Linking the PARCC Assessments to NWEA MAP Tests for New Mexico

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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 Partnership for Assessment of Readiness for College and Careers (PARCC) English language arts (ELA) and math with those of the MAP Reading and MAP for Mathematics assessments for New Mexico (NM). In this report, we present the 3rd through 8th grade cut scores on MAP reading and mathematics scales that correspond to the benchmarks that New Mexico adopted for its PARCC ELA 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 4 (i.e., "Proficient") or higher performance designation on the PARCC 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

PARCC assessments include a series of computer-based achievement tests aligned to the Common Core State Standards (CCSS) in ELA and math for grades 3-8 and high school. For New Mexico, each grade and subject has four cut scores that distinguish between performance levels: Level 1: *Did not yet meet expectations*, Level 2: *Partially met expectations*, Level 3: *Approached expectations*, Level 4: *Met expectations*, and Level 5: *Exceeded expectations*. The Level 4 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 a 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. Unlike PARCC tests, 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 PARCC Readiness Levels

Tables 1 to 4 report the PARCC scaled scores associated with each of the five performance levels adopted by New Mexico, as well as the estimated cut scores on the MAP tests associated with those performance levels. 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 New Mexico students' most probable PARCC performance level, based on their observed MAP scores. For example, a 3rd grade student who obtained a MAP math score of 220 in the spring testing season is likely to be at the very high end of Level 4 (Proficient) on the PARCC test taken during that same testing season (see Table 2). Similarly, a 6th grade student who obtained a MAP reading score of 240 in the fall testing season is likely to be at Level 5 on the PARCC test taken in the spring of 6th grade (see Table 3).

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

Grade	PARCC				
	Level 1	Level 2	Level 3	Level 4	Level 5
	Did not Meet	*Partially Met*	*Approached*	*Met*	*Exceeded*
3	650-699	700-724	725-749	**750**-809	810-850
4	650-699	700-724	725-749	**750**-789	790-850
5	650-699	700-724	725-749	**750**-798	799-850
6	650-699	700-724	725-749	**750**-789	790-850
7	650-699	700-724	725-749	**750**-784	785-850
8	650-699	700-724	725-749	**750**-793	794-850

Grade	MAP									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	Did not Meet		*Partially Met*		*Approached*		*Met*		*Exceeded*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-183	1-15	184-193	16-36	194-202	37-60	**203**-222	61-94	223-350	95-99
4	100-186	1-9	187-197	10-28	198-208	29-56	**209**-224	57-89	225-350	90-99
5	100-196	1-14	197-207	15-38	208-217	39-65	**218**-236	66-95*	237-350	95*-99
6	100-201	1-16	202-212	17-41	213-222	42-67	**223**-236	68-92	237-350	93-99
7	100-207	1-24	208-216	25-45	217-224	46-66	**225**-237	67-89	238-350	90-99
8	100-210	1-27	211-218	28-46	219-226	47-65	**227**-241	66-91	242-350	92-99

Notes. 1. %ile=percentile.
2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.
3. * 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 2. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN NM PARCC AND MAP MATH (WHEN MAP IS TAKEN IN SPRING)

Grade	PARCC				
	Level 1	Level 2	Level 3	Level 4	Level 5
	Did not Meet	*Partially Met*	*Approached*	*Met*	*Exceeded*
3	650-699	700-724	725-749	**750**-789	790-850
4	650-699	700-724	725-749	**750**-795	796-850
5	650-699	700-724	725-749	**750**-789	790-850
6	650-699	700-724	725-749	**750**-787	788-850
7	650-699	700-724	725-749	**750**-785	786-850
8	650-699	700-724	725-749	**750**-800	801-850

Grade	MAP									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	Did not Meet		*Partially Met*		*Approached*		*Met*		*Exceeded*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-187	1-12	188-197	13-33	198-206	34-58	**207**-219	59-87	220-350	88-99
4	100-200	1-19	201-212	20-47	213-223	48-74	**224**-241	75-96	242-350	97-99
5	100-208	1-21	209-220	22-47	221-232	48-75	**233**-256	76-98*	257-350	98*-99
6	100-213	1-23	214-224	24-48	225-237	49-76	**238**-257	77-97*	258-350	97*-99
7	100-214	1-21	215-226	22-45	227-240	46-74	**241**-264	75-97	265-350	98-99
8	100-228	1-44	229-237	45-63	238-245	64-77	**246**-264	78-96*	265-350	96*-99

Notes. 1. %ile=percentile.
2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.
3. * 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 NM PARCC ELA AND MAP READING (WHEN MAP IS TAKEN IN FALL OR WINTER PRIOR TO SPRING PARCC TESTS)

Grade	PARCC				
	Level 1	Level 2	Level 3	Level 4	Level 5
	Did not Meet	*Partially Met*	*Approached*	*Met*	*Exceeded*
3	650-699	700-724	725-749	**750**-809	810-850
4	650-699	700-724	725-749	**750**-789	790-850
5	650-699	700-724	725-749	**750**-798	799-850
6	650-699	700-724	725-749	**750**-789	790-850
7	650-699	700-724	725-749	**750**-784	785-850
8	650-699	700-724	725-749	**750**-793	794-850

