# Linking the Wyoming PAWS Assessments to NWEA MAP Growth Tests*

*As of June 2017 Measures of Academic Progress® (MAP®) is known as MAP® Growth™.

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# Introduction

Northwest Evaluation Association™ (NWEA™) is committed to providing partners with useful tools to help make inferences from the Measures of Academic Progress® (MAP®) interim assessment scores. One important tool is the concordance table between MAP and state summative assessments. Concordance tables have been used for decades to relate scores on different tests measuring similar but distinct constructs. These tables, typically derived from statistical linking procedures, provide a direct link between scores on different tests and serve various purposes. Aside from describing how a score on one test relates to performance on another test, they can also be used to identify benchmark scores on one test corresponding to performance categories on another test, or to maintain continuity of scores on a test after the test is redesigned or changed. Concordance tables are helpful for educators, parents, administrators, researchers, and policy makers to evaluate and formulate academic standing and growth.

Recently, NWEA completed a concordance study to connect the scales of the Proficiency Assessments for Wyoming Students (PAWS) reading and math with those of the MAP Reading and MAP for Mathematics assessments. In this report, we present the 2nd through 8th grade cut scores on MAP reading and mathematics scales that correspond to the benchmarks on the PAWS reading and math tests. Information about the consistency rate of classification based on the estimated MAP cut scores is also provided, along with a series of tables that predict the probability of receiving a Level 3 (i.e., "Proficient") or higher performance designation on the PAWS assessments, based on the observed MAP scores taken during the same school year. A detailed description of the data and analysis method used in this study is provided in the Appendix.

# Overview of Assessments

PAWS includes a series of achievement tests aligned to the Common Core State Standards (CCSS) in reading and math for grades 3-8. PAWS tests are delivered both online and in the paper-and-pencil form. For each grade and subject, there are three cut scores that distinguish between performance levels: Level 1: *Below Basic*, Level 2: *Basic*, Level 3: *Proficient*, and Level 4: *Advanced*. The Level 3 cut score demarks the minimum level of performance considered to be "proficient" for accountability purposes.

MAP tests are interim assessments that are administered in the form of computerized adaptive test (CAT). MAP tests are constructed to measure student achievement from Grades K to 12 in math, reading, language usage, and science and aligned to the CCSS. Like PAWS, MAP assessments are vertically scaled across grades, a feature that supports direct measurement of

academic growth and change. MAP scores are reported on a **R**asch Un**it** (RIT) scale with a range from 100 to 350. Each subject has its own RIT scale. To aid interpretation of MAP scores, NWEA periodically conducts norming studies of student and school performance on MAP. For example, the 2015 RIT Scale Norming Study (Thum & Hauser, 2015) employed multi-level growth models on nearly 500,000 longitudinal test scores from over 100,000 students that were weighted to create large, nationally representative norms for math, reading, language usage, and general science.

## Estimated MAP Cut Scores Associated with PAWS Readiness Levels

Tables 1 to 4 report the PAWS scaled scores associated with each of the four performance levels, as well as the estimated score range on the MAP tests associated with each PAWS performance level. Specifically, Tables 1 and 2 apply to MAP scores obtained during the spring testing season for reading and math, respectively. Tables 3 and 4 apply to MAP tests taken in a prior testing season (fall or winter) for reading and math, respectively. The tables also report the percentile rank (based on the *NWEA 2015 MAP Norms*) associated with each estimated MAP cut score. The MAP cut scores can be used to predict students' most probable PAWS performance level, based on their observed MAP scores. For example, a 5$^{th}$ grade student who obtained a MAP math score of 240 in the spring testing season is likely to be at the very high end of Level 3 (Proficient) on the PAWS taken during that same testing season (see Table 2). Similarly, a 3$^{rd}$ grade student who obtained a MAP reading score of 210 in the fall testing season is likely to be at Level 4 (Advanced) on the PAWS taken in the spring of 3$^{rd}$ grade (see Table 3).

## TABLE 1. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN PAWS AND MAP READING (WHEN MAP IS TAKEN IN SPRING)

| Grade | PAWS | | | |
|---|---|---|---|---|
| | Level 1 *Below Basic* | Level 2 *Basic* | Level 3 *Proficient* | Level 4 *Advanced* |
| 3 | 375-552 | 553-589 | **590**-640 | 641-800 |
| 4 | 400-565 | 566-605 | **606**-659 | 660-825 |
| 5 | 425-577 | 578-619 | **620**-667 | 668-850 |
| 6 | 450-588 | 589-629 | **630**-680 | 681-875 |
| 7 | 475-605 | 606-641 | **642**-692 | 693-900 |
| 8 | 500-615 | 616-655 | **656**-710 | 711-925 |

| Grade | MAP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Level 1 *Below Basic* | | Level 2 *Basic* | | Level 3 *Proficient* | | Level 4 *Advanced* | |
| | RIT | %ile | RIT | %ile | RIT | %ile | RIT | %ile |
| 2 | 100-180 | 1-29 | 181-191 | 30-57 | **192**-204 | 58-85 | 205-350 | 86-99 |
| 3 | 100-190 | 1-29 | 191-201 | 30-57 | **202**-214 | 58-85 | 215-350 | 86-99 |
| 4 | 100-195 | 1-24 | 196-207 | 25-54 | **208**-220 | 55-83 | 221-350 | 84-99 |
| 5 | 100-201 | 1-24 | 202-213 | 25-54 | **214**-225 | 55-82 | 226-350 | 83-99 |
| 6 | 100-207 | 1-28 | 208-217 | 29-54 | **218**-229 | 55-82 | 230-350 | 83-99 |
| 7 | 100-211 | 1-33 | 212-220 | 34-56 | **221**-233 | 57-84 | 234-350 | 85-99 |
| 8 | 100-214 | 1-36 | 215-226 | 37-65 | **227**-240 | 66-90 | 241-350 | 91-99 |

*Notes.* 1. %ile=percentile.
2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.
3. High-lighted text denotes Grade 2 benchmarks are extrapolated from Grade 3 cut scores.

## TABLE 2. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN PAWS AND MAP MATH (WHEN MAP IS TAKEN IN SPRING)

| Grade | PAWS | | | |
|---|---|---|---|---|
| | Level 1 *Below Basic* | Level 2 *Basic* | Level 3 *Proficient* | Level 4 *Advanced* |
| 3 | 375-549 | 550-598 | **599**-659 | 660-850 |
| 4 | 400-583 | 584-636 | **637**-696 | 697-875 |
| 5 | 425-608 | 609-651 | **652**-726 | 727-900 |
| 6 | 450-628 | 629-676 | **677**-742 | 743-925 |
| 7 | 475-652 | 653-696 | **697**-752 | 753-950 |
| 8 | 500-663 | 664-706 | **707**-762 | 763-925 |

| Grade | MAP | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Level 1 *Below Basic* | | Level 2 *Basic* | | Level 3 *Proficient* | | Level 4 *Advanced* | |
| | RIT | %ile | RIT | %ile | RIT | %ile | RIT | %ile |
| 2 | 100-184 | 1-28 | 185-195 | 29-59 | **196**-206 | 60-85 | 207-350 | 86-99 |
| 3 | 100-195 | 1-28 | 196-207 | 29-61 | **208**-218 | 62-86 | 219-350 | 87-99 |
| 4 | 100-200 | 1-19 | 201-215 | 20-55 | **216**-227 | 56-82 | 228-350 | 83-99 |
| 5 | 100-209 | 1-23 | 210-223 | 24-55 | **224**-240 | 56-88 | 241-350 | 89-99 |
| 6 | 100-211 | 1-20 | 212-228 | 21-57 | **229**-244 | 58-87 | 245-350 | 88-99 |
| 7 | 100-216 | 1-24 | 217-233 | 25-60 | **234**-248 | 61-86 | 249-350 | 87-99 |
| 8 | 100-217 | 1-24 | 218-237 | 25-63 | **238**-255 | 64-90* | 256-350 | 90*-99 |

*Notes.* 1. %ile=percentile.
2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.
3. High-lighted text denotes Grade 2 benchmarks are extrapolated from Grade 3 cut scores.
4. * reflects occasional departure from one-to-one correspondence between RITs and percentiles due to the larger range of the RIT scale relative to the percentile scale.

