall	227	228	230	232	–	–
	Winter	232	232	233	234	–	–
	Spring	235	235	235	235	–	–
MAP Growth Algebra 1	Fall			227			
	Winter			231			
	Spring			235			
OST Geometry				**700**			
MAP Growth Geometry	Fall			236			
	Winter			241			
	Spring			245			
OST ELA 2				**700**			
MAP Growth Reading 6+	Fall	–	–	216	217	218	218
	Winter	–	–	219	219	219	219
	Spring	–	–	220	220	220	220
OST Biology				**700**			
MAP Growth Life Science	Fall			208			
	Winter			210			
	Spring			212			

Educators can use these cut scores to determine whether students are likely on track for proficiency on the state assessment. For example, the *Proficient* cut score on the Grade 9 OST EOC Algebra 1 test is 700. A Grade 9 student who takes the MAP Growth Mathematics 6+ test in the fall and scores 230 is likely to meet proficiency on the OST EOC Algebra 1 test in the spring, whereas if they scored lower than 230, they would be in jeopardy of not meeting proficiency by spring.

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 cuts correctly classified students as proficient on the state EOC tests. Figure E.2 shows the MAP Growth Mathematics 6+ *Proficient* cut score has a 0.84 accuracy rate, meaning it accurately predicted student achievement on the state test for 84% of the sample. Overall, MAP Growth scores have a high accuracy rate of identifying student proficiency on the OST EOC tests.

Figure E.2. Accuracy of MAP Growth Classifications



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 the scores of the Ohio's State Test (OST) End-of-Course (EOC) Mathematics, English Language Arts (ELA), and Biology assessments with Rasch Unit (RIT) scores from the MAP Growth assessments taken during the Spring 2022 term. 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 OST EOC assessments
4. Classification accuracy statistics to determine the degree to which MAP Growth accurately predicts student proficiency status on the OST EOC tests
5. The probability of achieving grade-level proficiency on the OST EOC assessments based on MAP Growth RIT scores from fall, winter, and spring

The linking study has been updated since the previous version published in July 2020 to include Biology and provide percentiles corresponding to the 2022 course-specific norms (He, 2022).

1.2. Assessment Overview

The OST EOC assessments are part of Ohio's state summative assessment system aligned to the Ohio's Learning Standards. Based on their test scores, students are placed into one of five performance levels: *Limited*, *Basic*, *Proficient*, *Accomplished*, and *Advanced*. The *Proficient* cut score demarks the minimum level of performance considered to be proficient for state 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 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 course-specific norms study was completed in 2022 and published in Summer 2023.

2. Methods

2.1. Data Collection

This linking study is based on data from the Spring 2022 administrations of the MAP Growth assessments and the OST EOC assessments based on the following pairings:

- MAP Growth Mathematics 6+ to OST EOC Algebra 1
- MAP Growth Algebra 1 to OST EOC Algebra 1
- MAP Growth Geometry to OST EOC Geometry
- MAP Growth Reading 6+ to OST EOC ELA 2
- MAP Growth Life Science to OST EOC Biology

NWEA recruited Ohio districts to participate in the study by sharing their student and score data from the OST EOC tests taken in Spring 2022. 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 MAP Growth and the corresponding OST EOC assessments in Spring 2022 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 OST EOC 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 OST EOC 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

OST EOC test that references some other scale in the same subject?" The correlations were calculated as follows:

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

where r is the correlation coefficient, x_i and y_i are the values of the x- and y-variables in a sample, and $\overline{x}$ and $\overline{y}$ 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 OST EOC assessments are reported for Grades 7–12. Since the state EOC tests are not grade-dependent (i.e., any student can take the assessment once they finish the course), the spring RIT cuts were established based on all the students in the study sample regardless of their grades. Fall and winter RIT cut scores were then projected from the spring RIT cuts using the 2022 growth norms, conditional on the spring RIT cuts. When reporting results for the MAP Growth Mathematics 6+ and Reading 6+ assessments, the RIT cuts by grade level were included because the national percentile rank and estimated term-to-term growth are different for each grade. In contrast, with the MAP Growth Algebra 1, Geometry, and Life Science tests, the overall RIT cuts were reported independent of grade level.

Percentile ranks are based on the 2022 norms. 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 was used to identify the spring MAP Growth RIT scores that correspond to the spring OST EOC 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., OST EOC). 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 EOC on the scale of MAP Growth, $P(x)$ is the percentile rank of a given score on OST EOC, 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. Equation 2 was used to determine the previous terms or grades 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 terms or grades RIT score.
- g is the expected growth from the previous fall or winter RIT to the spring RIT score.