Grade	MAP FALL									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	Did not Meet		*Partially Met*		*Approached*		*Met*		*Exceeded*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-170	1-13	171-182	14-35	183-192	36-60	**193**-216	61-96*	217-350	96*-99
4	100-175	1-7	176-188	8-26	189-201	27-58	**202**-219	59-91	220-350	92-99
5	100-187	1-11	188-200	12-36	201-212	37-67	**213**-234	68-97*	235-350	97*-99
6	100-194	1-13	195-207	14-40	208-218	41-69	**219**-234	70-94*	235-350	94*-99
7	100-202	1-21	203-212	22-44	213-221	45-67	**222**-235	68-91	236-350	92-99
8	100-206	1-24	207-215	25-45	216-224	46-67	**225**-239	68-92	240-350	93-99

Grade	MAP WINTER									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	Did not Meet		*Partially Met*		*Approached*		*Met*		*Exceeded*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-179	1-14	180-190	15-36	191-199	37-60	**200**-221	61-95	222-350	96-99
4	100-182	1-7	183-194	8-27	195-206	28-57	**207**-223	58-90	224-350	91-99
5	100-193	1-13	194-205	14-38	206-215	39-65	**216**-235	66-96*	236-350	96*-99
6	100-199	1-15	200-210	16-39	211-221	40-69	**222**-235	70-92	236-350	93-99
7	100-205	1-22	206-215	23-46	216-223	47-66	**224**-236	67-90	237-350	91-99
8	100-209	1-26	210-217	27-45	218-225	46-66	**226**-240	67-91	241-350	92-99

Notes. 1. %ile=percentile.
2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.
3. * 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 4. CONCORDANCE OF PERFORMANCE LEVEL SCORE RANGES BETWEEN NM PARCC AND MAP MATH (WHEN MAP IS TAKEN IN FALL OR WINTER PRIOR TO SPRING PARCC TESTS)

Grade	PARCC				
	Level 1	Level 2	Level 3	Level 4	Level 5
	Did not Meet	*Partially Met*	*Approached*	*Met*	*Exceeded*
3	650-699	700-724	725-749	**750**-789	790-850
4	650-699	700-724	725-749	**750**-795	796-850
5	650-699	700-724	725-749	**750**-789	790-850
6	650-699	700-724	725-749	**750**-787	788-850
7	650-699	700-724	725-749	**750**-785	786-850
8	650-699	700-724	725-749	**750**-800	801-850

Grade	MAP FALL									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	Did not Meet		*Partially Met*		*Approached*		*Met*		*Exceeded*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-173	1-9	174-184	10-32	185-193	33-59	**194**-207	60-90	208-350	91-99
4	100-188	1-16	189-200	17-45	201-212	46-77	**213**-230	78-98*	231-350	98*-99
5	100-198	1-18	199-210	19-47	211-222	48-77	**223**-245	78-98	246-350	99
6	100-205	1-21	206-216	22-47	217-229	48-77	**230**-250	78-98*	251-350	98*-99
7	100-208	1-19	209-220	20-44	221-234	45-76	**235**-258	77-98*	259-350	98*-99
8	100-223	1-43	224-233	44-65	234-241	66-80	**242**-260	81-97*	261-350	97*-99

Grade	MAP WINTER									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	Did not Meet		*Partially Met*		*Approached*		*Met*		*Exceeded*	
	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile	RIT	%ile
3	100-181	1-10	182-192	11-33	193-201	34-59	**202**-214	60-88	215-350	89-99
4	100-195	1-17	196-207	18-46	208-218	47-75	**219**-236	76-97*	237-350	97*-99
5	100-204	1-20	205-216	21-48	217-228	49-76	**229**-252	77-98	253-350	99
6	100-210	1-23	211-221	24-48	222-234	49-78	**235**-254	79-97	255-350	98-99
7	100-212	1-21	213-224	22-46	225-238	47-76	**239**-262	77-98*	263-350	98*-99
8	100-226	1-44	227-235	45-63	236-243	64-78	**244**-262	79-96*	263-350	96*-99

Notes. 1. %ile=percentile.
2. Bolded numbers indicate the cut scores considered to be at least "proficient" for accountability purposes.
3. * 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 in the PARCC 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 PARCC and MAP scores. The results in Table 5 demonstrate that on average, MAP reading scores can consistently classify students' proficiency (Level 4 or higher) status on PARCC ELA test approximately 83% of the time and MAP math scores can consistently classify students on PARCC math test approximately 88% of the time. Those numbers are high suggesting that both MAP reading and math tests are great predictors of the students' proficiency status on the PARCC tests.