## TABLE 3. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN PAWS AND MAP READING (WHEN MAP IS TAKEN IN FALL OR WINTER PRIOR TO SPRING PAWS TESTS)

| Grade | PAWS | | | |
|---|---|---|---|---|
| | Level 1 *Below Basic* | Level 2 *Basic* | Level 3 *Proficient* | Level 4 *Advanced* |
| 3 | 375-552 | 553-589 | **590**-640 | 641-800 |
| 4 | 400-565 | 566-605 | **606**-659 | 660-825 |
| 5 | 425-577 | 578-619 | **620**-667 | 668-850 |
| 6 | 450-588 | 589-629 | **630**-680 | 681-875 |
| 7 | 475-605 | 606-641 | **642**-692 | 693-900 |
| 8 | 500-615 | 616-655 | **656**-710 | 711-925 |

| Grade | MAP FALL | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Level 1 *Below Basic* | | Level 2 *Basic* | | Level 3 *Proficient* | | Level 4 *Advanced* | |
| | RIT | %ile | RIT | %ile | RIT | %ile | RIT | %ile |
| 2 | 100-164 | 1-25 | 165-178 | 26-59 | **179**-193 | 60-88 | 194-350 | 89-99 |
| 3 | 100-178 | 1-26 | 179-191 | 27-58 | **192**-207 | 59-88 | 208-350 | 89-99 |
| 4 | 100-186 | 1-22 | 187-199 | 23-53 | **200**-215 | 54-86 | 216-350 | 87-99 |
| 5 | 100-193 | 1-21 | 194-207 | 22-54 | **208**-221 | 55-85 | 222-350 | 86-99 |
| 6 | 100-201 | 1-26 | 202-213 | 27-56 | **214**-226 | 57-85 | 227-350 | 86-99 |
| 7 | 100-206 | 1-30 | 207-217 | 31-57 | **218**-231 | 58-86 | 232-350 | 87-99 |
| 8 | 100-210 | 1-33 | 211-224 | 34-67 | **225**-238 | 68-91 | 239-350 | 92-99 |

| Grade | MAP WINTER | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Level 1 *Below Basic* | | Level 2 *Basic* | | Level 3 *Proficient* | | Level 4 *Advanced* | |
| | RIT | %ile | RIT | %ile | RIT | %ile | RIT | %ile |
| 2 | 100-175 | 1-28 | 176-187 | 29-58 | **188**-200 | 59-86 | 201-350 | 87-99 |
| 3 | 100-186 | 1-27 | 187-198 | 28-57 | **199**-212 | 58-86 | 213-350 | 87-99 |
| 4 | 100-192 | 1-22 | 193-205 | 23-55 | **206**-219 | 56-85 | 220-350 | 86-99 |
| 5 | 100-198 | 1-21 | 199-211 | 22-54 | **212**-224 | 55-84 | 225-350 | 85-99 |
| 6 | 100-205 | 1-27 | 206-216 | 28-56 | **217**-228 | 57-83 | 229-350 | 84-99 |
| 7 | 100-209 | 1-31 | 210-219 | 32-56 | **220**-232 | 57-85 | 233-350 | 86-99 |
| 8 | 100-213 | 1-35 | 214-225 | 36-66 | **226**-239 | 67-90 | 240-350 | 91-99 |

*Notes.* 1. %ile=percentile.
2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.
3. High-lighted text denotes Grade 2 benchmarks are extrapolated from Grade 3 cut scores.

## TABLE 4. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN PAWS AND MAP MATH (WHEN MAP IS TAKEN IN FALL OR WINTER PRIOR TO SPRING PAWS TESTS)

| Grade | PAWS | | | |
|---|---|---|---|---|
| | Level 1 *Below Basic* | Level 2 *Basic* | Level 3 *Proficient* | Level 4 *Advanced* |
| 3 | 375-549 | 550-598 | **599**-659 | 660-850 |
| 4 | 400-583 | 584-636 | **637**-696 | 697-875 |
| 5 | 425-608 | 609-651 | **652**-726 | 727-900 |
| 6 | 450-628 | 629-676 | **677**-742 | 743-925 |
| 7 | 475-652 | 653-696 | **697**-752 | 753-950 |
| 8 | 500-663 | 664-706 | **707**-762 | 763-925 |

| Grade | MAP FALL | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Level 1 *Below Basic* | | Level 2 *Basic* | | Level 3 *Proficient* | | Level 4 *Advanced* | |
| | RIT | %ile | RIT | %ile | RIT | %ile | RIT | %ile |
| 2 | 100-168 | 1-26 | 169-180 | 27-60 | **181**-193 | 61-89 | 194-350 | 90-99 |
| 3 | 100-181 | 1-24 | 182-194 | 25-62 | **195**-206 | 63-89 | 207-350 | 90-99 |
| 4 | 100-188 | 1-16 | 189-203 | 17-54 | **204**-216 | 55-85 | 217-350 | 86-99 |
| 5 | 100-199 | 1-20 | 200-213 | 21-55 | **214**-230 | 56-90 | 231-350 | 91-99 |
| 6 | 100-203 | 1-18 | 204-220 | 19-57 | **221**-237 | 58-89 | 238-350 | 90-99 |
| 7 | 100-210 | 1-23 | 211-227 | 24-61 | **228**-242 | 62-88 | 243-350 | 89-99 |
| 8 | 100-212 | 1-21 | 213-233 | 22-65 | **234**-251 | 66-92* | 252-350 | 92*-99 |

| Grade | MAP WINTER | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Level 1 *Below Basic* | | Level 2 *Basic* | | Level 3 *Proficient* | | Level 4 *Advanced* | |
| | RIT | %ile | RIT | %ile | RIT | %ile | RIT | %ile |
| 2 | 100-178 | 1-27 | 179-189 | 28-59 | **190**-201 | 60-87 | 202-350 | 88-99 |
| 3 | 100-190 | 1-28 | 191-202 | 29-62 | **203**-213 | 63-87 | 214-350 | 88-99 |
| 4 | 100-195 | 1-17 | 196-210 | 18-54 | **211**-222 | 55-83 | 223-350 | 84-99 |
| 5 | 100-205 | 1-22 | 206-219 | 23-55 | **220**-236 | 56-89 | 237-350 | 90-99 |
| 6 | 100-208 | 1-19 | 209-225 | 20-58 | **226**-241 | 59-88 | 242-350 | 89-99 |
| 7 | 100-214 | 1-24 | 215-231 | 25-62 | **232**-246 | 63-88 | 247-350 | 89-99 |
| 8 | 100-215 | 1-22 | 216-235 | 23-63 | **236**-253 | 64-90 | 254-350 | 91-99 |

*Notes.* 1. %ile=percentile.
2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.
3. High-lighted text denotes Grade 2 benchmarks are extrapolated from Grade 3 cut scores.
4. * reflects occasional departure from one-to-one correspondence between RITs and percentiles due to the larger range of the RIT scale relative to the percentile scale.

## Consistency Rate of Classification

Consistency rate of classification (Pommerich, Hanson, Harris, & Sconing, 2004), expressed in the form of a rate between 0 and 1, provides a means to measure the departure from equity for concordances (Hanson et al., 2001). This index can also be used as an indicator for the predictive validity of the MAP tests, i.e., how accurately the MAP scores can predict a student's proficiency status on the PAWS test. For each pair of concordant scores, a classification is considered consistent if the examinee is classified into the same performance category regardless of the test used for making a decision. Consistency rate provided in this report can be calculated as, for the "Proficient" performance category concordant scores, the percentage of examinees who score at or above both concordant scores plus the percentage of examinees who score below both concordant scores on each test. Higher consistency rate indicates stronger congruence between PAWS and MAP cut scores. The results in Table 5 demonstrate that MAP reading scores can consistently classify students' proficiency (Level 3 or higher) status on PAWS reading test 80-85% of the time and MAP math scores can consistently classify students on PAWS math test 84-87% of the time. Those numbers are high suggesting that both MAP reading and math tests are great predictors of students' proficiency status on the PAWS tests.

TABLE 5. CONSISTENCY RATE OF CLASSIFICATION FOR MAP AND PAWS LEVEL 3 EQUIPERCENTILE CONCORDANCES

| Grade | Reading | | | Math | | |
|---|---|---|---|---|---|---|
| | Consistency Rate | False Positives | False Negatives | Consistency Rate | False Positives | False Negatives |
| 3 | 0.83 | 0.09 | 0.08 | 0.84 | 0.08 | 0.08 |
| 4 | 0.83 | 0.08 | 0.09 | 0.87 | 0.08 | 0.07 |
| 5 | 0.85 | 0.08 | 0.07 | 0.87 | 0.07 | 0.06 |
| 6 | 0.84 | 0.09 | 0.07 | 0.84 | 0.09 | 0.07 |
| 7 | 0.84 | 0.08 | 0.08 | 0.86 | 0.07 | 0.07 |
| 8 | 0.80 | 0.09 | 0.11 | 0.85 | 0.08 | 0.07 |

## Proficiency Projection

Proficiency projection tells how likely a student is classified as "Proficient" on PAWS tests based on his/her observed MAP scores. The conditional growth norms provided in the 2015 MAP Norms were used to calculate this information (Thum & Hauser, 2015). The results of proficiency projection and corresponding probability of achieving "Proficient" on the PAWS tests are

presented in Tables 6 to 8. These tables estimate the probability of scoring at Level 3 or above on PAWS in the spring and the prior fall or winter testing season. For example, if a 3rd grade student obtained a MAP reading score of 199 in the fall, the probability of obtaining a Level 3 or higher PAWS score in the spring of 3rd grade is 80%. Table 6 presents the estimated probability of meeting Level 3 benchmark when MAP is taken in the spring, whereas Tables 7 and 8 present the estimated probability of meeting Level 3 benchmark when MAP is taken in the fall or winter prior to taking the PAWS tests.