2.5. Classification Accuracy

The degree to which MAP Growth predicts student proficiency status on the OST EOC 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 OST EOC tests. 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) / (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, the MAP Growth conditional growth norms data were also used to calculate the probability of reaching proficiency on the OST EOC tests in the spring 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* performance on the OST EOC tests based on their fall or winter RIT score:

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

where:

- Φ is the standard normal cumulative distribution function.
- $RIT_{previous}$ is the student's RIT score in fall or winter.
- g is the expected growth from the previous fall or winter RIT to the spring RIT.
- $RIT_{SpringCut}$ is the MAP Growth cut score associated with state proficiency 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* performance on the OST EOC tests based on their spring RIT score (RIT_{Spring}):

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

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 EOC assessments in Spring 2022 for the targeted subjects were included in the sample. Data were collected from 39 districts and 101 schools in Ohio across the sample. Table 3.3 presents the distributions of student 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 2022 OST EOC assessments. Since the unweighted data are different from the general OST EOC population, post-stratification weights were applied to the study sample to improve its representativeness. Table 3.3 presents the demographic distributions of the final analytic samples after weighting are almost identical to the OST EOC student population distributions. The analyses in this study were therefore conducted using the weighted sample.

Table 3.1. Linking Study Sample Demographics (Unweighted)

Linking Study Samples (Unweighted)						
Demographic Subgroup		**%Students by Sample**				
	OST EOC	**Algebra 1**	**Algebra 1**	**Geometry**	**ELA 2**	**Biology**
	MAP Growth	**Math 6+**	**Algebra 1**	**Geometry**	**Reading 6+**	**Life Science**
	Total N	2,875	4,448	3,782	4,846	1,623
Race	African American	14.7	24.5	23.3	23.7	37.3
	American Indian + Other	5.1	9.1	8.9	8.3	9.6
	Asian/NHPI	9.9	1.6	1.8	2.6	0.6
	Hispanic/Latino	5.0	6.2	5.6	5.7	5.4
	White	65.2	58.7	60.4	59.7	47.1
Sex	Female	46.6	50.0	50.1	48.9	51.5
	Male	53.4	50.0	49.9	51.1	48.5
Performance Level	*Limited*	15.5	34.7	46.0	22.9	34.1
	Basic	12.5	22.5	18.4	22.8	22.9
	Proficient	20.1	23.4	19.8	29.8	25.6
	Accomplished	27.2	13.3	11.0	14.6	6.7
	Advanced	24.8	6.1	4.8	9.9	10.7

*NH/PI = Native Hawaiian or Other Pacific Islander. The race categories reflect the OST EOC performance reports from each testing term.

Table 3.2. Spring 2022 OST EOC Student Population Demographics

Spring 2022 OST EOC Population					
Demographic Subgroup		**%Students by Sample**			
	OST EOC	**Algebra 1**	**Geometry**	**ELA 2**	**Biology**
	Total N	148,673	114,094	134,681	131,629
Race	African American	19.0	16.0	18.0	17.0
	American Indian + Other	8.0	7.0	7.0	7.0
	Asian/NHPI	3.0	3.0	3.0	3.0
	Hispanic/Latino	5.0	5.0	5.0	5.0
	White	65.0	70.0	67.0	68.0

Spring 2022 OST EOC Population					
Demographic Subgroup		**%Students by Sample**			
Sex	Female	48.0	49.0	48.0	49.0
	Male	52.0	51.0	52.0	51.0
Performance Level	*Limited*	35.0	40.0	21.0	21.0
	Basic	20.0	18.0	21.0	17.0
	Proficient	21.0	21.0	31.0	28.0
	Accomplished	16.0	15.0	16.0	10.0
	Advanced	8.0	7.0	11.0	24.0

*NH/PI = Native Hawaiian or Other Pacific Islander. The race categories reflect the OST EOC performance reports from each testing term.

Table 3.3. Linking Study Sample Demographics (Weighted)

Linking Study Samples (Weighted)						
Demographic Subgroup		**%Students by Sample**				
	OST EOC MAP Growth	**Algebra 1 Math 6+**	**Algebra 1 Algebra 1**	**Geometry Geometry**	**ELA 2 Reading 6+**	**Biology Life Science**
	Total N	2,875	4,448	3,820	4,846	1,623
Race	African American	19.1	19.1	15.5	17.8	16.9
	American Indian + Other	7.9	7.9	7.0	7.3	7.4
	Asian/NHPI	2.5	2.5	2.8	2.7	2.7
	Hispanic/Latino	5.4	5.4	4.6	5.1	4.9
	White	65.1	65.1	70.0	67.1	68.1
Sex	Female	48.3	48.3	49.4	48.4	49.1
	Male	51.7	51.7	50.6	51.6	50.9
Performance Level	*Limited*	35.0	35.0	39.6	21.0	21.0
	Basic	20.0	20.0	17.8	21.0	17.0
	Proficient	21.0	21.0	20.8	31.0	28.0
	Accomplished	16.0	16.0	14.9	16.0	10.0
	Advanced	8.0	8.0	6.9	11.0	24.0

*NH/PI = Native Hawaiian or Other Pacific Islander. The race categories reflect the OST EOC performance reports from each testing term.

3.2. Descriptive Statistics

Table 3.4 presents descriptive statistics of the MAP Growth and OST EOC test scores from Spring 2022, including the correlation coefficient (*r*) between them. The correlations between the scores range from 0.74 to 0.89. These values indicate a relatively 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 OST EOC assessments.