TABLE 5. CONSISTENCY RATE OF CLASSIFICATION FOR MAP AND PARCC LEVEL 4 EQUIPERCENTILE CONCORDANCES

Grade	ELA/Reading			Math		
	Consistency Rate	False Positives	False Negatives	Consistency Rate	False Positives	False Negatives
3	0.82	0.11	0.07	0.86	0.07	0.07
4	0.82	0.09	0.09	0.87	0.07	0.06
5	0.84	0.08	0.08	0.91	0.06	0.03
6	0.84	0.09	0.07	0.90	0.04	0.06
7	0.83	0.10	0.07	0.88	0.06	0.06
8	0.85	0.08	0.07	0.87	0.08	0.05

Proficiency Projection

Proficiency projection tells how likely a student is classified as "proficient" on PARCC 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 PARCC tests are presented in Tables 6 to 8. These tables estimate the probability of scoring at Level 4 or above on PARCC in the spring and the prior fall or winter testing season. For example, if a 3rd grade student obtained a MAP math score of 199 in the fall, the probability of obtaining a Level 4 or higher PARCC score in the spring of 3rd grade is 73%. Table 6 presents the estimated probability of meeting Level 4 benchmark when MAP is taken in the spring, whereas Tables 7 and 8 present the estimated probability of meeting Level 4 benchmark when MAP is taken in the fall or winter prior to taking the PARCC tests.

TABLE 6. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING PARCC LEVEL 4 (PROFICIENT) WHEN MAP IS TAKEN IN THE SPRING

Grade	ELA/Reading					Math				
	Start %ile	RIT Spring	Projected Proficiency			Start %ile	RIT Spring	Projected Proficiency		
			Cut Score	Level 4	Prob.			Cut Score	Level 4	Prob.
3	5	174	203	No	<0.01	5	181	207	No	<0.01
	10	179	203	No	<0.01	10	186	207	No	<0.01
	15	183	203	No	<0.01	15	189	207	No	<0.01
	20	186	203	No	<0.01	20	192	207	No	<0.01
	25	188	203	No	<0.01	25	194	207	No	<0.01
	30	191	203	No	<0.01	30	196	207	No	<0.01
	35	193	203	No	<0.01	35	198	207	No	<0.01
	40	195	203	No	0.01	40	200	207	No	0.01
	45	197	203	No	0.03	45	202	207	No	0.04
	50	199	203	No	0.11	50	203	207	No	0.08
	55	201	203	No	0.27	55	205	207	No	0.25
	60	202	203	No	0.38	60	207	207	Yes	0.50
	65	204	203	Yes	0.62	65	209	207	Yes	0.75
	70	207	203	Yes	0.89	70	211	207	Yes	0.92
	75	209	203	Yes	0.97	75	213	207	Yes	0.98
	80	211	203	Yes	0.99	80	215	207	Yes	>0.99
	85	214	203	Yes	>0.99	85	218	207	Yes	>0.99
	90	218	203	Yes	>0.99	90	221	207	Yes	>0.99
	95	223	203	Yes	>0.99	95	226	207	Yes	>0.99
4	5	181	209	No	<0.01	5	189	224	No	<0.01
	10	187	209	No	<0.01	10	194	224	No	<0.01
	15	190	209	No	<0.01	15	198	224	No	<0.01
	20	193	209	No	<0.01	20	201	224	No	<0.01
	25	196	209	No	<0.01	25	203	224	No	<0.01
	30	198	209	No	<0.01	30	206	224	No	<0.01
	35	200	209	No	<0.01	35	208	224	No	<0.01
	40	202	209	No	0.01	40	210	224	No	<0.01
	45	204	209	No	0.06	45	212	224	No	<0.01
	50	206	209	No	0.17	50	213	224	No	<0.01
	55	208	209	No	0.38	55	215	224	No	<0.01
	60	210	209	Yes	0.62	60	217	224	No	0.01
	65	212	209	Yes	0.83	65	219	224	No	0.04
	70	214	209	Yes	0.94	70	221	224	No	0.15
	75	216	209	Yes	0.99	75	224	224	Yes	0.50
	80	218	209	Yes	>0.99	80	226	224	Yes	0.75
	85	221	209	Yes	>0.99	85	229	224	Yes	0.96
	90	225	209	Yes	>0.99	90	233	224	Yes	>0.99
	95	230	209	Yes	>0.99	95	238	224	Yes	>0.99

TABLE 6. (CONTINUED)