## TABLE 6. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING PAWS LEVEL 3 (PROFICIENT) WHEN MAP IS TAKEN IN THE SPRING

| Grade | Reading | | | | | Math | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Start %ile | RIT Spring | Projected Proficiency | | | Start %ile | RIT Spring | Projected Proficiency | | |
| | | | Cut Score | Level 3 | Prob. | | | Cut Score | Level 3 | Prob. |
| 2 | 5 | 164 | 192 | No | <0.01 | 5 | 170 | 196 | No | <0.01 |
| | 10 | 169 | 192 | No | <0.01 | 10 | 175 | 196 | No | <0.01 |
| | 15 | 173 | 192 | No | <0.01 | 15 | 178 | 196 | No | <0.01 |
| | 20 | 176 | 192 | No | <0.01 | 20 | 181 | 196 | No | <0.01 |
| | 25 | 178 | 192 | No | <0.01 | 25 | 183 | 196 | No | <0.01 |
| | 30 | 181 | 192 | No | <0.01 | 30 | 185 | 196 | No | <0.01 |
| | 35 | 183 | 192 | No | <0.01 | 35 | 187 | 196 | No | <0.01 |
| | 40 | 185 | 192 | No | 0.01 | 40 | 189 | 196 | No | 0.01 |
| | 45 | 187 | 192 | No | 0.06 | 45 | 190 | 196 | No | 0.02 |
| | 50 | 189 | 192 | No | 0.17 | 50 | 192 | 196 | No | 0.08 |
| | 55 | 191 | 192 | No | 0.38 | 55 | 194 | 196 | No | 0.25 |
| | 60 | 193 | 192 | Yes | 0.62 | 60 | 196 | 196 | Yes | 0.50 |
| | 65 | 195 | 192 | Yes | 0.83 | 65 | 197 | 196 | Yes | 0.63 |
| | 70 | 197 | 192 | Yes | 0.94 | 70 | 199 | 196 | Yes | 0.85 |
| | 75 | 199 | 192 | Yes | 0.99 | 75 | 201 | 196 | Yes | 0.96 |
| | 80 | 201 | 192 | Yes | >0.99 | 80 | 204 | 196 | Yes | >0.99 |
| | 85 | 204 | 192 | Yes | >0.99 | 85 | 206 | 196 | Yes | >0.99 |
| | 90 | 208 | 192 | Yes | >0.99 | 90 | 209 | 196 | Yes | >0.99 |
| | 95 | 214 | 192 | Yes | >0.99 | 95 | 214 | 196 | Yes | >0.99 |
| 3 | 5 | 174 | 202 | No | <0.01 | 5 | 181 | 208 | No | <0.01 |
| | 10 | 179 | 202 | No | <0.01 | 10 | 186 | 208 | No | <0.01 |
| | 15 | 183 | 202 | No | <0.01 | 15 | 189 | 208 | No | <0.01 |
| | 20 | 186 | 202 | No | <0.01 | 20 | 192 | 208 | No | <0.01 |
| | 25 | 188 | 202 | No | <0.01 | 25 | 194 | 208 | No | <0.01 |
| | 30 | 191 | 202 | No | <0.01 | 30 | 196 | 208 | No | <0.01 |
| | 35 | 193 | 202 | No | <0.01 | 35 | 198 | 208 | No | <0.01 |
| | 40 | 195 | 202 | No | 0.01 | 40 | 200 | 208 | No | <0.01 |
| | 45 | 197 | 202 | No | 0.06 | 45 | 202 | 208 | No | 0.02 |
| | 50 | 199 | 202 | No | 0.17 | 50 | 203 | 208 | No | 0.04 |
| | 55 | 201 | 202 | No | 0.38 | 55 | 205 | 208 | No | 0.15 |
| | 60 | 202 | 202 | Yes | 0.50 | 60 | 207 | 208 | No | 0.37 |
| | 65 | 204 | 202 | Yes | 0.73 | 65 | 209 | 208 | Yes | 0.63 |
| | 70 | 207 | 202 | Yes | 0.94 | 70 | 211 | 208 | Yes | 0.85 |
| | 75 | 209 | 202 | Yes | 0.99 | 75 | 213 | 208 | Yes | 0.96 |
| | 80 | 211 | 202 | Yes | >0.99 | 80 | 215 | 208 | Yes | 0.99 |
| | 85 | 214 | 202 | Yes | >0.99 | 85 | 218 | 208 | Yes | >0.99 |
| | 90 | 218 | 202 | Yes | >0.99 | 90 | 221 | 208 | Yes | >0.99 |
| | 95 | 223 | 202 | Yes | >0.99 | 95 | 226 | 208 | Yes | >0.99 |

TABLE 6. (CONTINUED)

| Grade | Reading | | | | | Math | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Start %ile | RIT Spring | Projected Proficiency | | | Start %ile | RIT Spring | Projected Proficiency | | |
| | | | Cut Score | Level 3 | Prob. | | | Cut Score | Level 3 | Prob. |
| 4 | 5 | 181 | 208 | No | <0.01 | 5 | 189 | 216 | No | <0.01 |
| | 10 | 187 | 208 | No | <0.01 | 10 | 194 | 216 | No | <0.01 |
| | 15 | 190 | 208 | No | <0.01 | 15 | 198 | 216 | No | <0.01 |
| | 20 | 193 | 208 | No | <0.01 | 20 | 201 | 216 | No | <0.01 |
| | 25 | 196 | 208 | No | <0.01 | 25 | 203 | 216 | No | <0.01 |
| | 30 | 198 | 208 | No | <0.01 | 30 | 206 | 216 | No | <0.01 |
| | 35 | 200 | 208 | No | 0.01 | 35 | 208 | 216 | No | <0.01 |
| | 40 | 202 | 208 | No | 0.03 | 40 | 210 | 216 | No | 0.02 |
| | 45 | 204 | 208 | No | 0.11 | 45 | 212 | 216 | No | 0.08 |
| | 50 | 206 | 208 | No | 0.27 | 50 | 213 | 216 | No | 0.15 |
| | 55 | 208 | 208 | Yes | 0.50 | 55 | 215 | 216 | No | 0.37 |
| | 60 | 210 | 208 | Yes | 0.73 | 60 | 217 | 216 | Yes | 0.63 |
| | 65 | 212 | 208 | Yes | 0.89 | 65 | 219 | 216 | Yes | 0.85 |
| | 70 | 214 | 208 | Yes | 0.97 | 70 | 221 | 216 | Yes | 0.96 |
| | 75 | 216 | 208 | Yes | 0.99 | 75 | 224 | 216 | Yes | >0.99 |
| | 80 | 218 | 208 | Yes | >0.99 | 80 | 226 | 216 | Yes | >0.99 |
| | 85 | 221 | 208 | Yes | >0.99 | 85 | 229 | 216 | Yes | >0.99 |
| | 90 | 225 | 208 | Yes | >0.99 | 90 | 233 | 216 | Yes | >0.99 |
| | 95 | 230 | 208 | Yes | >0.99 | 95 | 238 | 216 | Yes | >0.99 |
| 5 | 5 | 188 | 214 | No | <0.01 | 5 | 195 | 224 | No | <0.01 |
| | 10 | 193 | 214 | No | <0.01 | 10 | 201 | 224 | No | <0.01 |
| | 15 | 197 | 214 | No | <0.01 | 15 | 205 | 224 | No | <0.01 |
| | 20 | 199 | 214 | No | <0.01 | 20 | 208 | 224 | No | <0.01 |
| | 25 | 202 | 214 | No | <0.01 | 25 | 210 | 224 | No | <0.01 |
| | 30 | 204 | 214 | No | <0.01 | 30 | 213 | 224 | No | <0.01 |
| | 35 | 206 | 214 | No | 0.01 | 35 | 215 | 224 | No | <0.01 |
| | 40 | 208 | 214 | No | 0.03 | 40 | 217 | 224 | No | 0.01 |
| | 45 | 210 | 214 | No | 0.11 | 45 | 219 | 224 | No | 0.04 |
| | 50 | 212 | 214 | No | 0.27 | 50 | 221 | 224 | No | 0.15 |
| | 55 | 214 | 214 | Yes | 0.50 | 55 | 223 | 224 | No | 0.37 |
| | 60 | 216 | 214 | Yes | 0.73 | 60 | 225 | 224 | Yes | 0.63 |
| | 65 | 217 | 214 | Yes | 0.83 | 65 | 228 | 224 | Yes | 0.92 |
| | 70 | 220 | 214 | Yes | 0.97 | 70 | 230 | 224 | Yes | 0.98 |
| | 75 | 222 | 214 | Yes | 0.99 | 75 | 232 | 224 | Yes | >0.99 |
| | 80 | 224 | 214 | Yes | >0.99 | 80 | 235 | 224 | Yes | >0.99 |
| | 85 | 227 | 214 | Yes | >0.99 | 85 | 238 | 224 | Yes | >0.99 |
| | 90 | 231 | 214 | Yes | >0.99 | 90 | 242 | 224 | Yes | >0.99 |
| | 95 | 236 | 214 | Yes | >0.99 | 95 | 248 | 224 | Yes | >0.99 |

