map GROWTH

2025 MAP Growth Norms Technical Manual

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Version 2025.1.1

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1. Introduction

Meaningful interpretation of MAP Growth data requires appropriate contextualization through comparison to established references. Without this context, assessment scores remain isolated numbers rather than actionable information. Educational assessments rely on two fundamental types of contextual references: norms and benchmarks.

Norms describe the typical performance within a defined population, enabling the interpretation of scores relative to comparable peers. Benchmarks establish performance standards or achievement targets, prescribing desired outcomes rather than describing existing patterns. These two references answer fundamentally different questions: norms provide a descriptive reference, addressing “what typically occurs,” while benchmarks provide a prescriptive reference, addressing “what should occur.”

The distinction between descriptive and prescriptive references is critical for valid assessment interpretation. Conflating these frameworks–mistaking typical performance for desired performance–can lead to significant misinterpretations and inappropriate educational decisions. Understanding this distinction ensures effective utilization of each reference type for its intended purpose. Partners seeking to understand performance in relation to external benchmarks–such as state proficiency standards–can consult NWEA linking studies. These studies provide guidance on how RIT scores relate to specific state assessments and can support prescriptive uses of the data in service of setting goals to reach meaningful targets.

MAP Growth Achievement and Growth Norms serve a descriptive function, characterizing the achievement and growth patterns of U.S. public school students to provide interpretive context for individual and group performance. Descriptive data differs fundamentally from prescriptive standards. Norms document what typically happens in student performance; they do not establish what should happen or represent achievement goals.

NWEA continuously refines the statistical models underlying MAP Growth Achievement and Growth Norms to enhance their accuracy and validity. This 2025 update addresses several critical factors: evolving U.S. student demographics, documented shifts in academic performance following the COVID-19 pandemic, and improvements in MAP Growth’s enhanced item-selection algorithm. These updated norms enable educators to:

Table 1.1.: MAP Growth Norms Coverage by Subject

	Grade												
Subject	K	1	2	3	4	5	6	7	8	9	10	11	12
Mathematics	X	X	X	X	X	X	X	X	X	X	X	X	X
Reading	X	X	X	X	X	X	X	X	X	X	X	X	X
Langauge Usage			X	X	X	X	X	X	X	X	X	X	
Science			X	X	X	X	X	X	X	X	X		

- Evaluate student and school achievement and growth
- Individualize instruction and set goals with students
- Support conversations about achievement and growth patterns

The 2025 norms are derived from a comprehensive dataset from 30% of all US public schools, making them one of the largest norming samples ever created. Specifically there were 116,225,831 test events administered to 13,804,182 students across 29,720 schools in 7,000 districts, spanning six testing terms from Fall 2022 through Spring 2024. This sample demonstrates broad demographic alignment with the U.S. student population, ensuring representative normative comparisons.

The norming process involved systematic evaluation of 344 candidate growth models to identify 86 optimal models for generating both student and school achievement and growth norms. This technical manual provides comprehensive documentation of the development methodology and validation procedures underlying the MAP Growth Achievement and Growth Norms. Table 1.1 illustrates the subjects and grade levels covered by the 2025 MAP Growth Norms.

1.1. Norms

Norms provide a statistical description of how a particular group performs on tests, expressed through summary statistics such as means, standard deviations, and percentile ranks. MAP Growth Achievement and Growth Norms are considered national norms because they represent the population achievement distribution of US students and schools by grade level after a specified period of instruction. NWEA develops four types of norms for MAP Growth: Student Achievement Norms, Student Growth Norms, School Achievement Norms, and School Growth Norms.

1.1.1. Achievement Norms

Achievement norms characterize assessment performance at discrete time points, providing cross-sectional snapshots of student ability. Achievement percentiles indicate the percentage of the reference population scoring at or below a given RIT score within a specific subject and grade level, measured after a designated number of weeks from the start of the school year.

1.1.2. Growth Norms

Growth norms define the change observed between two specific measurement occasions. Growth percentiles indicate the proportion of the reference population that shows growth rates at or below the observed change between two MAP Growth assessments. A reference distribution is created for each subject and grade level, taking into account the number of instructional weeks from the start of the school year for both assessments and a specified RIT score for the first assessment.

1.1.3. Student and School Norms

MAP Growth Achievement and Growth Norms offer achievement and growth norms for students and schools. Student-level achievement and growth norms provide comparative data on individual MAP Growth performance in relation to the U.S. population of students in the same grade. School-level norms offer comparative data for a school's grade-level aggregate MAP Growth scores relative to the U.S. population of schools serving that same grade.

2. Sampling

2.1. Target Population

The MAP Growth Achievement and Growth Norms target population encompasses all U.S. public schools and their enrolled students. This comprehensive population definition includes specialized educational institutions and programs designed to serve students with hearing or vision disabilities.

The normative population also includes students who use assistive technologies to access MAP Growth assessments, such as text-to-speech software. This inclusive approach ensures that the normative framework reflects the full range of students taking part in MAP Growth testing within the U.S. public education system, providing representative comparative data for all students regardless of their accommodation needs or specialized educational settings.

2.2. Sampling Procedure

Analytic samples were generated for the student and school-level models of each grade and measurement scale covered by the 2025 norms. To ensure these samples align with the target population, NWEA partner schools were cross-referenced with the directory of U.S. public schools maintained by the National Center for Education Statistics' (NCES) Common Core of Data (CCD). Schools were eligible for the analytic samples if they were active MAP users during the 2022-2023 school year, had a total enrollment of at least 20 students, and tested at least 20 students during the sampling period.

A pool of MAP Growth test events from selected schools was gathered and curated according to specific eligibility criteria based on test event features. Following standard model fitting practices, the analytic dataset was partitioned into training and test subsets to ensure robust model validation. Training datasets are used to develop and calibrate the statistical models, while test datasets provide independent validation of model performance and accuracy. Eligible events were sampled to create a training and test sets for both student- and school-level models.

2.2.1. Characteristics of Eligible Test Events

Survey with Goals tests are full-length adaptive assessments that provide detailed scores and growth projections to inform instruction and goal setting. In contrast, Screener tests are shorter versions designed for rapid identification of students requiring additional academic support. All Survey with Goals MAP Growth test events occurring during an academic term from Fall 2022-Spring 2024 within U.S. public schools were treated as candidates for inclusion in the model training or test samples if they met the following eligibility criteria:

1. The test event met reliability standards for valid events
   a) The event duration was not less than 6 minutes
   b) The event completed without exhausting the item pool
   c) The event was not marked as invalid by a proctor
   d) The resulting RIT score was between 100 and 320 for Reading tests or 100 and 350 for all other scales
   e) The resulting standard error of measure was between 1.0 and 5.5
2. The test event met standards for growth events
   a) The event started within the district's defined test window
   b) For students who had multiple events on the same measurement scale in a single season, only the valid event with the lowest standard error of measure is considered

Across all analytic samples, 116,225,831 test events from 13,804,182 students across 29,720 schools in 7,000 districts were eligible for inclusion in the sampling pool. Table 2.1 shows the disaggregated counts of the number of eligible test events, students, schools, and districts used for the Mathematics and Reading analytic samples. Table 2.2 reports the same information for the Language Usage and Science analytic samples.

2.2.1.1. Inclusion of MAP Spanish Math Test Events

NWEA offers MAP Growth assessments for Mathematics and Reading in both English and Spanish. The MAP Spanish and English Mathematics tests are on a common measurement scale, and both languages are included in the sample for the 2025 Mathematics Norms. The MAP Spanish Reading test is on a different measurement scale than the MAP English Reading test, however. Consequently, NWEA developed separate user norms specifically for the MAP Spanish Reading test, and these test events were not included in the MAP Reading sample used to establish the 2025 Reading Norms.

Table 2.1.: Analytic Sample by Subject (Mathematics and Reading)

	Mathematics				Reading			
Grade	Districs	Schools	Students	Test Events	Districs	Schools	Students	Test Events
K	4,611	12,528	1,447,537	5,440,061	4,452	11,426	1,184,451	4,391,169
1	4,995	14,273	1,768,966	6,946,025	4,844	13,096	1,479,699	5,780,062
2	5,339	15,867	1,969,185	7,500,773	5,211	15,136	1,774,498	6,674,500
3	5,436	16,410	1,994,109	7,612,961	5,405	16,273	1,914,037	7,276,402
4	5,463	16,608	2,018,431	7,651,324	5,417	16,336	1,959,245	7,405,757
5	5,543	19,104	2,018,911	7,481,984	5,485	18,701	1,961,577	7,274,593
6	5,673	18,609	2,037,987	7,402,939	5,611	18,341	2,020,562	7,354,134
7	5,538	11,576	2,044,658	7,139,557	5,490	11,435	2,043,867	7,293,730
8	5,551	11,721	1,903,825	5,371,642	5,514	11,610	2,029,393	6,015,867
9	3,604	8,018	935,723	2,608,851	3,893	9,139	1,322,926	3,817,974
10	3,315	5,176	731,172	1,921,240	3,632	5,836	1,057,945	2,750,285
11	2,900	4,467	435,631	1,044,556	3,135	4,994	530,603	1,294,755
12	2,164	3,405	211,601	398,158	2,356	3,875	285,413	543,682

Table 2.2.: Analytic Sample by Subject (Language Usage and Science)

	Language Usage				Science			
Grade	Districs	Schools	Students	Test Events	Districs	Schools	Students	Test Events
2	1,527	3,084	176,454	606,753	340	1,003	71,528	245,565
3	2,137	4,680	313,432	1,051,014	1,203	3,401	334,805	1,166,680
4	2,236	4,862	328,639	1,085,356	1,520	4,405	446,558	1,537,120
5	2,349	5,620	342,991	1,097,943	2,042	6,489	627,725	2,055,624
6	2,420	5,864	381,585	1,210,812	2,107	6,273	586,211	1,977,633
7	2,472	4,259	385,526	1,213,571	2,190	4,466	639,000	2,114,251
8	2,504	4,343	378,694	1,005,136	2,324	4,752	678,003	1,736,385
9	2,007	3,787	255,873	711,983	1,256	2,138	159,890	434,234
10	1,895	2,646	224,617	583,358	1,174	1,497	136,433	348,587
11	1,563	2,121	135,564	331,545	NA	NA	NA	NA

2.2.1.2. Inclusion of Non-EISA Test Events

The analytic sample includes test events that used either the enhanced item-selection algorithm (EISA) or the traditional item selection algorithm. A concordance approach was used to ensure the 2025 Norms are aligned to scores from EISA test events, as described in Section 2.6.

2.2.2. Student-level Sampling

The 2025 MAP Growth Achievement and Growth Norms employed a two-stage sampling procedure to create student-level training and test samples. In the first stage, 2,500 schools were randomly sampled from the pool of eligible test events. From the schools sampled in the first stage, a percentage of students was then randomly sampled to form a training sample of approximately 80,000 students. For subjects and grades with fewer test events, a smaller number of training observations was sampled for training to allow for the creation of robust test sets. Exact training sample sizes for the student-level models are reported in Table 2.3.

This two-stage sampling method was used to enable a more thorough validation process, with each student-level model tested against two test sets. The first test set included students enrolled in schools that were also part of the training sample, but who were not individually sampled for training. This set served to assess how accurately candidate models could predict student RIT scores within these sampled schools. The second test set included students from schools not used in training, enabling the evaluation of how well the candidate models represent population distributions in new, unsampled schools.

2.2.3. School-level Sampling

The data used to fit and validate school-level models used grade-level mean MAP Growth scores for each eligible school. After aggregating test event data to the school-level, training and test sets were created, targeting a training sample size of 2,500 schools and a test sample size of 500 schools for each model. For some subjects and grades with fewer test events, a smaller number of training observations was sampled for training to allow for the creation of robust test sets. Exact training sample sizes for the school-level models are reported in Table 2.4.

Table 2.3.: Training Sample Size (Student-level)

Grade	Mathematics	Reading	Language Usage	Science
K	79,109	79,650	-	-
1	79,243	79,898	-	-
2	79,474	80,142	58,762	24,472
3	83,254	80,258	79,902	78,488
4	80,460	79,637	80,297	80,034
5	79,087	78,376	80,398	80,382
6	80,158	80,771	79,891	80,958
7	80,897	80,476	78,612	79,778
8	79,479	82,142	78,949	81,488
9	81,454	79,713	82,512	53,675
10	80,068	78,996	76,608	48,218
11	78,673	79,750	45,693	-
12	71,680	81,425	-	-

Table 2.4.: Training Sample Size (School-level)

Grade	Mathematics	Reading	Language Usage	Science
K	2,500	2,500	-	-
1	2,500	2,500	-	-
2	2,500	2,500	1,155	434
3	2,500	2,500	2,002	1,861
4	2,500	2,500	2,102	2,471
5	2,500	2,500	2,236	2,500
6	2,500	2,500	2,396	2,500
7	2,500	2,500	1,775	2,379
8	2,500	2,500	1,644	2,283
9	2,500	2,500	1,437	922
10	2,468	2,500	1,084	712
11	1,894	2,197	751	-
12	1,060	1,331	-	-

2.3. Sample Representativeness

A great deal is known about the demographic and structural characteristics of U.S. public schools which can be used to assess the extent to which the NWEA partner base is observably representative of the overall target population. The National Center for Education Statistics (NCES) Common Core of Data (CCD) provides comprehensive annual census data on all public schools and school districts in the United States, including demographic breakdowns by race/ethnicity and socioeconomic status, geographic location, and school-level characteristics such as urbanicity classifications.

By comparing the distribution of these key characteristics between NWEA partner schools and the complete CCD universe, we can quantify potential selection biases and assess the generalizability of MAP Growth Achievement and Growth Norms to the broader population of U.S. public schools. Table 2.5 draws on the NCES-CCD dataset to compare the target population to the NWEA analytic sample on a range of these observable school-level characteristics. Standardized mean differences between the population and sample values are reported in the column farthest to the right. None of the characteristics met the 0.2 threshold for a “small effect” indicating there are no systematic differences between the norming sample and the target population, supporting the MAP Growth norms as population norms.

2.4. Encoding Time

The MAP Growth Achievement and Growth Norms derive from longitudinal statistical models that characterize RIT score trajectories across consecutive grade levels. Accurate temporal encoding represents a fundamental requirement for valid longitudinal modeling, as it establishes the temporal framework within which achievement and growth patterns are analyzed.

2.4.1. Data Sources for Temporal Reference Points

The temporal framework for MAP Growth norms utilizes district-specific academic calendar start dates obtained from MDR Education, the educational data division of Dun & Bradstreet. When district-specific start dates are unavailable through MDR, the model applies default state-level start dates as proxy measures. Test administration timing is captured through the recorded start datetime of each assessment event, as documented in the MAP Growth testing platform.