Grade	ELA/Reading					Math				
	Start %ile	RIT Spring	Projected Proficiency			Start %ile	RIT Spring	Projected Proficiency		
			Cut Score	Level 4	Prob.			Cut Score	Level 4	Prob.
5	5	188	218	No	<0.01	5	195	233	No	<0.01
	10	193	218	No	<0.01	10	201	233	No	<0.01
	15	197	218	No	<0.01	15	205	233	No	<0.01
	20	199	218	No	<0.01	20	208	233	No	<0.01
	25	202	218	No	<0.01	25	210	233	No	<0.01
	30	204	218	No	<0.01	30	213	233	No	<0.01
	35	206	218	No	<0.01	35	215	233	No	<0.01
	40	208	218	No	<0.01	40	217	233	No	<0.01
	45	210	218	No	0.01	45	219	233	No	<0.01
	50	212	218	No	0.03	50	221	233	No	<0.01
	55	214	218	No	0.11	55	223	233	No	<0.01
	60	216	218	No	0.27	60	225	233	No	<0.01
	65	217	218	No	0.38	65	228	233	No	0.04
	70	220	218	Yes	0.73	70	230	233	No	0.15
	75	222	218	Yes	0.89	75	232	233	No	0.37
	80	224	218	Yes	0.97	80	235	233	Yes	0.75
	85	227	218	Yes	>0.99	85	238	233	Yes	0.96
	90	231	218	Yes	>0.99	90	242	233	Yes	>0.99
	95	236	218	Yes	>0.99	95	248	233	Yes	>0.99
6	5	192	223	No	<0.01	5	198	238	No	<0.01
	10	197	223	No	<0.01	10	204	238	No	<0.01
	15	201	223	No	<0.01	15	208	238	No	<0.01
	20	203	223	No	<0.01	20	211	238	No	<0.01
	25	206	223	No	<0.01	25	214	238	No	<0.01
	30	208	223	No	<0.01	30	217	238	No	<0.01
	35	210	223	No	<0.01	35	219	238	No	<0.01
	40	212	223	No	<0.01	40	221	238	No	<0.01
	45	214	223	No	<0.01	45	223	238	No	<0.01
	50	216	223	No	0.01	50	225	238	No	<0.01
	55	218	223	No	0.06	55	227	238	No	<0.01
	60	219	223	No	0.11	60	230	238	No	<0.01
	65	221	223	No	0.27	65	232	238	No	0.02
	70	223	223	Yes	0.50	70	234	238	No	0.08
	75	226	223	Yes	0.83	75	237	238	No	0.37
	80	228	223	Yes	0.94	80	239	238	Yes	0.63
	85	231	223	Yes	0.99	85	243	238	Yes	0.96
	90	235	223	Yes	>0.99	90	247	238	Yes	>0.99
	95	240	223	Yes	>0.99	95	253	238	Yes	>0.99

TABLE 6. (CONTINUED)

Grade	ELA/Reading					Math				
	Start %ile	RIT Spring	Projected Proficiency			Start %ile	RIT Spring	Projected Proficiency		
			Cut Score	Level 4	Prob.			Cut Score	Level 4	Prob.
7	5	193	225	No	<0.01	5	199	241	No	<0.01
	10	199	225	No	<0.01	10	206	241	No	<0.01
	15	202	225	No	<0.01	15	210	241	No	<0.01
	20	205	225	No	<0.01	20	214	241	No	<0.01
	25	208	225	No	<0.01	25	217	241	No	<0.01
	30	210	225	No	<0.01	30	219	241	No	<0.01
	35	212	225	No	<0.01	35	222	241	No	<0.01
	40	214	225	No	<0.01	40	224	241	No	<0.01
	45	216	225	No	<0.01	45	226	241	No	<0.01
	50	218	225	No	0.01	50	229	241	No	<0.01
	55	220	225	No	0.06	55	231	241	No	<0.01
	60	222	225	No	0.17	60	233	241	No	<0.01
	65	224	225	No	0.38	65	235	241	No	0.02
	70	226	225	Yes	0.62	70	238	241	No	0.15
	75	228	225	Yes	0.83	75	241	241	Yes	0.50
	80	231	225	Yes	0.97	80	244	241	Yes	0.85
	85	234	225	Yes	>0.99	85	247	241	Yes	0.98
	90	238	225	Yes	>0.99	90	251	241	Yes	>0.99
	95	243	225	Yes	>0.99	95	258	241	Yes	>0.99
8	5	194	227	No	<0.01	5	199	246	No	<0.01
	10	200	227	No	<0.01	10	206	246	No	<0.01
	15	204	227	No	<0.01	15	211	246	No	<0.01
	20	207	227	No	<0.01	20	215	246	No	<0.01
	25	209	227	No	<0.01	25	218	246	No	<0.01
	30	212	227	No	<0.01	30	221	246	No	<0.01
	35	214	227	No	<0.01	35	224	246	No	<0.01
	40	216	227	No	<0.01	40	226	246	No	<0.01
	45	218	227	No	<0.01	45	229	246	No	<0.01
	50	220	227	No	0.01	50	231	246	No	<0.01
	55	222	227	No	0.06	55	233	246	No	<0.01
	60	224	227	No	0.17	60	236	246	No	<0.01
	65	226	227	No	0.38	65	238	246	No	<0.01
	70	228	227	Yes	0.62	70	241	246	No	0.04
	75	231	227	Yes	0.89	75	244	246	No	0.25
	80	233	227	Yes	0.97	80	247	246	Yes	0.63
	85	236	227	Yes	>0.99	85	251	246	Yes	0.96
	90	240	227	Yes	>0.99	90	255	246	Yes	>0.99
	95	246	227	Yes	>0.99	95	262	246	Yes	>0.99