TABLE 6. (CONTINUED)

| Grade | Reading | | | | | Math | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Start %ile | RIT Spring | Projected Proficiency | | | Start %ile | RIT Spring | Projected Proficiency | | |
| | | | Cut Score | Level 3 | Prob. | | | Cut Score | Level 3 | Prob. |
| 6 | 5 | 192 | 218 | No | <0.01 | 5 | 198 | 229 | No | <0.01 |
| | 10 | 197 | 218 | No | <0.01 | 10 | 204 | 229 | No | <0.01 |
| | 15 | 201 | 218 | No | <0.01 | 15 | 208 | 229 | No | <0.01 |
| | 20 | 203 | 218 | No | <0.01 | 20 | 211 | 229 | No | <0.01 |
| | 25 | 206 | 218 | No | <0.01 | 25 | 214 | 229 | No | <0.01 |
| | 30 | 208 | 218 | No | <0.01 | 30 | 217 | 229 | No | <0.01 |
| | 35 | 210 | 218 | No | 0.01 | 35 | 219 | 229 | No | <0.01 |
| | 40 | 212 | 218 | No | 0.03 | 40 | 221 | 229 | No | <0.01 |
| | 45 | 214 | 218 | No | 0.11 | 45 | 223 | 229 | No | 0.02 |
| | 50 | 216 | 218 | No | 0.27 | 50 | 225 | 229 | No | 0.08 |
| | 55 | 218 | 218 | Yes | 0.50 | 55 | 227 | 229 | No | 0.25 |
| | 60 | 219 | 218 | Yes | 0.62 | 60 | 230 | 229 | Yes | 0.63 |
| | 65 | 221 | 218 | Yes | 0.83 | 65 | 232 | 229 | Yes | 0.85 |
| | 70 | 223 | 218 | Yes | 0.94 | 70 | 234 | 229 | Yes | 0.96 |
| | 75 | 226 | 218 | Yes | 0.99 | 75 | 237 | 229 | Yes | >0.99 |
| | 80 | 228 | 218 | Yes | >0.99 | 80 | 239 | 229 | Yes | >0.99 |
| | 85 | 231 | 218 | Yes | >0.99 | 85 | 243 | 229 | Yes | >0.99 |
| | 90 | 235 | 218 | Yes | >0.99 | 90 | 247 | 229 | Yes | >0.99 |
| | 95 | 240 | 218 | Yes | >0.99 | 95 | 253 | 229 | Yes | >0.99 |
| 7 | 5 | 193 | 221 | No | <0.01 | 5 | 199 | 234 | No | <0.01 |
| | 10 | 199 | 221 | No | <0.01 | 10 | 206 | 234 | No | <0.01 |
| | 15 | 202 | 221 | No | <0.01 | 15 | 210 | 234 | No | <0.01 |
| | 20 | 205 | 221 | No | <0.01 | 20 | 214 | 234 | No | <0.01 |
| | 25 | 208 | 221 | No | <0.01 | 25 | 217 | 234 | No | <0.01 |
| | 30 | 210 | 221 | No | <0.01 | 30 | 219 | 234 | No | <0.01 |
| | 35 | 212 | 221 | No | <0.01 | 35 | 222 | 234 | No | <0.01 |
| | 40 | 214 | 221 | No | 0.01 | 40 | 224 | 234 | No | <0.01 |
| | 45 | 216 | 221 | No | 0.06 | 45 | 226 | 234 | No | <0.01 |
| | 50 | 218 | 221 | No | 0.17 | 50 | 229 | 234 | No | 0.04 |
| | 55 | 220 | 221 | No | 0.38 | 55 | 231 | 234 | No | 0.15 |
| | 60 | 222 | 221 | Yes | 0.62 | 60 | 233 | 234 | No | 0.37 |
| | 65 | 224 | 221 | Yes | 0.83 | 65 | 235 | 234 | Yes | 0.63 |
| | 70 | 226 | 221 | Yes | 0.94 | 70 | 238 | 234 | Yes | 0.92 |
| | 75 | 228 | 221 | Yes | 0.99 | 75 | 241 | 234 | Yes | 0.99 |
| | 80 | 231 | 221 | Yes | >0.99 | 80 | 244 | 234 | Yes | >0.99 |
| | 85 | 234 | 221 | Yes | >0.99 | 85 | 247 | 234 | Yes | >0.99 |
| | 90 | 238 | 221 | Yes | >0.99 | 90 | 251 | 234 | Yes | >0.99 |
| | 95 | 243 | 221 | Yes | >0.99 | 95 | 258 | 234 | Yes | >0.99 |

TABLE 6. (CONTINUED)

| Grade | Reading | | | | | Math | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Start %ile | RIT Spring | Projected Proficiency | | | Start %ile | RIT Spring | Projected Proficiency | | |
| | | | Cut Score | Level 3 | Prob. | | | Cut Score | Level 3 | Prob. |
| 8 | 5 | 194 | 227 | No | <0.01 | 5 | 199 | 238 | No | <0.01 |
| | 10 | 200 | 227 | No | <0.01 | 10 | 206 | 238 | No | <0.01 |
| | 15 | 204 | 227 | No | <0.01 | 15 | 211 | 238 | No | <0.01 |
| | 20 | 207 | 227 | No | <0.01 | 20 | 215 | 238 | No | <0.01 |
| | 25 | 209 | 227 | No | <0.01 | 25 | 218 | 238 | No | <0.01 |
| | 30 | 212 | 227 | No | <0.01 | 30 | 221 | 238 | No | <0.01 |
| | 35 | 214 | 227 | No | <0.01 | 35 | 224 | 238 | No | <0.01 |
| | 40 | 216 | 227 | No | <0.01 | 40 | 226 | 238 | No | <0.01 |
| | 45 | 218 | 227 | No | <0.01 | 45 | 229 | 238 | No | <0.01 |
| | 50 | 220 | 227 | No | 0.01 | 50 | 231 | 238 | No | 0.01 |
| | 55 | 222 | 227 | No | 0.06 | 55 | 233 | 238 | No | 0.04 |
| | 60 | 224 | 227 | No | 0.17 | 60 | 236 | 238 | No | 0.25 |
| | 65 | 226 | 227 | No | 0.38 | 65 | 238 | 238 | Yes | 0.50 |
| | 70 | 228 | 227 | Yes | 0.62 | 70 | 241 | 238 | Yes | 0.85 |
| | 75 | 231 | 227 | Yes | 0.89 | 75 | 244 | 238 | Yes | 0.98 |
| | 80 | 233 | 227 | Yes | 0.97 | 80 | 247 | 238 | Yes | >0.99 |
| | 85 | 236 | 227 | Yes | >0.99 | 85 | 251 | 238 | Yes | >0.99 |
| | 90 | 240 | 227 | Yes | >0.99 | 90 | 255 | 238 | Yes | >0.99 |
| | 95 | 246 | 227 | Yes | >0.99 | 95 | 262 | 238 | Yes | >0.99 |

*Note.* %ile=percentile

TABLE 7. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING PAWS READING LEVEL 3 (PROFICIENT) WHEN MAP IS TAKEN IN THE FALL OR WINTER PRIOR TO SPRING PAWS TESTS

| Grade | Start %ile | RIT Fall | Projected Proficiency | | | Start %ile | RIT Winter | Projected Proficiency | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cut Score | Level 3 | Prob. | | | Cut Score | Level 3 | Prob. |
| 2 | 5 | 149 | 192 | No | <0.01 | 5 | 160 | 192 | No | <0.01 |
| | 10 | 155 | 192 | No | 0.01 | 10 | 165 | 192 | No | <0.01 |
| | 15 | 159 | 192 | No | 0.01 | 15 | 169 | 192 | No | <0.01 |
| | 20 | 162 | 192 | No | 0.04 | 20 | 172 | 192 | No | <0.01 |
| | 25 | 164 | 192 | No | 0.06 | 25 | 174 | 192 | No | 0.01 |
| | 30 | 167 | 192 | No | 0.10 | 30 | 176 | 192 | No | 0.02 |
| | 35 | 169 | 192 | No | 0.15 | 35 | 178 | 192 | No | 0.05 |
| | 40 | 171 | 192 | No | 0.22 | 40 | 180 | 192 | No | 0.10 |
| | 45 | 173 | 192 | No | 0.26 | 45 | 182 | 192 | No | 0.18 |
| | 50 | 175 | 192 | No | 0.35 | 50 | 184 | 192 | No | 0.29 |
| | 55 | 177 | 192 | No | 0.45 | 55 | 186 | 192 | No | 0.36 |
| | 60 | 179 | 192 | Yes | 0.50 | 60 | 188 | 192 | Yes | 0.50 |
| | 65 | 181 | 192 | Yes | 0.60 | 65 | 190 | 192 | Yes | 0.64 |
| | 70 | 183 | 192 | Yes | 0.70 | 70 | 192 | 192 | Yes | 0.77 |
| | 75 | 185 | 192 | Yes | 0.74 | 75 | 194 | 192 | Yes | 0.86 |
| | 80 | 188 | 192 | Yes | 0.85 | 80 | 197 | 192 | Yes | 0.95 |
| | 85 | 191 | 192 | Yes | 0.90 | 85 | 200 | 192 | Yes | 0.99 |
| | 90 | 195 | 192 | Yes | 0.96 | 90 | 203 | 192 | Yes | >0.99 |
| | 95 | 200 | 192 | Yes | 0.99 | 95 | 209 | 192 | Yes | >0.99 |
| 3 | 5 | 162 | 202 | No | <0.01 | 5 | 171 | 202 | No | <0.01 |
| | 10 | 168 | 202 | No | <0.01 | 10 | 176 | 202 | No | <0.01 |
| | 15 | 172 | 202 | No | 0.01 | 15 | 180 | 202 | No | <0.01 |
| | 20 | 175 | 202 | No | 0.02 | 20 | 183 | 202 | No | <0.01 |
| | 25 | 178 | 202 | No | 0.05 | 25 | 185 | 202 | No | 0.01 |
| | 30 | 180 | 202 | No | 0.08 | 30 | 188 | 202 | No | 0.03 |
| | 35 | 182 | 202 | No | 0.10 | 35 | 190 | 202 | No | 0.04 |
| | 40 | 184 | 202 | No | 0.16 | 40 | 192 | 202 | No | 0.09 |
| | 45 | 186 | 202 | No | 0.24 | 45 | 194 | 202 | No | 0.17 |
| | 50 | 188 | 202 | No | 0.29 | 50 | 196 | 202 | No | 0.28 |
| | 55 | 190 | 202 | No | 0.39 | 55 | 198 | 202 | No | 0.42 |
| | 60 | 192 | 202 | Yes | 0.50 | 60 | 199 | 202 | Yes | 0.50 |
| | 65 | 194 | 202 | Yes | 0.56 | 65 | 201 | 202 | Yes | 0.65 |
| | 70 | 197 | 202 | Yes | 0.71 | 70 | 204 | 202 | Yes | 0.83 |
| | 75 | 199 | 202 | Yes | 0.80 | 75 | 206 | 202 | Yes | 0.87 |
| | 80 | 202 | 202 | Yes | 0.87 | 80 | 208 | 202 | Yes | 0.94 |
| | 85 | 205 | 202 | Yes | 0.94 | 85 | 211 | 202 | Yes | 0.98 |
| | 90 | 209 | 202 | Yes | 0.97 | 90 | 215 | 202 | Yes | >0.99 |
| | 95 | 214 | 202 | Yes | 0.99 | 95 | 221 | 202 | Yes | >0.99 |