Table 2.5.: Sample Representativeness on Selected Correlates

	Population		Sample		
	(N=102,268)		(N= 29,720)		
Variable	Mean	SD	Mean	SD	SMD
% Urban Schools	27.4	44.6	29.2	45.5	0.040
% Suburban Schools	31.4	46.4	30.8	46.2	-0.013
% Town Schools	13.1	33.7	11.5	31.9	-0.050
% Rural Schools	28.0	44.9	28.4	45.1	0.010
% Charter Schools	8.1	27.3	11.4	31.8	0.117
% FRPL Eligible	57.3	28.3	56.8	27.7	-0.017
% AI/AN Students[1]	1.8	9.2	2.3	11.7	0.054
% Asian Students	4.0	8.9	3.7	7.9	-0.039
% Black Students	14.5	22.6	15.2	22.6	0.030
% Hispanic Students	26.1	27.5	25.8	27.2	-0.013
% NHPI Students[2]	0.4	2.5	0.3	1.8	-0.041
% White Students	48.2	32.7	47.8	32.8	-0.012
% Two or more races Students	4.9	4.5	4.9	4.3	0.004
Full time equivalents	32.8	27.0	34.6	26.1	0.067
Pupil-teacher ratio	15.7	22.3	15.4	13.1	-0.017
% New England Schools	4.5	20.8	4.5	20.7	-0.001
% Middle Atlantic Schools	10.2	30.2	6.1	23.9	-0.141
% East North Central Schools	15.5	36.2	22.8	42.0	0.194
% West North Central Schools	10.1	30.1	10.5	30.7	0.015
% South Atlantic Schools	15.1	35.8	13.6	34.3	-0.042
% East South Central Schools	5.9	23.6	3.2	17.6	-0.122
% West South Central Schools	13.7	34.3	19.9	39.9	0.176
% Mountain Schools	9.1	28.8	9.2	28.8	0.002
% Pacific Schools	14.8	35.5	9.8	29.7	-0.146

[1]American Indian and Alaska Native Students
[2]Native Hawaiian and Pacific Islander Students

2.4.2. Standardized Time Metric Development

Educational calendars exhibit substantial variation across U.S. school districts in both start dates and academic year duration. Research indicates that school years may commence as early as July or extend into September (DeSilver 2023a), while state-mandated instructional days range from 160 days in Colorado to 186 days in Kansas (DeSilver 2023b). This temporal heterogeneity necessitates a standardized time metric that enables valid comparisons across diverse educational contexts.

Rather than employing raw calendar dates, the norming models utilize a district-relative temporal metric calculated as the number of ISO weeks elapsed between the district start date and the test administration date. This approach ensures temporal comparability across districts regardless of their specific academic calendars.

2.4.3. Elapsed Weeks Calculation

The elapsed weeks metric is computed such that:

- Test events occurring within the same ISO calendar week as the district start date are assigned 1 elapsed weeks
- Test events occurring in the ISO calendar week immediately following the district start date are assigned 2 elapsed week
- Subsequent weeks follow this sequential pattern
- Holidays and other school closures are not removed.

This standardized temporal encoding enables the longitudinal models to accurately capture achievement and growth patterns while accounting for the diverse academic calendar structures across the U.S. public education system.

2.4.4. Seasonal Classification Framework

The MAP Growth Achievement and Growth Norms are organized by academic season, specifically Fall, Winter, and Spring testing periods. Figure 2.1 illustrates the correspondence between elapsed weeks and seasonal designations. Test events are classified according to the following temporal boundaries:

- Fall: Test events initiated between week 1 and week 20
- Winter: Test events initiated between week 16 and week 30
- Spring: Test events initiated between week 26 and week 42

This seasonal framework provides educators with intuitive temporal reference points that align with traditional academic calendar structures while maintaining the precision of the underlying week-based temporal metric.

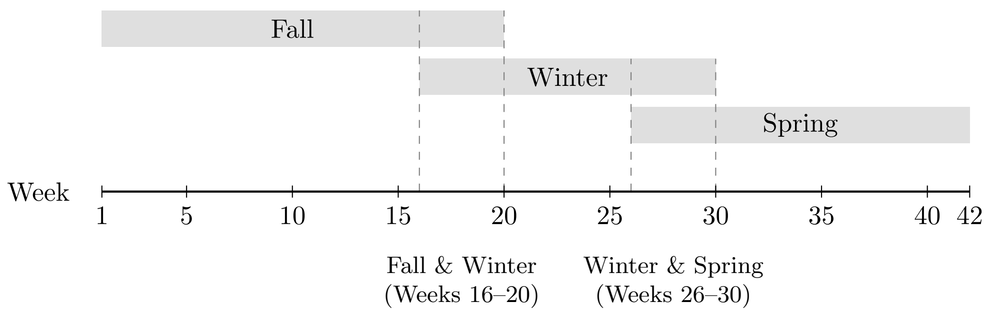

Figure 2.1.: Temporal classification framework showing seasonal boundaries and overlap periods for Fall, Winter, and Spring testing windows

2.5. Cohort Design

The 2025 MAP Growth Achievement and Growth Norms utilize assessment data from the 2022–23 and 2023–24 academic years. The norming approach uses a cohort-based design that maximizes the longitudinal information for both achievement and growth modeling while making efficient use of the available data. Figure 2.2 illustrates the cohort design implemented across two consecutive grade levels, designated as grades g_1 and g_2. Under this design, Grade g_1 is considered the focal grade.

The design incorporates two student cohorts:

- Cohort A comprises students enrolled in Grade g_1 during the 2022–23 academic year who were subsequently promoted to Grade g_2 during the 2023–24 academic year. This longitudinal cohort provides critical data for tracking student progression across consecutive grade levels.
- Cohort B comprises students enrolled in Grade g_1 during the 2023–24 academic year, contributing within-year longitudinal data.

Both cohorts contribute essential information to the g_1 achievement and within-grade growth norms. However, Cohort A provides the primary data source for between-grade growth norms due to its longitudinal span across consecutive academic years.

The design intentionally omits students enrolled in Grade g_2 during the 2022–23 academic year, as this cohort would not contribute meaningful information to between-grade growth patterns. This omission reflects a targeted cohort selection strategy that enhances the usefulness of the data.

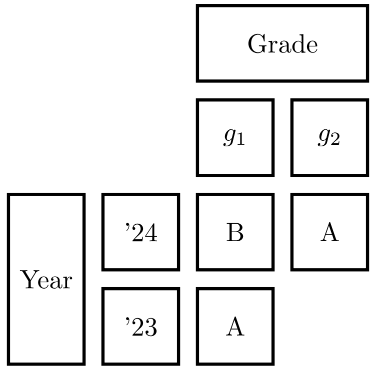

Figure 2.2.: Cohort sampling design for consecutive grades across the 2022–23 and 2023–24 academic years, illustrating longitudinal data contributions to achievement and growth norms.

2.6. EISA Concordance

In the summer of 2023, NWEA began the phased rollout of enhanced item-selection algorithm (EISA), a new item selection algorithm designed to better assess student achievement on grade-level content. This algorithm considers additional factors when choosing test items, specifically aiming to select items that more accurately match the grade level for a student using a compensatory version of the maximum priority index (Meyer, Hu, and Li 2023).

Although no significant impact of MAP with EISA has been found on achievement and growth patterns in Reading, Language Usage, or Science scores, results from pilot and follow-up concordance studies showed that fall Mathematics scores in most grades were slightly lower for EISA users compared to comparison groups using traditional MAP Growth assessments (Lewis and Kuhfeld 2024). These studies also showed winter and spring Mathematics scores in all grades were higher than those of the comparison groups. This initial dip in fall test scores, followed by stronger-than-expected winter and spring scores, led to increased within-year growth relative to comparison groups.

To account for differences between traditional MAP Growth assessments and MAP Growth with EISA, RIT scores from eligible test events that used traditional MAP Growth were aligned to the MAP with EISA scale using the equipercentile linking. In a concordance study, this linking approach was found to attenuate differences in scores between the two test versions, allowing for the use of both EISA and non-EISA events when fitting the 2025 MAP Growth Achievement and Growth Norms models. For more details on the concordance of traditional MAP Growth scores, see Lewis and Kuhfeld (2024).

3. Deriving MAP Growth Norms

This chapter explains how MAP Growth Achievement and Growth Norms are derived. MAP Growth Achievement and Growth Norms produce 10 distinct norms for a given subject, level, and grade. Figure 3.1 illustrates these norms in the context of Grade 4. Achievement norms (A-C) describe student achievement at specific points during the school year. Within-grade growth norms (D-F) describe how much students typically grow, season-to-season, during a single school year. Finally, between-grade growth norms (G-J) describe how much students typically grow between two adjacent grades. Repeated RIT scores for students over two grades are required to produce a model capable of supporting all 10 norms. We refer to the first of two grades as the *focal grade*. In the case of Grade 4 norms in Figure 3.1, Grade 4 is the focal grade.

There are three main steps to produce MAP Growth Achievement and Growth Norms. First, a longitudinal model that describes how RIT scores change over time is estimated using the training sample. Next, the estimated model parameters are used to create population distributions that describe the distribution of RIT scores at specific instructional weeks. Finally, these distributions are used to determine where any individual RIT score falls relative to the population, expressed as percentile ranks.

3.1. The Mixed Effects Modeling Framework

The MAP Growth Achievement and Growth norms have long focused on building population distributions based on models that describe the cyclical nature of MAP Growth tests—how students grow throughout the year then drop slightly over the summer only to grow again the following year (Kuhfeld, Condron, and Downey 2021). To achieve this, the 2025 MAP Growth norms were constructed from a 2-level mixed effects model where repeated RIT scores are nested within students. While it is common to work with 3-level models when students are nested within schools, the sampling strategies outlined in Chapter 2 negated the impact of clustering, thus allowing for a simpler, 2-level model.

Let $j \in \{1, \ldots, J\}$ indicate student j in a sample of J students and y_{ij} be the ith RIT score for student j. Because the number of RIT scores varies by student let n_j be the number of measures for student j such that $\mathbf{y}_j$ is their n_j vector of RIT scores. Because

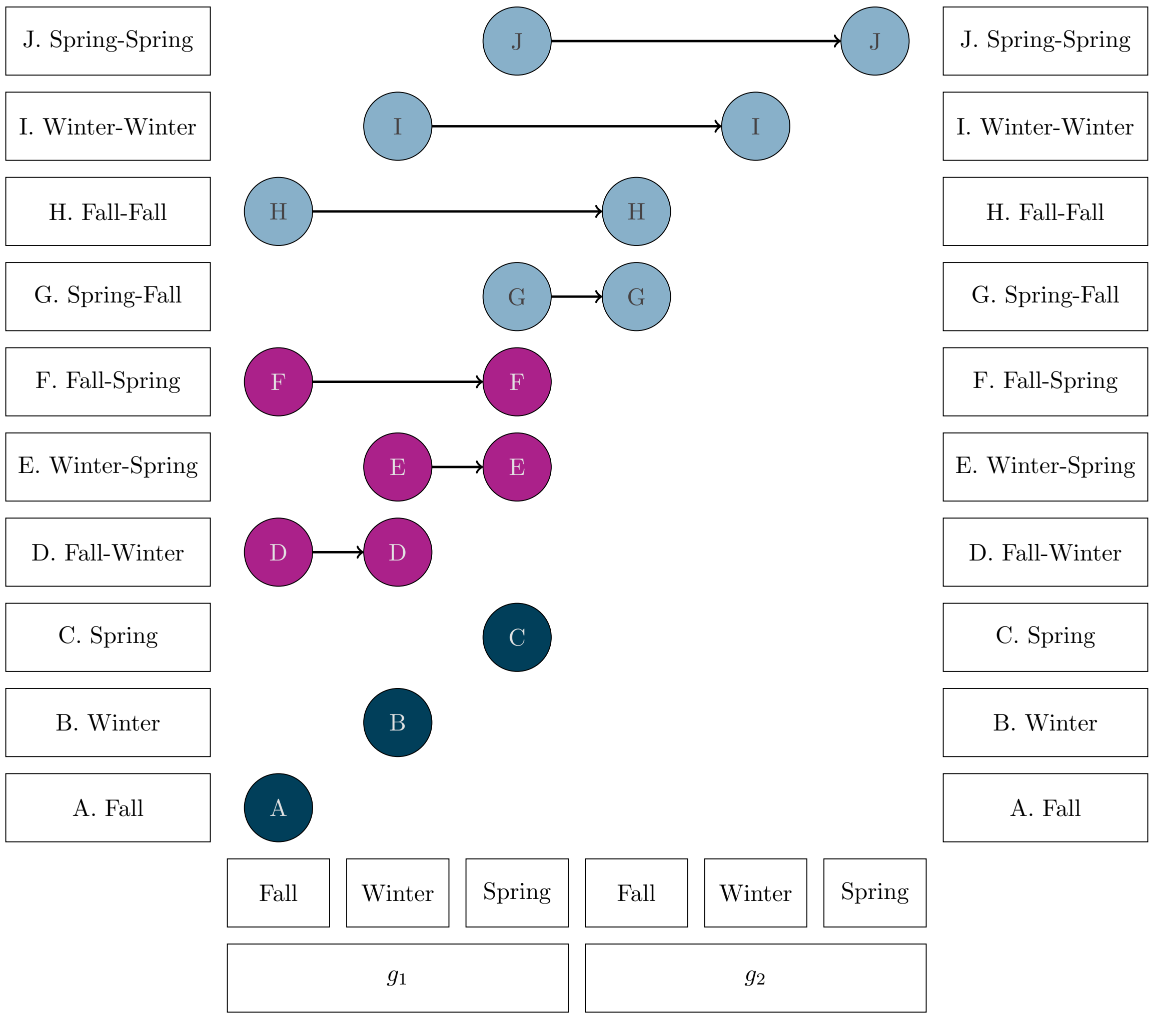

Figure 3.1.: Complete taxonomy of MAP Growth Achievement and Growth Norms showing the three achievement norms (Fall, Winter, Spring), three within-year growth norms, and four between-year growth norms generated for each level, subject, and grade level.

the 2025 MAP Growth Achievement and Growth Norms models were trained on data from two academic years, a student can have as many as six observations, $n_j \leq 6$. The mixed effects model can be defined as

$$\mathbf{y}_j = \mathbf{X}_j \boldsymbol{\beta} + \mathbf{Z}_j \boldsymbol{\zeta}_j + \boldsymbol{\epsilon}_j \tag{3.1}$$

where

- $\mathbf{y}_j$ is a n_j vector of RIT scores for student j
- $\mathbf{X}_j$ is an $n_j \times p$ fixed effect design matrix for student j
- $\boldsymbol{\beta}$ is a length-p parameter vector of fixed effects
- $\mathbf{Z}_j$ is an $n_j \times q$ random effect design matrix for student j
- $\boldsymbol{\zeta}_j$ is a length-q parameter vector of random effects for student j
- $\boldsymbol{\epsilon}_j$ is an n_j vector of student-by-occasion residual error

and p represents the number of fixed effects terms in the model and q represents the number of random effects. The random effects, $\boldsymbol{\zeta}$, and residual errors, $\boldsymbol{\epsilon}_j$, are assumed normally distributed

$$\boldsymbol{\zeta}_j \sim \mathcal{N}\left(\mathbf{0}, \boldsymbol{\Psi}\right),\ \boldsymbol{\epsilon}_j \sim \mathcal{N}\left(\mathbf{0}, \mathbf{I}\sigma\right). \tag{3.2}$$

Where $\boldsymbol{\Psi}$ is an unstructured covariance matrix of size q, $\mathbf{I}$ is an identity matrix of size n_j and σ is a variance parameter.