Note. %ile=percentile

TABLE 7. PROFICIENCY PROJECTION AND PROBABILITY FOR PASSING PARCC ELA LEVEL 4 (PROFICIENT) WHEN MAP IS TAKEN IN THE FALL OR WINTER PRIOR TO SPRING PARCC TESTS

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut Score	Level 4	Prob.			Cut Score	Level 4	Prob.
3	5	162	203	No	<0.01	5	171	203	No	<0.01
	10	168	203	No	<0.01	10	176	203	No	<0.01
	15	172	203	No	0.01	15	180	203	No	<0.01
	20	175	203	No	0.01	20	183	203	No	<0.01
	25	178	203	No	0.03	25	185	203	No	<0.01
	30	180	203	No	0.06	30	188	203	No	0.02
	35	182	203	No	0.08	35	190	203	No	0.03
	40	184	203	No	0.13	40	192	203	No	0.06
	45	186	203	No	0.20	45	194	203	No	0.13
	50	188	203	No	0.24	50	196	203	No	0.22
	55	190	203	No	0.34	55	198	203	No	0.35
	60	192	203	No	0.44	60	199	203	No	0.42
	65	194	203	Yes	0.50	65	201	203	Yes	0.58
	70	197	203	Yes	0.66	70	204	203	Yes	0.78
	75	199	203	Yes	0.76	75	206	203	Yes	0.83
	80	202	203	Yes	0.84	80	208	203	Yes	0.91
	85	205	203	Yes	0.92	85	211	203	Yes	0.97
	90	209	203	Yes	0.97	90	215	203	Yes	>0.99
	95	214	203	Yes	0.99	95	221	203	Yes	>0.99
4	5	173	209	No	<0.01	5	179	209	No	<0.01
	10	178	209	No	<0.01	10	184	209	No	<0.01
	15	182	209	No	0.01	15	188	209	No	<0.01
	20	185	209	No	0.02	20	191	209	No	<0.01
	25	188	209	No	0.04	25	194	209	No	0.01
	30	190	209	No	0.07	30	196	209	No	0.02
	35	192	209	No	0.12	35	198	209	No	0.06
	40	194	209	No	0.15	40	200	209	No	0.12
	45	196	209	No	0.23	45	202	209	No	0.16
	50	198	209	No	0.33	50	204	209	No	0.28
	55	200	209	No	0.38	55	205	209	No	0.35
	60	202	209	Yes	0.50	60	207	209	Yes	0.50
	65	204	209	Yes	0.62	65	209	209	Yes	0.65
	70	206	209	Yes	0.73	70	211	209	Yes	0.78
	75	209	209	Yes	0.82	75	214	209	Yes	0.92
	80	211	209	Yes	0.88	80	216	209	Yes	0.96
	85	214	209	Yes	0.93	85	219	209	Yes	0.98
	90	218	209	Yes	0.98	90	223	209	Yes	>0.99
	95	224	209	Yes	>0.99	95	228	209	Yes	>0.99

TABLE 7. (CONTINUED)

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut-Score	Level 4	Prob.			Cut-Score	Level 4	Prob.
5	5	181	218	No	<0.01	5	186	218	No	<0.01
	10	186	218	No	<0.01	10	191	218	No	<0.01
	15	190	218	No	<0.01	15	195	218	No	<0.01
	20	193	218	No	0.01	20	197	218	No	<0.01
	25	195	218	No	0.01	25	200	218	No	<0.01
	30	198	218	No	0.03	30	202	218	No	<0.01
	35	200	218	No	0.05	35	204	218	No	0.01
	40	202	218	No	0.09	40	206	218	No	0.03
	45	204	218	No	0.12	45	208	218	No	0.06
	50	206	218	No	0.19	50	210	218	No	0.12
	55	208	218	No	0.28	55	212	218	No	0.22
	60	210	218	No	0.38	60	214	218	No	0.35
	65	212	218	No	0.44	65	215	218	No	0.42
	70	214	218	Yes	0.56	70	218	218	Yes	0.65
	75	216	218	Yes	0.67	75	220	218	Yes	0.72
	80	218	218	Yes	0.72	80	222	218	Yes	0.83
	85	221	218	Yes	0.85	85	225	218	Yes	0.94
	90	225	218	Yes	0.93	90	229	218	Yes	0.99
	95	231	218	Yes	0.99	95	234	218	Yes	>0.99
6	5	186	223	No	<0.01	5	190	223	No	<0.01
	10	192	223	No	<0.01	10	196	223	No	<0.01
	15	196	223	No	<0.01	15	199	223	No	<0.01
	20	198	223	No	<0.01	20	202	223	No	<0.01
	25	201	223	No	0.01	25	204	223	No	<0.01
	30	203	223	No	0.02	30	207	223	No	<0.01
	35	205	223	No	0.04	35	209	223	No	0.01
	40	207	223	No	0.06	40	211	223	No	0.03
	45	209	223	No	0.10	45	212	223	No	0.04
	50	211	223	No	0.16	50	214	223	No	0.09
	55	213	223	No	0.23	55	216	223	No	0.12
	60	215	223	No	0.28	60	218	223	No	0.22
	65	217	223	No	0.39	65	220	223	No	0.35
	70	219	223	Yes	0.50	70	222	223	Yes	0.50
	75	221	223	Yes	0.56	75	224	223	Yes	0.65
	80	224	223	Yes	0.72	80	226	223	Yes	0.78
	85	226	223	Yes	0.81	85	229	223	Yes	0.91
	90	230	223	Yes	0.90	90	233	223	Yes	0.98
	95	236	223	Yes	0.99	95	238	223	Yes	>0.99