TABLE 7. (CONTINUED)

| Grade | Start %ile | RIT Fall | Projected Proficiency | | | Start %ile | RIT Winter | Projected Proficiency | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cut-Score | Level 3 | Prob. | | | Cut-Score | Level 3 | Prob. |
| 4 | 5 | 173 | 208 | No | <0.01 | 5 | 179 | 208 | No | <0.01 |
| | 10 | 178 | 208 | No | <0.01 | 10 | 184 | 208 | No | <0.01 |
| | 15 | 182 | 208 | No | 0.01 | 15 | 188 | 208 | No | <0.01 |
| | 20 | 185 | 208 | No | 0.03 | 20 | 191 | 208 | No | <0.01 |
| | 25 | 188 | 208 | No | 0.05 | 25 | 194 | 208 | No | 0.02 |
| | 30 | 190 | 208 | No | 0.09 | 30 | 196 | 208 | No | 0.04 |
| | 35 | 192 | 208 | No | 0.15 | 35 | 198 | 208 | No | 0.08 |
| | 40 | 194 | 208 | No | 0.18 | 40 | 200 | 208 | No | 0.16 |
| | 45 | 196 | 208 | No | 0.27 | 45 | 202 | 208 | No | 0.22 |
| | 50 | 198 | 208 | No | 0.38 | 50 | 204 | 208 | No | 0.35 |
| | 55 | 200 | 208 | No | 0.44 | 55 | 205 | 208 | No | 0.42 |
| | 60 | 202 | 208 | Yes | 0.56 | 60 | 207 | 208 | Yes | 0.58 |
| | 65 | 204 | 208 | Yes | 0.67 | 65 | 209 | 208 | Yes | 0.72 |
| | 70 | 206 | 208 | Yes | 0.77 | 70 | 211 | 208 | Yes | 0.84 |
| | 75 | 209 | 208 | Yes | 0.85 | 75 | 214 | 208 | Yes | 0.94 |
| | 80 | 211 | 208 | Yes | 0.91 | 80 | 216 | 208 | Yes | 0.98 |
| | 85 | 214 | 208 | Yes | 0.95 | 85 | 219 | 208 | Yes | 0.99 |
| | 90 | 218 | 208 | Yes | 0.99 | 90 | 223 | 208 | Yes | >0.99 |
| | 95 | 224 | 208 | Yes | >0.99 | 95 | 228 | 208 | Yes | >0.99 |
| 5 | 5 | 181 | 214 | No | <0.01 | 5 | 186 | 214 | No | <0.01 |
| | 10 | 186 | 214 | No | <0.01 | 10 | 191 | 214 | No | <0.01 |
| | 15 | 190 | 214 | No | 0.01 | 15 | 195 | 214 | No | <0.01 |
| | 20 | 193 | 214 | No | 0.03 | 20 | 197 | 214 | No | <0.01 |
| | 25 | 195 | 214 | No | 0.05 | 25 | 200 | 214 | No | 0.02 |
| | 30 | 198 | 214 | No | 0.09 | 30 | 202 | 214 | No | 0.03 |
| | 35 | 200 | 214 | No | 0.15 | 35 | 204 | 214 | No | 0.06 |
| | 40 | 202 | 214 | No | 0.23 | 40 | 206 | 214 | No | 0.12 |
| | 45 | 204 | 214 | No | 0.28 | 45 | 208 | 214 | No | 0.22 |
| | 50 | 206 | 214 | No | 0.38 | 50 | 210 | 214 | No | 0.35 |
| | 55 | 208 | 214 | Yes | 0.50 | 55 | 212 | 214 | Yes | 0.50 |
| | 60 | 210 | 214 | Yes | 0.62 | 60 | 214 | 214 | Yes | 0.65 |
| | 65 | 212 | 214 | Yes | 0.67 | 65 | 215 | 214 | Yes | 0.72 |
| | 70 | 214 | 214 | Yes | 0.77 | 70 | 218 | 214 | Yes | 0.88 |
| | 75 | 216 | 214 | Yes | 0.85 | 75 | 220 | 214 | Yes | 0.91 |
| | 80 | 218 | 214 | Yes | 0.88 | 80 | 222 | 214 | Yes | 0.96 |
| | 85 | 221 | 214 | Yes | 0.95 | 85 | 225 | 214 | Yes | 0.99 |
| | 90 | 225 | 214 | Yes | 0.98 | 90 | 229 | 214 | Yes | >0.99 |
| | 95 | 231 | 214 | Yes | >0.99 | 95 | 234 | 214 | Yes | >0.99 |

TABLE 7. (CONTINUED)

| Grade | Start %ile | RIT Fall | Projected Proficiency | | | Start %ile | RIT Winter | Projected Proficiency | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cut-Score | Level 3 | Prob. | | | Cut-Score | Level 3 | Prob. |
| 6 | 5 | 186 | 218 | No | <0.01 | 5 | 190 | 218 | No | <0.01 |
| | 10 | 192 | 218 | No | <0.01 | 10 | 196 | 218 | No | <0.01 |
| | 15 | 196 | 218 | No | 0.01 | 15 | 199 | 218 | No | <0.01 |
| | 20 | 198 | 218 | No | 0.02 | 20 | 202 | 218 | No | <0.01 |
| | 25 | 201 | 218 | No | 0.06 | 25 | 204 | 218 | No | 0.01 |
| | 30 | 203 | 218 | No | 0.10 | 30 | 207 | 218 | No | 0.04 |
| | 35 | 205 | 218 | No | 0.16 | 35 | 209 | 218 | No | 0.09 |
| | 40 | 207 | 218 | No | 0.19 | 40 | 211 | 218 | No | 0.17 |
| | 45 | 209 | 218 | No | 0.28 | 45 | 212 | 218 | No | 0.22 |
| | 50 | 211 | 218 | No | 0.39 | 50 | 214 | 218 | No | 0.35 |
| | 55 | 213 | 218 | Yes | 0.50 | 55 | 216 | 218 | No | 0.42 |
| | 60 | 215 | 218 | Yes | 0.56 | 60 | 218 | 218 | Yes | 0.58 |
| | 65 | 217 | 218 | Yes | 0.67 | 65 | 220 | 218 | Yes | 0.72 |
| | 70 | 219 | 218 | Yes | 0.77 | 70 | 222 | 218 | Yes | 0.83 |
| | 75 | 221 | 218 | Yes | 0.81 | 75 | 224 | 218 | Yes | 0.91 |
| | 80 | 224 | 218 | Yes | 0.90 | 80 | 226 | 218 | Yes | 0.96 |
| | 85 | 226 | 218 | Yes | 0.94 | 85 | 229 | 218 | Yes | 0.99 |
| | 90 | 230 | 218 | Yes | 0.98 | 90 | 233 | 218 | Yes | >0.99 |
| | 95 | 236 | 218 | Yes | >0.99 | 95 | 238 | 218 | Yes | >0.99 |
| 7 | 5 | 189 | 221 | No | <0.01 | 5 | 192 | 221 | No | <0.01 |
| | 10 | 195 | 221 | No | <0.01 | 10 | 198 | 221 | No | <0.01 |
| | 15 | 199 | 221 | No | 0.01 | 15 | 201 | 221 | No | <0.01 |
| | 20 | 202 | 221 | No | 0.02 | 20 | 204 | 221 | No | <0.01 |
| | 25 | 204 | 221 | No | 0.04 | 25 | 207 | 221 | No | 0.01 |
| | 30 | 206 | 221 | No | 0.07 | 30 | 209 | 221 | No | 0.03 |
| | 35 | 209 | 221 | No | 0.12 | 35 | 211 | 221 | No | 0.06 |
| | 40 | 211 | 221 | No | 0.19 | 40 | 213 | 221 | No | 0.09 |
| | 45 | 213 | 221 | No | 0.28 | 45 | 215 | 221 | No | 0.17 |
| | 50 | 214 | 221 | No | 0.33 | 50 | 217 | 221 | No | 0.28 |
| | 55 | 216 | 221 | No | 0.39 | 55 | 219 | 221 | No | 0.42 |
| | 60 | 218 | 221 | Yes | 0.50 | 60 | 221 | 221 | Yes | 0.58 |
| | 65 | 220 | 221 | Yes | 0.61 | 65 | 223 | 221 | Yes | 0.72 |
| | 70 | 222 | 221 | Yes | 0.72 | 70 | 225 | 221 | Yes | 0.83 |
| | 75 | 225 | 221 | Yes | 0.81 | 75 | 227 | 221 | Yes | 0.91 |
| | 80 | 227 | 221 | Yes | 0.88 | 80 | 230 | 221 | Yes | 0.97 |
| | 85 | 230 | 221 | Yes | 0.95 | 85 | 232 | 221 | Yes | 0.98 |
| | 90 | 234 | 221 | Yes | 0.98 | 90 | 236 | 221 | Yes | >0.99 |
| | 95 | 240 | 221 | Yes | >0.99 | 95 | 242 | 221 | Yes | >0.99 |