Table 3.4. Descriptive Statistics of Test Scores

Sample	N	*r*	Mean	SD*	Min*	Max.*
OST Algebra 1	2,875	0.74	699.4	36.2	618	814
MAP Growth Math 6+			231.2	22.0	155	303
OST Algebra 1	4,448	0.87	698.5	34.9	618	814
MAP Growth Algebra 1			232.7	22.1	173	295
OST Geometry	3,820	0.89	692.9	39.6	604	810
MAP Growth Geometry			240	21.1	186	304
OST ELA 2	4,846	0.79	704.3	30.6	601	808
MAP Growth Reading 6+			220.8	19.1	155	273
OST Biology	1,623	0.84	709.7	30.9	617	801
MAP Growth Life Science			217.2	16.2	176	260

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

3.3. MAP Growth Cut Scores

Table 3.5 – Table 3.9 present the OST EOC scale score ranges and the corresponding MAP Growth RIT cut scores and percentile ranges. Bolded numbers highlight the cut scores considered to be proficient. These tables can be used to gauge a student's likely performance level on the OST EOC spring assessment when MAP Growth is taken in the fall, winter, or spring. For example, a Grade 9 student who obtained a MAP Growth Mathematics RIT score of 232 in the fall is likely to achieve *Proficient* performance on the OST EOC Algebra 1 test in spring. The same is true for a Grade 9 student who obtained a MAP Growth RIT score of 235 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 document. 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 6+, Algebra 1

OST Algebra 1										
Grade	***Limited***		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
7–10	618–681		682–699		**700**–724		725–753		754–814	
MAP Growth Mathematics 6+										
	Limited		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
Grade	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**
Fall										
7	100–216	1–42	217–227	43–66	**228**–240	67–87	241–253	88–96	254–350	97–99
8	100–217	1–35	218–229	36–60	**230**–242	61–82	243–255	83–94	256–350	95–99
9	100–218	1–34	219–231	35–60	**232**–244	61–82	245–257	83–93	258–350	94–99
10	100–218	1–30	219–231	31–55	**232**–244	56–77	245–257	78–91	258–350	92–99
Winter										
7	100–219	1–40	220–231	41–66	**232**–244	67–87	245–257	88–96	258–350	97–99
8	100–220	1–35	221–232	36–59	**233**–245	60–81	246–258	82–93	259–350	94–99
9	100–221	1–36	222–233	37–59	**234**–246	60–81	247–259	82–93	260–350	94–99
10	100–221	1–32	222–233	33–54	**234**–246	55–77	247–259	78–91	260–350	92–99
Spring										
7	100–222	1–41	223–234	42–66	**235**–247	67–86	248–260	87–96	261–350	97–99
8	100–222	1–35	223–234	36–58	**235**–247	59–80	248–260	81–93	261–350	94–99
9	100–222	1–36	223–234	37–59	**235**–247	60–80	248–260	81–92	261–350	93–99
10	100–222	1–32	223–234	33–54	**235**–247	55–76	248–260	77–90	261–350	91–99

Table 3.6. MAP Growth Cut Scores—Algebra 1, Algebra 1

OST Algebra 1										
Grade	***Limited***		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
9–12	618–681		682–699		**700**–724		725–753		754–814	
MAP Growth Algebra 1										
	Limited		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
	RIT	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**
Fall	100–215	1–20	216–226	21–44	**227**–241	45–78	242–256	79–95	257–350	65–99
Winter	100–218	1–21	219–230	22–44	**231**–246	45–77	247–261	78–94	262–350	95–99
Spring	100–222	1–23	223–234	24–45	**235**–250	46–75	251–265	76–92	266–350	93–99

Table 3.7. MAP Growth Cut Scores—Geometry, Geometry

OST Geometry										
Grade	***Limited***		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
9-12	604–677		678–699		**700**–724		725–755		756–810	
MAP Growth Geometry										
	Limited		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
	RIT	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**
Fall	100–224	1–18	225–235	19–40	**236**–247	41–68	248–260	69–88	261–350	89–99
Winter	100–228	1–20	229–240	21–42	**241**–252	43–67	253–266	68–88	267–350	89–99
Spring	100–232	1–22	233–244	23–45	**245**–256	46–69	257–271	79–89	272–350	90–99