TABLE 7. (CONTINUED)

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut-Score	Level 4	Prob.			Cut-Score	Level 4	Prob.
7	5	189	225	No	<0.01	5	192	225	No	<0.01
	10	195	225	No	<0.01	10	198	225	No	<0.01
	15	199	225	No	<0.01	15	201	225	No	<0.01
	20	202	225	No	<0.01	20	204	225	No	<0.01
	25	204	225	No	0.01	25	207	225	No	<0.01
	30	206	225	No	0.02	30	209	225	No	<0.01
	35	209	225	No	0.04	35	211	225	No	0.01
	40	211	225	No	0.07	40	213	225	No	0.02
	45	213	225	No	0.12	45	215	225	No	0.04
	50	214	225	No	0.15	50	217	225	No	0.09
	55	216	225	No	0.19	55	219	225	No	0.17
	60	218	225	No	0.28	60	221	225	No	0.28
	65	220	225	No	0.39	65	223	225	No	0.42
	70	222	225	Yes	0.50	70	225	225	Yes	0.58
	75	225	225	Yes	0.61	75	227	225	Yes	0.72
	80	227	225	Yes	0.72	80	230	225	Yes	0.88
	85	230	225	Yes	0.85	85	232	225	Yes	0.91
	90	234	225	Yes	0.93	90	236	225	Yes	0.98
	95	240	225	Yes	0.99	95	242	225	Yes	>0.99
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 PARCC MATH LEVEL 4 (PROFICIENT) WHEN MAP IS TAKEN IN THE FALL OR WINTER PRIOR TO SPRING PARCC TESTS

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut Score	Level 4	Prob.			Cut Score	Level 4	Prob.
3	5	169	207	No	<0.01	5	176	207	No	<0.01
	10	174	207	No	<0.01	10	181	207	No	<0.01
	15	177	207	No	0.01	15	184	207	No	<0.01
	20	179	207	No	0.01	20	187	207	No	<0.01
	25	182	207	No	0.04	25	189	207	No	<0.01
	30	184	207	No	0.06	30	191	207	No	0.01
	35	185	207	No	0.08	35	193	207	No	0.03
	40	187	207	No	0.14	40	195	207	No	0.07
	45	189	207	No	0.22	45	197	207	No	0.14
	50	190	207	No	0.27	50	198	207	No	0.20
	55	192	207	No	0.38	55	200	207	No	0.34
	60	194	207	Yes	0.50	60	202	207	Yes	0.50
	65	195	207	Yes	0.56	65	203	207	Yes	0.58
	70	197	207	Yes	0.68	70	205	207	Yes	0.74
	75	199	207	Yes	0.73	75	207	207	Yes	0.86
	80	201	207	Yes	0.83	80	209	207	Yes	0.93
	85	204	207	Yes	0.92	85	212	207	Yes	0.98
	90	207	207	Yes	0.97	90	215	207	Yes	>0.99
	95	212	207	Yes	>0.99	95	220	207	Yes	>0.99
4	5	179	224	No	<0.01	5	185	224	No	<0.01
	10	184	224	No	<0.01	10	190	224	No	<0.01
	15	188	224	No	<0.01	15	194	224	No	<0.01
	20	190	224	No	<0.01	20	197	224	No	<0.01
	25	193	224	No	<0.01	25	199	224	No	<0.01
	30	195	224	No	<0.01	30	201	224	No	<0.01
	35	197	224	No	0.01	35	203	224	No	<0.01
	40	198	224	No	0.01	40	205	224	No	<0.01
	45	200	224	No	0.03	45	207	224	No	0.01
	50	202	224	No	0.06	50	209	224	No	0.02
	55	204	224	No	0.11	55	211	224	No	0.05
	60	205	224	No	0.11	60	212	224	No	0.07
	65	207	224	No	0.17	65	214	224	No	0.14
	70	209	224	No	0.27	70	216	224	No	0.26
	75	211	224	No	0.38	75	218	224	No	0.42
	80	214	224	Yes	0.56	80	221	224	Yes	0.66
	85	216	224	Yes	0.68	85	223	224	Yes	0.80
	90	220	224	Yes	0.86	90	227	224	Yes	0.95
	95	225	224	Yes	0.97	95	232	224	Yes	>0.99