TABLE 7. (CONTINUED)

| Grade | Start %ile | RIT Fall | Projected Proficiency | | | Start %ile | RIT Winter | Projected Proficiency | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cut-Score | Level 3 | Prob. | | | Cut-Score | Level 3 | Prob. |
| 8 | 5 | 191 | 227 | No | <0.01 | 5 | 194 | 227 | No | <0.01 |
| | 10 | 197 | 227 | No | <0.01 | 10 | 199 | 227 | No | <0.01 |
| | 15 | 201 | 227 | No | <0.01 | 15 | 203 | 227 | No | <0.01 |
| | 20 | 204 | 227 | No | 0.01 | 20 | 206 | 227 | No | <0.01 |
| | 25 | 207 | 227 | No | 0.02 | 25 | 209 | 227 | No | <0.01 |
| | 30 | 209 | 227 | No | 0.04 | 30 | 211 | 227 | No | <0.01 |
| | 35 | 211 | 227 | No | 0.06 | 35 | 213 | 227 | No | 0.01 |
| | 40 | 213 | 227 | No | 0.08 | 40 | 215 | 227 | No | 0.02 |
| | 45 | 215 | 227 | No | 0.13 | 45 | 217 | 227 | No | 0.05 |
| | 50 | 217 | 227 | No | 0.19 | 50 | 219 | 227 | No | 0.10 |
| | 55 | 219 | 227 | No | 0.26 | 55 | 221 | 227 | No | 0.18 |
| | 60 | 221 | 227 | No | 0.31 | 60 | 223 | 227 | No | 0.29 |
| | 65 | 223 | 227 | No | 0.40 | 65 | 225 | 227 | No | 0.43 |
| | 70 | 225 | 227 | Yes | 0.50 | 70 | 227 | 227 | Yes | 0.57 |
| | 75 | 228 | 227 | Yes | 0.60 | 75 | 229 | 227 | Yes | 0.71 |
| | 80 | 230 | 227 | Yes | 0.69 | 80 | 232 | 227 | Yes | 0.82 |
| | 85 | 234 | 227 | Yes | 0.84 | 85 | 235 | 227 | Yes | 0.93 |
| | 90 | 237 | 227 | Yes | 0.90 | 90 | 239 | 227 | Yes | 0.99 |
| | 95 | 243 | 227 | Yes | 0.98 | 95 | 244 | 227 | Yes | >0.99 |

*Note.* %ile=percentile

TABLE 8. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING PAWS MATH LEVEL 3 (PROFICIENT) WHEN MAP IS TAKEN IN THE FALL OR WINTER PRIOR TO SPRING PAWS TESTS

| Grade | Start %ile | RIT Fall | Projected Proficiency | | | Start %ile | RIT Winter | Projected Proficiency | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cut Score | Level 3 | Prob. | | | Cut Score | Level 3 | Prob. |
| 2 | 5 | 155 | 196 | No | <0.01 | 5 | 165 | 196 | No | <0.01 |
| | 10 | 160 | 196 | No | <0.01 | 10 | 170 | 196 | No | <0.01 |
| | 15 | 163 | 196 | No | 0.01 | 15 | 173 | 196 | No | <0.01 |
| | 20 | 166 | 196 | No | 0.03 | 20 | 175 | 196 | No | <0.01 |
| | 25 | 168 | 196 | No | 0.04 | 25 | 178 | 196 | No | 0.01 |
| | 30 | 170 | 196 | No | 0.07 | 30 | 180 | 196 | No | 0.02 |
| | 35 | 172 | 196 | No | 0.12 | 35 | 181 | 196 | No | 0.03 |
| | 40 | 174 | 196 | No | 0.19 | 40 | 183 | 196 | No | 0.08 |
| | 45 | 175 | 196 | No | 0.19 | 45 | 185 | 196 | No | 0.15 |
| | 50 | 177 | 196 | No | 0.28 | 50 | 186 | 196 | No | 0.21 |
| | 55 | 179 | 196 | No | 0.39 | 55 | 188 | 196 | No | 0.34 |
| | 60 | 180 | 196 | No | 0.44 | 60 | 190 | 196 | Yes | 0.50 |
| | 65 | 182 | 196 | Yes | 0.56 | 65 | 191 | 196 | Yes | 0.58 |
| | 70 | 184 | 196 | Yes | 0.61 | 70 | 193 | 196 | Yes | 0.66 |
| | 75 | 186 | 196 | Yes | 0.72 | 75 | 195 | 196 | Yes | 0.79 |
| | 80 | 188 | 196 | Yes | 0.81 | 80 | 197 | 196 | Yes | 0.89 |
| | 85 | 191 | 196 | Yes | 0.90 | 85 | 200 | 196 | Yes | 0.97 |
| | 90 | 194 | 196 | Yes | 0.94 | 90 | 203 | 196 | Yes | 0.99 |
| | 95 | 199 | 196 | Yes | 0.99 | 95 | 208 | 196 | Yes | >0.99 |
| 3 | 5 | 169 | 208 | No | <0.01 | 5 | 176 | 208 | No | <0.01 |
| | 10 | 174 | 208 | No | <0.01 | 10 | 181 | 208 | No | <0.01 |
| | 15 | 177 | 208 | No | <0.01 | 15 | 184 | 208 | No | <0.01 |
| | 20 | 179 | 208 | No | 0.01 | 20 | 187 | 208 | No | <0.01 |
| | 25 | 182 | 208 | No | 0.03 | 25 | 189 | 208 | No | <0.01 |
| | 30 | 184 | 208 | No | 0.04 | 30 | 191 | 208 | No | 0.01 |
| | 35 | 185 | 208 | No | 0.06 | 35 | 193 | 208 | No | 0.02 |
| | 40 | 187 | 208 | No | 0.11 | 40 | 195 | 208 | No | 0.05 |
| | 45 | 189 | 208 | No | 0.17 | 45 | 197 | 208 | No | 0.10 |
| | 50 | 190 | 208 | No | 0.22 | 50 | 198 | 208 | No | 0.14 |
| | 55 | 192 | 208 | No | 0.32 | 55 | 200 | 208 | No | 0.26 |
| | 60 | 194 | 208 | No | 0.44 | 60 | 202 | 208 | No | 0.42 |
| | 65 | 195 | 208 | Yes | 0.50 | 65 | 203 | 208 | Yes | 0.50 |
| | 70 | 197 | 208 | Yes | 0.62 | 70 | 205 | 208 | Yes | 0.66 |
| | 75 | 199 | 208 | Yes | 0.68 | 75 | 207 | 208 | Yes | 0.80 |
| | 80 | 201 | 208 | Yes | 0.78 | 80 | 209 | 208 | Yes | 0.90 |
| | 85 | 204 | 208 | Yes | 0.89 | 85 | 212 | 208 | Yes | 0.97 |
| | 90 | 207 | 208 | Yes | 0.96 | 90 | 215 | 208 | Yes | 0.99 |
| | 95 | 212 | 208 | Yes | 0.99 | 95 | 220 | 208 | Yes | >0.99 |

