

Investigating the Concordance Relationship between the HSA Cut Scores and the PARCC Cut Scores

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By

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Executive Summary

The purpose of this study is to obtain the PARCC equivalent of the HSA cut score and the HSA equivalent of the PARCC cut score that divides performance level 2 from 3. More specifically, the HSA Algebra cut score needs to be mapped onto the PARCC Algebra I scale and the HSA English cut score to the PARCC ELA10 scale and vice versa. The cut scores for passing HSA English and Algebra are currently 396 and 412 respectively. The cut scores for being in performance level 3 are 725 for both PARCC ELA10 and Algebra I. Based on the discussions at the recent Technical Advisory Committee (TAC) meeting, the MARC team explored the following two options to create the concordance tables:

1. Option I: Using PSAT as an external common test to link HSA and PARCC tests via two-step linking. As item level response data are not available, the equipercentile linking method is used to set up the linkage using a single group design. The exploration was conducted using the first-time test takers' scores.
2. Option II: Using the propensity score matching method to come up with matched equivalent groups so that the equivalent group linking method can be used to map the HSA cut scores onto the PARCC scales directly, and vice versa. The equipercentile linking method is used to set up the linkage using the first-time test takers' scores.

Major Findings

The detailed data cleaning, preparation, and analyses are documented in this report. The following summarizes the major findings based on this current exploration.

1. Using PSAT as an external common test to link HSA and PARCC tests via two-step linking produced PARCC equivalent cut scores of 707 and 720 for PARCC ELA10 and Algebra I respectively. Overall, the PARCC equivalent cut score for ELA10 yields a passing rate falling within the ranges of the HSA historical passing rates for both the May test-takers who resembled the 2015 PARCC test-takers and the yearly passing rates. On the other hand, the PARCC equivalent cut score for Algebra I yields a passing rate slightly lower than the lowest HSA yearly

passing rate and falls outside the range of the historical passing rates of the May test administration.

2. Using the propensity score matching method under different matching conditions produced PARCC equivalent cut scores of 704, 705, and 706 for PARCC ELA10 depending on the matching conditions and 721 and 725 for Algebra I depending on the use of different matching samples. Further when combining Design II and III matched samples, the cut scores were 722, 724, and 727 depending on the matching conditions. The PARCC ELA10 equivalent scores for the HSA English test yield higher passing rates compared with the PSAT linking method. These passing rates fall within the ranges of both the May and the yearly passing rates except for the cut score of 704 leading to a much higher passing rate. Based on this method, the PARCC Algebra I equivalent scores for the HSA Algebra test produced much lower passing rates that fall outside the ranges of the passing rates for both the May tests and the yearly passing rates.
3. 95% confidence intervals and one standard deviation above and below the PARCC equivalents of the HSA cut scores were constructed. For ELA10, the 95% confidence interval around the mapped PARCC equivalent score of the HSA cut score using the mean and the maximum conditional standard error of measurement (CSEM) contained the PARCC cut score of 725 which divides performance level 2 from 3 while the interval one standard deviation above and below the CSEM did not capture the mapped PARCC cut score. Neither does the 95% confidence interval using the minimum CSEM. For Algebra I, all intervals contained the PARCC cut score of 725. The patterns were consistent across linking methods.
4. The HSA equivalents of the PARCC cut score of 725 that divides performance level 2 from 3 are summarized. In general, the HSA equivalents of the PARCC cut score, 725 for both ELA10 and Algebra were higher than the original HSA cut scores.
5. This study provides empirical evidence about the PARCC equivalents of the HSA cut scores and the HSA equivalents of the PARCC cut score of 725 that divides performance level 2 from 3 for ELA10 and Algebra I. The final adoption of cut scores obtained in this study depends on considerations from psychometric, policy, and practical perspectives.

Option I

Using PSAT as External Linking Tests

Data Cleaning and Preparation

The three datasets used in this exploration are from the PARCC, PSAT, and HSA tests. Data cleaning was conducted prior to data analysis for English and Algebra tests respectively. In the HSA layout table, 05 stands for Algebra test. The team used Test Format by Content information in the dataset as supplemental information to find the code for English test (Code 06 for HSA English). For each HSA dataset, the first timer test scores were selected and used in the analyses when multiple attempts were found. Further, only the regular students were selected for the linking study.

For the PARCC test and PSAT tests, the dataset was separated into English and Math test and the first time test scores for each unique student ID were extracted using testing year information. For duplicated cases (the same test year and administration but with different scores), first entry record was used.

The contents areas of the PARCC, PSAT, and HSA tests are summarized in Table 1.1. The subjects used in this study are the PARCC Algebra I, PARCC ELA10, PSAT Math, PSAT Verbal, HSA English, and HSA Algebra. The PARCC test data are from the 2015 administrations. The HSA test data and the PSAT test data are from the administrations during 2008 to 2015. The HSA test was administrated five times a year, and the PSAT test was administrated once a year. The name of subjects such as Algebra and Math, English and Verbal, are used interchangeably in this report.

Table 1.1
Subjects in Each Test

Test	Subjects
PARCC	Algebra I, Algebra II, ELA10
PSAT	Math, Verbal, Writing
HSA	English, Biology, Government, Algebra/Data Analysis

Table 1.2 provides the summary statistics for the HSA Algebra and English tests after data cleaning. For both the HSA Algebra and English tests, the minimum score is 240 and the maximum score is 650. The average Algebra test score is 424.96. The standard deviation of Algebra test scores is also higher than that of English test scores.

Table 1.2
Summary Statistics for the HSA Test

Test	N	Mean	SD	Min	Max
English	441,957	409.49	33.68	240	650
Algebra	485,673	424.96	41.43	240	650

Table 1.3 provides the summary results for the PARCC Algebra I and ELA10 tests using the first-time test takers' scores. The total number of PARCC Algebra I test takers is 61,760 while that for the PARCC ELA10 test is 55,629. The standard deviation of the PARCC Algebra I test scores is lower than that of the PARCC ELA10 test scores.

Table 1.3

Summary Statistics for the PARCC Test

Test	N	Mean	SD	Min	Max
ELA10	55,629	737.8	44.95	650	850
ALG I	61,760	734.3	32.81	650	850

Table 1.4 provides the summary results for the PSAT test scores. All students are required to take both the PSAT Verbal and Math tests at the same time; therefore, the sample size for the Math and Verbal test is the same. The standard deviations of both tests are similar.

Table 1.4

Summary Statistics for the PSAT Test

	N	Mean	SD	Min	Max
Verbal	515,109	40.37	10.90	20	80
Math	515,109	41.47	11.09	20	80

In order to use the PSAT test as an external linking test, the HSA test was merged with the PSAT test and the PSAT test was merged with the PARCC test using the state issued student ID. Specifically, the PSAT Verbal test was merged with the HSA English test, the PSAT Verbal test was merged with the PARCC ELA10 test using the student ID. The PSAT Math test was merged with the HSA Algebra test, the PSAT Math test was merged with the PARCC Algebra I test. In total, there are four merged datasets and the descriptive statistics for the PSAT test in each merged dataset are summarized in Table 1.5. Descriptive statistics for the HSA test and the PARCC test in the merged datasets are summarized in Table 1.6.

Table 1.5

Summary Statistics for the PSAT Scores after Merging with the HSA and PARCC Tests

Subject	Test	N	Mean	SD	Min	Max	Correlation
English	PSAT Verbal & HSA English	381,599	40.28	10.69	20	80	0.711
	PSAT Verbal & PARCC ELA10	46,680	40.80	10.49	20	80	0.712
Math	PSAT Math & HSA Algebra	366,632	40.10	10.43	20	80	0.711
	PSAT Math & PARCC ALG I	11,018	33.09	7.36	20	69	0.581

Table 1.6

Summary Statistics for the HSA and PARCC Test Scores after Merging with the PSAT

Subject	Test	N	Mean	SD	Min	Max
English	HSA	381,599	413.27	31.42	240	650
	PARCC	46,680	742.11	44.34	650	850
Math	HSA	366,632	428.71	37.67	240	650
	PARCC	11,018	718.87	26.16	650	850

Using the PSAT Tests to Link the HSA and PARCC Tests

After data cleaning and matching samples, the equipercentile linking method was conducted based on the matched samples of HSA and PSAT first and then those of PSAT and PARCC for both Algebra and English tests. The Linking with Equivalent Group or the Single Group Design (LEGS) program developed by Kolen and Brennan was used to link the two matched samples. After specifying the input data format which is the scores and frequencies, subgroup information (no subgroup in this study), smoothing parameters and score truncation in the original scale scores, the LEGS program reported the results for the equipercentile linking based on the single group design for mapping HSA to PSAT, then PSAT to PARCC based on a two-step linking approach. In Appendix A, a screenshot capturing the input window for linking HSA and PSAT English using the first-time test-takers' scores was shown. Two smoothing values were compared in post-linking: 0.3 and 1. The choice of using smoothing parameters is supported by simulation studies that show the smoothed results outperforming the non-smoothed results in reducing linking errors (Cui & Kolen, 2009; Hanson et al., 1994). The results using smoothing value of 1 were reported due to the fact that after rounding there was little difference between the results based on the two smoothing parameters.

The concordance tables were generated using LEGS. Single group design was used in this part. The passing score or proficiency score for the HSA English is 396 and for the HSA Algebra is 412. As was shown in Tables 1.7 to 1.10, the corresponding score for the PARCC ELA10 is 707 and for the PARCC Algebra I test is 720. The direct concordance tables between the HSA and PARCC tests are presented in Tables 1.11 and 1.12 for ELA and Algebra respectively. An imputation equation was developed based on the available HSA and PARCC scores matched via the same PSAT scores. Impact data or the passing rate for different cut score are presented in the concluding part of this report.

In other words, the HSA English cut score of 396 was mapped to a PSAT score of 33. Then the PSAT score of 33 was mapped to a PARCC score of 707. Therefore, a PARCC equivalent score of the HSA English cut score of 396 is 707. Following the same logic, the cut score of 412 for the HSA algebra test was mapped to a PSAT score of 33. Then the PSAT score of 33 was mapped to a PARCC Algebra I score of 720. Therefore, a PARCC Algebra I equivalent score of the HSA Algebra cut score of 412 is 720.

Table 1.7

Concordance Table for HSA English Test and PSAT Verbal Test

HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT
240	20	292	20	344	20	396	33	448	54	500	71	552	74	604	78
241	20	293	20	345	20	397	33	449	55	501	71	553	74	605	78
242	20	294	20	346	20	398	33	450	56	502	71	554	74	606	78
243	20	295	20	347	20	399	34	451	56	503	71	555	74	607	78
244	20	296	20	348	20	400	34	452	57	504	71	556	75	608	78
245	20	297	20	349	20	401	34	453	57	505	71	557	75	609	78
246	20	298	20	350	20	402	35	454	58	506	71	558	75	610	78
247	20	299	20	351	20	403	35	455	58	507	71	559	75	611	78
248	20	300	20	352	20	404	35	456	59	508	72	560	75	612	78
249	20	301	20	353	20	405	36	457	59	509	72	561	75	613	78
250	20	302	20	354	20	406	36	458	59	510	72	562	75	614	78
251	20	303	20	355	21	407	37	459	60	511	72	563	75	615	78
252	20	304	20	356	21	408	37	460	60	512	72	564	75	616	78
253	20	305	20	357	21	409	37	461	61	513	72	565	75	617	78
254	20	306	20	358	21	410	38	462	61	514	72	566	75	618	78
255	20	307	20	359	21	411	38	463	62	515	72	567	75	619	79
256	20	308	20	360	21	412	38	464	62	516	72	568	75	620	79
257	20	309	20	361	22	413	39	465	63	517	72	569	75	621	79
258	20	310	20	362	22	414	39	466	63	518	72	570	75	622	79
259	20	311	20	363	22	415	40	467	63	519	72	571	75	623	79
260	20	312	20	364	23	416	40	468	64	520	72	572	76	624	79
261	20	313	20	365	23	417	40	469	64	521	72	573	76	625	79
262	20	314	20	366	23	418	41	470	64	522	72	574	76	626	79
263	20	315	20	367	24	419	41	471	65	523	72	575	76	627	79
264	20	316	20	368	24	420	41	472	65	524	73	576	76	628	79
265	20	317	20	369	24	421	42	473	66	525	73	577	76	629	79
266	20	318	20	370	24	422	42	474	66	526	73	578	76	630	79
267	20	319	20	371	25	423	43	475	66	527	73	579	76	631	79
268	20	320	20	372	25	424	43	476	67	528	73	580	76	632	79
269	20	321	20	373	25	425	44	477	67	529	73	581	76	633	79
270	20	322	20	374	26	426	44	478	67	530	73	582	76	634	79
271	20	323	20	375	26	427	45	479	68	531	73	583	76	635	80
272	20	324	20	376	26	428	45	480	68	532	73	584	76	636	80
273	20	325	20	377	27	429	45	481	68	533	73	585	76	637	80
274	20	326	20	378	27	430	46	482	69	534	73	586	76	638	80
275	20	327	20	379	27	431	46	483	69	535	73	587	76	639	80
276	20	328	20	380	27	432	47	484	69	536	73	588	77	640	80
277	20	329	20	381	28	433	47	485	69	537	73	589	77	641	80
278	20	330	20	382	28	434	48	486	70	538	73	590	77	642	80
279	20	331	20	383	28	435	48	487	70	539	73	591	77	643	80
280	20	332	20	384	29	436	49	488	70	540	74	592	77	644	80
281	20	333	20	385	29	437	49	489	70	541	74	593	77	645	80
282	20	334	20	386	29	438	50	490	70	542	74	594	77	646	80
283	20	335	20	387	29	439	50	491	70	543	74	595	77	647	80
284	20	336	20	388	30	440	51	492	71	544	74	596	77	648	80
285	20	337	20	389	31	441	51	493	71	545	74	597	77	649	80
286	20	338	20	390	31	442	51	494	71	546	74	598	77	650	80
287	20	339	20	391	31	443	52	495	71	547	74	599	77		
288	20	340	20	392	31	444	53	496	71	548	74	600	77		
289	20	341	20	393	32	445	53	497	71	549	74	601	77		
290	20	342	20	394	32	446	54	498	71	550	74	602	77		
291	20	343	20	395	32	447	54	499	71	551	74	603	78		