Table 3.8. MAP Growth Cut Scores—Reading 6+, ELA 2

OST ELA 2										
Grade	***Limited***		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
9–12	597–678		679–699		**700**–724		725–741		742–808	
MAP Growth Reading 6+										
	Limited		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
Grade	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**
Fall										
9	100–202	1–19	203–216	20–45	**217**–231	46–74	232–239	75–86	240–350	87–99
10	100–202	1–14	203–217	15–41	**218**–231	42–71	232–239	72–84	240–350	85–99
11	100–203	1–13	204–217	14–37	**218**–231	38–67	232–239	68–81	240–350	82–99
12	100–204	1–16	205–217	17–37	**218**–231	38–65	232–239	66–79	240–350	80–99
Winter										
9	100–205	1–21	206–218	22–46	**219**–232	47–74	233–240	75–85	241–350	86–99
10	100–205	1–16	206–218	17–40	**219**–232	41–70	233–240	71–84	241–350	85–99
11	100–205	1–14	206–218	15–37	**219**–232	38–67	233–240	68–81	241–350	82–99
12	100–205	1–19	206–218	20–40	**219**–232	41–66	233–240	67–78	241–350	79–99
Spring										
9	100–206	1–21	207–219	22–46	**220**–233	47–74	234–241	75–85	242–350	86–99
10	100–206	1–17	207–219	18–41	**220**–233	42–71	234–241	72–84	242–350	85–99
11	100–206	1–16	207–219	17–39	**220**–233	40–68	234–241	69–82	242–350	83–99
12	100–206	1–22	207–219	23–42	**220**–233	43–65	234–241	66–77	242–350	78–99

Table 3.9. MAP Growth Cut Scores—Life Science, Biology

OST Biology										
Grade	***Limited***		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
9-12	617–684		685–699		**700**–724		725–734		735–823	
MAP Growth Life Science										
	Limited		***Basic***		***Proficient***		***Accomplished***		***Advanced***	
	RIT	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**	**RIT**	**Percentile**
Fall	100–199	1–15	200–207	16–33	**208**–221	34–72	222–226	73–83	227–350	84–99
Winter	100–201	1–16	202–209	17–33	**210**–223	34–70	224–229	71–82	230–350	83–99
Spring	100–203	1–18	204–211	19–35	**212**–225	36–69	226–230	70–79	231–350	80–99

3.4. High School Graduation Requirements

The purpose of Ohio's graduation requirements is to allow students to demonstrate competency and readiness for next steps after high school. In June 2019 the Ohio's State Board of Education decided that students who demonstrate competency by scoring 684 or higher on OST EOC ELA 2 and Algebra 1 will earn two seals towards graduation eligibility.[1] Table 3.10 presents the MAP Growth RIT cut scores corresponding to the competency threshold, including the MAP Growth classification accuracy results from Spring 2022.

[1] https://education.ohio.gov/getattachment/Topics/Ohio-s-Graduation-Requirements/Ohio-s-Graduation-Requirements_Long-term-Requirements-2023-and-Beyond.pdf

Table 3.10. MAP Growth Cut Scores for Ohio's Competency Requirements

Grade		MAP Growth Cut								Classification Accuracy
		9		10		11		12		
Assessment		RIT	Percentile	RIT	Percentile	RIT	Percentile	RIT	Percentile	
OST Algebra 1		**684**								
MAP Growth Math 6+	Fall	221	39	222	36	–		–		–
	Winter	224	41	224	36	–		–		–
	Spring	225	40	225	36	–		–		0.85
MAP Growth Algebra 1	Fall	217	19							–
	Spring	224	22							0.85
OST ELA 2		**684**								
MAP Growth Reading 6+	Fall	206	25	207	21	208	19	208	21	–
	Winter	209	27	209	22	209	19	209	24	–
	Spring	210	27	210	23	210	21	210	27	0.85

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 EOC tests, providing insight into the predictive validity of MAP Growth. The overall classification accuracy rate ranges from 0.83 to 0.89. These values suggest that the RIT cut scores are effective at classifying students as proficient or not proficient on the OST EOC assessments.

Although the results show that MAP Growth scores can be used to predict student proficiency with high accuracy on the OST EOC test, there is a notable limitation to how these results should be used and interpreted. The OST EOC 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

Sample	N	Cut Score		Class. Accuracy*	Rate*		Sensitivity	Specificity	Precision	AUC*
		MAP Growth	OST EOC		FP	FN				
OST Algebra 1 MAP Math 6+	2,875	235	700	0.84	0.15	0.18	0.82	0.85	0.82	0.89
OST Algebra 1 MAP Algebra 1	4,448	235	700	0.86	0.14	0.14	0.86	0.86	0.83	0.94
OST Geometry MAP Geometry	3,820	245	700	0.89	0.07	0.15	0.85	0.93	0.89	0.96
OST ELA 2 MAP Reading 6+	4,846	220	700	0.83	0.21	0.14	0.86	0.79	0.85	0.91
OST Biology MAP Life Science	1,623	212	700	0.84	0.21	0.13	0.87	0.79	0.87	0.92

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

3.6. Proficiency Projections

Table 3.12 – Table 3.16 present the estimated probability of achieving *Proficient* performance on the OST EOC tests based on RIT scores from fall, winter, or spring for each of the MAP Growth tests. Due to measurement error in all test scores, the *Proficient* MAP Growth cuts do not guarantee that a student will reach proficiency on the OST EOC tests. 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 state tests in the spring at a given percentile throughout the year.

For example, the spring Grade 9 *Proficient* RIT cut score for Mathematics 6+ is 235, which indicates a 50% chance of achieving state proficiency in the spring, as shown in Table 3.12. An educator can also use this table to estimate that a Grade 9 student who obtained a MAP Growth score of 229 in the fall has a 39% probability of reaching *Proficient* or higher on the OST Algebra 1 test in the spring.