TABLE 8. (CONTINUED)

| Grade | Start %ile | RIT Fall | Projected Proficiency | | | Start %ile | RIT Winter | Projected Proficiency | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cut-Score | Level 3 | Prob. | | | Cut-Score | Level 3 | Prob. |
| 4 | 5 | 179 | 216 | No | <0.01 | 5 | 185 | 216 | No | <0.01 |
| | 10 | 184 | 216 | No | <0.01 | 10 | 190 | 216 | No | <0.01 |
| | 15 | 188 | 216 | No | 0.01 | 15 | 194 | 216 | No | <0.01 |
| | 20 | 190 | 216 | No | 0.01 | 20 | 197 | 216 | No | <0.01 |
| | 25 | 193 | 216 | No | 0.04 | 25 | 199 | 216 | No | 0.01 |
| | 30 | 195 | 216 | No | 0.08 | 30 | 201 | 216 | No | 0.02 |
| | 35 | 197 | 216 | No | 0.14 | 35 | 203 | 216 | No | 0.05 |
| | 40 | 198 | 216 | No | 0.17 | 40 | 205 | 216 | No | 0.10 |
| | 45 | 200 | 216 | No | 0.27 | 45 | 207 | 216 | No | 0.20 |
| | 50 | 202 | 216 | No | 0.38 | 50 | 209 | 216 | No | 0.34 |
| | 55 | 204 | 216 | Yes | 0.50 | 55 | 211 | 216 | Yes | 0.50 |
| | 60 | 205 | 216 | Yes | 0.50 | 60 | 212 | 216 | Yes | 0.58 |
| | 65 | 207 | 216 | Yes | 0.62 | 65 | 214 | 216 | Yes | 0.74 |
| | 70 | 209 | 216 | Yes | 0.73 | 70 | 216 | 216 | Yes | 0.86 |
| | 75 | 211 | 216 | Yes | 0.83 | 75 | 218 | 216 | Yes | 0.93 |
| | 80 | 214 | 216 | Yes | 0.92 | 80 | 221 | 216 | Yes | 0.98 |
| | 85 | 216 | 216 | Yes | 0.96 | 85 | 223 | 216 | Yes | 0.99 |
| | 90 | 220 | 216 | Yes | 0.99 | 90 | 227 | 216 | Yes | >0.99 |
| | 95 | 225 | 216 | Yes | >0.99 | 95 | 232 | 216 | Yes | >0.99 |
| 5 | 5 | 187 | 224 | No | <0.01 | 5 | 192 | 224 | No | <0.01 |
| | 10 | 193 | 224 | No | <0.01 | 10 | 198 | 224 | No | <0.01 |
| | 15 | 196 | 224 | No | <0.01 | 15 | 201 | 224 | No | <0.01 |
| | 20 | 199 | 224 | No | 0.01 | 20 | 204 | 224 | No | <0.01 |
| | 25 | 202 | 224 | No | 0.04 | 25 | 207 | 224 | No | <0.01 |
| | 30 | 204 | 224 | No | 0.07 | 30 | 209 | 224 | No | 0.01 |
| | 35 | 206 | 224 | No | 0.12 | 35 | 211 | 224 | No | 0.03 |
| | 40 | 208 | 224 | No | 0.19 | 40 | 213 | 224 | No | 0.07 |
| | 45 | 210 | 224 | No | 0.28 | 45 | 215 | 224 | No | 0.15 |
| | 50 | 211 | 224 | No | 0.33 | 50 | 217 | 224 | No | 0.27 |
| | 55 | 213 | 224 | No | 0.44 | 55 | 219 | 224 | No | 0.42 |
| | 60 | 215 | 224 | Yes | 0.56 | 60 | 221 | 224 | Yes | 0.58 |
| | 65 | 217 | 224 | Yes | 0.67 | 65 | 223 | 224 | Yes | 0.73 |
| | 70 | 219 | 224 | Yes | 0.77 | 70 | 225 | 224 | Yes | 0.85 |
| | 75 | 221 | 224 | Yes | 0.85 | 75 | 228 | 224 | Yes | 0.95 |
| | 80 | 224 | 224 | Yes | 0.93 | 80 | 230 | 224 | Yes | 0.98 |
| | 85 | 227 | 224 | Yes | 0.97 | 85 | 233 | 224 | Yes | >0.99 |
| | 90 | 230 | 224 | Yes | 0.99 | 90 | 237 | 224 | Yes | >0.99 |
| | 95 | 236 | 224 | Yes | >0.99 | 95 | 242 | 224 | Yes | >0.99 |

TABLE 8. (CONTINUED)

| Grade | Start %ile | RIT Fall | Projected Proficiency | | | Start %ile | RIT Winter | Projected Proficiency | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cut-Score | Level 3 | Prob. | | | Cut-Score | Level 3 | Prob. |
| 6 | 5 | 192 | 229 | No | <0.01 | 5 | 196 | 229 | No | <0.01 |
| | 10 | 198 | 229 | No | <0.01 | 10 | 202 | 229 | No | <0.01 |
| | 15 | 202 | 229 | No | <0.01 | 15 | 205 | 229 | No | <0.01 |
| | 20 | 205 | 229 | No | 0.01 | 20 | 209 | 229 | No | <0.01 |
| | 25 | 207 | 229 | No | 0.02 | 25 | 211 | 229 | No | <0.01 |
| | 30 | 209 | 229 | No | 0.04 | 30 | 214 | 229 | No | 0.01 |
| | 35 | 212 | 229 | No | 0.09 | 35 | 216 | 229 | No | 0.02 |
| | 40 | 214 | 229 | No | 0.15 | 40 | 218 | 229 | No | 0.05 |
| | 45 | 216 | 229 | No | 0.23 | 45 | 220 | 229 | No | 0.11 |
| | 50 | 218 | 229 | No | 0.33 | 50 | 222 | 229 | No | 0.20 |
| | 55 | 220 | 229 | No | 0.44 | 55 | 224 | 229 | No | 0.34 |
| | 60 | 222 | 229 | Yes | 0.56 | 60 | 226 | 229 | Yes | 0.50 |
| | 65 | 224 | 229 | Yes | 0.67 | 65 | 228 | 229 | Yes | 0.66 |
| | 70 | 226 | 229 | Yes | 0.77 | 70 | 230 | 229 | Yes | 0.80 |
| | 75 | 228 | 229 | Yes | 0.85 | 75 | 233 | 229 | Yes | 0.93 |
| | 80 | 231 | 229 | Yes | 0.93 | 80 | 236 | 229 | Yes | 0.98 |
| | 85 | 234 | 229 | Yes | 0.96 | 85 | 239 | 229 | Yes | >0.99 |
| | 90 | 238 | 229 | Yes | 0.99 | 90 | 243 | 229 | Yes | >0.99 |
| | 95 | 243 | 229 | Yes | >0.99 | 95 | 248 | 229 | Yes | >0.99 |
| 7 | 5 | 195 | 234 | No | <0.01 | 5 | 198 | 234 | No | <0.01 |
| | 10 | 201 | 234 | No | <0.01 | 10 | 204 | 234 | No | <0.01 |
| | 15 | 205 | 234 | No | <0.01 | 15 | 208 | 234 | No | <0.01 |
| | 20 | 209 | 234 | No | <0.01 | 20 | 212 | 234 | No | <0.01 |
| | 25 | 211 | 234 | No | <0.01 | 25 | 215 | 234 | No | <0.01 |
| | 30 | 214 | 234 | No | 0.02 | 30 | 217 | 234 | No | <0.01 |
| | 35 | 216 | 234 | No | 0.03 | 35 | 220 | 234 | No | 0.01 |
| | 40 | 218 | 234 | No | 0.06 | 40 | 222 | 234 | No | 0.02 |
| | 45 | 221 | 234 | No | 0.14 | 45 | 224 | 234 | No | 0.05 |
| | 50 | 223 | 234 | No | 0.22 | 50 | 226 | 234 | No | 0.10 |
| | 55 | 225 | 234 | No | 0.32 | 55 | 228 | 234 | No | 0.20 |
| | 60 | 227 | 234 | No | 0.44 | 60 | 230 | 234 | No | 0.34 |
| | 65 | 229 | 234 | Yes | 0.56 | 65 | 233 | 234 | Yes | 0.58 |
| | 70 | 231 | 234 | Yes | 0.68 | 70 | 235 | 234 | Yes | 0.74 |
| | 75 | 234 | 234 | Yes | 0.82 | 75 | 238 | 234 | Yes | 0.90 |
| | 80 | 237 | 234 | Yes | 0.92 | 80 | 240 | 234 | Yes | 0.95 |
| | 85 | 240 | 234 | Yes | 0.97 | 85 | 244 | 234 | Yes | 0.99 |
| | 90 | 244 | 234 | Yes | 0.99 | 90 | 248 | 234 | Yes | >0.99 |
| | 95 | 250 | 234 | Yes | >0.99 | 95 | 254 | 234 | Yes | >0.99 |