Table 1.8

Concordance Table for PSAT Verbal Test and PARCC ELA10 Test

PSAT	PARCC	Proficiency Level	PSAT	PARCC	Proficiency Level
20	650	1	51	787	4
21	661	1	52	791	4
22	665	1	53	795	5
23	666	1	54	799	5
24	667	1	55	802	5
25	669	1	56	805	5
26	673	1	57	809	5
27	680	1	58	812	5
28	685	1	59	815	5
29	689	1	60	819	5
30	693	1	61	824	5
31	697	1	62	827	5
32	702	2	63	830	5
33	707	2	64	835	5
34	713	2	65	840	5
35	719	2	66	843	5
36	722	2	67	845	5
37	726	3	68	848	5
38	732	3	69	849	5
39	737	3	70	850	5
40	742	3	71	850	5
41	746	3	72	850	5
42	750	4	73	850	5
43	754	4	74	850	5
44	759	4	75	850	5
45	764	4	76	850	5
46	767	4	77	850	5
47	770	4	78	850	5
48	774	4	79	850	5
49	778	4	80	850	5
50	782	4			

Table 1.9

Concordance Table between the HSA Algebra Test and the PSAT Math Test

HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT	HSA	PSAT
240	20	292	20	344	21	396	30	448	45	500	67	552	73	604	77
241	20	293	20	345	21	397	30	449	45	501	67	553	73	605	77
242	20	294	20	346	21	398	30	450	45	502	68	554	73	606	77
243	20	295	20	347	21	399	30	451	46	503	68	555	73	607	77
244	20	296	20	348	21	400	31	452	46	504	68	556	73	608	77
245	20	297	20	349	21	401	31	453	47	505	68	557	73	609	77
246	20	298	20	350	21	402	31	454	47	506	69	558	74	610	77
247	20	299	20	351	21	403	32	455	47	507	69	559	74	611	78
248	20	300	20	352	21	404	32	456	48	508	69	560	74	612	78
249	20	301	20	353	22	405	32	457	48	509	69	561	74	613	78
250	20	302	20	354	22	406	32	458	49	510	70	562	74	614	78
251	20	303	20	355	22	407	32	459	49	511	70	563	74	615	78
252	20	304	20	356	22	408	32	460	50	512	70	564	74	616	78
253	20	305	20	357	22	409	33	461	50	513	70	565	74	617	78
254	20	306	20	358	22	410	33	462	51	514	70	566	74	618	78
255	20	307	20	359	22	411	33	463	51	515	70	567	74	619	78
256	20	308	20	360	23	412	33	464	52	516	70	568	74	620	78
257	20	309	20	361	23	413	34	465	52	517	70	569	74	621	78
258	20	310	20	362	23	414	34	466	53	518	71	570	74	622	78
259	20	311	20	363	23	415	34	467	53	519	71	571	75	623	78
260	20	312	20	364	23	416	35	468	53	520	71	572	75	624	79
261	20	313	20	365	23	417	35	469	54	521	71	573	75	625	79
262	20	314	20	366	24	418	35	470	54	522	71	574	75	626	79
263	20	315	20	367	24	419	36	471	55	523	71	575	75	627	79
264	20	316	20	368	24	420	36	472	55	524	71	576	75	628	79
265	20	317	20	369	24	421	36	473	56	525	71	577	75	629	79
266	20	318	20	370	24	422	36	474	56	526	71	578	75	630	79
267	20	319	20	371	24	423	37	475	57	527	71	579	75	631	79
268	20	320	20	372	25	424	37	476	57	528	71	580	75	632	79
269	20	321	20	373	25	425	37	477	58	529	71	581	75	633	79
270	20	322	20	374	25	426	37	478	58	530	71	582	75	634	79
271	20	323	20	375	25	427	38	479	59	531	72	583	75	635	79
272	20	324	20	376	25	428	38	480	59	532	72	584	76	636	79
273	20	325	20	377	26	429	38	481	59	533	72	585	76	637	79
274	20	326	20	378	26	430	38	482	60	534	72	586	76	638	80
275	20	327	20	379	26	431	39	483	61	535	72	587	76	639	80
276	20	328	20	380	26	432	39	484	61	536	72	588	76	640	80
277	20	329	20	381	27	433	39	485	61	537	72	589	76	641	80
278	20	330	20	382	27	434	40	486	62	538	72	590	76	642	80
279	20	331	20	383	27	435	40	487	62	539	72	591	76	643	80
280	20	332	20	384	27	436	40	488	63	540	72	592	76	644	80
281	20	333	20	385	28	437	40	489	63	541	72	593	76	645	80
282	20	334	20	386	28	438	41	490	64	542	72	594	76	646	80
283	20	335	20	387	28	439	41	491	64	543	72	595	76	647	80
284	20	336	20	388	28	440	42	492	64	544	73	596	76	648	80
285	20	337	20	389	29	441	42	493	65	545	73	597	76	649	80
286	20	338	20	390	29	442	42	494	65	546	73	598	77	650	80
287	20	339	21	391	29	443	43	495	65	547	73	599	77		
288	20	340	21	392	29	444	43	496	66	548	73	600	77		
289	20	341	21	393	29	445	43	497	66	549	73	601	77		
290	20	342	21	394	29	446	44	498	66	550	73	602	77		
291	20	343	21	395	30	447	44	499	67	551	73	603	77		

Table 1.10

Concordance Table for PSAT Math Test and PARCC Algebra I Test

PSAT	PARCC	Proficiency Level	PSAT	PARCC	Proficiency Level
20	671	1	45	759	4
21	680	1	46	763	4
22	683	1	47	767	4
23	687	1	48	770	4
24	691	1	49	774	4
25	693	1	50	778	4
26	694	1	51	781	4
27	697	1	52	784	4
28	701	2	53	787	4
29	705	2	54	791	4
30	710	2	55	793	4
31	713	2	56	796	4
32	715	2	57	798	4
33	720	2	58	801	4
34	722	2	59	803	4
35	724	2	60	806	5
36	728	3	61	808	5
37	732	3	62	811	5
38	736	3	63	813	5
39	740	3	64	816	5
40	744	3	65	818	5
41	748	3	66	821	5
42	751	4	67	823	5
43	753	4	68	826	5
44	756	4	69	828	5

Table 1.11

Concordance Table for PARCC ELA10 Test and HSA English Test

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	297	650	354	650	411	730	468	831	525	850	582	850	639	850
241	650	298	650	355	652	412	732	469	833	526	850	583	850	640	850
242	650	299	650	356	654	413	735	470	835	527	850	584	850	641	850
243	650	300	650	357	655	414	737	471	838	528	850	585	850	642	850
244	650	301	650	358	657	415	739	472	840	529	850	586	850	643	850
245	650	302	650	359	658	416	741	473	841	530	850	587	850	644	850
246	650	303	650	360	661	417	742	474	842	531	850	588	850	645	850
247	650	304	650	361	662	418	744	475	843	532	850	589	850	646	850
248	650	305	650	362	664	419	745	476	844	533	850	590	850	647	850
249	650	306	650	363	665	420	746	477	845	534	850	591	850	648	850
250	650	307	650	364	665	421	749	478	845	535	850	592	850	649	850
251	650	308	650	365	666	422	750	479	846	536	850	593	850	650	850
252	650	309	650	366	666	423	752	480	847	537	850	594	850		
253	650	310	650	367	666	424	754	481	848	538	850	595	850		
254	650	311	650	368	666	425	756	482	848	539	850	596	850		
255	650	312	650	369	667	426	759	483	848	540	850	597	850		
256	650	313	650	370	667	427	761	484	848	541	850	598	850		
257	650	314	650	371	668	428	762	485	849	542	850	599	850		
258	650	315	650	372	669	429	764	486	849	543	850	600	850		
259	650	316	650	373	669	430	766	487	849	544	850	601	850		
260	650	317	650	374	671	431	767	488	849	545	850	602	850		
261	650	318	650	375	672	432	769	489	849	546	850	603	850		
262	650	319	650	376	673	433	770	490	849	547	850	604	850		
263	650	320	650	377	675	434	772	491	850	548	850	605	850		
264	650	321	650	378	676	435	774	492	850	549	850	606	850		
265	650	322	650	379	678	436	776	493	850	550	850	607	850		
266	650	323	650	380	680	437	778	494	850	551	850	608	850		
267	650	324	650	381	684	438	780	495	850	552	850	609	850		
268	650	325	650	382	685	439	782	496	850	553	850	610	850		
269	650	326	650	383	685	440	783	497	850	554	850	611	850		
270	650	327	650	384	686	441	785	498	850	555	850	612	850		
271	650	328	650	385	687	442	787	499	850	556	850	613	850		
272	650	329	650	386	688	443	791	500	850	557	850	614	850		
273	650	330	650	387	689	444	793	501	850	558	850	615	850		
274	650	331	650	388	693	445	795	502	850	559	850	616	850		
275	650	332	650	389	694	446	796	503	850	560	850	617	850		
276	650	333	650	390	695	447	797	504	850	561	850	618	850		
277	650	334	650	391	696	448	799	505	850	562	850	619	850		
278	650	335	650	392	697	449	802	506	850	563	850	620	850		
279	650	336	650	393	698	450	803	507	850	564	850	621	850		
280	650	337	650	394	700	451	805	508	850	565	850	622	850		
281	650	338	650	395	702	452	807	509	850	566	850	623	850		
282	650	339	650	396	707	453	809	510	850	567	850	624	850		
283	650	340	650	397	707	454	811	511	850	568	850	625	850		
284	650	341	650	398	707	455	812	512	850	569	850	626	850		
285	650	342	650	399	709	456	813	513	850	570	850	627	850		
286	650	343	650	400	711	457	814	514	850	571	850	628	850		
287	650	344	650	401	713	458	815	515	850	572	850	629	850		
288	650	345	650	402	715	459	817	516	850	573	850	630	850		
289	650	346	650	403	716	460	819	517	850	574	850	631	850		
290	650	347	650	404	719	461	822	518	850	575	850	632	850		
291	650	348	650	405	721	462	824	519	850	576	850	633	850		
292	650	349	650	406	722	463	826	520	850	577	850	634	850		
293	650	350	650	407	724	464	827	521	850	578	850	635	850		
294	650	351	650	408	725	465	828	522	850	579	850	636	850		
295	650	352	650	409	726	466	829	523	850	580	850	637	850		
296	650	353	650	410	728	467	830	524	850	581	850	638	850		