To indicate when model parameters are used in subsequent formals, we adopt the notion of *structural parameters* found in Skrondal and Rabe-Hesketh (2004, 117). Let $\boldsymbol{\theta}$ include the regression parameters and non-duplicated elements of the covariance matrices such that $\boldsymbol{\theta} = \left[\beta', \text{vech}\left(\boldsymbol{\Psi}\right)', \sigma\right]'$ where vech$(\cdot)$ is the half-vectorization function.

3.1.1. Design Matrices

The 2025 MAP Growth Achievement and Growth Norms models adopt a piecewise structure where within-year growth is modeled as a grade-specific linear process. This approach fits a unique initial status and growth rate for each grade in a given model. With a two-year design, a student can have up to six test events, one per grade-season pair. Let $w_{g,s}$ be the number of weeks elapsed since the start of school where g is the grade $g \in G$ where $G = \{g_1, g_2\}$ and s is the season, $s \in S$ where $S = \{fall, winter, spring\}$. Under this notation, $\mathbf{X}_j$ in Equation 3.3 is the fixed effect design matrix for student j who tested at weeks 4, 20, and 32 in the focal grade and weeks 3, 21, and 31 in the subsequent year,

$$\mathbf{X}_j = \begin{bmatrix} 1 & w_{g_1 fall} & 0 & 0 \\ 1 & w_{g_1 winter} & 0 & 0 \\ 1 & w_{g_1 spring} & 0 & 0 \\ 1 & 0 & 1 & w_{g_2 fall} \\ 1 & 0 & 1 & w_{g_2 winter} \\ 1 & 0 & 1 & w_{g_2 spring} \end{bmatrix} = \begin{bmatrix} 1 & 4 & 0 & 0 \\ 1 & 20 & 0 & 0 \\ 1 & 32 & 0 & 0 \\ 1 & 0 & 1 & 3 \\ 1 & 0 & 1 & 21 \\ 1 & 0 & 1 & 31 \end{bmatrix}. \tag{3.3}$$

In this case, $p = 4$ which means 4 fixed effect parameters make up the parameter vector β. Under the 2025 MAP Growth norms piecewise parameterization, the parameters have the following interpretation,

- β_0 is the expected RIT score at the start of the school year in the focal grade, g_1.
- β_1 is the expected week-to-week linear change in RIT scores during the focal grade, g_1.
- β_2 is the expected difference between the start of the focal grade, g_1, and the start of the subsequent year, g_2.
- β_3 is the expected week-to-week linear change in RIT scores during the subsequent year, g_2

In the case of the 2025 norms model, $q = p$ such that $\mathbf{X}_j = \mathbf{Z}_j$. That is, every fixed effect has a corresponding random effect. The random effects have the following interpretation,

- ζ_{0j} is the deviation from the expected RIT score at the start of the school year in the focal grade, g_1 for student j.
- ζ_{1j} is the deviation from the expected week-to-week linear change in RIT scores during the focal grade, g_1 for student j.
- ζ_{2j} is the deviation from the expected difference between the start of the focal grade, g_1, and the start of the subsequent year, g_2 for student j.
- ζ_{3j} is the deviation from the expected week-to-week linear change in RIT scores during the subsequent year, g_2 for student j.

! Important

When there is no subsequent grade (Grade 12 for Mathematics and Reading, Grade 11 for Language Usage, Grade 10 for Science), a model is defined for only the focal grade growth. This results in $p = q = 2$ and the design matrices are 3×2.

Figure 3.2 illustrates the functional form of the student piecewise growth trajectory. We see the growth occurring throughout g_1, followed by a drop between the end of g_1 and start of g_2, and linear growth picking back up for g_2. Additionally, notice the difference in the rate of growth, or slope, in the two grades.

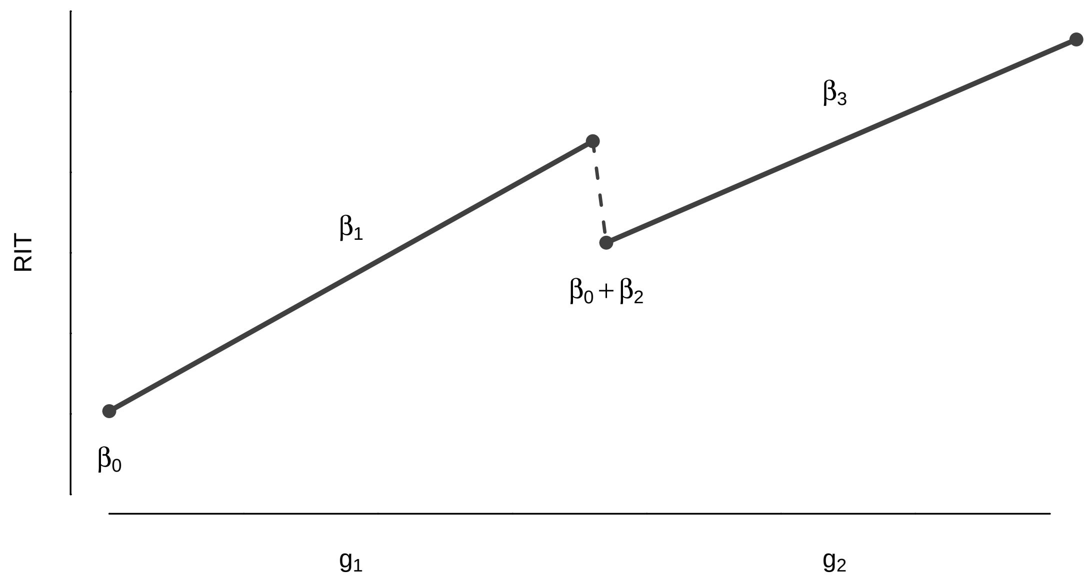

Figure 3.2.: Piecewise linear growth model for MAP Growth norms illustrating grade-specific growth trajectories. The model captures different rates of academic growth within each grade level, with discontinuities at grade boundaries reflecting the segmented nature of the growth function.

3.2. Achievement Norms

The MAP Growth achievement norms leverage estimated structural parameters, $\hat{\boldsymbol{\theta}}$, to construct time-specific distributions to understand how a RIT score from a specific subject, in a specific grade, at a specific week compares to the population of test scores for the same subject, grade, and number of weeks since the start of school. To do this, we start by computing the first two moments (mean and variance) to construct the normative achievement distribution at week w. From there, we can compute the percentile of a single observed score at that week.

The achievement norm distributions for Mathematics and Reading Grades K–11, Language Usage Grades 2–10, and Science Grades 2–9 utilize the design matrices $\mathbf{X} =$

$\mathbf{Z} = [1, w, 0, 0]$. The design matrix will be $\mathbf{X} = \mathbf{Z} = [1, w]$ for Mathematics and Reading Grade 12, Language Usage Grade 11, and Science Grade 10.

3.2.1. Achievement Population Distribution

The first moment of the status distribution is the expected RIT (mean) given w weeks since the start of the focal school year. We use the parameter $\hat{\mu}$ to denote this,

$$\hat{\mu} = \mathsf{E}\left(Y = y \,|\, w; \hat{\boldsymbol{\theta}}\right) = \mathbf{X}\hat{\beta} \tag{3.4}$$

The second moment for the achievement distribution, the variance, given w weeks since the start of school is denoted by the parameter $\hat{\omega}$.

$$\hat{\omega} = \mathsf{Cov}\left(y \,|\, w; \hat{\boldsymbol{\theta}}\right) = \mathbf{X}\mathsf{Cov}\left(\hat{\beta}\right)\mathbf{X}' + \mathbf{Z}\hat{\boldsymbol{\Psi}}\mathbf{Z}' + \hat{\sigma} \tag{3.5}$$

> **Note**
>
> Notice the distinction between the notation for a week, w, and the variance parameter ω (omega).

3.2.2. Achievement Percentiles

With the achievement distribution defined, we can now compute the achievement percentile for an observed score. First, we must compute the z-score for an observed RIT score.

$$z = \frac{y - \hat{\mu}}{\sqrt{\hat{\omega}}} \tag{3.6}$$

> **Note**
>
> Notice the distinction between the random effects design matrix, $\mathbf{Z}$, and the z-score.

With the z-score computed, we can find the probability of obtaining a score that is less than or equal to y

$$p = \mathsf{Pr}(Y \leq y) = \Phi\left(z\right) \tag{3.7}$$

where $\Phi(\cdot)$ is the cumulative distribution function. The final step is to multiply the probability by 100 to arrive at the percentile, $P = p \times 100$.

3.2.3. Percentile Intervals

Because all tests are error prone, a RIT score is accompanied by a standard error of measure, $\sqrt{v}$. We can use the standard error of measure to construct a score interval,

$$[y_{\text{lo}}, y_{\text{hi}}] = \left[y - \sqrt{v},\, y + \sqrt{v}\right] \ . \tag{3.8}$$

Intervals such as this have multiple interpretations. In frequentist terms, this 68% *confidence* interval treats the true ability of a student as fixed and says, *if a student were to theoretically retest an infinite number of times, the bounds established from 68% of the tests would include the student's "true" ability.* A Bayesian perspective treats this as a 68% *credible* interval. Here, the student's true score is not fixed, but captured with uncertainty by the posterior distribution with a mean of y and a standard deviation of $\sqrt{v}$. In this context, the interval says *there is a 68% chance the test takers true score lies within the bounds.* Regardless of interpretation, the interval can be used to compute $[P_{\text{lo}}, P_{\text{hi}}]$ to understand the variability in percentiles due to measurement error.

3.3. Growth Norms

To calculate growth norms, we first produce the "marginal" growth distribution (marginal with respect to a specific starting RIT), from which we can derive the "conditional" growth distribution (conditional with respect to a specific starting RIT score). For growth norms, we must work with two measurement occasions. To simplify notation, we'll say $\mathbf{y}_j = [y_{w_1 j}, y_{w_2 j}]'$ where w_1 *must* be a week in the focal grade and w_2 may be a week in the focal grade or the subsequent grade. From there, we can also say $\Delta(\mathbf{y}_j) = y_{w_2 j} - y_{w_1 j}$ is the change score.

When the second MAP Growth test event is also from the focal grade, the design matrices are

$$\mathbf{X}_j = \mathbf{Z}_j = \begin{bmatrix} 1 & w_1 & 0 & 0 \\ 1 & w_2 & 0 & 0 \end{bmatrix} .$$

When the second MAP Growth test event is from the subsequent grade, the design matrices are

$$\mathbf{X}_j = \mathbf{Z}_j = \begin{bmatrix} 1 & w_1 & 0 & 0 \\ 1 & 0 & 1 & w_2 \end{bmatrix} .$$

3.3.1. Marginal Growth Population Distribution

The marginal growth mean, $\hat{\boldsymbol{\mu}}_\Delta$, is defined as

$$\begin{aligned}
\hat{\boldsymbol{\mu}}_\Delta &= \mathsf{E}\left([y_{w_1},\, \Delta(\mathbf{y})]' \mid w_1,\, w_2;\, \hat{\boldsymbol{\theta}}\right) && (3.9)\\
&= \mathbf{C}\hat{\boldsymbol{\mu}} && (3.10)\\
&= \mathbf{CX}\hat{\beta} && (3.11)\\
&= [\hat{\mu}_{w_1},\, \hat{\mu}_{w_2} - \hat{\mu}_{w_1}]' && (3.12)
\end{aligned}$$

where $\mathbf{C}$ is a 2×2 contrast matrix,

$$\mathbf{C} = \begin{bmatrix} 1 & 0 \\ -1 & 1 \end{bmatrix}. \qquad (3.13)$$

Equation 3.12 shows that multiplying the contrast matrix by the achievement means results in a vector with the starting RIT achievement mean and the expected change between the starting RIT and ending RIT.

The marginal growth covariance between the starting RIT achievement mean and the expected change between the starting RIT and ending RIT is defined as

$$\begin{aligned}
\hat{\boldsymbol{\Omega}}_\Delta &= \mathsf{Cov}\left([\, y_{w_1},\, \Delta(\mathbf{y})\big]' \mid w_1,\, w_2;\, \hat{\boldsymbol{\theta}}\right) && (3.14)\\
&= \mathbf{C}\hat{\boldsymbol{\Omega}}\mathbf{C}' && (3.15)\\
&= \mathbf{C}\left[\mathbf{X}\mathsf{Cov}\left(\hat{\beta}\right)\mathbf{X}' + \mathbf{Z}\hat{\boldsymbol{\Psi}}\mathbf{Z}' + \hat{\boldsymbol{\Sigma}}\right]\mathbf{C}' && (3.16)\\
&= \begin{bmatrix} \hat{\omega}_{y_{w_1}} & \hat{\omega}_{y_w,\Delta(\mathbf{y})} \\ \hat{\omega}_{y_w,\Delta(\mathbf{y})} & \hat{\omega}_{\Delta(\mathbf{y})} \end{bmatrix}. && (3.17)
\end{aligned}$$

In Equation 3.15 where we are dealing with more than one measure, the achievement variance, ω becomes an achievement covariance matrix denoted as Ω and the residual variance becomes a diagonal matrix $\hat{\boldsymbol{\Sigma}} = \mathbf{I}\hat{\sigma}$ where $\mathbf{I}$ is an identity matrix equal in size to the length of $\mathbf{y}$. The term $\hat{\omega}_{y_{w_1}}$ in Equation 3.17 is the achievement variance for the first measurement occasion defined in Equation 3.5.

3.3.2. Conditional Growth Population Distribution

While all the distributions derived so far have been conditional on time, what NWEA refers to as "conditional growth percentiles" are percentiles based on growth distributions conditional on a student's starting RIT. We build from the marginal growth moments to produce the conditional growth moments. The conditional growth mean is defined as

$$\hat{\mu}_{\Delta}(y_{w_1}) = \mathsf{E}\left(\Delta(\mathbf{y})\,|\,y_{w_1} = y\,,\,w_1,\,w_2;\,\hat{\boldsymbol{\theta}}\right) = \mu_{\Delta} + \left(\frac{\hat{\omega}_{y_{w_1},\Delta(\mathbf{y})}}{\hat{\omega}_{y_{w_1}}}\right) \times (y_{w_1} - \hat{\mu}_{w_1}) \ . \tag{3.18}$$

We adopt the functional notation of $\hat{\mu}_{\Delta}\left(y_{w_1}\right)$ to indicate a mean conditional on the value of the first RIT score, y_{w_1}. Notice we are working with specific elements of the marginal covariance, $\hat{\boldsymbol{\Omega}}_{\Delta}$ from Equation 3.17.

The conditional growth variance is defined as

$$\hat{\omega}_{\Delta}(y_{w_1}) = \mathsf{Var}\left(\Delta(\mathbf{y})\,|\,y_{w_1} = y\,,\,w_1,\,w_2;\,\hat{\boldsymbol{\theta}}\right) = \hat{\omega}_{\Delta(\mathsf{y})} - \frac{\hat{\omega}^2_{y_{w_1},\Delta(\mathbf{y})}}{\hat{\omega}_{y_{w_1}}} \, . \tag{3.19}$$

Again, notice we are working with specific elements of the marginal covariance, $\hat{\boldsymbol{\Omega}}_{\Delta}$ from Equation 3.17.