TABLE 8. (CONTINUED)

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut-Score	Level 4	Prob.			Cut-Score	Level 4	Prob.
5	5	187	233	No	<0.01	5	192	233	No	<0.01
	10	193	233	No	<0.01	10	198	233	No	<0.01
	15	196	233	No	<0.01	15	201	233	No	<0.01
	20	199	233	No	<0.01	20	204	233	No	<0.01
	25	202	233	No	<0.01	25	207	233	No	<0.01
	30	204	233	No	<0.01	30	209	233	No	<0.01
	35	206	233	No	0.01	35	211	233	No	<0.01
	40	208	233	No	0.01	40	213	233	No	<0.01
	45	210	233	No	0.03	45	215	233	No	<0.01
	50	211	233	No	0.04	50	217	233	No	0.01
	55	213	233	No	0.07	55	219	233	No	0.02
	60	215	233	No	0.12	60	221	233	No	0.05
	65	217	233	No	0.19	65	223	233	No	0.11
	70	219	233	No	0.28	70	225	233	No	0.20
	75	221	233	No	0.38	75	228	233	No	0.42
	80	224	233	Yes	0.56	80	230	233	Yes	0.58
	85	227	233	Yes	0.72	85	233	233	Yes	0.80
	90	230	233	Yes	0.85	90	237	233	Yes	0.95
	95	236	233	Yes	0.97	95	242	233	Yes	>0.99
6	5	192	238	No	<0.01	5	196	238	No	<0.01
	10	198	238	No	<0.01	10	202	238	No	<0.01
	15	202	238	No	<0.01	15	205	238	No	<0.01
	20	205	238	No	<0.01	20	209	238	No	<0.01
	25	207	238	No	<0.01	25	211	238	No	<0.01
	30	209	238	No	<0.01	30	214	238	No	<0.01
	35	212	238	No	<0.01	35	216	238	No	<0.01
	40	214	238	No	0.01	40	218	238	No	<0.01
	45	216	238	No	0.02	45	220	238	No	<0.01
	50	218	238	No	0.04	50	222	238	No	<0.01
	55	220	238	No	0.07	55	224	238	No	0.01
	60	222	238	No	0.12	60	226	238	No	0.03
	65	224	238	No	0.19	65	228	238	No	0.07
	70	226	238	No	0.28	70	230	238	No	0.15
	75	228	238	No	0.38	75	233	238	No	0.34
	80	231	238	Yes	0.56	80	236	238	Yes	0.58
	85	234	238	Yes	0.67	85	239	238	Yes	0.80
	90	238	238	Yes	0.85	90	243	238	Yes	0.95
	95	243	238	Yes	0.96	95	248	238	Yes	>0.99

TABLE 8. (CONTINUED)

Grade	Start %ile	RIT Fall	Projected Proficiency			Start %ile	RIT Winter	Projected Proficiency		
			Cut-Score	Level 4	Prob.			Cut-Score	Level 4	Prob.
7	5	195	241	No	<0.01	5	198	241	No	<0.01
	10	201	241	No	<0.01	10	204	241	No	<0.01
	15	205	241	No	<0.01	15	208	241	No	<0.01
	20	209	241	No	<0.01	20	212	241	No	<0.01
	25	211	241	No	<0.01	25	215	241	No	<0.01
	30	214	241	No	<0.01	30	217	241	No	<0.01
	35	216	241	No	<0.01	35	220	241	No	<0.01
	40	218	241	No	<0.01	40	222	241	No	<0.01
	45	221	241	No	0.02	45	224	241	No	<0.01
	50	223	241	No	0.03	50	226	241	No	<0.01
	55	225	241	No	0.06	55	228	241	No	0.01
	60	227	241	No	0.11	60	230	241	No	0.03
	65	229	241	No	0.18	65	233	241	No	0.10
	70	231	241	No	0.27	70	235	241	No	0.20
	75	234	241	No	0.44	75	238	241	No	0.42
	80	237	241	Yes	0.62	80	240	241	Yes	0.58
	85	240	241	Yes	0.78	85	244	241	Yes	0.85
	90	244	241	Yes	0.92	90	248	241	Yes	0.97
	95	250	241	Yes	0.99	95	254	241	Yes	>0.99
8	5	197	246	No	<0.01	5	199	246	No	<0.01
	10	203	246	No	<0.01	10	206	246	No	<0.01
	15	208	246	No	<0.01	15	210	246	No	<0.01
	20	211	246	No	<0.01	20	214	246	No	<0.01
	25	214	246	No	<0.01	25	217	246	No	<0.01
	30	217	246	No	<0.01	30	220	246	No	<0.01
	35	219	246	No	<0.01	35	222	246	No	<0.01
	40	222	246	No	0.01	40	225	246	No	<0.01
	45	224	246	No	0.01	45	227	246	No	<0.01
	50	226	246	No	0.02	50	229	246	No	<0.01
	55	229	246	No	0.06	55	231	246	No	<0.01
	60	231	246	No	0.10	60	234	246	No	0.02
	65	233	246	No	0.15	65	236	246	No	0.06
	70	236	246	No	0.22	70	239	246	No	0.16
	75	238	246	No	0.30	75	241	246	No	0.28
	80	241	246	No	0.45	80	245	246	Yes	0.58
	85	245	246	Yes	0.65	85	248	246	Yes	0.79
	90	249	246	Yes	0.82	90	253	246	Yes	0.96
	95	256	246	Yes	0.97	95	259	246	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 3 to 8 that correspond to each New Mexico PARCC performance level. By using matched score data from a sample of students from New Mexico, 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 NWEA 2015 RIT Scale 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 PARCC 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 PARCC 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 20 schools, which may limit the generalizability of the results to test takers who differ significantly from this sample. Finally, cautions should also be exercised if the concorded scores are used for a subpopulation. NWEA will continue to gather information about PARCC performance from other schools in New Mexico to enhance the quality and generalizability of the study.