Table 1.12

Concordance Table for PARCC Algebra I Test and HSA Algebra Test

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	297	657	354	681	411	719	468	787	525	850	582	850	639	850
241	650	298	657	355	682	412	720	469	789	526	850	583	850	640	850
242	650	299	657	356	682	413	721	470	791	527	850	584	850	641	850
243	650	300	658	357	683	414	722	471	792	528	850	585	850	642	850
244	650	301	658	358	683	415	722	472	793	529	850	586	850	643	850
245	650	302	658	359	683	416	723	473	795	530	850	587	850	644	850
246	650	303	658	360	685	417	723	474	796	531	850	588	850	645	850
247	650	304	659	361	685	418	724	475	797	532	850	589	850	646	850
248	650	305	659	362	686	419	725	476	798	533	850	590	850	647	850
249	650	306	659	363	687	420	726	477	800	534	850	591	850	648	850
250	650	307	660	364	687	421	727	478	801	535	850	592	850	649	850
251	651	308	660	365	687	422	728	479	801	536	850	593	850	650	850
252	651	309	660	366	689	423	729	480	802	537	850	594	850		
253	651	310	661	367	689	424	730	481	803	538	850	595	850		
254	651	311	661	368	690	425	731	482	806	539	850	596	850		
255	651	312	661	369	691	426	732	483	807	540	850	597	850		
256	651	313	662	370	691	427	733	484	807	541	850	598	850		
257	651	314	662	371	691	428	734	485	808	542	850	599	850		
258	651	315	662	372	692	429	735	486	810	543	850	600	850		
259	652	316	663	373	693	430	736	487	811	544	850	601	850		
260	652	317	663	374	693	431	738	488	812	545	850	602	850		
261	652	318	664	375	693	432	739	489	813	546	850	603	850		
262	652	319	664	376	693	433	740	490	814	547	850	604	850		
263	652	320	664	377	694	434	741	491	815	548	850	605	850		
264	652	321	665	378	694	435	742	492	816	549	850	606	850		
265	652	322	665	379	694	436	743	493	817	550	850	607	850		
266	652	323	665	380	694	437	744	494	817	551	850	608	850		
267	652	324	666	381	695	438	746	495	818	552	850	609	850		
268	652	325	666	382	696	439	748	496	819	553	850	610	850		
269	652	326	667	383	697	440	749	497	820	554	850	611	850		
270	652	327	667	384	697	441	750	498	821	555	850	612	850		
271	652	328	668	385	698	442	751	499	822	556	850	613	850		
272	652	329	668	386	699	443	752	500	822	557	850	614	850		
273	652	330	669	387	700	444	753	501	823	558	850	615	850		
274	653	331	669	388	701	445	753	502	824	559	850	616	850		
275	653	332	669	389	702	446	755	503	825	560	850	617	850		
276	653	333	670	390	702	447	756	504	825	561	850	618	850		
277	653	334	670	391	703	448	757	505	826	562	850	619	850		
278	653	335	671	392	704	449	758	506	827	563	850	620	850		
279	653	336	671	393	705	450	759	507	827	564	850	621	850		
280	653	337	671	394	705	451	761	508	827	565	850	622	850		
281	654	338	671	395	706	452	763	509	828	566	850	623	850		
282	654	339	673	396	707	453	765	510	847	567	850	624	850		
283	654	340	673	397	708	454	766	511	849	568	850	625	850		
284	654	341	674	398	709	455	767	512	850	569	850	626	850		
285	654	342	674	399	710	456	769	513	850	570	850	627	850		
286	654	343	675	400	711	457	770	514	850	571	850	628	850		
287	655	344	675	401	712	458	773	515	850	572	850	629	850		
288	655	345	676	402	713	459	774	516	850	573	850	630	850		
289	655	346	677	403	714	460	776	517	850	574	850	631	850		
290	655	347	677	404	714	461	778	518	850	575	850	632	850		
291	655	348	678	405	715	462	780	519	850	576	850	633	850		
292	656	349	678	406	715	463	781	520	850	577	850	634	850		
293	656	350	679	407	715	464	783	521	850	578	850	635	850		
294	656	351	679	408	715	465	784	522	850	579	850	636	850		
295	656	352	680	409	717	466	786	523	850	580	850	637	850		
296	657	353	680	410	718	467	787	524	850	581	850	638	850		

Option II

Using Equivalent Groups Based on Propensity Score Matching to Link HSA and PARCC Tests

Based on the discussions at the recent TAC meeting, the following three designs were suggested to link the HSA and PARCC tests based on equivalent groups from propensity score matching. Six covariates were used in matching; they are gender, race, limited English proficiency (LEP), FARMS, Title I, and MSA test scores in the same content area.

Design I (English)

Group 1: HSA 2014 Grade 10 English + MSA 2012 Grade 8 Reading

Group 2: PARCC 2015 Grade 10 Algebra I + MSA 2013 Grade 8 Reading

Design II (Algebra)

Group 1: HSA 2014 Grade 9 Algebra+ MSA 2013 Grade 8 Math

Group 2: PARCC 2015 Grade 9 Algebra I + MSA 2014 Grade 8 Math

Design III (Algebra)

Group 1: HSA 2014 Grade 8 Algebra + MSA 2013 Grade 7 Math

Group 2: PARCC 2015 Grade 8 Algebra I + MSA 2014 Grade 7 Math

Combined Design II & III (Algebra)

Group 1: HSA 2014 Grade 9 Algebra+ MSA 2013 Grade 8 Math + HSA 2014 Grade 8 Algebra + MSA 2013 Grade 7 Math

Group 2: PARCC 2015 Grade 9 Algebra I + MSA 2014 Grade 8 Math + PARCC 2015 Grade 8 Algebra I + MSA 2014 Grade 7 Math

Prior to data analysis, the HSA test scores were merged with the above matched MSA test scores using testing year, grade, and state issued ID information for the regular first-time test-takers for each of the above mentioned three designs. Further, the PARCC test scores were also merged with the MSA test scores based on the above matched test year, grade, and state issued ID information for each design.

For Design I, after extracting first-time test takers' scores and removing students taking the Modified MSA tests, the matched sample size for HSA and MSA for Group 1 is 47,656. For Group 2, the matched sample size for PARCC and MSA is 46,692. For Design II, the matched sample size between HSA and MSA for Group 1 is 23,738; for Group 2, the matched sample size for PARCC and MSA is 26,704. For Design III, Group 1 matched sample size between HSA and MSA is 24,420 while the matched sample size

between PARCC and MSA for Group 2 is 16,525. Table 2.1 summarizes the matched sample sizes for each pair.

Table 2.1
Sample Sizes for Matched Cases in Each Group under Each Design

Design	Matched Pair	Sample Size
Design I	Group1 HSA English with MSA	47,656
	Group2 PARCC ELA10 with MSA	46,692
Design II	Group1 HSA Algebra with MSA	23,738
	Group2 PARCC ALG I with MSA	26,704
Design III	Group1 HSA Algebra with MSA	24,420
	Group2 PARCC ALG I with MSA	16,525

In the merged dataset, six covariates were utilized for propensity score matching. As stated above, the six covariates are Gender, Race, LEP, Farms, Title I and MSA scores in the same content area. Gender, Race, LEP, Farms and Title I are variables from the HSA test dataset in Group 1 and the PARCC test dataset in Group 2 in all three designs. For the Gender variable, males are coded as 1 and females are coded as 0. For the Race variable, White is coded as 1 and all others are coded as 0. We also explored to code White/Asian as 1 and 0 for others. However, the standardized mean difference for each covariate is larger than the current method. LEP is coded as 1 for students with limited English proficiency and 0 for others. The Farms variable is coded as 1 for students who take free and reduced priced meals and 0 for students who do not. The Title I variable is coded as 1 for students who belong to this category and 0 for students who do not belong to this category. The MSA scale score was used as a covariate directly with no recoding needed. No missing data were detected for the six covariates in the three designs.

R studio was used for propensity score matching. The package “MatchIt” developed by Ho, Imai, K. and Imai, M. (2013) was used to match cases in the control group to those in the treatment group. Usually the group with a smaller sample size is treated as the treatment group, and this was done in matching HSA and PARCC tests. The Match.Matrix function in the package was called to export one-to-one matched case IDs. For better matching, this study explored four conditions for each design by using different caliper values and the use of replacement of cases in matching. Caliper, which is the maximum degree of difference to be considered as a match, was set at two levels: caliper of 0.1 and caliper of 0.25. Replacement was set at two levels: with and without replacement of cases. Replacement means that the cases in the control group can be used multiple times to match those in the treatment group.

To compare the similarity of the treated and control subjects in the matched sample, the standardized mean difference is commonly used as an indicator for what is called a balance check. It can be used to compare the mean of continuous and binary variables between the treatment and control groups. For a continuous covariate, the standardized mean difference is defined as

$$d = \frac{\bar{x}_{treatment} - \bar{x}_{control}}{\sqrt{\frac{s_{treatment}^2 + s_{control}^2}{2}}}$$

where $\bar{x}_{treatment}$ and $\bar{x}_{control}$ denote the sample mean of the covariate in treated and control subjects, respectively, whereas $s_{treatment}^2$ and $s_{control}^2$ denote the sample variance of the covariate in the treated and control groups, respectively.

The standardized mean difference compares the difference in means in units of the pooled standard deviation. Furthermore, it is not influenced by sample size and allows for the comparison of the relative balance of variables measured in different units. Although there is no universally agreed upon criterion as to what threshold of the standardized difference can be used to indicate important imbalance, an absolute value of standardized mean difference that is less than 0.25 has been suggested to indicate a negligible difference in the mean of a covariate between the treatment group and control group (Stuart, 2010).

Table 2.2
Propensity Score Matching Results for Design I

Condition No.	1.1	1.2	1.3	1.4
K	1	1	1	1
Caliper	0.1	0.1	0.25	0.25
Replacement	NO	YES	NO	YES
Gender	0.0010	0.0005	0.0003	0.0068
Race	0.0038	0.0114	0.0047	0.0020
LEP	0.0062	0.0095	0.0151	0.0132
FARMS	0.0017	0.0027	0.0037	0.0118
Title1	0.0006	0.0004	<0.0001	0.0006
MSA	0.0030	0.0027	0.0040	0.0014
HSA English (Control)	46,228	29,663	46,311	29,421
PARCC ELA10 (Treatment)	46,228	46,691	46,311	46,692

Table 2.3
Propensity Score Matching Results for Design II

Condition No.	2.1	2.2	2.3	2.4
K	1	1	1	1
Caliper	0.1	0.1	0.25	0.25
Replacement	NO	YES	NO	YES
Gender	0.0009	0.0013	0.0011	0.0141
Race	0.0091	0.0102	0.0082	0.0033
LEP	0.0021	0.0053	0.0014	0.0014
FARMS	0.0017	0.0050	0.0004	0.0065
Title1	0.0071	0.0070	0.0084	0.0111
MSA	0.0139	0.0145	0.0043	0.0016
HSA Algebra (Treatment)	23,316	23,733	23,522	23,736
PARCC ALG I (Control)	23,316	15,627	23,522	15,590

Table 2.4
Propensity Score Matching Results for Design III

Condition No.	3.1	3.2	3.3	3.4
K	1	1	1	1
Caliper	0.1	0.1	0.25	0.25
Replacement	NO	YES	NO	YES
Gender	0.0009	0.0021	0.0025	0.0064
Race	0.0144	0.0143	0.0184	0.0139
LEP	0.0219	0.0173	0.0141	0.0179
FARMS	0.0204	0.0140	0.0186	0.0160
Title1	0.0170	0.0116	0.0123	0.0048
MSA	0.0067	0.0035	0.0049	0.0017
HSA Math (Control)	16,118	11,754	16,268	11,820
PARCC ALG I (Treatment)	16,118	16,504	16,268	16,522

In Tables 2.2 to 2.4, the 12 conditions are labeled from 1.1 to 3.4 for convenience. The first number represents each of the three designs and the second number represents the matching condition based on the combination of different caliper values and matching with or without replacement. For example, Condition 3.1 represents one-to-one matching with a caliper value of 0.1 and no replacement. Each of these tables presents the absolute standardized mean difference values for each covariate. The bottom part in each of the three tables contains the number of matched cases in the treatment group and the control group. In this study, the group with fewer cases (the sample size is indicated in Table 2.1) was chosen as the treatment group and the other group was chosen as the control group in order to maximize the sample size of the matched cases in both the treatment and control groups. Therefore, in each design, either Group 1 or Group 2 was chosen as a treatment group based on the sample size of the matched cases in Table 2.1. The values of the absolute standardized mean differences in Tables 2.2 to 2.4 were checked. The results

indicated that for these three designs, the covariates were balanced after matching. The descriptive statistics for the HSA and PARCC test scores for the matched groups for each design and each matching condition are summarized in Tables 2.5 to 2.7.