Table 3.12. Proficiency Projections based on RIT Scores—Mathematics 6+, Algebra 1

MAP Growth Mathematics 6+ to OST Algebra 1											
			Fall			Winter			Spring		
Grade	Start %ile*	Spring Cut	Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		*Proficient*	Prob.		*Proficient*	Prob.
7	5	235	192	No	<0.01	194	No	<0.01	196	No	<0.01
	10	235	198	No	<0.01	201	No	<0.01	203	No	<0.01
	15	235	202	No	<0.01	205	No	<0.01	207	No	<0.01
	20	235	206	No	<0.01	209	No	<0.01	211	No	<0.01
	25	235	208	No	<0.01	212	No	<0.01	214	No	<0.01
	30	235	211	No	<0.01	215	No	<0.01	217	No	<0.01
	35	235	213	No	<0.01	217	No	<0.01	220	No	<0.01
	40	235	216	No	0.02	219	No	<0.01	222	No	<0.01
	45	235	218	No	0.05	222	No	0.02	224	No	<0.01
	50	235	220	No	0.10	224	No	0.04	227	No	<0.01
	55	235	222	No	0.17	226	No	0.10	229	No	0.02
	60	235	225	No	0.31	229	No	0.26	231	No	0.08
	65	235	227	No	0.44	231	No	0.42	234	No	0.37
	70	235	229	Yes	0.56	233	Yes	0.58	236	Yes	0.63
	75	235	232	Yes	0.74	236	Yes	0.80	239	Yes	0.92
	80	235	235	Yes	0.87	239	Yes	0.93	242	Yes	0.99
	85	235	238	Yes	0.95	243	Yes	0.99	246	Yes	>0.99
	90	235	243	Yes	0.99	247	Yes	>0.99	251	Yes	>0.99
	95	235	249	Yes	>0.99	254	Yes	>0.99	257	Yes	>0.99
8	5	235	194	No	<0.01	196	No	<0.01	197	No	<0.01
	10	235	201	No	<0.01	203	No	<0.01	205	No	<0.01
	15	235	205	No	<0.01	208	No	<0.01	210	No	<0.01
	20	235	209	No	<0.01	212	No	<0.01	214	No	<0.01
	25	235	212	No	0.01	215	No	<0.01	217	No	<0.01
	30	235	215	No	0.02	218	No	<0.01	220	No	<0.01
	35	235	218	No	0.04	221	No	0.01	223	No	<0.01
	40	235	220	No	0.07	223	No	0.02	225	No	<0.01
	45	235	223	No	0.16	226	No	0.07	228	No	0.01
	50	235	225	No	0.24	228	No	0.15	230	No	0.04
	55	235	227	No	0.33	231	No	0.34	233	No	0.25
	60	235	230	Yes	0.50	233	Yes	0.50	235	Yes	0.50
	65	235	232	Yes	0.61	236	Yes	0.73	238	Yes	0.85
	70	235	235	Yes	0.76	238	Yes	0.85	241	Yes	0.98
	75	235	238	Yes	0.88	241	Yes	0.95	244	Yes	>0.99
	80	235	241	Yes	0.94	244	Yes	0.99	247	Yes	>0.99
	85	235	245	Yes	0.98	248	Yes	>0.99	251	Yes	>0.99
	90	235	249	Yes	>0.99	253	Yes	>0.99	256	Yes	>0.99
	95	235	256	Yes	>0.99	260	Yes	>0.99	263	Yes	>0.99