3.3.3. Conditional Growth Percentiles

With the conditional moments defined, we can move forward to compute our z-score and percentile as we did for achievement percentiles,

$$z_{\Delta} = \frac{\Delta(\mathbf{y}) - \hat{\mu}_{\Delta}(y_{w_1})}{\sqrt{\hat{\omega}_{\Delta}(y_{w_1})}} \tag{3.20}$$

With z_{Δ} computed, we can find the probability of obtaining a change score that is less than or equal to y

$$p_{\Delta} = \mathsf{Pr}\left(\Delta(\mathbf{Y}) \leq \Delta(\mathbf{y})\right) = \Phi\left(z_{\Delta}\right) \tag{3.21}$$

Finally, like for achievement percentiles, we multiply the probability by 100 to arrive at the growth percentile, $p_{\Delta} \times 100$. Note, the Equation 3.20 for z_{Δ} and Equation 3.21 for p_{Δ} are identical in structure to Equation 3.6 for z and Equation 3.7 for p defined for achievement norms. All that is changing are the scaling from the RIT scale to the change scale.

3.4. School Achievement and Growth Norms

Whereas the MAP Growth Achievement and Growth Norms for students are based on a model that describes the within-student change across repeated MAP Growth test events, the MAP Growth Achievement and Growth Norms for school are derived from a model that describes within-school change (for a specific grade-level) across repeated aggregated RIT scores.

To describe how the school models are built we must redefine our notation. Recall that a student can take a MAP Growth test in grade $g \in \{G\}$ where $\{G\} = \{g_1, g_2\}$ and within a grade, a student can take one test per season $s \in \{S\}$ where $\{S\} = \{fall, winter, spring\}$. Let (g, s) be a grade-season tuple from the ordered canonical set

$$G \times S = \{(g_1, fall), (g_1, winter), (g_1, spring), (g_2, fall), (g_2, winter), (g_2, spring)\}$$

such that $|G \times S| = 6$.

Whereas Section 3.1 set up notation for repeated measures nested within students, we extend notation to students nested in schools. Schools are indexed $k \in \{1, \ldots, K\}$ such that there are K schools. Students are indexed $j \in \{1, \ldots J_k\}$ such that school k has J_k students. Rather than defining variable-length outcome vector, each student has an outcome vector $\mathbf{y}_{jk}$ that is length $|G \times S|$.

Let y_{ijk} be the ith RIT score for student j in school k. Each RIT score y_{ijk} is based on a MAP Growth test event, with the event occurring w_{ijk} weeks since the start of school. Recall that a student can have up to one RIT score for each grade-season tuple (g, s) but not all students test at every grade-season pair. Thus some elements of $\mathbf{y}_{jk}$ will be missing. Let $\mathbf{r}_{jk}$ be an indicator vector of length $|G \times S|$ where $r_{ijk} = 1$ if student j sat for a MAP Growth test at grade-season i and 0 otherwise.

The number of students in school k with RIT scores for grade-season tuple (g, s)

$$n_{ik} = \sum_{j \in J_k} r_{ijk} \left[(g, s)\right]$$

The grade-season tuple-specific mean RIT score for school k is

$$\bar{y}_{ik} = \frac{1}{n_{ik}} \sum_{j \in J_k} y_{ijk} \left[(g, s)\right] \times r_{ijk} \left[(g, s)\right]$$

and the repeated measure for a school is $\bar{\mathbf{y}}_k$.

Because schools may set multi-week testing windows, students within a school may test in at different weeks. We compute the grade-season tuple-specific mean week for school k as

$$\bar{w}_{ik} = \frac{1}{n_{ik}} \sum_{j \in J_k} w_{ijk} \left[(g, s)\right] \times r_{ijk} \left[(g, s)\right] \, .$$

The school-level norms were derived from growth models estimated using $\bar{\mathbf{y}}_k$ leveraging the same piecewise design outlined in Section 3.1.1 using $\bar{w}_{ik}$. The resulting model parameters were used in the same way the student-level model had been used to arrive at achievement and growth norms. The school mixed effects model is defined as

$$\bar{\mathbf{y}}_k = \mathbf{X}_k \boldsymbol{\beta} + \mathbf{Z}_k \boldsymbol{\zeta}_k + \boldsymbol{\epsilon}_k$$

with the distributional assumptions being identical to the student norms model.

$$\boldsymbol{\zeta}_k \sim \mathcal{N}\left(\mathbf{0}, \boldsymbol{\Psi}\right), \; \boldsymbol{\epsilon}_k \sim \mathcal{N}\left(0, \mathbf{I}\sigma\right) \, .$$

Also like the student norms, we leverage $\boldsymbol{\theta} = \left[\boldsymbol{\beta}', \text{vech}\left(\boldsymbol{\Psi}\right)', \sigma\right]'$ to be the vector of *structural parameters* for a test-specific subject and focal grade model. Given this, the derivation of the school norms is identical to that of the student norms. When considering school models, leverage $\bar{y}$ over y.

4. MAP Growth Norms Validation

The two-year piecewise growth model described in Chapter 3 was selected as the result of numerous experiments to identify the best-fitting model. The process started by evaluating different model structures that mirrored the three-year cohort design of the 2020 MAP Growth norms. This process is defined in Section 4.1. Next, we evaluated the value of three years of data relative to two years of data, which is described in Section 4.2.

4.1. Three Year models

Since the 2015 MAP Growth Achievement and Growth Norms, the models have been based on a main cohort spanning three years (Thum and Kuhfeld 2020; Thum and Hauser 2015), the 2025 MAP Growth Achievement and Growth Norms effort began by evaluating three 3-year model designs to understand which design best fits the data. Specifically, we fitted each model using longitudinal data collected over three years (i.e., data from three school years: 2021–2022, 2022–2023, and 2023–2024).

With a three-year design, a student can have up to nine test events, one per grade-season pair. Let $w_{g,s}$ be the number of weeks elapsed since the start of school where g is the grade $g \in G$ where $G = \{g_1, g_2, g_3\}$ and s is the season, $s \in S$ where $S = \{fall, winter, spring\}$. Under this notation, $w_{1,fall} = 4$ indicates that the fall test for the first grade of the cohort was taken after 4 weeks of instruction, $w_{2,winter} = 18$ indicates the winter test of the second grade of the cohort was taken after 18 weeks of instruction, and $w_{3,spring} = 31$ indicates the spring test of the third grade of the cohort was taken after 31 weeks of instruction.

4.1.1. Quadratic Compound Polynomial

The 2015 and 2020 MAP Growth norms models leveraged a quadratic compound polynomial design matrix, indicated as CP-Q. The CP-Q fixed effect design matrix for a student with all nine measures adopts the structure,

$$\mathbf{X}_j^{CP-Q} = \begin{bmatrix} 1 & -1 & 1 & w_{1f} & -w_{1f} & w_{1f}^2 \\ 1 & -1 & 1 & w_{1w} & -w_{1w} & w_{1w}^2 \\ 1 & -1 & 1 & w_{1s} & -w_{1s} & w_{1s}^2 \\ 1 & 0 & 0 & w_{2f} & 0 & w_{2f}^2 \\ 1 & 0 & 0 & w_{2w} & 0 & w_{2w}^2 \\ 1 & 0 & 0 & w_{2s} & 0 & w_{2s}^2 \\ 1 & 1 & 1 & w_{3f} & w_{3f} & w_{3f}^2 \\ 1 & 1 & 1 & w_{3w} & w_{3w} & w_{3w}^2 \\ 1 & 1 & 1 & w_{3s} & w_{3s} & w_{3s}^2 \end{bmatrix} \tag{4.1}$$

Resulting in a length-6 parameter vector of fixed effects, $\boldsymbol{\beta}^{CP-Q}$ where

- β_0 the expected RIT score at the start of the focal year, g_2.
- β_1 the expected year-to-year linear change in starting RIT scores.
- β_2 the expected year-to-year quadratic change in starting RIT scores.
- β_3 the expected week-to-week linear change in RIT scores across years
- β_4 the expected year-to-year linear change in within-year linear change across years.
- β_5 the expected week-to-week quadratic change in RIT scores across all three years

Note that due to identification constraints, not all fixed effects can have corresponding random effects. This is due to the fact that no component (within or between cycles) can be modeled beyond linear since the most within-grade events a student can have is 3 and the number of grades is 3. Neither quadratic term, β_2 nor β_5, has a corresponding random effect. Without random effects, a fixed effect parameter function as a law-like parameter in that all students are assumed to grow according to the sign of the quadratic parameter (concave or convex). The random effects design matrix for the CP-Q is

$$\mathbf{Z}_j^{CP-Q} = \begin{bmatrix} 1 & -1 & w_{1f} & -w_{1f} \\ 1 & -1 & w_{1w} & -w_{1w} \\ 1 & -1 & w_{1s} & -w_{1s} \\ 1 & 0 & w_{2f} & 0 \\ 1 & 0 & w_{2w} & 0 \\ 1 & 0 & w_{2s} & 0 \\ 1 & 1 & w_{3f} & w_{3f} \\ 1 & 1 & w_{3w} & w_{3w} \\ 1 & 1 & w_{3s} & w_{3s} \end{bmatrix}.$$

4.1.2. Linear Compound Polynomial

The second model proposed was a reduced CP design matrix that modeled within-year and between-year change as linear, indicated as CP-L.

$$\mathbf{X}_j^{CP-L} = \begin{bmatrix} 1 & -1 & w_{1f} & -w_{1f} \\ 1 & -1 & w_{1w} & -w_{1w} \\ 1 & -1 & w_{1s} & -w_{1s} \\ 1 & 0 & w_{2f} & 0 \\ 1 & 0 & w_{2w} & 0 \\ 1 & 0 & w_{2s} & 0 \\ 1 & 1 & w_{3f} & w_{3f} \\ 1 & 1 & w_{3w} & w_{3w} \\ 1 & 1 & w_{3s} & w_{3s} \end{bmatrix}$$

This design matrix corresponds to a length-4 parameter vector of fixed effects, $\boldsymbol{\beta}^{CP-L}$ where

- β_0 the expected RIT score at the start of the focal year, g_2.
- β_1 the expected year-to-year linear change in starting RIT scores.
- β_2 the expected week-to-week linear change in RIT scores across years
- β_3 the expected year-to-year linear change in within-year linear change across years.

Note, the linear CP model specifies all effects to be random, $\mathbf{X}_j^{CP-L} \equiv \mathbf{Z}_j^{CP-L}$.

$$\mathbf{Z}_j^{CP-L} = \begin{bmatrix} 1 & -1 & w_{1f} & -w_{1f} \\ 1 & -1 & w_{1w} & -w_{1w} \\ 1 & -1 & w_{1s} & -w_{1s} \\ 1 & 0 & w_{2f} & 0 \\ 1 & 0 & w_{2w} & 0 \\ 1 & 0 & w_{2s} & 0 \\ 1 & 1 & w_{3f} & w_{3f} \\ 1 & 1 & w_{3w} & w_{3w} \\ 1 & 1 & w_{3s} & w_{3s} \end{bmatrix}$$

It is also equivalent to the random effect design matrix for the quadratic CP model, $\mathbf{X}_j^{CP-L} \equiv \mathbf{Z}_j^{CP-Q}$. From a theoretical perspective, such a parameterization accords to an identified model for within-person change.

4.1.3. Linear 3-piece Piecewise

Finally, an alternative to the compound polynomial was considered— the piecewise model. The piecewise model makes fewer assumptions on the trend of the within-grade change. These models are quite well studied and can be found in Raudenbush and Bryk (2002, 178–79), Rabe-Hesketh and Skrondal (2012, 353), and other classic texts on longitudinal models. Below is a three-piece linear design matrix.

$$\mathbf{X}_j^{PW-3} = \begin{bmatrix} 1 & w_{1f} & 1 & 0 & 0 & 0 \\ 1 & w_{1w} & 1 & 0 & 0 & 0 \\ 1 & w_{1s} & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & w_{2f} & 0 & 0 \\ 0 & 0 & 1 & w_{2w} & 0 & 0 \\ 0 & 0 & 1 & w_{2s} & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & w_{3f} \\ 0 & 0 & 1 & 0 & 1 & w_{3w} \\ 0 & 0 & 1 & 0 & 1 & w_{3s} \end{bmatrix} \tag{4.2}$$

This design matrix has a corresponding length-6 parameter vector of fixed effects, $\boldsymbol{\beta}^{PW-3}$ where

- β_0 the expected difference between the start of the prior year g_1 and the start of the focal year, g_2.
- β_1 the expected week-to-week linear change in RIT scores during the year prior, g_1
- β_2 the expected RIT score at the start of the school year in the focal year, g_2
- β_3 the expected week-to-week linear change in RIT scores during the focal year, g_2
- β_4 the expected difference between the start of the focal year g_2 and the start of the subsequent year, g_1.
- β_5 the expected week-to-week linear change in RIT scores during the subsequent year, g_3

4.1.4. Relative Fit

For each level, subject, and grade, all three models were estimated using Bayesian inference. To fairly evaluate and compare the performance of the three candidate models, comparable metrics to measure the prediction accuracy of each model were needed. The Expected Log Pointwise Predictive Density (ELPD) measures the expected predictive accuracy of a model for new data points (Vehtari, Gelman, and Gabry 2017). This represents how well we expect the model to predict new observations given the data we've already seen. Higher ELPD values indicate better predictive performance.

ELPD is based on the expected log probability of the observed data, and there are two methods typically used to estimate it: LOOIC (Leave-One-Out Information Criterion) and WAIC (Widely Applicable Information Criterion), both utilizing log-likelihoods. The log-likelihoods were obtained for each estimated model and later used to calculate LOOIC and WAIC.

Traditionally, for LOOIC, we use leave-one-out cross-validation, which requires refitting each model multiple times with one observation left out of the sample. To produce the LOOIC metric more efficiently, the PSIS (pareto smoothing importance sampling) technique is utilized to generate more robust estimations of LOOIC (Vehtari, Gelman, and Gabry 2017) using log-likelihood values that we already have, rather than relying on the time-consuming process of refitting the models.

We compared the three candidate models for each subject, grade, and level using deviance values. Unlike ELPD, larger deviance values indicate worse model-data fit (i.e., the predicted RIT scores from the estimated models deviated more from the actual values). Out of the 90 conditions (45 grade-subject combinations for both student-level and school-level data), 64% of the student-level 3-piece piecewise models showed the lowest deviance values among the three model candidates, while 78% of the school-level 3-piece piecewise models produced the lowest deviance values among the three models, as indicated by both the LOOIC and WAIC metrics. Therefore, the three-piece piecewise model was considered the most suitable choice of the three candidate models. Table 4.1 and Table 4.2 report the relative fit indices for Mathematics and Reading Grades 4 and 7 for student-level and school-level models, respectively.

4.2. Three year vs two year models

As mentioned in Section 4.1.1, the compound polynomial model requires at least three consecutive grades of longitudinal data to be identified. That is, due to the parameterization, at least three data cycles (grades) and three measurements per cycle are needed to estimate the between-year linear change and the within-year linear changes. The piecewise model, however, offers greater flexibility by adapting to any number of years of data. When using the piecewise model, growth is divided into three annual segments for a three-year period, two annual segments for a two-year period, and one annual segment for a single-year period.