Table 2.5

Descriptive Statistics for HSA and PARCC in the Matched Data in Design I (English)

	Test Name	N	Mean	SD	Min	Max
Condition 1	HSA	46,228	413.48	28.97	240	650
	PARCC	46,228	741.33	43.96	650	850
Condition 2	HSA	29,663	413.15	29.05	240	650
	PARCC	46,691	740.97	44.02	650	850
Condition 3	HSA	46,311	413.46	28.76	240	650
	PARCC	46,311	741.26	43.97	650	850
Condition 4	HSA	29,421	413.46	28.02	240	650
	PARCC	46,692	740.97	44.02	650	850

Table 2.6

Descriptive Statistics for HSA and PARCC in the Matched Data in Design II (Algebra)

	Test Name	N	Mean	SD	Min	Max
Condition 1	HSA	23,316	404.20	40.63	240	650
	PARCC	23,316	721.67	26.11	650	850
Condition 2	HSA	23,733	404.44	40.51	240	650
	PARCC	15,627	721.58	26.22	650	850
Condition 3	HSA	23,522	404.41	40.53	240	650
	PARCC	23,522	721.64	26.15	650	850
Condition 4	HSA	23,736	404.44	40.44	240	650
	PARCC	15,590	721.51	26.09	650	850

Table 2.7

Descriptive Statistics for HSA and PARCC in the Matched Data in Design III (Algebra)

	Test Name	N	Mean	SD	Min	Max
Condition 1	HSA	16,118	433.48	33.41	240	650
	PARCC	16,118	749.56	29.05	650	850
Condition 2	HSA	11,754	432.1	34.4	240	650
	PARCC	16,504	750.5	29.58	650	850
Condition 3	HSA	16,268	433.56	33.46	240	650
	PARCC	16,268	749.88	29.24	650	850
Condition 4	HSA	11,820	432.42	34	240	650
	PARCC	16,522	750.59	29.69	650	850

After propensity score matching, the matched data were exported from all conditions in the three designs. LEGS program was again used for equipercentile linking using the equivalent group design using frequency data. The propensity score matching with replacement weighs different cases differently. Weights for cases in the control group (with a larger sample size) may be a value larger or smaller than 1 while the weights for cases in the treatment group (with a smaller sample size) are still 1. Thus, in computing the frequency for the control group in the matched sample, weights assigned to each case were summed up and used as the frequency for each case. The sum of the weights is rounded up if larger than 0.5.

In total, there are 16 concordance tables created based on propensity score matching. The PARCC equivalents of the HSA cut scores for each matching condition are summarized in Table 2.8. The 16 HSA and PARCC concordance tables are presented in Tables 2.9 to 2.24.

Table 2.8
PARCC Equivalent Scores of the HSA Cut Scores Using Propensity Score Matching

Sub-Condition	1	2	3	4
Caliper	0.1	0.1	0.25	0.25
Replacement	NO	YES	NO	YES
Design I (ELA10)	706	706	705	704
Design II (ALG I)	721	721	721	721
Design III (ALG I)	725	725	725	725
Combined Design II & III (ALG I)	722	727	722	724

Table 2.9

Concordance Table for HSA English Test and PARCC ELA10 Test (Condition 1.1)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	292	650	344	651	396	706	448	805	500	850	552	850	604	850
241	650	293	650	345	652	397	707	449	807	501	850	553	850	605	850
242	650	294	650	346	652	398	709	450	809	502	850	554	850	606	850
243	650	295	650	347	653	399	711	451	811	503	850	555	850	607	850
244	650	296	650	348	654	400	712	452	813	504	850	556	850	608	850
245	650	297	650	349	655	401	714	453	815	505	850	557	850	609	850
246	650	298	650	350	655	402	716	454	817	506	850	558	850	610	850
247	650	299	650	351	656	403	718	455	819	507	850	559	850	611	850
248	650	300	650	352	657	404	720	456	821	508	850	560	850	612	850
249	650	301	650	353	657	405	721	457	823	509	850	561	850	613	850
250	650	302	650	354	658	406	723	458	825	510	850	562	850	614	850
251	650	303	650	355	659	407	725	459	827	511	850	563	850	615	850
252	650	304	650	356	660	408	727	460	829	512	850	564	850	616	850
253	650	305	650	357	660	409	728	461	831	513	850	565	850	617	850
254	650	306	650	358	661	410	730	462	833	514	850	566	850	618	850
255	650	307	650	359	662	411	732	463	835	515	850	567	850	619	850
256	650	308	650	360	663	412	734	464	837	516	850	568	850	620	850
257	650	309	650	361	663	413	736	465	839	517	850	569	850	621	850
258	650	310	650	362	664	414	737	466	841	518	850	570	850	622	850
259	650	311	650	363	665	415	739	467	843	519	850	571	850	623	850
260	650	312	650	364	666	416	741	468	845	520	850	572	850	624	850
261	650	313	650	365	667	417	743	469	846	521	850	573	850	625	850
262	650	314	650	366	667	418	745	470	848	522	850	574	850	626	850
263	650	315	650	367	668	419	747	471	849	523	850	575	850	627	850
264	650	316	650	368	669	420	749	472	849	524	850	576	850	628	850
265	650	317	650	369	670	421	751	473	849	525	850	577	850	629	850
266	650	318	650	370	671	422	753	474	849	526	850	578	850	630	850
267	650	319	650	371	672	423	754	475	850	527	850	579	850	631	850
268	650	320	650	372	673	424	756	476	850	528	850	580	850	632	850
269	650	321	650	373	674	425	758	477	850	529	850	581	850	633	850
270	650	322	650	374	675	426	760	478	850	530	850	582	850	634	850
271	650	323	650	375	676	427	762	479	850	531	850	583	850	635	850
272	650	324	650	376	677	428	764	480	850	532	850	584	850	636	850
273	650	325	650	377	678	429	766	481	850	533	850	585	850	637	850
274	650	326	650	378	679	430	768	482	850	534	850	586	850	638	850
275	650	327	650	379	681	431	770	483	850	535	850	587	850	639	850
276	650	328	650	380	682	432	772	484	850	536	850	588	850	640	850
277	650	329	650	381	683	433	774	485	850	537	850	589	850	641	850
278	650	330	650	382	684	434	776	486	850	538	850	590	850	642	850
279	650	331	650	383	686	435	778	487	850	539	850	591	850	643	850
280	650	332	650	384	687	436	780	488	850	540	850	592	850	644	850
281	650	333	650	385	688	437	782	489	850	541	850	593	850	645	850
282	650	334	650	386	690	438	784	490	850	542	850	594	850	646	850
283	650	335	650	387	691	439	786	491	850	543	850	595	850	647	850
284	650	336	650	388	693	440	788	492	850	544	850	596	850	648	850
285	650	337	650	389	694	441	790	493	850	545	850	597	850	649	850
286	650	338	650	390	696	442	792	494	850	546	850	598	850	650	850
287	650	339	650	391	697	443	794	495	850	547	850	599	850		
288	650	340	650	392	699	444	796	496	850	548	850	600	850		
289	650	341	650	393	701	445	798	497	850	549	850	601	850		
290	650	342	650	394	702	446	800	498	850	550	850	602	850		
291	650	343	651	395	704	447	802	499	850	551	850	603	850		

Table 2.10

Concordance Table for HSA English Test and PARCC ELA10 Test (Condition 1.2)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	292	650	344	652	396	706	448	805	500	850	552	850	604	850
241	650	293	650	345	653	397	708	449	807	501	850	553	850	605	850
242	650	294	650	346	654	398	710	450	809	502	850	554	850	606	850
243	650	295	650	347	654	399	711	451	811	503	850	555	850	607	850
244	650	296	650	348	655	400	713	452	813	504	850	556	850	608	850
245	650	297	650	349	655	401	715	453	815	505	850	557	850	609	850
246	650	298	650	350	656	402	717	454	817	506	850	558	850	610	850
247	650	299	650	351	657	403	718	455	820	507	850	559	850	611	850
248	650	300	650	352	657	404	720	456	822	508	850	560	850	612	850
249	650	301	650	353	658	405	722	457	824	509	850	561	850	613	850
250	650	302	650	354	659	406	724	458	826	510	850	562	850	614	850
251	650	303	650	355	660	407	725	459	828	511	850	563	850	615	850
252	650	304	650	356	660	408	727	460	830	512	850	564	850	616	850
253	650	305	650	357	661	409	729	461	832	513	850	565	850	617	850
254	650	306	650	358	662	410	731	462	834	514	850	566	850	618	850
255	650	307	650	359	662	411	732	463	836	515	850	567	850	619	850
256	650	308	650	360	663	412	734	464	838	516	850	568	850	620	850
257	650	309	650	361	664	413	736	465	840	517	850	569	850	621	850
258	650	310	650	362	665	414	738	466	842	518	850	570	850	622	850
259	650	311	650	363	666	415	740	467	844	519	850	571	850	623	850
260	650	312	650	364	666	416	741	468	845	520	850	572	850	624	850
261	650	313	650	365	667	417	743	469	847	521	850	573	850	625	850
262	650	314	650	366	668	418	745	470	848	522	850	574	850	626	850
263	650	315	650	367	669	419	747	471	849	523	850	575	850	627	850
264	650	316	650	368	670	420	749	472	849	524	850	576	850	628	850
265	650	317	650	369	671	421	751	473	849	525	850	577	850	629	850
266	650	318	650	370	672	422	753	474	849	526	850	578	850	630	850
267	650	319	650	371	673	423	754	475	850	527	850	579	850	631	850
268	650	320	650	372	673	424	756	476	850	528	850	580	850	632	850
269	650	321	650	373	674	425	758	477	850	529	850	581	850	633	850
270	650	322	650	374	676	426	760	478	850	530	850	582	850	634	850
271	650	323	650	375	677	427	762	479	850	531	850	583	850	635	850
272	650	324	650	376	678	428	764	480	850	532	850	584	850	636	850
273	650	325	650	377	679	429	766	481	850	533	850	585	850	637	850
274	650	326	650	378	680	430	768	482	850	534	850	586	850	638	850
275	650	327	650	379	681	431	770	483	850	535	850	587	850	639	850
276	650	328	650	380	682	432	772	484	850	536	850	588	850	640	850
277	650	329	650	381	684	433	774	485	850	537	850	589	850	641	850
278	650	330	650	382	685	434	776	486	850	538	850	590	850	642	850
279	650	331	650	383	686	435	778	487	850	539	850	591	850	643	850
280	650	332	650	384	688	436	780	488	850	540	850	592	850	644	850
281	650	333	650	385	689	437	782	489	850	541	850	593	850	645	850
282	650	334	650	386	690	438	784	490	850	542	850	594	850	646	850
283	650	335	650	387	692	439	786	491	850	543	850	595	850	647	850
284	650	336	650	388	693	440	788	492	850	544	850	596	850	648	850
285	650	337	650	389	695	441	791	493	850	545	850	597	850	649	850
286	650	338	650	390	696	442	793	494	850	546	850	598	850	650	850
287	650	339	650	391	698	443	795	495	850	547	850	599	850		
288	650	340	650	392	700	444	797	496	850	548	850	600	850		
289	650	341	650	393	701	445	799	497	850	549	850	601	850		
290	650	342	651	394	703	446	801	498	850	550	850	602	850		
291	650	343	652	395	704	447	803	499	850	551	850	603	850		

Table 2.11

Concordance Table for HSA English Test and PARCC ELA10 Test (Condition 1.3)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	292	650	344	654	396	705	448	805	500	850	552	850	604	850
241	650	293	650	345	654	397	707	449	807	501	850	553	850	605	850
242	650	294	650	346	655	398	709	450	809	502	850	554	850	606	850
243	650	295	650	347	655	399	711	451	811	503	850	555	850	607	850
244	650	296	650	348	655	400	712	452	813	504	850	556	850	608	850
245	650	297	650	349	656	401	714	453	815	505	850	557	850	609	850
246	650	298	650	350	657	402	716	454	817	506	850	558	850	610	850
247	650	299	650	351	657	403	718	455	820	507	850	559	850	611	850
248	650	300	650	352	658	404	719	456	822	508	850	560	850	612	850
249	650	301	650	353	658	405	721	457	824	509	850	561	850	613	850
250	650	302	650	354	659	406	723	458	826	510	850	562	850	614	850
251	650	303	650	355	659	407	725	459	828	511	850	563	850	615	850
252	650	304	650	356	660	408	727	460	830	512	850	564	850	616	850
253	650	305	650	357	661	409	728	461	832	513	850	565	850	617	850
254	650	306	650	358	661	410	730	462	834	514	850	566	850	618	850
255	650	307	650	359	662	411	732	463	836	515	850	567	850	619	850
256	650	308	650	360	662	412	734	464	838	516	850	568	850	620	850
257	650	309	650	361	663	413	736	465	840	517	850	569	850	621	850
258	650	310	650	362	664	414	737	466	842	518	850	570	850	622	850
259	650	311	650	363	665	415	739	467	844	519	850	571	850	623	850
260	650	312	650	364	665	416	741	468	845	520	850	572	850	624	850
261	650	313	650	365	666	417	743	469	847	521	850	573	850	625	850
262	650	314	650	366	667	418	745	470	848	522	850	574	850	626	850
263	650	315	650	367	668	419	747	471	849	523	850	575	850	627	850
264	650	316	650	368	669	420	749	472	849	524	850	576	850	628	850
265	650	317	650	369	669	421	751	473	849	525	850	577	850	629	850
266	650	318	650	370	670	422	753	474	849	526	850	578	850	630	850
267	650	319	650	371	671	423	755	475	850	527	850	579	850	631	850
268	650	320	650	372	672	424	756	476	850	528	850	580	850	632	850
269	650	321	650	373	673	425	758	477	850	529	850	581	850	633	850
270	650	322	650	374	674	426	760	478	850	530	850	582	850	634	850
271	650	323	650	375	675	427	762	479	850	531	850	583	850	635	850
272	650	324	650	376	676	428	764	480	850	532	850	584	850	636	850
273	650	325	650	377	678	429	766	481	850	533	850	585	850	637	850
274	650	326	650	378	679	430	768	482	850	534	850	586	850	638	850
275	650	327	650	379	680	431	770	483	850	535	850	587	850	639	850
276	650	328	650	380	681	432	772	484	850	536	850	588	850	640	850
277	650	329	650	381	682	433	774	485	850	537	850	589	850	641	850
278	650	330	650	382	684	434	776	486	850	538	850	590	850	642	850
279	650	331	650	383	685	435	778	487	850	539	850	591	850	643	850
280	650	332	650	384	687	436	780	488	850	540	850	592	850	644	850
281	650	333	650	385	688	437	782	489	850	541	850	593	850	645	850
282	650	334	650	386	690	438	785	490	850	542	850	594	850	646	850
283	650	335	650	387	691	439	787	491	850	543	850	595	850	647	850
284	650	336	651	388	693	440	789	492	850	544	850	596	850	648	850
285	650	337	651	389	694	441	791	493	850	545	850	597	850	649	850
286	650	338	651	390	696	442	793	494	850	546	850	598	850	650	850
287	650	339	652	391	697	443	795	495	850	547	850	599	850		
288	650	340	652	392	699	444	797	496	850	548	850	600	850		
289	650	341	652	393	700	445	799	497	850	549	850	601	850		
290	650	342	653	394	702	446	801	498	850	550	850	602	850		
291	650	343	653	395	704	447	803	499	850	551	850	603	850		