References

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Appendix

Data and Analysis

Data

Data used in this study were collected from 20 schools in New Mexico. The sample contained matched PARCC ELA and MAP reading scores from 8,165 students in Grades 3 to 8 and matched PARCC and MAP math scores from 7,938 students in Grades 3 to 8 who completed both PARCC and MAP in the spring of 2015.

To understand the statistical characteristics of the test scores, descriptive statistics are provided in Table A1. As Table A1 indicates, the correlation coefficients between MAP reading and PARCC ELA scores range from 0.74 to 0.85, and the correlation coefficients between MAP and PARCC math scores range from 0.77 to 0.90. All these correlations indicate a strong relationship between MAP and PARCC test scores.

TABLE A1. DESCRIPTIVE STATISTICS OF THE SAMPLE DATA

				PARCC				MAP			
Subject	**Grade**	**N**	***r***	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**
ELA/ Reading	3	1,435	0.82	741	39.85	650	850	199	16.07	141	234
	4	1,397	0.83	746	31.00	650	836	207	13.04	165	243
	5	1,490	0.85	738	30.46	650	818	213	12.67	159	246
	6	1,404	0.81	738	29.57	650	850	218	11.84	173	251
	7	1,383	0.84	736	35.32	650	828	220	12.94	174	253
	8	1,056	0.74	729	30.39	650	812	221	10.02	180	250
Math	3	1,378	0.85	738	32.08	650	832	202	12.14	151	245
	4	1,358	0.89	734	28.41	650	823	217	12.62	159	250
	5	1,478	0.90	736	29.69	650	846	227	15.01	182	272
	6	1,391	0.89	734	27.93	650	822	230	13.33	194	269
	7	1,340	0.87	733	25.58	650	799	232	14.15	189	281
	8	993	0.77	721	28.27	650	824	236	10.00	203	271

Equipercentile Linking Procedure

The equipercentile procedure (e.g., Kolen & Brennan, 2004) was used to establish the concordance relationship between PARCC and MAP scores for grades 3 to 8 in ELA/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., PARCC). 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 PARCC 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 4 or higher) on PARCC tests.

To calculate consistency rate of classification, sample students were designated "Below PARCC cut" or "At or above PARCC cut" based on their actual PARCC 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 PARCC 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 PARCC cut scores. Students classified in the *true negative* (TN) category were those predicted to be Not Proficient based on the MAP cut scores and were also classified as Not Proficient based on the PARCC cut scores. Students classified in the *false positive* (FP) category were those predicted to be Proficient based on the MAP cut scores but were classified as Not Proficient based on the PARCC cut scores. Students classified in the *false negative* (FN) category were those predicated to be Not Proficient based on the MAP cut scores but were classified as Proficient based on the PARCC 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 PARCC TO MAP CONCORDANCE

		PARCC Score	
		Below PARCC cut	At or Above PARCC cut
MAP Score	Below MAP cut	True Negative	False Positive
	At or Above MAP cut	False Negative	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 PARCC based on that student's MAP scores in prior seasons (e.g. fall and winter). The probability of a student achieving Level 4 (Proficient) on PARCC, based on his/her fall or winter MAP score is given in Equation (A2):

$$Pr(Achieveing\ Level\ 4\ in\ spring | a\ RIT\ score\ of\ x) = 1 - \Phi\left(\frac{x + g - c}{SD}\right) \qquad (A2)$$

where, Φ 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 4 on the PARCC tests, based on his/her spring score s, it can be calculated by Equation (A3):

$$Pr(Achieveing\ Level\ 4\ in\ spring | a\ RIT\ score\ of\ s\ in\ spring) = 1 - \Phi\left(\frac{s - c}{SE}\right) \qquad (A3)$$

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