MAP Growth Mathematics 6+ to OST Algebra 1											
			Fall			Winter			Spring		
	Start	Spring	Fall	Projected Proficiency		Winter	Projected Proficiency		Spring	Projected Proficiency	
Grade	%ile*	Cut	RIT	*Proficient*	Prob.	RIT	*Proficient*	Prob.	RIT	*Proficient*	Prob.
9	5	235	194	No	<0.01	196	No	<0.01	196	No	<0.01
	10	235	201	No	<0.01	203	No	<0.01	204	No	<0.01
	15	235	206	No	<0.01	208	No	<0.01	209	No	<0.01
	20	235	210	No	<0.01	212	No	<0.01	213	No	<0.01
	25	235	213	No	0.01	215	No	<0.01	216	No	<0.01
	30	235	216	No	0.02	218	No	<0.01	219	No	<0.01
	35	235	219	No	0.05	221	No	<0.01	222	No	<0.01
	40	235	221	No	0.09	224	No	0.02	225	No	<0.01
	45	235	224	No	0.17	226	No	0.05	227	No	<0.01
	50	235	226	No	0.25	229	No	0.16	230	No	0.04
	55	235	229	No	0.39	231	No	0.27	233	No	0.25
	60	235	231	No	0.45	234	Yes	0.50	235	Yes	0.50
	65	235	234	Yes	0.61	236	Yes	0.66	238	Yes	0.85
	70	235	237	Yes	0.75	239	Yes	0.84	241	Yes	0.98
	75	235	240	Yes	0.86	242	Yes	0.95	244	Yes	>0.99
	80	235	243	Yes	0.93	246	Yes	0.99	247	Yes	>0.99
	85	235	247	Yes	0.98	249	Yes	>0.99	251	Yes	>0.99
	90	235	252	Yes	>0.99	254	Yes	>0.99	256	Yes	>0.99
	95	235	259	Yes	>0.99	262	Yes	>0.99	264	Yes	>0.99
10	5	235	196	No	<0.01	197	No	<0.01	197	No	<0.01
	10	235	203	No	<0.01	205	No	<0.01	205	No	<0.01
	15	235	208	No	<0.01	210	No	<0.01	210	No	<0.01
	20	235	212	No	<0.01	214	No	<0.01	215	No	<0.01
	25	235	215	No	0.01	217	No	<0.01	218	No	<0.01
	30	235	218	No	0.04	220	No	<0.01	221	No	<0.01
	35	235	221	No	0.07	223	No	0.01	224	No	<0.01
	40	235	224	No	0.14	226	No	0.05	227	No	<0.01
	45	235	227	No	0.25	229	No	0.16	230	No	0.04
	50	235	229	No	0.34	231	No	0.27	232	No	0.15
	55	235	232	Yes	0.50	234	Yes	0.50	235	Yes	0.50
	60	235	234	Yes	0.61	236	Yes	0.66	238	Yes	0.85
	65	235	237	Yes	0.75	239	Yes	0.84	241	Yes	0.98
	70	235	240	Yes	0.86	242	Yes	0.95	244	Yes	>0.99
	75	235	243	Yes	0.93	245	Yes	0.99	247	Yes	>0.99
	80	235	246	Yes	0.97	249	Yes	>0.99	250	Yes	>0.99
	85	235	250	Yes	0.99	253	Yes	>0.99	254	Yes	>0.99
	90	235	255	Yes	>0.99	258	Yes	>0.99	260	Yes	>0.99
	95	235	262	Yes	>0.99	265	Yes	>0.99	267	Yes	>0.99

*%tile = Percentile.

Table 3.13. Proficiency Projections based on RIT Scores—Algebra 1

MAP Growth Algebra 1 to OST Algebra 1											
			Fall			Winter			Spring		
Grades	Start %ile*	Spring Cut	Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		*Proficient*	Prob.		*Proficient*	Prob.
9–12	5	235	202	No	0.01	204	No	<0.01	204	No	<0.01
	10	235	208	No	0.02	210	No	0.01	212	No	<0.01
	15	235	212	No	0.06	214	No	0.03	216	No	<0.01
	20	235	215	No	0.10	218	No	0.07	220	No	<0.01
	25	235	218	No	0.16	221	No	0.13	224	No	<0.01
	30	235	220	No	0.25	224	No	0.21	227	No	0.01
	35	235	223	No	0.35	226	No	0.29	229	No	0.03
	40	235	225	No	0.42	228	No	0.37	232	No	0.18
	45	235	227	Yes	0.50	231	Yes	0.50	234	No	0.38
	50	235	229	Yes	0.58	233	Yes	0.59	237	Yes	0.73
	55	235	231	Yes	0.65	235	Yes	0.67	239	Yes	0.89
	60	235	233	Yes	0.72	238	Yes	0.79	242	Yes	0.98
	65	235	235	Yes	0.78	240	Yes	0.85	245	Yes	>0.99
	70	235	237	Yes	0.84	242	Yes	0.89	247	Yes	>0.99
	75	235	240	Yes	0.92	245	Yes	0.94	250	Yes	>0.99
	80	235	243	Yes	0.95	248	Yes	0.97	254	Yes	>0.99
	85	235	246	Yes	0.98	252	Yes	0.99	257	Yes	>0.99
	90	235	250	Yes	0.99	256	Yes	>0.99	262	Yes	>0.99
	95	235	256	Yes	>0.99	263	Yes	>0.99	269	Yes	>0.99

*%tile = Percentile.

Table 3.14. Proficiency Projections based on RIT Scores—Geometry

MAP Growth Geometry to OST Geometry											
			Fall			Winter			Spring		
Grades	Start %ile*	Spring Cut	Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		*Proficient*	Prob.		*Proficient*	Prob.
9–12	5	245	212	No	<0.01	213	No	<0.01	215	No	<0.01
	10	245	218	No	0.01	220	No	<0.01	222	No	<0.01
	15	245	222	No	0.04	225	No	0.02	227	No	<0.01
	20	245	225	No	0.09	228	No	0.05	231	No	<0.01
	25	245	228	No	0.16	232	No	0.12	234	No	<0.01
	30	245	231	No	0.25	234	No	0.18	237	No	0.01
	35	245	233	No	0.33	237	No	0.30	240	No	0.06
	40	245	235	No	0.41	239	No	0.40	242	No	0.18
	45	245	238	Yes	0.59	242	Yes	0.55	245	Yes	0.50
	50	245	240	Yes	0.67	244	Yes	0.65	247	Yes	0.73
	55	245	242	Yes	0.75	247	Yes	0.78	249	Yes	0.89
	60	245	244	Yes	0.81	249	Yes	0.85	252	Yes	0.98
	65	245	246	Yes	0.87	251	Yes	0.90	254	Yes	>0.99
	70	245	249	Yes	0.94	254	Yes	0.95	257	Yes	>0.99
	75	245	251	Yes	0.96	257	Yes	0.99	260	Yes	>0.99
	80	245	254	Yes	0.98	260	Yes	>0.99	263	Yes	>0.99
	85	245	257	Yes	0.99	264	Yes	>0.99	267	Yes	>0.99
	90	245	262	Yes	>0.99	268	Yes	>0.99	272	Yes	>0.99
	95	245	268	Yes	>0.99	275	Yes	>0.99	279	Yes	>0.99

*%tile = Percentile.