Table 2.12

Concordance Table for HSA English Test and PARCC ELA10 Test (Condition 1.4)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	292	650	344	650	396	704	448	807	500	850	552	850	604	850
241	650	293	650	345	650	397	706	449	809	501	850	553	850	605	850
242	650	294	650	346	650	398	708	450	811	502	850	554	850	606	850
243	650	295	650	347	651	399	710	451	813	503	850	555	850	607	850
244	650	296	650	348	651	400	711	452	815	504	850	556	850	608	850
245	650	297	650	349	652	401	713	453	817	505	850	557	850	609	850
246	650	298	650	350	653	402	715	454	820	506	850	558	850	610	850
247	650	299	650	351	653	403	717	455	822	507	850	559	850	611	850
248	650	300	650	352	654	404	719	456	824	508	850	560	850	612	850
249	650	301	650	353	655	405	721	457	826	509	850	561	850	613	850
250	650	302	650	354	656	406	722	458	828	510	850	562	850	614	850
251	650	303	650	355	656	407	724	459	830	511	850	563	850	615	850
252	650	304	650	356	657	408	726	460	832	512	850	564	850	616	850
253	650	305	650	357	658	409	728	461	834	513	850	565	850	617	850
254	650	306	650	358	659	410	730	462	836	514	850	566	850	618	850
255	650	307	650	359	660	411	732	463	838	515	850	567	850	619	850
256	650	308	650	360	660	412	734	464	840	516	850	568	850	620	850
257	650	309	650	361	661	413	736	465	842	517	850	569	850	621	850
258	650	310	650	362	662	414	738	466	844	518	850	570	850	622	850
259	650	311	650	363	663	415	739	467	846	519	850	571	850	623	850
260	650	312	650	364	664	416	741	468	847	520	850	572	850	624	850
261	650	313	650	365	665	417	743	469	849	521	850	573	850	625	850
262	650	314	650	366	665	418	745	470	849	522	850	574	850	626	850
263	650	315	650	367	666	419	747	471	849	523	850	575	850	627	850
264	650	316	650	368	667	420	749	472	849	524	850	576	850	628	850
265	650	317	650	369	668	421	751	473	850	525	850	577	850	629	850
266	650	318	650	370	669	422	753	474	850	526	850	578	850	630	850
267	650	319	650	371	670	423	755	475	850	527	850	579	850	631	850
268	650	320	650	372	671	424	757	476	850	528	850	580	850	632	850
269	650	321	650	373	672	425	759	477	850	529	850	581	850	633	850
270	650	322	650	374	673	426	761	478	850	530	850	582	850	634	850
271	650	323	650	375	674	427	763	479	850	531	850	583	850	635	850
272	650	324	650	376	675	428	765	480	850	532	850	584	850	636	850
273	650	325	650	377	676	429	768	481	850	533	850	585	850	637	850
274	650	326	650	378	678	430	770	482	850	534	850	586	850	638	850
275	650	327	650	379	679	431	772	483	850	535	850	587	850	639	850
276	650	328	650	380	680	432	774	484	850	536	850	588	850	640	850
277	650	329	650	381	681	433	776	485	850	537	850	589	850	641	850
278	650	330	650	382	683	434	778	486	850	538	850	590	850	642	850
279	650	331	650	383	684	435	780	487	850	539	850	591	850	643	850
280	650	332	650	384	685	436	782	488	850	540	850	592	850	644	850
281	650	333	650	385	687	437	784	489	850	541	850	593	850	645	850
282	650	334	650	386	688	438	786	490	850	542	850	594	850	646	850
283	650	335	650	387	690	439	788	491	850	543	850	595	850	647	850
284	650	336	650	388	691	440	791	492	850	544	850	596	850	648	850
285	650	337	650	389	693	441	793	493	850	545	850	597	850	649	850
286	650	338	650	390	694	442	795	494	850	546	850	598	850	650	850
287	650	339	650	391	696	443	797	495	850	547	850	599	850		
288	650	340	650	392	698	444	799	496	850	548	850	600	850		
289	650	341	650	393	699	445	801	497	850	549	850	601	850		
290	650	342	650	394	701	446	803	498	850	550	850	602	850		
291	650	343	650	395	703	447	805	499	850	551	850	603	850		

Table 2.13

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Condition 2.1)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	660	292	672	344	684	396	710	448	759	500	801	552	813	604	825
241	665	293	672	345	685	397	710	449	760	501	801	553	813	605	825
242	665	294	672	346	685	398	711	450	762	502	802	554	813	606	825
243	666	295	673	347	685	399	712	451	763	503	802	555	814	607	826
244	666	296	673	348	686	400	712	452	764	504	802	556	814	608	826
245	666	297	673	349	686	401	713	453	766	505	802	557	814	609	826
246	666	298	673	350	686	402	714	454	767	506	803	558	814	610	826
247	666	299	673	351	687	403	714	455	769	507	803	559	815	611	826
248	666	300	673	352	687	404	715	456	770	508	803	560	815	612	827
249	667	301	674	353	688	405	716	457	772	509	803	561	815	613	827
250	667	302	674	354	688	406	717	458	773	510	803	562	815	614	827
251	667	303	674	355	689	407	717	459	775	511	804	563	816	615	827
252	667	304	674	356	689	408	718	460	776	512	804	564	816	616	828
253	667	305	674	357	689	409	719	461	778	513	804	565	816	617	828
254	667	306	674	358	690	410	720	462	779	514	804	566	816	618	828
255	667	307	675	359	691	411	721	463	781	515	805	567	816	619	828
256	667	308	675	360	691	412	721	464	782	516	805	568	817	620	829
257	668	309	675	361	691	413	722	465	784	517	805	569	817	621	829
258	668	310	675	362	692	414	723	466	785	518	805	570	817	622	829
259	668	311	675	363	692	415	724	467	786	519	806	571	817	623	829
260	668	312	676	364	693	416	725	468	788	520	806	572	818	624	829
261	668	313	676	365	693	417	725	469	789	521	806	573	818	625	830
262	668	314	676	366	694	418	726	470	790	522	806	574	818	626	830
263	668	315	676	367	694	419	727	471	792	523	806	575	818	627	830
264	668	316	677	368	695	420	728	472	793	524	807	576	819	628	830
265	668	317	677	369	695	421	729	473	794	525	807	577	819	629	831
266	668	318	677	370	696	422	730	474	795	526	807	578	819	630	831
267	669	319	677	371	696	423	731	475	795	527	807	579	819	631	831
268	669	320	677	372	697	424	732	476	796	528	808	580	819	632	831
269	669	321	678	373	697	425	732	477	796	529	808	581	820	633	832
270	669	322	678	374	698	426	733	478	796	530	808	582	820	634	832
271	669	323	678	375	698	427	734	479	796	531	808	583	820	635	832
272	669	324	678	376	699	428	735	480	797	532	808	584	820	636	832
273	669	325	678	377	699	429	736	481	797	533	809	585	821	637	832
274	669	326	679	378	700	430	737	482	797	534	809	586	821	638	833
275	669	327	679	379	700	431	739	483	797	535	809	587	821	639	833
276	670	328	679	380	701	432	740	484	798	536	809	588	821	640	833
277	670	329	679	381	701	433	741	485	798	537	810	589	821	641	833
278	670	330	680	382	702	434	742	486	798	538	810	590	822	642	834
279	670	331	680	383	702	435	743	487	798	539	810	591	822	643	834
280	670	332	680	384	703	436	744	488	798	540	810	592	822	644	834
281	670	333	681	385	703	437	745	489	799	541	811	593	822	645	834
282	670	334	681	386	704	438	746	490	799	542	811	594	823	646	834
283	671	335	681	387	705	439	747	491	799	543	811	595	823	647	835
284	671	336	681	388	705	440	749	492	799	544	811	596	823	648	835
285	671	337	682	389	706	441	750	493	800	545	811	597	823	649	835
286	671	338	682	390	706	442	751	494	800	546	812	598	824	650	835
287	671	339	682	391	707	443	752	495	800	547	812	599	824		
288	671	340	683	392	707	444	754	496	800	548	812	600	824		
289	672	341	683	393	708	445	755	497	801	549	812	601	824		
290	672	342	683	394	709	446	756	498	801	550	813	602	824		
291	672	343	684	395	709	447	758	499	801	551	813	603	825		

Table 2.14

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Condition 2.2)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	658	292	672	344	684	396	710	448	758	500	802	552	819	604	836
241	665	293	672	345	684	397	710	449	760	501	803	553	819	605	836
242	665	294	672	346	685	398	711	450	761	502	803	554	820	606	836
243	665	295	672	347	685	399	712	451	762	503	803	555	820	607	837
244	665	296	672	348	686	400	712	452	764	504	803	556	820	608	837
245	666	297	673	349	686	401	713	453	765	505	804	557	820	609	837
246	666	298	673	350	686	402	714	454	767	506	804	558	821	610	838
247	666	299	673	351	687	403	714	455	768	507	804	559	821	611	838
248	666	300	673	352	687	404	715	456	769	508	805	560	821	612	838
249	666	301	673	353	688	405	716	457	771	509	805	561	822	613	838
250	666	302	674	354	688	406	717	458	772	510	805	562	822	614	839
251	666	303	674	355	688	407	717	459	774	511	806	563	822	615	839
252	667	304	674	356	689	408	718	460	775	512	806	564	823	616	839
253	667	305	674	357	689	409	719	461	777	513	806	565	823	617	840
254	667	306	674	358	690	410	720	462	778	514	807	566	823	618	840
255	667	307	675	359	690	411	720	463	780	515	807	567	824	619	840
256	667	308	675	360	691	412	721	464	781	516	807	568	824	620	841
257	667	309	675	361	691	413	722	465	783	517	808	569	824	621	841
258	667	310	675	362	692	414	723	466	784	518	808	570	825	622	841
259	667	311	675	363	692	415	724	467	785	519	808	571	825	623	842
260	667	312	676	364	693	416	724	468	787	520	809	572	825	624	842
261	668	313	676	365	693	417	725	469	788	521	809	573	826	625	842
262	668	314	676	366	694	418	726	470	789	522	809	574	826	626	843
263	668	315	676	367	694	419	727	471	790	523	810	575	826	627	843
264	668	316	676	368	695	420	728	472	792	524	810	576	827	628	843
265	668	317	677	369	695	421	729	473	793	525	810	577	827	629	844
266	668	318	677	370	696	422	730	474	794	526	811	578	827	630	844
267	668	319	677	371	696	423	731	475	794	527	811	579	828	631	844
268	668	320	677	372	697	424	731	476	794	528	811	580	828	632	845
269	668	321	677	373	697	425	732	477	795	529	812	581	828	633	845
270	669	322	678	374	698	426	733	478	795	530	812	582	829	634	845
271	669	323	678	375	698	427	734	479	795	531	812	583	829	635	846
272	669	324	678	376	699	428	735	480	796	532	812	584	829	636	846
273	669	325	678	377	699	429	736	481	796	533	813	585	829	637	846
274	669	326	679	378	700	430	737	482	796	534	813	586	830	638	846
275	669	327	679	379	700	431	738	483	797	535	813	587	830	639	847
276	669	328	679	380	701	432	739	484	797	536	814	588	830	640	847
277	669	329	679	381	701	433	740	485	797	537	814	589	831	641	847
278	670	330	680	382	702	434	741	486	798	538	814	590	831	642	848
279	670	331	680	383	702	435	742	487	798	539	815	591	831	643	848
280	670	332	680	384	703	436	744	488	798	540	815	592	832	644	848
281	670	333	681	385	703	437	745	489	799	541	815	593	832	645	849
282	670	334	681	386	704	438	746	490	799	542	816	594	832	646	849
283	670	335	681	387	704	439	747	491	799	543	816	595	833	647	849
284	670	336	681	388	705	440	748	492	800	544	816	596	833	648	850
285	671	337	682	389	706	441	750	493	800	545	817	597	833	649	850
286	671	338	682	390	706	442	751	494	800	546	817	598	834	650	850
287	671	339	682	391	707	443	752	495	801	547	817	599	834		
288	671	340	683	392	707	444	753	496	801	548	818	600	834		
289	671	341	683	393	708	445	755	497	801	549	818	601	835		
290	671	342	683	394	709	446	756	498	802	550	818	602	835		
291	671	343	684	395	709	447	757	499	802	551	819	603	835		