The growth models used for MAP Growth Achievement and Growth Norms must generate within-year and adjacent-year growth norms. Two consecutive years of data are sufficient to achieve these outcomes. Given that the three-year piecewise model outperformed both compound polynomial models, and the piecewise framework is capable of modeling growth

Table 4.1.: Student Model Relative Fit Comparison

Subject	Grade	Model	$elpd_{\text{LOO}}$	$elpd_{\text{WAIC}}$	LOOIC	WAIC
Mathematics	4	CP-I	-1286633	-1465591	2573267	2931181
		CP-R	-1167759	-1167759	2335518	2335517
		PW-3	-1164596	-1165025	2329192	2330050
	7	CP-I	-1142913	-1143082	2285827	2286163
		CP-R	-1142406	-1142406	2284812	2284812
		PW-3	-1143028	-1143382	2286057	2286764
Reading	4	CP-I	-1194971	-1195607	2389942	2391213
		CP-R	-1288492	-1364393	2576983	2728786
		PW-3	-1193885	-1193894	2387771	2387787
	7	CP-I	-1156257	-1156193	2312514	2312385
		CP-R	-1156238	-1156238	2312476	2312476
		PW-3	-1156175	-1156185	2312350	2312371

Table 4.2.: School Model Relative Fit Comparison

Subject	Grade	Model	$elpd_{\text{LOO}}$	$elpd_{\text{WAIC}}$	LOOIC	WAIC
Mathematics	4	CP-I	-54083	-53960	108166	107920
		CP-R	-59810	-71623	119620	143247
		PW-3	-53237	-53239	106473	106477
	7	CP-I	-51670	-56174	103340	112348
		CP-R	-49228	-49228	98456	98456
		PW-3	-48631	-48631	97262	97262
Reading	4	CP-I	-53771	-53649	107541	107297
		CP-R	-54462	-54462	108924	108924
		PW-3	-53823	-53825	107646	107649
	7	CP-I	-51025	-56517	102050	113033
		CP-R	-47459	-47459	94917	94917
		PW-3	-47785	-49514	95569	99027

over two years, the next phase of model experimentation was to evaluate the piecewise model fit using three years of data compared to two years.

The fixed effects and random effects design matrices for the 2 year piecewise are defined as

$$\mathbf{X}_j^{PW-2} = \mathbf{Z}_j^{PW-2} = \begin{bmatrix} 1 & w_{1f} & 0 & 0 \\ 1 & w_{1w} & 0 & 0 \\ 1 & w_{1s} & 0 & 0 \\ 1 & 0 & 1 & w_{2f} \\ 1 & 0 & 1 & w_{2w} \\ 1 & 0 & 1 & w_{2s} \end{bmatrix}$$

Notice we effectively drop the first year of measurement occasions that had been part of the three year models described in Section 4.1.3. Reducing the number of years from three to two reduces the number of fixed and random effects from 6 to 4.

Because the data used for the two-year piecewise is quite different from the data used for the three-year models, we cannot compare models relatively using ELPD. Instead, we carried out a cross-validation process to understand how a hold out sample recovered the percentiles produced by each model.

4.2.1. Model Validation

The two- and three-year piecewise models were evaluated by testing how well each classified proportions of students using data from test datasets that the models had never seen before. The evaluation criterion was straightforward: a well-performing model should place approximately the correct percentage of students within each percentile range. For example, if roughly 25 percent of students from randomly sampled test datasets score below the 25th percentile, it indicates the model is producing a distribution that accurately classifies students at or below the 25th percentile. Table 4.3 and Table 4.4 below report the proportion of students from a hold-out sample who were classified at the 5th, 25th, 50th, 75th, and 95th percentiles for the two-piece and three-piece models for students in Reading and Math, Grades 4 and 7, for status norms and within-year growth norms, respectively. As is clear, there are no substantive differences between models that include or exclude an additional third grade. As such, the 2025 norms adopt the simpler two-piece piecewise model.

Table 4.3.: Student Status Norms Benchmark Comparison (PW-3 VS PW-2)

Subject	Grade	Model	5th %ile	25th %ile	50th %ile	75th %ile	95th %ile
Mathematics	4	PW-2	0.06	0.22	0.46	0.74	0.97
		PW-3	0.05	0.20	0.43	0.73	0.96
	7	PW-2	0.04	0.24	0.49	0.75	0.95
		PW-3	0.05	0.24	0.48	0.74	0.95
Reading	4	PW-2	0.07	0.23	0.44	0.72	0.98
		PW-3	0.07	0.22	0.43	0.72	0.98
	7	PW-2	0.07	0.21	0.44	0.73	0.97
		PW-3	0.07	0.21	0.44	0.73	0.97

Table 4.4.: Student Growth Norms Benchmark Comparison - Within Year (PW-3 VS PW-2)

Subject	Grade	Model	5th %ile	25th %ile	50th %ile	75th %ile	95th %ile
Mathematics	4	PW-2	0.05	0.22	0.49	0.76	0.95
		PW-3	0.04	0.22	0.49	0.77	0.96
	7	PW-2	0.04	0.22	0.49	0.77	0.96
		PW-3	0.04	0.22	0.50	0.77	0.96
Reading	4	PW-2	0.05	0.21	0.48	0.77	0.96
		PW-3	0.05	0.21	0.48	0.77	0.96
	7	PW-2	0.05	0.21	0.47	0.77	0.96
		PW-3	0.05	0.21	0.47	0.77	0.96

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A. Achievement Norms

The following tables present the first two moments—namely, means and standard deviations—of student and school achievement norms for Mathematics, Reading, Language Usage, and Science MAP Growth Tests at designated grade levels and seasons.

A.1. Seasonal Conditioning and Timing

MAP Growth Achievement Norms are based on specific instructional weeks to ensure accurate benchmarking. The following tables report only one instructional week per season.

- Fall norms: Based on assessments administered during the 4th week of instruction
- Winter norms: Based on assessments administered during the 20th week of instruction
- Spring norms: Based on assessments administered during the 32nd week of instruction

A.2. Intended Use and Limitations

These tables provide normative references for understanding typical student and school performance at designated points during the academic year. The weeks reported herein reflect default weeks of instruction for a given season and are not intended to serve as season-specific distributions.

These statistics should not be used to produce achievement percentiles for assessments given outside the designated instructional weeks. Accurate percentile rank calculations depend on test administration timing matching the conditioning weeks used to create these norms.

A.3. Mathematics Achievement Norms

Table A.1.: Achievement Norms - Mathematics, Student

	Fall		Winter		Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
K	141.17	12.29	150.65	12.57	157.77	13.04
1	159.29	13.40	168.26	13.83	174.99	14.32
2	172.87	15.44	181.20	15.70	187.46	16.07
3	184.05	15.54	192.65	16.34	199.10	17.03
4	197.03	15.91	204.48	17.02	210.07	18.04
5	206.23	16.23	211.82	17.42	216.01	18.44
6	210.23	15.99	216.00	17.35	220.33	18.47
7	217.21	17.22	221.00	18.36	223.85	19.29
8	222.05	18.33	225.95	19.31	228.87	20.16
9	224.90	17.67	227.14	19.17	228.82	21.08
10	226.80	18.58	229.40	20.19	231.36	22.23
11	229.19	20.48	231.36	21.85	233.00	23.16
12	228.14	20.95	229.85	21.81	231.13	23.28

Table A.2.: Achievement Norms - Mathematics, School

	Fall		Winter		Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
K	141.66	5.51	150.91	5.49	157.84	5.73
1	159.49	5.69	168.37	6.07	175.03	6.39
2	173.26	6.99	181.45	7.28	187.60	7.50
3	184.03	7.24	192.46	7.84	198.79	8.37
4	196.25	6.94	203.42	8.13	208.80	9.43
5	205.71	7.56	211.08	8.78	215.11	10.07
6	209.77	7.68	215.26	8.92	219.37	10.24
7	216.56	8.68	220.25	9.42	223.02	9.99
8	220.48	9.59	224.08	10.21	226.78	10.70
9	223.94	10.73	226.13	11.01	227.77	11.24
10	225.14	11.55	227.35	12.16	229.01	12.66
11	227.04	11.67	228.76	12.54	230.05	13.25

12	224.44	11.77	226.20	12.05	227.51	12.79

A.4. Reading Achievement Norms

Table A.3.: Achievement Norms - Reading, Student

	Fall		Winter		Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
K	138.07	9.36	146.01	11.01	151.96	12.77
1	155.37	12.85	162.51	14.04	167.87	15.52
2	170.06	17.13	176.70	17.14	181.68	17.34
3	184.69	18.30	189.89	18.13	193.79	18.15
4	195.92	17.99	199.45	17.76	202.09	17.74
5	203.67	17.45	206.36	17.21	208.37	17.15
6	208.95	16.84	210.72	16.70	212.04	16.67
7	212.34	16.74	213.77	16.83	214.83	17.00
8	215.72	17.03	216.92	17.04	217.82	17.16
9	216.20	18.10	216.76	18.14	217.17	18.30
10	217.76	17.98	218.16	18.04	218.46	18.26
11	218.20	18.14	217.97	18.38	217.80	18.77
12	217.62	18.87	216.83	18.99	216.23	19.47

Table A.4.: Achievement Norms - Reading, School

	Fall		Winter		Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
K	138.27	4.50	146.05	4.94	151.89	5.51
1	155.27	5.99	162.37	6.48	167.69	6.87
2	170.08	7.39	176.52	7.78	181.34	8.07
3	184.30	8.19	189.34	8.38	193.12	8.57
4	195.31	8.15	198.73	8.27	201.29	8.42
5	202.91	8.11	205.42	8.25	207.31	8.37
6	208.40	7.40	209.93	7.57	211.09	7.76
7	211.81	7.51	213.01	7.75	213.91	8.04
8	215.05	7.96	216.04	8.18	216.78	8.36
9	215.78	8.79	216.24	9.00	216.59	9.20
10	216.84	9.24	217.03	9.36	217.17	9.54
11	216.31	10.02	215.95	10.28	215.68	10.49

12	214.83	10.25	214.05	10.69	213.47	11.37

A.5. Language Usage Achievement Norms

Table A.5.: Achievement Norms - Language Usage, Student

	Fall		Winter		Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
2	170.48	16.52	177.57	16.41	182.88	16.62
3	184.42	17.37	189.58	17.00	193.44	16.93
4	194.69	16.81	198.45	16.46	201.27	16.26
5	201.87	16.09	204.79	15.79	206.97	15.67
6	206.49	15.67	208.57	15.68	210.12	15.78
7	210.08	15.81	211.77	15.81	213.03	15.88
8	213.72	15.67	215.33	15.77	216.54	15.93
9	213.91	16.59	214.85	16.79	215.55	17.04
10	215.86	17.06	216.74	17.21	217.40	17.44
11	217.60	17.19	218.07	17.45	218.43	17.80

Table A.6.: Achievement Norms - Language Usage, School

	Fall		Winter		Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
2	170.37	7.30	177.28	7.66	182.46	7.96
3	183.92	8.10	188.86	8.50	192.57	8.82
4	194.00	8.17	197.56	8.33	200.23	8.45
5	201.71	7.75	204.48	7.89	206.55	7.99
6	205.97	7.26	207.88	7.91	209.31	8.67
7	209.43	8.30	210.93	8.53	212.06	8.71
8	212.79	8.15	214.19	8.49	215.25	8.75
9	214.57	8.36	215.41	8.70	216.03	8.99
10	215.73	9.54	216.57	9.69	217.19	9.80
11	217.39	9.33	217.69	9.71	217.93	10.06

A.6. Science Achievement Norms

Table A.7.: Achievement Norms - Science, Student

	Fall		Winter		Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
2	176.22	13.75	181.41	12.96	185.31	12.66
3	187.24	13.36	191.20	12.96	194.16	12.81
4	194.88	12.93	197.92	13.02	200.20	13.16
5	200.92	13.15	204.19	13.46	206.65	13.81
6	204.05	13.05	205.86	13.32	207.22	13.59
7	207.18	13.71	208.81	14.04	210.03	14.35
8	209.66	14.21	211.48	14.64	212.84	15.07
9	211.76	12.96	212.73	13.64	213.46	14.66
10	213.21	13.21	213.99	14.07	214.58	15.27

Table A.8.: Achievement Norms - Science, School

	Fall		Winter		Spring	
Grade	Mean	SD	Mean	SD	Mean	SD
2	176.47	6.59	181.60	6.35	185.45	6.25
3	186.93	6.35	190.78	6.25	193.67	6.22
4	194.63	5.75	197.57	6.14	199.77	6.67
5	200.44	6.23	203.57	6.54	205.91	6.86
6	204.11	6.16	205.92	6.34	207.28	6.47
7	207.13	5.95	208.65	6.43	209.80	7.02
8	209.54	6.58	211.18	6.91	212.41	7.16
9	212.18	6.42	213.35	6.68	214.22	6.91
10	214.10	6.71	214.92	6.79	215.54	6.85

B. Achievement Percentiles

The following tables present specific student and school achievement percentiles for Mathematics, Reading, Language Usage, and Science MAP Growth Tests at designated grade levels and seasons.

B.1. Seasonal Conditioning and Timing

MAP Growth Achievement Percentiles are based on specific instructional weeks to ensure accurate benchmarking. The following tables report only one instructional week per season.

- Fall norms: Based on assessments administered during the 4th week of instruction
- Winter norms: Based on assessments administered during the 20th week of instruction
- Spring norms: Based on assessments administered during the 32nd week of instruction

B.2. Intended Use and Limitations

These tables provide normative references for understanding typical student and school performance at designated points during the academic year. The weeks reported herein reflect default weeks of instruction for a given season and are not intended to serve as season-specific Achievement Percentiles

These percentile-to-RIT scores should not be used outside the designated instructional weeks. Accurate achievement percentiles depend on test administration timing matching the conditioning weeks used to create these norms.