Table 3.15. Proficiency Projections based on RIT Scores—Reading 6+, ELA 2

MAP Growth Reading 6+ to OST ELA 2											
			Fall			Winter			Spring		
Grade	Start %ile*	Spring Cut	Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		*Proficient*	Prob.		*Proficient*	Prob.
9	5	220	188	No	<0.01	190	No	<0.01	190	No	<0.01
	10	220	195	No	0.01	197	No	<0.01	197	No	<0.01
	15	220	199	No	0.02	201	No	<0.01	202	No	<0.01
	20	220	203	No	0.05	205	No	0.01	205	No	<0.01
	25	220	206	No	0.11	208	No	0.02	209	No	<0.01
	30	220	209	No	0.16	211	No	0.07	211	No	<0.01
	35	220	212	No	0.27	213	No	0.14	214	No	0.03
	40	220	214	No	0.35	216	No	0.29	217	No	0.17
	45	220	217	Yes	0.50	218	No	0.43	219	No	0.38
	50	220	219	Yes	0.55	221	Yes	0.64	221	Yes	0.62
	55	220	221	Yes	0.65	223	Yes	0.77	224	Yes	0.89
	60	220	224	Yes	0.77	225	Yes	0.86	226	Yes	0.97
	65	220	226	Yes	0.84	228	Yes	0.95	229	Yes	>0.99
	70	220	229	Yes	0.91	230	Yes	0.98	231	Yes	>0.99
	75	220	232	Yes	0.96	233	Yes	0.99	234	Yes	>0.99
	80	220	235	Yes	0.98	236	Yes	>0.99	237	Yes	>0.99
	85	220	239	Yes	>0.99	240	Yes	>0.99	241	Yes	>0.99
	90	220	243	Yes	>0.99	245	Yes	>0.99	246	Yes	>0.99
	95	220	250	Yes	>0.99	251	Yes	>0.99	253	Yes	>0.99
10	5	220	192	No	<0.01	194	No	<0.01	194	No	<0.01
	10	220	199	No	0.01	200	No	<0.01	200	No	<0.01
	15	220	203	No	0.05	204	No	<0.01	205	No	<0.01
	20	220	206	No	0.08	208	No	0.02	208	No	<0.01
	25	220	209	No	0.15	211	No	0.07	211	No	<0.01
	30	220	212	No	0.26	214	No	0.18	214	No	0.03
	35	220	215	No	0.40	216	No	0.29	217	No	0.17
	40	220	217	No	0.45	218	No	0.43	219	No	0.38
	45	220	219	Yes	0.55	221	Yes	0.65	221	Yes	0.62
	50	220	221	Yes	0.65	223	Yes	0.77	224	Yes	0.89
	55	220	224	Yes	0.78	225	Yes	0.87	226	Yes	0.97
	60	220	226	Yes	0.85	227	Yes	0.93	228	Yes	0.99
	65	220	228	Yes	0.90	230	Yes	0.98	231	Yes	>0.99
	70	220	231	Yes	0.95	232	Yes	0.99	233	Yes	>0.99
	75	220	234	Yes	0.98	235	Yes	>0.99	236	Yes	>0.99
	80	220	237	Yes	0.99	238	Yes	>0.99	239	Yes	>0.99
	85	220	240	Yes	>0.99	241	Yes	>0.99	242	Yes	>0.99
	90	220	244	Yes	>0.99	246	Yes	>0.99	247	Yes	>0.99
	95	220	251	Yes	>0.99	252	Yes	>0.99	253	Yes	>0.99