Table 2.15

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Condition 2.3)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	660	292	672	344	684	396	710	448	759	500	804	552	820	604	836
241	665	293	672	345	684	397	710	449	760	501	805	553	821	605	837
242	665	294	672	346	685	398	711	450	762	502	805	554	821	606	837
243	665	295	673	347	685	399	712	451	763	503	805	555	821	607	837
244	666	296	673	348	686	400	712	452	765	504	805	556	821	608	837
245	666	297	673	349	686	401	713	453	766	505	806	557	822	609	838
246	666	298	673	350	686	402	714	454	768	506	806	558	822	610	838
247	666	299	673	351	687	403	714	455	769	507	806	559	822	611	838
248	666	300	673	352	687	404	715	456	770	508	807	560	823	612	839
249	667	301	674	353	688	405	716	457	772	509	807	561	823	613	839
250	667	302	674	354	688	406	716	458	774	510	807	562	823	614	839
251	667	303	674	355	688	407	717	459	775	511	808	563	824	615	840
252	667	304	674	356	689	408	718	460	777	512	808	564	824	616	840
253	667	305	674	357	689	409	719	461	778	513	808	565	824	617	840
254	667	306	675	358	690	410	720	462	780	514	809	566	825	618	841
255	667	307	675	359	690	411	720	463	781	515	809	567	825	619	841
256	668	308	675	360	691	412	721	464	783	516	809	568	825	620	841
257	668	309	675	361	691	413	722	465	784	517	809	569	825	621	841
258	668	310	675	362	692	414	723	466	786	518	810	570	826	622	842
259	668	311	675	363	692	415	724	467	787	519	810	571	826	623	842
260	668	312	676	364	693	416	724	468	789	520	810	572	826	624	842
261	668	313	676	365	693	417	725	469	790	521	811	573	827	625	843
262	668	314	676	366	694	418	726	470	791	522	811	574	827	626	843
263	668	315	676	367	694	419	727	471	792	523	811	575	827	627	843
264	668	316	676	368	695	420	728	472	794	524	812	576	828	628	844
265	668	317	677	369	695	421	729	473	795	525	812	577	828	629	844
266	668	318	677	370	695	422	729	474	796	526	812	578	828	630	844
267	668	319	677	371	696	423	730	475	797	527	813	579	829	631	845
268	668	320	677	372	696	424	731	476	797	528	813	580	829	632	845
269	669	321	677	373	697	425	732	477	797	529	813	581	829	633	845
270	669	322	678	374	697	426	733	478	797	530	813	582	829	634	845
271	669	323	678	375	698	427	734	479	798	531	814	583	830	635	846
272	669	324	678	376	698	428	735	480	798	532	814	584	830	636	846
273	669	325	678	377	699	429	736	481	798	533	814	585	830	637	846
274	669	326	679	378	699	430	737	482	799	534	815	586	831	638	847
275	669	327	679	379	700	431	738	483	799	535	815	587	831	639	847
276	669	328	679	380	700	432	739	484	799	536	815	588	831	640	847
277	669	329	679	381	701	433	740	485	800	537	816	589	832	641	848
278	670	330	679	382	701	434	741	486	800	538	816	590	832	642	848
279	670	331	680	383	702	435	742	487	800	539	816	591	832	643	848
280	670	332	680	384	702	436	743	488	801	540	817	592	833	644	849
281	670	333	680	385	703	437	745	489	801	541	817	593	833	645	849
282	670	334	681	386	704	438	746	490	801	542	817	594	833	646	849
283	670	335	681	387	704	439	747	491	801	543	817	595	833	647	849
284	670	336	681	388	705	440	748	492	802	544	818	596	834	648	850
285	671	337	682	389	705	441	750	493	802	545	818	597	834	649	850
286	671	338	682	390	706	442	751	494	802	546	818	598	834	650	850
287	671	339	682	391	706	443	752	495	803	547	819	599	835		
288	671	340	683	392	707	444	753	496	803	548	819	600	835		
289	671	341	683	393	708	445	755	497	803	549	819	601	835		
290	671	342	683	394	708	446	756	498	804	550	820	602	836		
291	672	343	684	395	709	447	757	499	804	551	820	603	836		

Table 2.16

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Condition 2.4)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	659	292	673	344	685	396	710	448	758	500	833
241	665	293	673	345	685	397	710	449	760	501	835
242	665	294	673	346	685	398	711	450	761	502	836
243	666	295	673	347	686	399	712	451	762	503	838
244	666	296	673	348	686	400	712	452	764	504	839
245	666	297	674	349	686	401	713	453	765	505	841
246	666	298	674	350	687	402	714	454	767	506	842
247	666	299	674	351	687	403	714	455	768	507	844
248	666	300	674	352	688	404	715	456	770	508	845
249	667	301	674	353	688	405	716	457	771	509	847
250	667	302	674	354	689	406	717	458	772	510	848
251	667	303	675	355	689	407	717	459	774	511	850
252	667	304	675	356	689	408	718	460	776		
253	667	305	675	357	690	409	719	461	777		
254	667	306	675	358	690	410	720	462	779		
255	667	307	675	359	691	411	720	463	780		
256	668	308	676	360	691	412	721	464	782		
257	668	309	676	361	692	413	722	465	783		
258	668	310	676	362	692	414	723	466	785		
259	668	311	676	363	693	415	723	467	786		
260	668	312	676	364	693	416	724	468	787		
261	668	313	676	365	694	417	725	469	788		
262	668	314	677	366	694	418	726	470	790		
263	669	315	677	367	694	419	727	471	791		
264	669	316	677	368	695	420	728	472	792		
265	669	317	677	369	695	421	728	473	793		
266	669	318	677	370	696	422	729	474	795		
267	669	319	678	371	696	423	730	475	796		
268	669	320	678	372	697	424	731	476	798		
269	669	321	678	373	697	425	732	477	799		
270	669	322	678	374	698	426	733	478	801		
271	670	323	679	375	698	427	734	479	802		
272	670	324	679	376	699	428	735	480	804		
273	670	325	679	377	699	429	736	481	805		
274	670	326	679	378	700	430	737	482	806		
275	670	327	679	379	700	431	738	483	808		
276	670	328	680	380	701	432	739	484	809		
277	670	329	680	381	701	433	740	485	811		
278	671	330	680	382	702	434	741	486	812		
279	671	331	681	383	702	435	742	487	814		
280	671	332	681	384	703	436	743	488	815		
281	671	333	681	385	704	437	745	489	817		
282	671	334	681	386	704	438	746	490	818		
283	671	335	682	387	705	439	747	491	820		
284	671	336	682	388	705	440	748	492	821		
285	672	337	682	389	706	441	749	493	823		
286	672	338	683	390	706	442	751	494	824		
287	672	339	683	391	707	443	752	495	826		
288	672	340	683	392	707	444	753	496	827		
289	672	341	683	393	708	445	755	497	829		
290	672	342	684	394	709	446	756	498	830		
291	673	343	684	395	709	447	757	499	832		

Table 2.17

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Condition 3.1)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	292	671	344	687	396	713	448	762	500	817	552	831	604	841
241	650	293	671	345	687	397	713	449	763	501	818	553	831	605	842
242	651	294	671	346	688	398	714	450	765	502	819	554	831	606	842
243	651	295	671	347	688	399	715	451	766	503	820	555	832	607	842
244	651	296	672	348	689	400	716	452	767	504	820	556	832	608	842
245	652	297	672	349	689	401	716	453	769	505	821	557	832	609	842
246	652	298	672	350	689	402	717	454	770	506	821	558	832	610	843
247	653	299	672	351	690	403	718	455	771	507	822	559	832	611	843
248	653	300	673	352	690	404	718	456	772	508	822	560	833	612	843
249	653	301	673	353	691	405	719	457	774	509	823	561	833	613	843
250	654	302	673	354	691	406	720	458	775	510	823	562	833	614	843
251	654	303	673	355	691	407	721	459	776	511	823	563	833	615	843
252	655	304	674	356	692	408	722	460	777	512	823	564	833	616	844
253	655	305	674	357	692	409	722	461	779	513	823	565	834	617	844
254	655	306	674	358	693	410	723	462	780	514	824	566	834	618	844
255	656	307	675	359	693	411	724	463	781	515	824	567	834	619	844
256	656	308	675	360	694	412	725	464	782	516	824	568	834	620	844
257	657	309	675	361	694	413	726	465	783	517	824	569	834	621	845
258	657	310	675	362	695	414	726	466	785	518	824	570	835	622	845
259	658	311	676	363	695	415	727	467	786	519	825	571	835	623	845
260	658	312	676	364	695	416	728	468	787	520	825	572	835	624	845
261	658	313	676	365	696	417	729	469	788	521	825	573	835	625	845
262	659	314	676	366	696	418	730	470	789	522	825	574	835	626	846
263	659	315	677	367	697	419	731	471	790	523	825	575	836	627	846
264	660	316	677	368	697	420	732	472	792	524	826	576	836	628	846
265	660	317	677	369	698	421	733	473	793	525	826	577	836	629	846
266	660	318	678	370	698	422	734	474	794	526	826	578	836	630	846
267	661	319	678	371	699	423	735	475	795	527	826	579	836	631	847
268	661	320	679	372	699	424	736	476	796	528	826	580	837	632	847
269	662	321	679	373	700	425	737	477	797	529	827	581	837	633	847
270	662	322	679	374	700	426	738	478	798	530	827	582	837	634	847
271	662	323	679	375	701	427	739	479	799	531	827	583	837	635	847
272	663	324	680	376	701	428	740	480	800	532	827	584	837	636	848
273	663	325	680	377	702	429	741	481	801	533	827	585	838	637	848
274	664	326	680	378	702	430	742	482	802	534	828	586	838	638	848
275	664	327	681	379	703	431	743	483	803	535	828	587	838	639	848
276	665	328	681	380	703	432	744	484	804	536	828	588	838	640	848
277	665	329	682	381	704	433	745	485	805	537	828	589	838	641	849
278	665	330	682	382	704	434	746	486	805	538	828	590	839	642	849
279	666	331	682	383	705	435	747	487	806	539	829	591	839	643	849
280	666	332	683	384	706	436	748	488	807	540	829	592	839	644	849
281	667	333	683	385	706	437	749	489	808	541	829	593	839	645	849
282	667	334	683	386	707	438	750	490	809	542	829	594	839	646	850
283	667	335	684	387	707	439	751	491	810	543	829	595	840	647	850
284	668	336	684	388	708	440	753	492	811	544	829	596	840	648	850
285	668	337	684	389	708	441	754	493	811	545	830	597	840	649	850
286	669	338	685	390	709	442	755	494	812	546	830	598	840	650	850
287	669	339	685	391	710	443	756	495	813	547	830	599	840		
288	669	340	686	392	710	444	757	496	814	548	830	600	841		
289	670	341	686	393	711	445	758	497	815	549	830	601	841		
290	670	342	686	394	712	446	760	498	816	550	831	602	841		
291	670	343	687	395	712	447	761	499	816	551	831	603	841		