B.3. Mathematics

Table B.1.: Achievement Percentiles - Mathematics, Fall, Student

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	121	137	147	158	171	180	184	189	192	196	196	195	194	5
10	125	142	153	164	177	185	190	195	199	202	203	203	201	10
15	128	145	157	168	181	189	194	199	203	207	208	208	206	15
20	131	148	160	171	184	193	197	203	207	210	211	212	211	20
25	133	150	162	174	186	195	199	206	210	213	214	215	214	25
30	135	152	165	176	189	198	202	208	212	216	217	218	217	30
35	136	154	167	178	191	200	204	211	215	218	220	221	220	35
40	138	156	169	180	193	202	206	213	217	220	222	224	223	40
45	140	158	171	182	195	204	208	215	220	223	224	227	226	45
50	141	159	173	184	197	206	210	217	222	225	227	229	228	50
55	143	161	175	186	199	208	212	219	224	227	229	232	231	55
60	144	163	177	188	201	210	214	222	227	229	232	234	233	60
65	146	164	179	190	203	212	216	224	229	232	234	237	236	65
70	148	166	181	192	205	215	219	226	232	234	237	240	239	70
75	149	168	183	195	208	217	221	229	234	237	239	243	242	75
80	152	171	186	197	210	220	224	232	237	240	242	246	246	80
85	154	173	189	200	214	223	227	235	241	243	246	250	250	85
90	157	176	193	204	217	227	231	239	246	248	251	255	255	90
95	161	181	198	210	223	233	237	246	252	254	257	263	263	95

Table B.2.: Achievement Percentiles - Mathematics, Fall, School

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	133	150	162	172	185	193	197	202	205	206	206	208	205	5
10	135	152	164	175	187	196	200	205	208	210	210	212	209	10
15	136	154	166	177	189	198	202	208	211	213	213	215	212	15
20	137	155	167	178	190	199	203	209	212	215	215	217	215	20
25	138	156	169	179	192	201	205	211	214	217	217	219	216	25
30	139	157	170	180	193	202	206	212	215	218	219	221	218	30
35	140	157	171	181	194	203	207	213	217	220	221	223	220	35
40	140	158	171	182	194	204	208	214	218	221	222	224	221	40
45	141	159	172	183	195	205	209	215	219	223	224	226	223	45
50	142	159	173	184	196	206	210	217	220	224	225	227	224	50
55	142	160	174	185	197	207	211	218	222	225	227	229	226	55
60	143	161	175	186	198	208	212	219	223	227	228	230	227	60
65	144	162	176	187	199	209	213	220	224	228	230	232	229	65
70	145	162	177	188	200	210	214	221	226	230	231	233	231	70
75	145	163	178	189	201	211	215	222	227	231	233	235	232	75
80	146	164	179	190	202	212	216	224	229	233	235	237	234	80
85	147	165	181	192	203	214	218	226	230	235	237	239	237	85
90	149	167	182	193	205	215	220	228	233	238	240	242	240	90
95	151	169	185	196	208	218	222	231	236	242	244	246	244	95

Table B.3.: Achievement Percentiles - Mathematics, Winter, Student

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	130	146	155	166	176	183	187	191	194	196	196	195	194	5
10	135	151	161	172	183	189	194	197	201	203	204	203	202	10
15	138	154	165	176	187	194	198	202	206	207	208	209	207	15
20	140	157	168	179	190	197	201	206	210	211	212	213	211	20
25	142	159	171	182	193	200	204	209	213	214	216	217	215	25
30	144	161	173	184	196	203	207	211	216	217	219	220	218	30
35	146	163	175	186	198	205	209	214	219	220	222	223	221	35
40	147	165	177	189	200	207	212	216	221	222	224	226	224	40
45	149	167	179	191	202	210	214	219	224	225	227	229	227	45
50	151	168	181	193	204	212	216	221	226	227	229	231	230	50
55	152	170	183	195	207	214	218	223	228	230	232	234	233	55
60	154	172	185	197	209	216	220	226	231	232	235	237	235	60
65	155	174	187	199	211	219	223	228	233	235	237	240	238	65
70	157	176	189	201	213	221	225	231	236	237	240	243	241	70
75	159	178	192	204	216	224	228	233	239	240	243	246	245	75
80	161	180	194	206	219	226	231	236	242	243	246	250	248	80
85	164	183	197	210	222	230	234	240	246	247	250	254	252	85
90	167	186	201	214	226	234	238	245	251	252	255	259	258	90
95	171	191	207	220	232	240	245	251	258	259	263	267	266	95

Table B.4.: Achievement Percentiles - Mathematics, Winter, School

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	142	158	169	180	190	197	201	205	207	208	207	208	206	5
10	144	161	172	182	193	200	204	208	211	212	212	213	211	10
15	145	162	174	184	195	202	206	210	213	215	215	216	214	15
20	146	163	175	186	197	204	208	212	215	217	217	218	216	20
25	147	164	177	187	198	205	209	214	217	219	219	220	218	25
30	148	165	178	188	199	206	211	215	219	220	221	222	220	30
35	149	166	179	189	200	208	212	217	220	222	223	224	222	35
40	150	167	180	190	201	209	213	218	221	223	224	226	223	40
45	150	168	181	191	202	210	214	219	223	225	226	227	225	45
50	151	168	181	192	203	211	215	220	224	226	227	229	226	50
55	152	169	182	193	204	212	216	221	225	228	229	230	228	55
60	152	170	183	194	205	213	218	223	227	229	230	232	229	60
65	153	171	184	195	207	214	219	224	228	230	232	234	231	65
70	154	172	185	197	208	216	220	225	229	232	234	235	233	70
75	155	172	186	198	209	217	221	227	231	234	236	237	234	75
80	156	173	188	199	210	218	223	228	233	235	238	239	236	80
85	157	175	189	201	212	220	225	230	235	238	240	242	239	85
90	158	176	191	203	214	222	227	232	237	240	243	245	242	90
95	160	178	193	205	217	226	230	236	241	244	247	249	246	95

Table B.5.: Achievement Percentiles - Mathematics, Spring, Student

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	136	151	161	171	180	186	190	192	196	194	195	195	193	5
10	141	157	167	177	187	192	197	199	203	202	203	203	201	10
15	144	160	171	181	191	197	201	204	208	207	208	209	207	15
20	147	163	174	185	195	200	205	208	212	211	213	214	212	20
25	149	165	177	188	198	204	208	211	215	215	216	217	215	25
30	151	167	179	190	201	206	211	214	218	218	220	221	219	30
35	153	169	181	193	203	209	213	216	221	221	223	224	222	35
40	154	171	183	195	206	211	216	219	224	223	226	227	225	40
45	156	173	185	197	208	214	218	221	226	226	229	230	228	45
50	158	175	187	199	210	216	220	224	229	229	231	233	231	50
55	159	177	189	201	212	218	223	226	231	231	234	236	234	55
60	161	179	192	203	215	221	225	229	234	234	237	239	237	60
65	163	181	194	206	217	223	227	231	237	237	240	242	240	65
70	165	183	196	208	220	226	230	234	239	240	243	245	243	70
75	167	185	198	211	222	228	233	237	242	243	246	249	247	75
80	169	187	201	213	225	232	236	240	246	247	250	252	251	80
85	171	190	204	217	229	235	239	244	250	251	254	257	255	85
90	174	193	208	221	233	240	244	249	255	256	260	263	261	90
95	179	199	214	227	240	246	251	256	262	263	268	271	269	95

Table B.6.: Achievement Percentiles - Mathematics, Spring, School

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	148	165	175	185	193	199	203	207	209	209	208	208	206	5
10	150	167	178	188	197	202	206	210	213	213	213	213	211	10
15	152	168	180	190	199	205	209	213	216	216	216	216	214	15
20	153	170	181	192	201	207	211	215	218	218	218	219	217	20
25	154	171	183	193	202	208	212	216	220	220	220	221	219	25
30	155	172	184	194	204	210	214	218	221	222	222	223	221	30
35	156	173	185	196	205	211	215	219	223	223	224	225	223	35
40	156	173	186	197	206	213	217	220	224	225	226	227	224	40
45	157	174	187	198	208	214	218	222	225	226	227	228	226	45
50	158	175	188	199	209	215	219	223	227	228	229	230	228	50
55	159	176	189	200	210	216	221	224	228	229	231	232	229	55
60	159	177	190	201	211	218	222	226	229	231	232	233	231	60
65	160	177	190	202	212	219	223	227	231	232	234	235	232	65
70	161	178	192	203	214	220	225	228	232	234	236	237	234	70
75	162	179	193	204	215	222	226	230	234	235	238	239	236	75
80	163	180	194	206	217	224	228	231	236	237	240	241	238	80
85	164	182	195	207	219	226	230	233	238	239	242	244	241	85
90	165	183	197	210	221	228	232	236	240	242	245	247	244	90
95	167	186	200	213	224	232	236	239	244	246	250	252	249	95

B.4. Reading

Table B.7.: Achievement Percentiles - Reading, Fall, Student

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	123	134	142	155	166	175	181	185	188	186	188	188	187	5
10	126	139	148	161	173	181	187	191	194	193	195	195	193	10
15	128	142	152	166	177	186	191	195	198	197	199	199	198	15
20	130	145	156	169	181	189	195	198	201	201	203	203	202	20
25	132	147	159	172	184	192	198	201	204	204	206	206	205	25
30	133	149	161	175	186	195	200	204	207	207	208	209	208	30
35	134	150	163	178	189	197	202	206	209	209	211	211	210	35
40	136	152	166	180	191	199	205	208	211	212	213	214	213	40
45	137	154	168	182	194	201	207	210	214	214	215	216	215	45
50	138	155	170	185	196	204	209	212	216	216	218	218	218	50
55	139	157	172	187	198	206	211	214	218	218	220	220	220	55
60	140	159	174	189	200	208	213	217	220	221	222	223	222	60
65	142	160	177	192	203	210	215	219	222	223	225	225	225	65
70	143	162	179	194	205	213	218	221	225	226	227	228	228	70
75	144	164	182	197	208	215	220	224	227	228	230	230	230	75
80	146	166	184	200	211	218	223	226	230	231	233	233	234	80
85	148	169	188	204	215	222	226	230	233	235	236	237	237	85
90	150	172	192	208	219	226	231	234	238	239	241	241	242	90
95	153	177	198	215	226	232	237	240	244	246	247	248	249	95

Table B.8.: Achievement Percentiles - Reading, Fall, School

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	131	145	158	171	182	190	196	199	202	201	202	200	198	5
10	132	148	161	174	185	193	199	202	205	205	205	203	202	10
15	134	149	162	176	187	195	201	204	207	207	207	206	204	15
20	134	150	164	177	188	196	202	205	208	208	209	208	206	20
25	135	151	165	179	190	197	203	207	210	210	211	210	208	25
30	136	152	166	180	191	199	205	208	211	211	212	211	209	30
35	137	153	167	181	192	200	206	209	212	212	213	212	211	35
40	137	154	168	182	193	201	207	210	213	214	215	214	212	40
45	138	155	169	183	194	202	207	211	214	215	216	215	214	45
50	138	155	170	184	195	203	208	212	215	216	217	216	215	50
55	139	156	171	185	196	204	209	213	216	217	218	218	216	55
60	139	157	172	186	197	205	210	214	217	218	219	219	217	60
65	140	158	173	187	198	206	211	215	218	219	220	220	219	65
70	141	158	174	189	200	207	212	216	219	220	222	222	220	70
75	141	159	175	190	201	208	213	217	220	222	223	223	222	75
80	142	160	176	191	202	210	215	218	222	223	225	225	223	80
85	143	161	178	193	204	211	216	220	223	225	226	227	225	85
90	144	163	180	195	206	213	218	221	225	227	229	229	228	90
95	146	165	182	198	209	216	221	224	228	230	232	233	232	95

Table B.9.: Achievement Percentiles - Reading, Winter, Student

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	128	139	149	160	170	178	183	186	189	187	188	188	186	5
10	132	145	155	167	177	184	189	192	195	194	195	194	192	10
15	135	148	159	171	181	189	193	196	199	198	199	199	197	15
20	137	151	162	175	184	192	197	200	203	201	203	203	201	20
25	139	153	165	178	187	195	199	202	205	205	206	206	204	25
30	140	155	168	180	190	197	202	205	208	207	209	208	207	30
35	142	157	170	183	193	200	204	207	210	210	211	211	210	35
40	143	159	172	185	195	202	206	210	213	212	214	213	212	40
45	145	161	175	188	197	204	209	212	215	214	216	216	214	45
50	146	163	177	190	199	206	211	214	217	217	218	218	217	50
55	147	164	179	192	202	209	213	216	219	219	220	220	219	55
60	149	166	181	194	204	211	215	218	221	221	223	223	222	60
65	150	168	183	197	206	213	217	220	223	224	225	225	224	65
70	152	170	186	199	209	215	219	223	226	226	228	228	227	70
75	153	172	188	202	211	218	222	225	228	229	230	230	230	75
80	155	174	191	205	214	221	225	228	231	232	233	233	233	80
85	157	177	194	209	218	224	228	231	235	236	237	237	237	85
90	160	181	199	213	222	228	232	235	239	240	241	242	241	90
95	164	186	205	220	229	235	238	241	245	247	248	248	248	95

Table B.10.: Achievement Percentiles - Reading, Winter, School

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	138	152	164	176	185	192	197	200	203	201	202	199	196	5
10	140	154	167	179	188	195	200	203	206	205	205	203	200	10
15	141	156	168	181	190	197	202	205	208	207	207	205	203	15
20	142	157	170	182	192	198	204	206	209	209	209	207	205	20
25	143	158	171	184	193	200	205	208	211	210	211	209	207	25
30	143	159	172	185	194	201	206	209	212	212	212	211	208	30
35	144	160	174	186	196	202	207	210	213	213	213	212	210	35
40	145	161	175	187	197	203	208	211	214	214	215	213	211	40
45	145	162	176	188	198	204	209	212	215	215	216	215	213	45
50	146	162	177	189	199	205	210	213	216	216	217	216	214	50
55	147	163	177	190	200	206	211	214	217	217	218	217	215	55
60	147	164	178	191	201	208	212	215	218	219	219	219	217	60
65	148	165	180	193	202	209	213	216	219	220	221	220	218	65
70	149	166	181	194	203	210	214	217	220	221	222	221	220	70
75	149	167	182	195	204	211	215	218	222	222	223	223	221	75
80	150	168	183	196	206	212	216	220	223	224	225	225	223	80
85	151	169	185	198	207	214	218	221	225	226	227	227	225	85
90	152	171	186	200	209	216	220	223	227	228	229	229	228	90
95	154	173	189	203	212	219	222	226	230	231	232	233	232	95

Table B.11.: Achievement Percentiles - Reading, Spring, Student

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	131	142	153	164	173	180	185	187	190	187	188	187	184	5
10	136	148	159	171	179	186	191	193	196	194	195	194	191	10
15	139	152	164	175	184	191	195	197	200	198	200	198	196	15
20	141	155	167	179	187	194	198	201	203	202	203	202	200	20
25	143	157	170	182	190	197	201	203	206	205	206	205	203	25
30	145	160	173	184	193	199	203	206	209	208	209	208	206	30
35	147	162	175	187	195	202	206	208	211	210	211	211	209	35
40	149	164	177	189	198	204	208	211	213	213	214	213	211	40
45	150	166	180	192	200	206	210	213	216	215	216	215	214	45
50	152	168	182	194	202	208	212	215	218	217	218	218	216	50
55	154	170	184	196	204	211	214	217	220	219	221	220	219	55
60	155	172	186	198	207	213	216	219	222	222	223	223	221	60
65	157	174	188	201	209	215	218	221	224	224	225	225	224	65
70	159	176	191	203	211	217	221	224	227	227	228	228	226	70
75	161	178	193	206	214	220	223	226	229	230	231	230	229	75
80	163	181	196	209	217	223	226	229	232	233	234	234	233	80
85	165	184	200	213	220	226	229	232	236	236	237	237	236	85
90	168	188	204	217	225	230	233	237	240	241	242	242	241	90
95	173	193	210	224	231	237	239	243	246	247	248	249	248	95