MAP Growth Reading 6+ to OST ELA 2											
			Fall			Winter			Spring		
Grade	Start %ile*	Spring Cut	Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		*Proficient*	Prob.		*Proficient*	Prob.
11	5	220	194	No	<0.01	195	No	<0.01	194	No	<0.01
	10	220	201	No	0.03	202	No	<0.01	201	No	<0.01
	15	220	205	No	0.08	206	No	0.01	206	No	<0.01
	20	220	209	No	0.15	210	No	0.05	209	No	<0.01
	25	220	212	No	0.24	213	No	0.14	212	No	0.01
	30	220	214	No	0.32	215	No	0.24	215	No	0.06
	35	220	217	No	0.45	218	No	0.43	218	No	0.27
	40	220	219	Yes	0.55	220	Yes	0.57	220	Yes	0.50
	45	220	221	Yes	0.64	222	Yes	0.70	222	Yes	0.73
	50	220	224	Yes	0.76	225	Yes	0.86	225	Yes	0.94
	55	220	226	Yes	0.82	227	Yes	0.92	227	Yes	0.99
	60	220	228	Yes	0.88	229	Yes	0.96	229	Yes	>0.99
	65	220	230	Yes	0.92	231	Yes	0.98	232	Yes	>0.99
	70	220	233	Yes	0.96	234	Yes	>0.99	234	Yes	>0.99
	75	220	235	Yes	0.98	237	Yes	>0.99	237	Yes	>0.99
	80	220	238	Yes	0.99	240	Yes	>0.99	240	Yes	>0.99
	85	220	242	Yes	>0.99	243	Yes	>0.99	244	Yes	>0.99
	90	220	246	Yes	>0.99	247	Yes	>0.99	248	Yes	>0.99
	95	220	253	Yes	>0.99	254	Yes	>0.99	255	Yes	>0.99
12	5	220	192	No	<0.01	189	No	<0.01	186	No	<0.01
	10	220	199	No	0.01	197	No	<0.01	195	No	<0.01
	15	220	204	No	0.05	202	No	<0.01	200	No	<0.01
	20	220	208	No	0.12	206	No	0.01	205	No	<0.01
	25	220	211	No	0.21	210	No	0.05	209	No	<0.01
	30	220	214	No	0.32	213	No	0.14	212	No	0.01
	35	220	216	No	0.41	216	No	0.30	215	No	0.06
	40	220	219	Yes	0.55	218	No	0.43	218	No	0.27
	45	220	221	Yes	0.64	221	Yes	0.64	221	Yes	0.62
	50	220	224	Yes	0.76	224	Yes	0.82	224	Yes	0.89
	55	220	226	Yes	0.82	227	Yes	0.92	227	Yes	0.99
	60	220	229	Yes	0.90	229	Yes	0.96	230	Yes	>0.99
	65	220	231	Yes	0.93	232	Yes	0.99	233	Yes	>0.99
	70	220	234	Yes	0.97	235	Yes	>0.99	236	Yes	>0.99
	75	220	237	Yes	0.99	238	Yes	>0.99	240	Yes	>0.99
	80	220	240	Yes	0.99	242	Yes	>0.99	244	Yes	>0.99
	85	220	244	Yes	>0.99	246	Yes	>0.99	248	Yes	>0.99
	90	220	249	Yes	>0.99	251	Yes	>0.99	254	Yes	>0.99
	95	220	256	Yes	>0.99	259	Yes	>0.99	262	Yes	>0.99

*%tile = Percentile.

Table 3.16. Proficiency Projections based on RIT Scores—Life Science, Biology

MAP Growth Life Science to OST Biology											
			Fall			Winter			Spring		
Grades	Start %ile*	Spring Cut	Fall RIT	Projected Proficiency		Winter RIT	Projected Proficiency		Spring RIT	Projected Proficiency	
				Proficient	Prob.		*Proficient*	Prob.		*Proficient*	Prob.
9–12	5	212	191	No	0.02	192	No	0.01	192	No	<0.01
	10	212	196	No	0.06	197	No	0.04	197	No	<0.01
	15	212	200	No	0.16	201	No	0.10	201	No	<0.01
	20	212	202	No	0.22	203	No	0.16	204	No	0.01
	25	212	205	No	0.35	206	No	0.28	207	No	0.06
	30	212	207	No	0.45	208	No	0.39	209	No	0.18
	35	212	208	Yes	0.50	210	Yes	0.50	212	Yes	0.50
	40	212	210	Yes	0.60	212	Yes	0.61	214	Yes	0.73
	45	212	212	Yes	0.69	214	Yes	0.72	216	Yes	0.89
	50	212	214	Yes	0.78	216	Yes	0.80	218	Yes	0.97
	55	212	215	Yes	0.81	218	Yes	0.87	220	Yes	0.99
	60	212	217	Yes	0.87	220	Yes	0.92	222	Yes	>0.99
	65	212	219	Yes	0.92	222	Yes	0.96	224	Yes	>0.99
	70	212	221	Yes	0.95	224	Yes	0.98	226	Yes	>0.99
	75	212	223	Yes	0.97	226	Yes	0.98	228	Yes	>0.99
	80	212	225	Yes	0.98	228	Yes	0.99	231	Yes	>0.99
	85	212	228	Yes	0.99	231	Yes	>0.99	234	Yes	>0.99
	90	212	231	Yes	>0.99	235	Yes	>0.99	238	Yes	>0.99
	95	212	236	Yes	>0.99	240	Yes	>0.99	244	Yes	>0.99

*%tile = Percentile.

4. References

He, W. (2022). *Achievement and Growth Norms for Course-Specific MAP Growth Tests*. NWEA Research Report. Portland, OR: NWEA. https://www.nwea.org/uploads/2023/02/2022-MAP-Growth-HS-Math-Norms-Report-02-07-2023.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.