Table 2.18

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Condition 3.2)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	292	674	344	689	396	713	448	762	500	816	552	833	604	842
241	650	293	674	345	689	397	714	449	763	501	817	553	833	605	842
242	651	294	675	346	690	398	715	450	764	502	818	554	833	606	843
243	651	295	675	347	690	399	715	451	766	503	818	555	833	607	843
244	652	296	675	348	690	400	716	452	767	504	819	556	834	608	843
245	652	297	676	349	691	401	717	453	768	505	820	557	834	609	843
246	653	298	676	350	691	402	717	454	770	506	820	558	834	610	843
247	654	299	676	351	691	403	718	455	771	507	821	559	834	611	843
248	654	300	677	352	692	404	719	456	772	508	822	560	834	612	844
249	655	301	677	353	692	405	720	457	773	509	823	561	835	613	844
250	655	302	677	354	693	406	720	458	775	510	823	562	835	614	844
251	656	303	677	355	693	407	721	459	776	511	824	563	835	615	844
252	656	304	678	356	693	408	722	460	777	512	825	564	835	616	844
253	657	305	678	357	694	409	723	461	778	513	826	565	835	617	845
254	657	306	678	358	694	410	723	462	779	514	826	566	835	618	845
255	658	307	678	359	695	411	724	463	781	515	826	567	836	619	845
256	658	308	679	360	695	412	725	464	782	516	827	568	836	620	845
257	659	309	679	361	695	413	726	465	783	517	827	569	836	621	845
258	660	310	679	362	696	414	727	466	784	518	827	570	836	622	845
259	660	311	679	363	696	415	728	467	785	519	827	571	836	623	846
260	661	312	680	364	697	416	729	468	787	520	827	572	836	624	846
261	661	313	680	365	697	417	729	469	788	521	827	573	837	625	846
262	662	314	680	366	697	418	730	470	789	522	828	574	837	626	846
263	662	315	680	367	698	419	731	471	790	523	828	575	837	627	846
264	663	316	681	368	698	420	732	472	791	524	828	576	837	628	846
265	663	317	681	369	699	421	733	473	792	525	828	577	837	629	847
266	664	318	681	370	699	422	734	474	793	526	828	578	838	630	847
267	664	319	681	371	700	423	735	475	794	527	828	579	838	631	847
268	665	320	682	372	700	424	736	476	795	528	829	580	838	632	847
269	666	321	682	373	701	425	737	477	796	529	829	581	838	633	847
270	666	322	682	374	701	426	738	478	797	530	829	582	838	634	848
271	667	323	683	375	702	427	739	479	798	531	829	583	838	635	848
272	667	324	683	376	702	428	740	480	799	532	829	584	839	636	848
273	668	325	683	377	703	429	741	481	800	533	830	585	839	637	848
274	668	326	683	378	703	430	742	482	801	534	830	586	839	638	848
275	669	327	684	379	704	431	743	483	802	535	830	587	839	639	848
276	669	328	684	380	704	432	744	484	803	536	830	588	839	640	849
277	670	329	684	381	705	433	745	485	804	537	830	589	840	641	849
278	670	330	685	382	705	434	746	486	805	538	830	590	840	642	849
279	670	331	685	383	706	435	747	487	806	539	831	591	840	643	849
280	670	332	685	384	706	436	748	488	807	540	831	592	840	644	849
281	671	333	685	385	707	437	749	489	807	541	831	593	840	645	850
282	671	334	686	386	707	438	750	490	808	542	831	594	840	646	850
283	672	335	686	387	708	439	751	491	809	543	831	595	841	647	850
284	672	336	686	388	708	440	752	492	810	544	831	596	841	648	850
285	672	337	687	389	709	441	754	493	811	545	832	597	841	649	850
286	672	338	687	390	710	442	755	494	811	546	832	598	841	650	850
287	673	339	687	391	710	443	756	495	812	547	832	599	841		
288	673	340	688	392	711	444	757	496	813	548	832	600	841		
289	673	341	688	393	711	445	758	497	814	549	832	601	842		
290	674	342	688	394	712	446	760	498	815	550	833	602	842		
291	674	343	689	395	713	447	761	499	815	551	833	603	842		

Table 2.19

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Condition 3.3)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	292	671	344	688	396	713	448	762	500	819	552	832	604	842
241	650	293	672	345	688	397	713	449	764	501	819	553	833	605	842
242	651	294	672	346	688	398	714	450	765	502	820	554	833	606	842
243	651	295	672	347	689	399	715	451	766	503	821	555	833	607	843
244	651	296	672	348	689	400	716	452	768	504	822	556	833	608	843
245	652	297	673	349	690	401	716	453	769	505	823	557	833	609	843
246	652	298	673	350	690	402	717	454	770	506	823	558	834	610	843
247	653	299	673	351	690	403	718	455	771	507	824	559	834	611	843
248	653	300	674	352	691	404	718	456	773	508	824	560	834	612	843
249	654	301	674	353	691	405	719	457	774	509	825	561	834	613	844
250	654	302	674	354	692	406	720	458	775	510	825	562	834	614	844
251	654	303	674	355	692	407	721	459	777	511	825	563	834	615	844
252	655	304	675	356	692	408	721	460	778	512	825	564	835	616	844
253	655	305	675	357	693	409	722	461	779	513	825	565	835	617	844
254	656	306	675	358	693	410	723	462	780	514	826	566	835	618	845
255	656	307	676	359	694	411	724	463	781	515	826	567	835	619	845
256	657	308	676	360	694	412	725	464	783	516	826	568	835	620	845
257	657	309	676	361	694	413	726	465	784	517	826	569	836	621	845
258	657	310	677	362	695	414	726	466	785	518	826	570	836	622	845
259	658	311	677	363	695	415	727	467	786	519	826	571	836	623	845
260	658	312	677	364	696	416	728	468	788	520	827	572	836	624	846
261	659	313	677	365	696	417	729	469	789	521	827	573	836	625	846
262	659	314	678	366	697	418	730	470	790	522	827	574	836	626	846
263	660	315	678	367	697	419	731	471	791	523	827	575	837	627	846
264	660	316	678	368	698	420	732	472	792	524	827	576	837	628	846
265	660	317	679	369	698	421	733	473	793	525	828	577	837	629	847
266	661	318	679	370	699	422	734	474	794	526	828	578	837	630	847
267	661	319	679	371	699	423	735	475	796	527	828	579	837	631	847
268	662	320	680	372	699	424	736	476	797	528	828	580	838	632	847
269	662	321	680	373	700	425	737	477	798	529	828	581	838	633	847
270	663	322	680	374	700	426	738	478	799	530	828	582	838	634	847
271	663	323	681	375	701	427	739	479	800	531	829	583	838	635	848
272	663	324	681	376	701	428	740	480	801	532	829	584	838	636	848
273	664	325	681	377	702	429	741	481	802	533	829	585	839	637	848
274	664	326	682	378	702	430	742	482	803	534	829	586	839	638	848
275	665	327	682	379	703	431	743	483	804	535	829	587	839	639	848
276	665	328	682	380	703	432	744	484	805	536	830	588	839	640	849
277	666	329	683	381	704	433	745	485	806	537	830	589	839	641	849
278	666	330	683	382	705	434	746	486	806	538	830	590	839	642	849
279	666	331	683	383	705	435	747	487	807	539	830	591	840	643	849
280	667	332	684	384	706	436	748	488	808	540	830	592	840	644	849
281	667	333	684	385	706	437	749	489	809	541	830	593	840	645	849
282	668	334	684	386	707	438	750	490	810	542	831	594	840	646	850
283	668	335	685	387	707	439	751	491	811	543	831	595	840	647	850
284	669	336	685	388	708	440	753	492	812	544	831	596	841	648	850
285	669	337	685	389	708	441	754	493	813	545	831	597	841	649	850
286	669	338	686	390	709	442	755	494	814	546	831	598	841	650	850
287	670	339	686	391	710	443	756	495	814	547	832	599	841		
288	670	340	686	392	710	444	757	496	815	548	832	600	841		
289	671	341	687	393	711	445	759	497	816	549	832	601	841		
290	671	342	687	394	712	446	760	498	817	550	832	602	842		
291	671	343	687	395	712	447	761	499	818	551	832	603	842		

Table 2.20

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Condition 3.4)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	650	292	673	344	688	396	713	448	762	500	818	552	834	604	843
241	650	293	673	345	689	397	713	449	764	501	818	553	834	605	843
242	651	294	673	346	689	398	714	450	765	502	819	554	834	606	843
243	651	295	674	347	689	399	715	451	766	503	820	555	835	607	843
244	652	296	674	348	690	400	715	452	767	504	821	556	835	608	843
245	652	297	674	349	690	401	716	453	769	505	822	557	835	609	844
246	653	298	675	350	690	402	717	454	770	506	822	558	835	610	844
247	653	299	675	351	691	403	718	455	771	507	823	559	835	611	844
248	654	300	675	352	691	404	718	456	772	508	824	560	835	612	844
249	654	301	675	353	692	405	719	457	774	509	825	561	836	613	844
250	654	302	676	354	692	406	720	458	775	510	826	562	836	614	844
251	655	303	676	355	692	407	721	459	776	511	826	563	836	615	845
252	655	304	676	356	693	408	721	460	777	512	827	564	836	616	845
253	656	305	677	357	693	409	722	461	779	513	827	565	836	617	845
254	656	306	677	358	694	410	723	462	780	514	828	566	836	618	845
255	657	307	677	359	694	411	724	463	781	515	828	567	837	619	845
256	657	308	677	360	694	412	725	464	782	516	828	568	837	620	845
257	658	309	678	361	695	413	726	465	783	517	828	569	837	621	846
258	658	310	678	362	695	414	726	466	785	518	828	570	837	622	846
259	659	311	678	363	696	415	727	467	786	519	829	571	837	623	846
260	659	312	679	364	696	416	728	468	787	520	829	572	837	624	846
261	660	313	679	365	696	417	729	469	788	521	829	573	838	625	846
262	660	314	679	366	697	418	730	470	789	522	829	574	838	626	846
263	661	315	679	367	697	419	731	471	790	523	829	575	838	627	847
264	661	316	680	368	698	420	732	472	792	524	829	576	838	628	847
265	662	317	680	369	698	421	733	473	793	525	830	577	838	629	847
266	662	318	680	370	699	422	734	474	794	526	830	578	838	630	847
267	663	319	680	371	699	423	735	475	795	527	830	579	839	631	847
268	663	320	681	372	700	424	736	476	796	528	830	580	839	632	847
269	664	321	681	373	700	425	737	477	797	529	830	581	839	633	848
270	664	322	681	374	701	426	738	478	798	530	830	582	839	634	848
271	664	323	682	375	701	427	739	479	799	531	831	583	839	635	848
272	665	324	682	376	702	428	740	480	800	532	831	584	839	636	848
273	665	325	682	377	702	429	741	481	801	533	831	585	840	637	848
274	666	326	682	378	703	430	742	482	802	534	831	586	840	638	848
275	666	327	683	379	703	431	743	483	803	535	831	587	840	639	849
276	667	328	683	380	704	432	744	484	804	536	831	588	840	640	849
277	667	329	683	381	704	433	745	485	805	537	832	589	840	641	849
278	668	330	684	382	705	434	746	486	806	538	832	590	840	642	849
279	668	331	684	383	705	435	747	487	807	539	832	591	841	643	849
280	669	332	684	384	706	436	748	488	807	540	832	592	841	644	849
281	669	333	685	385	706	437	749	489	808	541	832	593	841	645	850
282	670	334	685	386	707	438	750	490	809	542	832	594	841	646	850
283	670	335	685	387	707	439	751	491	810	543	833	595	841	647	850
284	670	336	686	388	708	440	753	492	811	544	833	596	841	648	850
285	671	337	686	389	708	441	754	493	812	545	833	597	842	649	850
286	671	338	686	390	709	442	755	494	813	546	833	598	842	650	850
287	671	339	687	391	710	443	756	495	813	547	833	599	842		
288	672	340	687	392	710	444	757	496	814	548	833	600	842		
289	672	341	687	393	711	445	759	497	815	549	834	601	842		
290	672	342	688	394	712	446	760	498	816	550	834	602	842		
291	672	343	688	395	712	447	761	499	817	551	834	603	843		