Table B.12.: Achievement Percentiles - Reading, Spring, School

	Grade													
Pct	K	1	2	3	4	5	6	7	8	9	10	11	12	Pct
5	143	156	168	179	187	194	198	201	203	201	201	198	195	5
10	145	159	171	182	190	197	201	204	206	205	205	202	199	10
15	146	161	173	184	193	199	203	206	208	207	207	205	202	15
20	147	162	175	186	194	200	205	207	210	209	209	207	204	20
25	148	163	176	187	196	202	206	208	211	210	211	209	206	25
30	149	164	177	189	197	203	207	210	212	212	212	210	208	30
35	150	165	178	190	198	204	208	211	214	213	213	212	209	35
40	150	166	179	191	199	205	209	212	215	214	215	213	211	40
45	151	167	180	192	200	206	210	213	216	215	216	214	212	45
50	152	168	181	193	201	207	211	214	217	217	217	216	213	50
55	153	169	182	194	202	208	212	215	218	218	218	217	215	55
60	153	169	183	195	203	209	213	216	219	219	220	218	216	60
65	154	170	184	196	205	211	214	217	220	220	221	220	218	65
70	155	171	186	198	206	212	215	218	221	221	222	221	219	70
75	156	172	187	199	207	213	216	219	222	223	224	223	221	75
80	157	173	188	200	208	214	218	221	224	224	225	225	223	80
85	158	175	190	202	210	216	219	222	225	226	227	227	225	85
90	159	176	192	204	212	218	221	224	227	228	229	229	228	90
95	161	179	195	207	215	221	224	227	231	232	233	233	232	95

B.5. Language Usage

Table B.13.: Achievement Percentiles - Language Usage, Fall, Student

	Grade										
Pct	2	3	4	5	6	7	8	9	10	11	Pct
5	143	156	167	175	181	184	188	187	188	189	5
10	149	162	173	181	186	190	194	193	194	196	10
15	153	166	177	185	190	194	197	197	198	200	15
20	157	170	181	188	193	197	201	200	201	203	20
25	159	173	183	191	196	199	203	203	204	206	25
30	162	175	186	193	198	202	206	205	207	209	30
35	164	178	188	196	200	204	208	208	209	211	35
40	166	180	190	198	203	206	210	210	212	213	40
45	168	182	193	200	205	208	212	212	214	215	45
50	170	184	195	202	206	210	214	214	216	218	50
55	173	187	197	204	208	212	216	216	218	220	55
60	175	189	199	206	210	214	218	218	220	222	60
65	177	191	201	208	213	216	220	220	222	224	65
70	179	194	204	210	215	218	222	223	225	227	70
75	182	196	206	213	217	221	224	225	227	229	75
80	184	199	209	215	220	223	227	228	230	232	80
85	188	202	212	219	223	226	230	231	234	235	85
90	192	207	216	222	227	230	234	235	238	240	90
95	198	213	222	228	232	236	239	241	244	246	95

Table B.14.: Achievement Percentiles - Language Usage, Fall, School

	Grade										
Pct	2	3	4	5	6	7	8	9	10	11	Pct
5	158	171	181	189	194	196	199	201	200	202	5
10	161	174	184	192	197	199	202	204	203	205	10
15	163	176	186	194	198	201	204	206	206	208	15
20	164	177	187	195	200	202	206	208	208	210	20
25	165	178	188	196	201	204	207	209	209	211	25
30	167	180	190	198	202	205	209	210	211	212	30
35	168	181	191	199	203	206	210	211	212	214	35
40	169	182	192	200	204	207	211	212	213	215	40
45	169	183	193	201	205	208	212	214	215	216	45
50	170	184	194	202	206	209	213	215	216	217	50
55	171	185	195	203	207	210	214	216	217	219	55
60	172	186	196	204	208	212	215	217	218	220	60
65	173	187	197	205	209	213	216	218	219	221	65
70	174	188	198	206	210	214	217	219	221	222	70
75	175	189	200	207	211	215	218	220	222	224	75
80	177	191	201	208	212	216	220	222	224	225	80
85	178	192	202	210	213	218	221	223	226	227	85
90	180	194	204	212	215	220	223	225	228	229	90
95	182	197	207	214	218	223	226	228	231	233	95

Table B.15.: Achievement Percentiles - Language Usage, Winter, Student

	Grade										
Pct	2	3	4	5	6	7	8	9	10	11	Pct
5	151	162	171	179	183	186	189	187	188	189	5
10	157	168	177	185	188	192	195	193	195	196	10
15	161	172	181	188	192	195	199	197	199	200	15
20	164	175	185	191	195	198	202	201	202	203	20
25	167	178	187	194	198	201	205	204	205	206	25
30	169	181	190	197	200	203	207	206	208	209	30
35	171	183	192	199	203	206	209	208	210	211	35
40	173	185	194	201	205	208	211	211	212	214	40
45	176	187	196	203	207	210	213	213	215	216	45
50	178	190	198	205	209	212	215	215	217	218	50
55	180	192	201	207	211	214	217	217	219	220	55
60	182	194	203	209	213	216	219	219	221	222	60
65	184	196	205	211	215	218	221	221	223	225	65
70	186	198	207	213	217	220	224	224	226	227	70
75	189	201	210	215	219	222	226	226	228	230	75
80	191	204	212	218	222	225	229	229	231	233	80
85	195	207	216	221	225	228	232	232	235	236	85
90	199	211	220	225	229	232	236	236	239	240	90
95	205	218	226	231	234	238	241	242	245	247	95

Table B.16.: Achievement Percentiles - Language Usage, Winter, School

	Grade										
Pct	2	3	4	5	6	7	8	9	10	11	Pct
5	165	175	184	192	195	197	200	201	201	202	5
10	167	178	187	194	198	200	203	204	204	205	10
15	169	180	189	196	200	202	205	206	207	208	15
20	171	182	191	198	201	204	207	208	208	210	20
25	172	183	192	199	203	205	208	210	210	211	25
30	173	184	193	200	204	206	210	211	211	213	30
35	174	186	194	201	205	208	211	212	213	214	35
40	175	187	195	202	206	209	212	213	214	215	40
45	176	188	197	203	207	210	213	214	215	216	45
50	177	189	198	204	208	211	214	215	217	218	50
55	178	190	199	205	209	212	215	217	218	219	55
60	179	191	200	206	210	213	216	218	219	220	60
65	180	192	201	208	211	214	217	219	220	221	65
70	181	193	202	209	212	215	219	220	222	223	70
75	182	195	203	210	213	217	220	221	223	224	75
80	184	196	205	211	215	218	221	223	225	226	80
85	185	198	206	213	216	220	223	224	227	228	85
90	187	200	208	215	218	222	225	227	229	230	90
95	190	203	211	217	221	225	228	230	232	234	95

Table B.17.: Achievement Percentiles - Language Usage, Spring, Student

	Grade										
Pct	2	3	4	5	6	7	8	9	10	11	Pct
5	156	166	175	181	184	187	190	188	189	189	5
10	162	172	180	187	190	193	196	194	195	196	10
15	166	176	184	191	194	197	200	198	199	200	15
20	169	179	188	194	197	200	203	201	203	203	20
25	172	182	190	196	199	202	206	204	206	206	25
30	174	185	193	199	202	205	208	207	208	209	30
35	176	187	195	201	204	207	210	209	211	212	35
40	179	189	197	203	206	209	213	211	213	214	40
45	181	191	199	205	208	211	215	213	215	216	45
50	183	193	201	207	210	213	217	216	217	218	50
55	185	196	203	209	212	215	219	218	220	221	55
60	187	198	205	211	214	217	221	220	222	223	60
65	189	200	208	213	216	219	223	222	224	225	65
70	192	202	210	215	218	221	225	224	227	228	70
75	194	205	212	218	221	224	227	227	229	230	75
80	197	208	215	220	223	226	230	230	232	233	80
85	200	211	218	223	226	229	233	233	235	237	85
90	204	215	222	227	230	233	237	237	240	241	90
95	210	221	228	233	236	239	243	244	246	248	95

Table B.18.: Achievement Percentiles - Language Usage, Spring, School

	Grade										
Pct	2	3	4	5	6	7	8	9	10	11	Pct
5	169	178	186	193	195	198	201	201	201	201	5
10	172	181	189	196	198	201	204	205	205	205	10
15	174	183	191	198	200	203	206	207	207	207	15
20	176	185	193	200	202	205	208	208	209	209	20
25	177	187	195	201	203	206	209	210	211	211	25
30	178	188	196	202	205	207	211	211	212	213	30
35	179	189	197	203	206	209	212	213	213	214	35
40	180	190	198	205	207	210	213	214	215	215	40
45	181	191	199	206	208	211	214	215	216	217	45
50	182	193	200	207	209	212	215	216	217	218	50
55	183	194	201	208	210	213	216	217	218	219	55
60	184	195	202	209	212	214	217	218	220	220	60
65	186	196	203	210	213	215	219	219	221	222	65
70	187	197	205	211	214	217	220	221	222	223	70
75	188	199	206	212	215	218	221	222	224	225	75
80	189	200	207	213	217	219	223	224	225	226	80
85	191	202	209	215	218	221	224	225	227	228	85
90	193	204	211	217	220	223	226	228	230	231	90
95	196	207	214	220	224	226	230	231	233	234	95

B.6. Science

Table B.19.: Achievement Percentiles - Science, Fall, Student

	Grade									
Pct	2	3	4	5	6	7	8	9	10	Pct
5	154	165	174	179	183	185	186	190	191	5
10	159	170	178	184	187	190	191	195	196	10
15	162	173	181	187	191	193	195	198	200	15
20	165	176	184	190	193	196	198	201	202	20
25	167	178	186	192	195	198	200	203	204	25
30	169	180	188	194	197	200	202	205	206	30
35	171	182	190	196	199	202	204	207	208	35
40	173	184	192	198	201	204	206	208	210	40
45	174	186	193	199	202	205	208	210	212	45
50	176	187	195	201	204	207	210	212	213	50
55	178	189	197	203	206	209	211	213	215	55
60	180	191	198	204	207	211	213	215	217	60
65	182	192	200	206	209	212	215	217	218	65
70	183	194	202	208	211	214	217	219	220	70
75	185	196	204	210	213	216	219	221	222	75
80	188	198	206	212	215	219	222	223	224	80
85	190	201	208	215	218	221	224	225	227	85
90	194	204	211	218	221	225	228	228	230	90
95	199	209	216	223	226	230	233	233	235	95

Table B.20.: Achievement Percentiles - Science, Fall, School

	Grade									
Pct	2	3	4	5	6	7	8	9	10	Pct
5	166	176	185	190	194	197	199	202	203	5
10	168	179	187	192	196	200	201	204	205	10
15	170	180	189	194	198	201	203	206	207	15
20	171	182	190	195	199	202	204	207	208	20
25	172	183	191	196	200	203	205	208	210	25
30	173	184	192	197	201	204	206	209	211	30
35	174	184	192	198	202	205	207	210	212	35
40	175	185	193	199	203	206	208	211	212	40
45	176	186	194	200	203	206	209	211	213	45
50	176	187	195	200	204	207	210	212	214	50
55	177	188	195	201	205	208	210	213	215	55
60	178	189	196	202	206	209	211	214	216	60
65	179	189	197	203	206	209	212	215	217	65
70	180	190	198	204	207	210	213	216	218	70
75	181	191	199	205	208	211	214	217	219	75
80	182	192	199	206	209	212	215	218	220	80
85	183	194	201	207	210	213	216	219	221	85
90	185	195	202	208	212	215	218	220	223	90
95	187	197	204	211	214	217	220	223	225	95

Table B.21.: Achievement Percentiles - Science, Winter, Student

	Grade									
Pct	2	3	4	5	6	7	8	9	10	Pct
5	160	170	177	182	184	186	187	190	191	5
10	165	175	181	187	189	191	193	195	196	10
15	168	178	184	190	192	194	196	199	199	15
20	171	180	187	193	195	197	199	201	202	20
25	173	182	189	195	197	199	202	204	205	25
30	175	184	191	197	199	201	204	206	207	30
35	176	186	193	199	201	203	206	207	209	35
40	178	188	195	201	202	205	208	209	210	40
45	180	190	196	203	204	207	210	211	212	45
50	181	191	198	204	206	209	211	213	214	50
55	183	193	200	206	208	211	213	214	216	55
60	185	194	201	208	209	212	215	216	218	60
65	186	196	203	209	211	214	217	218	219	65
70	188	198	205	211	213	216	219	220	221	70
75	190	200	207	213	215	218	221	222	223	75
80	192	202	209	216	217	221	224	224	226	80
85	195	205	211	218	220	223	227	227	229	85
90	198	208	215	221	223	227	230	230	232	90
95	203	213	219	226	228	232	236	235	237	95

Table B.22.: Achievement Percentiles - Science, Winter, School

	Grade									
Pct	2	3	4	5	6	7	8	9	10	Pct
5	171	180	187	193	196	198	200	202	204	5
10	173	183	190	195	198	200	202	205	206	10
15	175	184	191	197	199	202	204	206	208	15
20	176	186	192	198	201	203	205	208	209	20
25	177	187	193	199	202	204	207	209	210	25
30	178	188	194	200	203	205	208	210	211	30
35	179	188	195	201	203	206	209	211	212	35
40	180	189	196	202	204	207	209	212	213	40
45	181	190	197	203	205	208	210	213	214	45
50	182	191	198	204	206	209	211	213	215	50
55	182	192	198	204	207	209	212	214	216	55
60	183	192	199	205	208	210	213	215	217	60
65	184	193	200	206	208	211	214	216	218	65
70	185	194	201	207	209	212	215	217	218	70
75	186	195	202	208	210	213	216	218	219	75
80	187	196	203	209	211	214	217	219	221	80
85	188	197	204	210	212	215	218	220	222	85
90	190	199	205	212	214	217	220	222	224	90
95	192	201	208	214	216	219	223	224	226	95

Table B.23.: Achievement Percentiles - Science, Spring, Student

	Grade									
Pct	2	3	4	5	6	7	8	9	10	Pct
5	164	173	179	184	185	186	188	189	189	5
10	169	178	183	189	190	192	194	195	195	10
15	172	181	187	192	193	195	197	198	199	15
20	175	183	189	195	196	198	200	201	202	20
25	177	186	191	197	198	200	203	204	204	25
30	179	187	193	199	200	203	205	206	207	30
35	180	189	195	201	202	205	207	208	209	35
40	182	191	197	203	204	206	209	210	211	40
45	184	193	199	205	206	208	211	212	213	45
50	185	194	200	207	207	210	213	213	215	50
55	187	196	202	208	209	212	215	215	216	55
60	189	197	204	210	211	214	217	217	218	60
65	190	199	205	212	212	216	219	219	220	65
70	192	201	207	214	214	218	221	221	223	70
75	194	203	209	216	216	220	223	223	225	75
80	196	205	211	218	219	222	226	226	227	80
85	198	207	214	221	221	225	228	229	230	85
90	202	211	217	224	225	228	232	232	234	90
95	206	215	222	229	230	234	238	238	240	95

Table B.24.: Achievement Percentiles - Science, Spring, School

	Grade									
Pct	2	3	4	5	6	7	8	9	10	Pct
5	175	183	189	195	197	198	201	203	204	5
10	177	186	191	197	199	201	203	205	207	10
15	179	187	193	199	201	203	205	207	208	15
20	180	188	194	200	202	204	206	208	210	20
25	181	189	195	201	203	205	208	210	211	25
30	182	190	196	202	204	206	209	211	212	30
35	183	191	197	203	205	207	210	212	213	35
40	184	192	198	204	206	208	211	212	214	40
45	185	193	199	205	206	209	212	213	215	45
50	185	194	200	206	207	210	212	214	216	50
55	186	194	201	207	208	211	213	215	216	55
60	187	195	201	208	209	212	214	216	217	60
65	188	196	202	209	210	213	215	217	218	65
70	189	197	203	210	211	213	216	218	219	70
75	190	198	204	211	212	215	217	219	220	75
80	191	199	205	212	213	216	218	220	221	80
85	192	200	207	213	214	217	220	221	223	85
90	193	202	208	215	216	219	222	223	224	90
95	196	204	211	217	218	221	224	226	227	95

C. Growth Norms

The following tables present the first two moments—namely, means and standard deviations—of student and school marginal growth norms for Mathematics, Reading, Language Usage, and Science MAP Growth Tests at designated grade levels and seasons.