TABLE 8. (CONTINUED)

| Grade | Start %ile | RIT Fall | Projected Proficiency | | | Start %ile | RIT Winter | Projected Proficiency | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cut-Score | Level 3 | Prob. | | | Cut-Score | Level 3 | Prob. |
| 8 | 5 | 197 | 238 | No | <0.01 | 5 | 199 | 238 | No | <0.01 |
| | 10 | 203 | 238 | No | <0.01 | 10 | 206 | 238 | No | <0.01 |
| | 15 | 208 | 238 | No | <0.01 | 15 | 210 | 238 | No | <0.01 |
| | 20 | 211 | 238 | No | <0.01 | 20 | 214 | 238 | No | <0.01 |
| | 25 | 214 | 238 | No | 0.01 | 25 | 217 | 238 | No | <0.01 |
| | 30 | 217 | 238 | No | 0.02 | 30 | 220 | 238 | No | <0.01 |
| | 35 | 219 | 238 | No | 0.03 | 35 | 222 | 238 | No | <0.01 |
| | 40 | 222 | 238 | No | 0.08 | 40 | 225 | 238 | No | 0.01 |
| | 45 | 224 | 238 | No | 0.12 | 45 | 227 | 238 | No | 0.04 |
| | 50 | 226 | 238 | No | 0.18 | 50 | 229 | 238 | No | 0.08 |
| | 55 | 229 | 238 | No | 0.30 | 55 | 231 | 238 | No | 0.16 |
| | 60 | 231 | 238 | No | 0.40 | 60 | 234 | 238 | No | 0.35 |
| | 65 | 233 | 238 | Yes | 0.50 | 65 | 236 | 238 | Yes | 0.50 |
| | 70 | 236 | 238 | Yes | 0.60 | 70 | 239 | 238 | Yes | 0.72 |
| | 75 | 238 | 238 | Yes | 0.70 | 75 | 241 | 238 | Yes | 0.84 |
| | 80 | 241 | 238 | Yes | 0.82 | 80 | 245 | 238 | Yes | 0.96 |
| | 85 | 245 | 238 | Yes | 0.92 | 85 | 248 | 238 | Yes | 0.99 |
| | 90 | 249 | 238 | Yes | 0.98 | 90 | 253 | 238 | Yes | >0.99 |
| | 95 | 256 | 238 | Yes | >0.99 | 95 | 259 | 238 | Yes | >0.99 |

*Note.* %ile=percentile

## Summary and Discussion

This study produced a set of cut scores on MAP reading and math tests for Grades 2 to 8 that correspond to each PAWS performance level. By using matched score data from a sample of students from Wyoming, the study demonstrates that MAP scores can accurately predict whether a student could be proficient or above on the basis of his/her MAP scores. This study also used the 2015 NWEA norming study results to project a student's probability to meet proficiency based on that student's prior MAP scores in fall and winter. These results will help educators predict student performance in PAWS tests as early as possible and identify those students who are at risk of failing to meet required standards so that they can receive necessary resources and assistance to meet their goals.

While concordance tables can be helpful and informative, they have general limitations. First, the concordance tables provide information about score comparability on different tests, but the scores cannot be assumed to be interchangeable. In the case for PAWS and MAP tests, as they are not parallel in content, scores from these two tests should not be directly compared. Second, the sample data used in this study were collected from 84 schools in Wyoming, which may limit the generalizability of the results to test takers who differ significantly from this sample. Finally, caution should be exercised if the concorded scores are used for a subpopulation. NWEA will continue to gather information about PAWS performance from other schools in Wyoming to enhance the quality and generalizability of the study.

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# Appendix

## Data and Analysis

### Data

Data used in this study were collected from 84 schools in Wyoming. The sample contained matched PAWS and MAP reading scores from 15,144 students in Grades 3 to 8 and matched PAWS and MAP math scores from 15,155 students in Grades 3 to 8 who completed both PAWS and MAP in the spring of 2016.

To understand the statistical characteristics of the test scores, descriptive statistics are provided in Table A1 below. As Table A1 indicates, the correlation coefficients between MAP and PAWS reading scores range from 0.80 to 0.83, and the correlation coefficients between MAP and PAWS math scores range from 0.83 to 0.86. In general, all these correlations indicate a strong relationship between MAP and PAWS test scores.

TABLE A1. DESCRIPTIVE STATISTICS OF THE SAMPLE DATA

| | | | | PAWS | | | | MAP | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subject** | **Grade** | **N** | ***r*** | **Mean** | **SD** | **Min** | **Max** | **Mean** | **SD** | **Min** | **Max** |
| **Reading** | 3 | 2740 | 0.81 | 598.92 | 45.84 | 451 | 769 | 203.21 | 13.40 | 146 | 238 |
| | 4 | 2542 | 0.81 | 620.34 | 47.08 | 472 | 793 | 210.75 | 13.08 | 145 | 248 |
| | 5 | 2597 | 0.82 | 630.88 | 50.22 | 478 | 787 | 215.63 | 13.37 | 152 | 249 |
| | 6 | 2406 | 0.83 | 635.07 | 50.71 | 488 | 807 | 218.30 | 13.53 | 154 | 256 |
| | 7 | 2497 | 0.81 | 649.67 | 47.08 | 525 | 831 | 222.37 | 13.10 | 162 | 263 |
| | 8 | 2362 | 0.80 | 653.33 | 44.52 | 524 | 796 | 225.40 | 13.26 | 152 | 263 |
| **Math** | 3 | 2744 | 0.83 | 605.38 | 53.82 | 435 | 780 | 207.90 | 11.27 | 141 | 246 |
| | 4 | 2544 | 0.85 | 649.94 | 52.04 | 538 | 827 | 217.46 | 11.88 | 151 | 260 |
| | 5 | 2602 | 0.86 | 667.07 | 55.44 | 542 | 857 | 225.59 | 14.45 | 166 | 275 |
| | 6 | 2402 | 0.84 | 676.35 | 44.64 | 562 | 876 | 226.85 | 13.73 | 170 | 266 |
| | 7 | 2496 | 0.85 | 699.16 | 45.07 | 568 | 905 | 232.41 | 14.38 | 146 | 274 |
| | 8 | 2367 | 0.84 | 709.62 | 43.08 | 584 | 918 | 236.26 | 15.98 | 172 | 285 |

## Equipercentile Linking Procedure

The equipercentile procedure (e.g., Kolen & Brennan, 2004) was used to establish the concordance relationship between PAWS and MAP scores for grades 3 to 8 in reading and math. This procedure matches scores on the two scales that have the same percentile rank (i.e., the proportion of scores at or below each score).

Suppose we need to establish the concorded scores between two tests. $x$ is a score on Test $X$ (e.g., PAWS). Its equipercentile equivalent score on Test $Y$ (e.g., MAP), $e_y(x)$, can be obtained through a cumulative-distribution-based linking function defined in Equation (A1):

$$e_y(x) = G^{-1}[P(x)] \quad \text{(A1)}$$

where $e_y(x)$ is the equipercentile equivalent of scores on PAWS on the scale of MAP, $P(x)$ is the percentile rank of a given score on Test $X$. $G^{-1}$ is the inverse of the percentile rank function for scores on Test $Y$ which indicates the scores on Test $Y$ corresponding to a given percentile. Polynomial loglinear pre-smoothing was applied to reduce irregularities of the frequency distributions as well as equipercentile linking curve.

## Consistency Rate of Classification

Consistency rate of classification accuracy, expressed in the form of a rate between 0 and 1, measures the extent to which MAP scores (and the estimated MAP cut scores) accurately predicted whether students in the sample would be proficient (i.e., Level 3 or higher) on PAWS tests.

To calculate consistency rate of classification, sample students were designated “Below PAWS cut” or “At or above PAWS cut” based on their actual PAWS scores. Similarly, they were also designated as “Below MAP cut” or “At or above MAP cut” based on their actual MAP scores. A 2-way contingency table was then tabulated (see Table A2), classifying students as “Proficient” on the basis of PAWS cut score and concordant MAP cut score. Students classified in the *true positive* (TP) category were those predicted to be proficient based on the MAP cut scores and were also classified as proficient based on the PAWS cut scores. Students classified in the *true negative* (TN) category were those predicted to be Below Basic Expectations based on the MAP cut scores and were also classified as Below Basic Expectations based on the PAWS cut scores. Students classified in the *false positive* (FP) category were those predicted to be Proficient Expectations based on the MAP cut scores but were classified as Below Basic Expectations based on the PAWS cut scores. Students classified in the *false negative* (FN) category were those predicated to be Below Basic Expectations based on the MAP cut scores but were classified as Proficient Expectations based on the PAWS cut scores. The overall consistency rate of classification was computed as the proportion of correct classifications among the entire sample by (TP+TN) / (TP+TN+FP+FN).

TABLE A2. DEFINITION OF CONSISTENCY RATE FOR PAWS TO MAP CONCORDANCE

| | | PAWS Score | |
|---|---|---|---|
| | | Below PAWS cut | At or Above PAWS cut |
| **MAP Score** | Below MAP cut | True Negative | False Negative |
| | At or Above MAP cut | False Positive | True Positive |

*Note.* Shaded cells are summed to compute the consistency rate.

## Proficiency Projection

MAP conditional growth norms provide student's expected gain scores across testing seasons (Thum & Hauser, 2015). This information is utilized to predict a student's performance on the PAWS based on that student's MAP scores in prior seasons (e.g. fall and winter). The probability of a student achieving Level 3 (Proficient) on PAWS, based on his/her fall or winter MAP score is given in Equation (A2):

$$Pr(Achieveing\ Level\ 3\ in\ spring|a\ RIT\ score\ of\ x) = \Phi\left(\frac{x+g-c}{SD}\right) \qquad (A2)$$

where, $\Phi$ is a standardized normal cumulative distribution, $x$ is the student's RIT score in fall or winter, $g$ is the expected growth from fall or winter to spring corresponding to $x$, $c$ is the MAP cut-score for spring, and $SD$ is the conditional standard deviation of growth from fall or winter to spring.

For the probability of a student achieving Level 3 on the PAWS tests, based on his/her spring score $s$, it can be calculated by Equation (A3):

$$Pr(Achieveing\ Level\ 3\ in\ spring|a\ RIT\ score\ of\ s\ in\ spring) = \Phi\left(\frac{s-c}{SE}\right) \qquad (A3)$$

where *SE* is the standard error of measurement for MAP reading or math test.