C.1. Seasonal Conditioning and Timing

MAP Growth Marginal Growth Norms are based on specific instructional weeks for the marginal starting RIT score at the starting week. The following tables report only one pair of instructional weeks for a given season-to-season growth distribution

- Fall-to-Winter norms: First assessment during the 4th week of instruction and the second assessment administered during the 20th week of instruction.
- Winter-to-Spring: First assessment during the 20th week of instruction and the second assessment administered during the 32nd week of instruction.
- Fall-to-Spring: First assessment during the 4th week of instruction and the second assessment administered during the 32nd week of instruction.
- Fall-to-Fall: First assessment during the 4th week of instruction of the prior year and the second assessment administered during the 4th week of the reported year
- Winter-to-Winter: First assessment during the 20th week of instruction of the prior year and the second assessment administered during the 20th week of the reported year
- Spring-to-Spring: First assessment during the 32nd week of instruction of the prior year and the second assessment administered during the 32nd week of the reported year

C.2. Intended Use and Limitations

These tables provide normative references for understanding typical student and school growth at designated times over one or two academic years. The weeks reported herein reflect default weeks of instruction for a given season and are not intended to serve as season-specific growth distributions.

These statistics should not be used to produce percentile ranks for growth between two time points for assessments given outside the designated instructional weeks. Accurate growth percentiles depend on test administration timing matching the conditioning weeks used to create these norms.

C.3. Mathematics Growth Norms

Table C.1.: Growth Norms - Mathematics, Student

	Within-Year						Between-Year					
	Fa-to-Wi		Wi-to-Sp		Fa-to-Sp		Fa-to-Fa		Wi-to-Wi		Sp-to-Sp	
Grade	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
K	9.49	8.17	7.12	8.03	16.61	8.81	-	-	-	-	-	-
1	8.97	7.55	6.73	7.43	15.70	8.06	18.60	9.13	18.02	8.94	17.59	9.27
2	8.33	7.82	6.25	7.70	14.59	8.36	14.26	9.24	13.55	8.85	13.03	9.13
3	8.60	7.40	6.45	7.30	15.05	7.84	11.94	8.71	12.15	8.69	12.32	9.21
4	7.45	7.23	5.59	7.04	13.04	8.05	13.44	7.73	12.21	7.95	11.28	8.50
5	5.59	7.16	4.19	7.01	9.78	7.83	10.00	7.44	8.16	7.64	6.78	8.24
6	5.77	7.45	4.33	7.30	10.11	8.10	4.83	7.48	4.93	7.81	5.00	8.60
7	3.80	7.77	2.85	7.67	6.64	8.25	8.29	7.86	6.39	7.99	4.95	8.60
8	3.90	8.12	2.93	8.00	6.83	8.70	5.87	8.26	5.99	8.56	6.09	9.35
9	2.24	12.69	1.68	12.22	3.92	14.72	4.98	8.86	3.53	9.45	2.45	10.96
10	2.61	13.68	1.95	13.19	4.56	15.81	2.53	14.50	3.08	13.12	3.49	13.51
11	2.18	11.39	1.63	11.16	3.81	12.42	3.61	15.39	3.29	14.09	3.05	14.79
12	1.71	16.42	1.28	16.02	2.99	18.19	0.18	12.43	-0.36	13.60	-0.76	15.98

Table C.2.: Growth Norms - Mathematics, School

	Within-Year						Between-Year					
	Fa-to-Wi		Wi-to-Sp		Fa-to-Sp		Fa-to-Fa		Wi-to-Wi		Sp-to-Sp	
Grade	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
K	9.24	3.34	6.93	3.19	16.18	3.95	-	-	-	-	-	-
1	8.88	2.98	6.66	2.96	15.55	3.11	18.47	3.99	18.03	3.90	17.70	4.07
2	8.20	3.45	6.15	3.44	14.34	3.49	14.18	3.94	13.54	4.07	13.06	4.24
3	8.43	3.86	6.33	3.79	14.76	4.18	11.57	4.22	11.86	4.80	12.08	5.39
4	7.17	5.00	5.38	4.68	12.56	6.31	13.09	3.84	11.93	4.52	11.05	5.34
5	5.37	5.05	4.03	4.74	9.40	6.34	9.84	5.43	8.19	4.89	6.95	5.03
6	5.48	5.83	4.11	5.54	9.60	7.03	4.70	5.70	4.94	5.40	5.11	5.82
7	3.69	5.03	2.77	5.00	6.46	5.18	7.67	6.73	6.03	5.97	4.79	5.92
8	3.60	5.97	2.70	5.95	6.31	6.08	4.68	6.42	4.90	6.96	5.07	7.44
9	2.19	7.08	1.64	7.07	3.82	7.12	1.39	12.15	0.05	13.10	-0.95	14.22
10	2.21	7.81	1.66	7.79	3.87	7.95	1.07	9.85	1.42	10.40	1.68	10.86
11	1.72	8.01	1.29	7.96	3.01	8.24	0.58	11.18	0.06	11.74	-0.33	12.49
12	1.76	8.98	1.32	8.73	3.07	10.07	-3.37	12.81	-3.23	12.85	-3.11	13.93

C.4. Reading Growth Norms

Table C.3.: Growth Norms - Reading, Student

	Within-Year						Between-Year					
	Fa-to-Wi		Wi-to-Sp		Fa-to-Sp		Fa-to-Fa		Wi-to-Wi		Sp-to-Sp	
Grade	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
K	7.94	9.28	5.95	8.98	13.89	10.62	-	-	-	-	-	-
1	7.14	9.99	5.35	9.66	12.49	11.42	18.04	11.48	17.18	10.31	16.53	10.18
2	6.64	8.68	4.98	8.55	11.62	9.26	15.40	13.12	14.78	11.31	14.32	10.95
3	5.20	8.69	3.90	8.58	9.10	9.21	14.98	10.50	13.56	10.22	12.49	10.58
4	3.52	8.31	2.64	8.20	6.16	8.82	11.20	9.69	9.60	9.54	8.39	9.80
5	2.68	8.11	2.01	8.02	4.70	8.53	7.68	9.11	6.86	8.90	6.25	9.18
6	1.77	8.21	1.33	8.15	3.09	8.48	5.75	8.96	4.86	8.91	4.19	9.28
7	1.42	8.51	1.07	8.44	2.49	8.82	3.86	8.85	3.40	8.90	3.05	9.19
8	1.20	8.78	0.90	8.70	2.10	9.14	3.64	9.10	3.40	9.12	3.22	9.51
9	0.56	9.81	0.42	9.73	0.97	10.16	1.87	9.80	1.34	9.91	0.94	10.63
10	0.40	10.32	0.30	10.22	0.71	10.79	1.52	10.38	1.65	10.63	1.75	11.27
11	-0.23	11.36	-0.17	11.24	-0.40	11.92	0.98	11.31	0.74	11.61	0.55	12.52
12	-0.80	12.53	-0.60	12.33	-1.39	13.41	-0.72	12.39	-0.82	12.99	-0.88	14.26

Table C.4.: Growth Norms - Reading, School

	Within-Year						Between-Year					
	Fa-to-Wi		Wi-to-Sp		Fa-to-Sp		Fa-to-Fa		Wi-to-Wi		Sp-to-Sp	
Grade	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
K	7.79	3.30	5.84	3.15	13.62	3.94	-	-	-	-	-	-
1	7.09	3.16	5.32	3.13	12.41	3.30	17.74	4.54	17.00	4.42	16.44	4.58
2	6.43	3.83	4.83	3.82	11.26	3.89	15.14	4.18	14.53	4.32	14.08	4.56
3	5.04	3.79	3.78	3.75	8.82	3.97	14.70	4.71	13.34	4.97	12.32	5.38
4	3.42	3.65	2.56	3.59	5.98	3.88	11.17	4.12	9.65	4.48	8.52	4.84
5	2.52	4.11	1.89	4.10	4.40	4.12	7.94	4.20	7.20	4.56	6.63	4.88
6	1.54	4.06	1.15	4.02	2.69	4.24	5.89	4.47	5.12	4.93	4.54	5.37
7	1.20	4.20	0.90	4.12	2.09	4.56	3.74	4.93	3.62	5.02	3.53	5.11
8	0.99	5.48	0.74	5.47	1.72	5.51	3.62	4.40	3.69	4.58	3.74	4.79
9	0.46	6.20	0.35	6.18	0.81	6.31	-0.08	9.40	-0.32	9.87	-0.51	10.31
10	0.19	7.04	0.14	6.99	0.33	7.24	1.00	7.75	1.00	8.22	0.99	8.73
11	-0.36	7.25	-0.27	7.23	-0.64	7.30	-1.66	10.44	-2.00	10.75	-2.25	11.20
12	-0.77	8.04	-0.58	7.87	-1.36	8.81	-2.10	10.06	-2.51	10.67	-2.81	12.13

C.5. Language Usage Growth Norms

Table C.5.: Growth Norms - Language Usage, Student

	Within-Year						Between-Year					
	Fa-to-Wi		Wi-to-Sp		Fa-to-Sp		Fa-to-Fa		Wi-to-Wi		Sp-to-Sp	
Grade	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2	7.09	8.45	5.31	8.26	12.40	9.29	-	-	-	-	-	-
3	5.16	8.05	3.87	7.91	9.02	8.67	14.65	10.12	12.79	9.50	11.39	9.57
4	3.76	7.75	2.82	7.70	6.57	7.98	10.46	9.18	9.02	8.75	7.94	8.83
5	2.91	7.50	2.19	7.43	5.10	7.82	7.62	8.39	6.69	8.36	5.99	8.53
6	2.07	7.70	1.56	7.64	3.63	7.97	5.34	8.25	4.50	8.09	3.86	8.25
7	1.69	7.84	1.27	7.79	2.95	8.07	3.99	8.42	3.64	8.23	3.38	8.41
8	1.61	7.97	1.21	7.92	2.82	8.21	3.62	8.32	3.60	8.37	3.59	8.72
9	0.94	8.88	0.70	8.81	1.64	9.18	2.49	8.89	1.87	8.90	1.40	9.43
10	0.88	9.38	0.66	9.31	1.54	9.74	1.79	9.46	1.70	9.58	1.63	10.20
11	0.47	9.87	0.36	9.78	0.83	10.31	1.54	10.23	1.23	10.25	1.01	10.88

Table C.6.: Growth Norms - Language Usage, School

	Within-Year						Between-Year					
	Fa-to-Wi		Wi-to-Sp		Fa-to-Sp		Fa-to-Fa		Wi-to-Wi		Sp-to-Sp	
Grade	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2	6.91	4.17	5.18	4.15	12.09	4.27	-	-	-	-	-	-
3	4.94	4.99	3.71	4.97	8.65	5.09	14.56	5.18	12.76	5.46	11.41	5.74
4	3.56	4.83	2.67	4.82	6.23	4.86	9.83	5.80	8.57	6.43	7.62	7.04
5	2.76	5.05	2.07	5.05	4.84	5.08	7.44	5.50	6.59	6.03	5.95	6.52
6	1.91	6.11	1.43	5.96	3.34	6.77	5.03	6.07	4.42	6.33	3.96	6.55
7	1.50	5.92	1.12	5.91	2.62	5.96	3.75	7.34	3.54	6.74	3.38	6.68
8	1.41	5.73	1.05	5.72	2.46	5.77	3.22	6.76	3.24	7.19	3.26	7.58
9	0.83	5.89	0.63	5.87	1.46	5.99	0.68	10.04	0.54	9.75	0.44	9.91
10	0.84	6.30	0.63	6.30	1.46	6.33	1.80	7.24	1.89	7.45	1.96	7.71
11	0.31	6.78	0.23	6.74	0.54	6.97	-0.66	9.56	-0.63	9.72	-0.61	10.08

C.6. Science Growth Norms

Table C.7.: Growth Norms - Science, Student

	Within-Year						Between-Year					
	Fa-to-Wi		Wi-to-Sp		Fa-to-Sp		Fa-to-Fa		Wi-to-Wi		Sp-to-Sp	
Grade	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2	5.19	7.81	3.89	7.64	9.09	8.57	-	-	-	-	-	-
3	3.95	7.13	2.96	7.03	6.92	7.58	11.97	9.43	10.62	8.63	9.62	8.45
4	3.04	6.92	2.28	6.87	5.33	7.17	8.52	7.96	7.51	7.57	6.76	7.61
5	3.27	7.04	2.45	6.96	5.72	7.43	6.53	7.37	6.60	7.41	6.65	7.68
6	1.81	7.10	1.36	7.06	3.17	7.29	4.07	7.60	2.61	7.51	1.52	7.82
7	1.63	7.43	1.22	7.38	2.85	7.65	3.60	7.49	3.41	7.57	3.27	7.88
8	1.82	7.68	1.36	7.60	3.18	8.04	3.46	7.81	3.75	7.90	3.96	8.34
9	0.97	9.77	0.73	9.50	1.71	10.92	2.34	7.89	1.84	8.15	1.46	8.59
10	0.78	10.28	0.59	9.99	1.37	11.54	1.77	10.79	1.67	9.79	1.59	9.83

Table C.8.: Growth Norms - Science, School

	Within-Year						Between-Year					
	Fa-to-Wi		Wi-to-Sp		Fa-to-Sp		Fa-to-Fa		Wi-to-Wi		Sp-to-Sp	
Grade	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
2	5.13	2.55	3.85	2.48	8.97	2.88	-	-	-	-	-	-
3	3.85	2.51	2.89	2.48	6.74	2.65	11.06	3.73	9.78	3.80	8.83	3.96
4	2.94	3.82	2.21	3.67	5.15	4.45	8.32	2.95	7.38	3.15	6.68	3.36
5	3.13	2.88	2.35	2.80	5.47	3.23	6.37	4.71	6.50	4.36	6.59	4.52
6	1.81	3.05	1.36	3.05	3.16	3.07	4.13	3.58	2.78	3.97	1.78	4.48
7	1.52	4.37	1.14	4.23	2.67	4.96	3.88	3.39	3.73	3.72	3.62	4.07
8	1.64	3.53	1.23	3.52	2.87	3.58	3.10	5.43	3.37	4.92	3.57	4.85
9	1.16	3.74	0.87	3.72	2.04	3.86	1.71	8.25	1.47	7.73	1.29	7.92
10	0.82	3.80	0.62	3.80	1.44	3.82	2.15	4.96	1.79	5.55	1.52	6.23