Table 2.21

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Combined Condition 1)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	660	292	673	344	685	396	710	448	761	500	816	552	828	604	840
241	666	293	673	345	685	397	711	449	762	501	816	553	828	605	840
242	666	294	673	346	685	398	712	450	764	502	816	554	828	606	840
243	666	295	673	347	686	399	712	451	765	503	817	555	829	607	841
244	667	296	673	348	686	400	713	452	766	504	817	556	829	608	841
245	667	297	673	349	686	401	714	453	768	505	817	557	829	609	841
246	667	298	674	350	687	402	714	454	769	506	817	558	829	610	841
247	667	299	674	351	687	403	715	455	771	507	818	559	830	611	841
248	667	300	674	352	688	404	716	456	772	508	818	560	830	612	842
249	667	301	674	353	688	405	717	457	773	509	818	561	830	613	842
250	667	302	674	354	689	406	717	458	775	510	818	562	830	614	842
251	667	303	674	355	689	407	718	459	776	511	818	563	830	615	842
252	667	304	675	356	690	408	719	460	777	512	819	564	831	616	843
253	668	305	675	357	690	409	720	461	778	513	819	565	831	617	843
254	668	306	675	358	690	410	721	462	780	514	819	566	831	618	843
255	668	307	675	359	691	411	722	463	781	515	819	567	831	619	843
256	668	308	675	360	691	412	722	464	782	516	820	568	832	620	844
257	668	309	675	361	692	413	723	465	783	517	820	569	832	621	844
258	668	310	676	362	692	414	724	466	785	518	820	570	832	622	844
259	668	311	676	363	693	415	725	467	786	519	820	571	832	623	844
260	668	312	676	364	693	416	726	468	787	520	821	572	832	624	844
261	668	313	676	365	694	417	727	469	788	521	821	573	833	625	845
262	668	314	676	366	694	418	727	470	790	522	821	574	833	626	845
263	669	315	677	367	695	419	728	471	791	523	821	575	833	627	845
264	669	316	677	368	695	420	729	472	792	524	821	576	833	628	845
265	669	317	677	369	696	421	730	473	793	525	822	577	834	629	846
266	669	318	677	370	696	422	731	474	794	526	822	578	834	630	846
267	669	319	678	371	697	423	732	475	795	527	822	579	834	631	846
268	669	320	678	372	697	424	733	476	796	528	822	580	834	632	846
269	669	321	678	373	698	425	734	477	797	529	823	581	835	633	846
270	669	322	678	374	698	426	735	478	798	530	823	582	835	634	847
271	669	323	678	375	699	427	736	479	799	531	823	583	835	635	847
272	670	324	679	376	699	428	737	480	800	532	823	584	835	636	847
273	670	325	679	377	700	429	738	481	801	533	824	585	835	637	847
274	670	326	679	378	700	430	739	482	802	534	824	586	836	638	848
275	670	327	679	379	701	431	740	483	803	535	824	587	836	639	848
276	670	328	680	380	701	432	741	484	804	536	824	588	836	640	848
277	670	329	680	381	702	433	742	485	805	537	824	589	836	641	848
278	670	330	680	382	702	434	744	486	806	538	825	590	837	642	849
279	670	331	680	383	703	435	745	487	807	539	825	591	837	643	849
280	671	332	681	384	703	436	746	488	808	540	825	592	837	644	849
281	671	333	681	385	704	437	747	489	809	541	825	593	837	645	849
282	671	334	681	386	705	438	748	490	810	542	826	594	838	646	849
283	671	335	682	387	705	439	750	491	811	543	826	595	838	647	850
284	671	336	682	388	706	440	751	492	812	544	826	596	838	648	850
285	671	337	682	389	706	441	752	493	813	545	826	597	838	649	850
286	672	338	682	390	707	442	753	494	814	546	827	598	838	650	850
287	672	339	683	391	707	443	755	495	815	547	827	599	839		
288	672	340	683	392	708	444	756	496	815	548	827	600	839		
289	672	341	684	393	709	445	757	497	815	549	827	601	839		
290	672	342	684	394	709	446	758	498	816	550	827	602	839		
291	672	343	684	395	710	447	760	499	816	551	828	603	840		

Table 2.22

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Combined Condition 2)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	662	292	676	344	688	396	714	448	767	500	821	552	831	604	841
241	668	293	676	345	688	397	715	449	768	501	821	553	831	605	841
242	668	294	676	346	689	398	716	450	770	502	821	554	831	606	842
243	668	295	676	347	689	399	716	451	771	503	821	555	832	607	842
244	669	296	677	348	689	400	717	452	772	504	822	556	832	608	842
245	669	297	677	349	690	401	718	453	774	505	822	557	832	609	842
246	669	298	677	350	690	402	719	454	775	506	822	558	832	610	842
247	669	299	677	351	691	403	720	455	776	507	822	559	832	611	843
248	669	300	677	352	691	404	720	456	777	508	822	560	833	612	843
249	670	301	677	353	691	405	721	457	779	509	823	561	833	613	843
250	670	302	678	354	692	406	722	458	780	510	823	562	833	614	843
251	670	303	678	355	692	407	723	459	781	511	823	563	833	615	843
252	670	304	678	356	693	408	724	460	782	512	823	564	833	616	844
253	670	305	678	357	693	409	725	461	783	513	823	565	834	617	844
254	670	306	678	358	694	410	725	462	785	514	823	566	834	618	844
255	670	307	678	359	694	411	726	463	786	515	824	567	834	619	844
256	671	308	679	360	694	412	727	464	787	516	824	568	834	620	844
257	671	309	679	361	695	413	728	465	788	517	824	569	834	621	845
258	671	310	679	362	695	414	729	466	789	518	824	570	835	622	845
259	671	311	679	363	696	415	730	467	791	519	824	571	835	623	845
260	671	312	679	364	696	416	731	468	792	520	825	572	835	624	845
261	671	313	680	365	697	417	732	469	793	521	825	573	835	625	845
262	671	314	680	366	697	418	733	470	794	522	825	574	835	626	846
263	672	315	680	367	698	419	734	471	795	523	825	575	836	627	846
264	672	316	680	368	698	420	735	472	796	524	825	576	836	628	846
265	672	317	680	369	699	421	736	473	797	525	826	577	836	629	846
266	672	318	681	370	699	422	737	474	798	526	826	578	836	630	846
267	672	319	681	371	700	423	738	475	799	527	826	579	836	631	847
268	672	320	681	372	700	424	739	476	800	528	826	580	837	632	847
269	672	321	681	373	701	425	740	477	801	529	826	581	837	633	847
270	673	322	682	374	701	426	741	478	802	530	827	582	837	634	847
271	673	323	682	375	702	427	742	479	803	531	827	583	837	635	847
272	673	324	682	376	702	428	743	480	804	532	827	584	837	636	848
273	673	325	682	377	703	429	744	481	805	533	827	585	838	637	848
274	673	326	682	378	703	430	745	482	807	534	827	586	838	638	848
275	673	327	683	379	704	431	747	483	808	535	828	587	838	639	848
276	673	328	683	380	705	432	748	484	808	536	828	588	838	640	848
277	674	329	683	381	705	433	749	485	809	537	828	589	838	641	849
278	674	330	683	382	706	434	750	486	810	538	828	590	839	642	849
279	674	331	684	383	706	435	751	487	811	539	828	591	839	643	849
280	674	332	684	384	707	436	752	488	812	540	829	592	839	644	849
281	674	333	684	385	707	437	754	489	813	541	829	593	839	645	849
282	674	334	685	386	708	438	755	490	814	542	829	594	839	646	850
283	675	335	685	387	709	439	756	491	815	543	829	595	840	647	850
284	675	336	685	388	709	440	757	492	816	544	829	596	840	648	850
285	675	337	685	389	710	441	758	493	817	545	830	597	840	649	850
286	675	338	686	390	710	442	760	494	818	546	830	598	840	650	850
287	675	339	686	391	711	443	761	495	819	547	830	599	840		
288	675	340	686	392	712	444	762	496	820	548	830	600	841		
289	675	341	687	393	712	445	763	497	820	549	830	601	841		
290	676	342	687	394	713	446	765	498	820	550	831	602	841		
291	676	343	687	395	714	447	766	499	821	551	831	603	841		

Table 2.23

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Combined Condition 3)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	660	292	672	344	685	396	710	448	761	500	817	552	829	604	840
241	666	293	673	345	685	397	711	449	762	501	817	553	829	605	840
242	666	294	673	346	685	398	712	450	764	502	817	554	829	606	841
243	666	295	673	347	686	399	712	451	765	503	818	555	829	607	841
244	666	296	673	348	686	400	713	452	767	504	818	556	829	608	841
245	667	297	673	349	687	401	714	453	768	505	818	557	830	609	841
246	667	298	673	350	687	402	714	454	769	506	818	558	830	610	841
247	667	299	673	351	687	403	715	455	771	507	819	559	830	611	842
248	667	300	674	352	688	404	716	456	772	508	819	560	830	612	842
249	667	301	674	353	688	405	716	457	774	509	819	561	831	613	842
250	667	302	674	354	689	406	717	458	775	510	819	562	831	614	842
251	667	303	674	355	689	407	718	459	776	511	819	563	831	615	843
252	667	304	674	356	689	408	719	460	777	512	820	564	831	616	843
253	667	305	675	357	690	409	720	461	779	513	820	565	831	617	843
254	667	306	675	358	690	410	720	462	780	514	820	566	832	618	843
255	668	307	675	359	691	411	721	463	781	515	820	567	832	619	843
256	668	308	675	360	691	412	722	464	783	516	821	568	832	620	844
257	668	309	675	361	692	413	723	465	784	517	821	569	832	621	844
258	668	310	676	362	692	414	724	466	785	518	821	570	833	622	844
259	668	311	676	363	693	415	725	467	786	519	821	571	833	623	844
260	668	312	676	364	693	416	725	468	788	520	821	572	833	624	845
261	668	313	676	365	694	417	726	469	789	521	822	573	833	625	845
262	668	314	676	366	694	418	727	470	790	522	822	574	833	626	845
263	668	315	677	367	695	419	728	471	791	523	822	575	834	627	845
264	668	316	677	368	695	420	729	472	793	524	822	576	834	628	845
265	669	317	677	369	696	421	730	473	794	525	823	577	834	629	846
266	669	318	677	370	696	422	731	474	795	526	823	578	834	630	846
267	669	319	677	371	696	423	732	475	796	527	823	579	835	631	846
268	669	320	678	372	697	424	733	476	797	528	823	580	835	632	846
269	669	321	678	373	697	425	734	477	798	529	823	581	835	633	847
270	669	322	678	374	698	426	735	478	799	530	824	582	835	634	847
271	669	323	678	375	699	427	736	479	800	531	824	583	835	635	847
272	669	324	679	376	699	428	737	480	801	532	824	584	836	636	847
273	669	325	679	377	700	429	738	481	802	533	824	585	836	637	847
274	670	326	679	378	700	430	739	482	803	534	825	586	836	638	848
275	670	327	679	379	700	431	740	483	804	535	825	587	836	639	848
276	670	328	680	380	701	432	741	484	805	536	825	588	837	640	848
277	670	329	680	381	701	433	742	485	806	537	825	589	837	641	848
278	670	330	680	382	702	434	743	486	807	538	825	590	837	642	849
279	670	331	680	383	703	435	745	487	808	539	826	591	837	643	849
280	670	332	681	384	703	436	746	488	809	540	826	592	837	644	849
281	670	333	681	385	704	437	747	489	810	541	826	593	838	645	849
282	671	334	681	386	704	438	748	490	811	542	826	594	838	646	849
283	671	335	682	387	705	439	750	491	812	543	827	595	838	647	850
284	671	336	682	388	705	440	751	492	813	544	827	596	838	648	850
285	671	337	682	389	706	441	752	493	814	545	827	597	839	649	850
286	671	338	683	390	706	442	753	494	815	546	827	598	839	650	850
287	671	339	683	391	707	443	755	495	816	547	827	599	839		
288	672	340	683	392	708	444	756	496	816	548	828	600	839		
289	672	341	684	393	708	445	757	497	816	549	828	601	839		
290	672	342	684	394	709	446	758	498	817	550	828	602	840		
291	672	343	684	395	710	447	760	499	817	551	828	603	840		

Table 2.24

Concordance Table for HSA Algebra Test and PARCC Algebra I Test (Combined Condition 4)

HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC	HSA	PARCC
240	661	292	675	344	686	396	712	448	763	500	820	552	831	604	841
241	667	293	675	345	687	397	713	449	765	501	820	553	831	605	841
242	667	294	675	346	687	398	713	450	766	502	821	554	831	606	842
243	667	295	675	347	687	399	714	451	767	503	821	555	831	607	842
244	668	296	675	348	688	400	715	452	769	504	821	556	831	608	842
245	668	297	676	349	688	401	715	453	770	505	821	557	832	609	842
246	668	298	676	350	689	402	716	454	771	506	821	558	832	610	842
247	668	299	676	351	689	403	717	455	773	507	822	559	832	611	843
248	668	300	676	352	689	404	718	456	774	508	822	560	832	612	843
249	669	301	676	353	690	405	718	457	775	509	822	561	832	613	843
250	669	302	677	354	690	406	719	458	777	510	822	562	833	614	843
251	669	303	677	355	691	407	720	459	778	511	822	563	833	615	843
252	669	304	677	356	691	408	721	460	779	512	823	564	833	616	844
253	669	305	677	357	692	409	722	461	780	513	823	565	833	617	844
254	669	306	677	358	692	410	722	462	782	514	823	566	834	618	844
255	669	307	677	359	692	411	723	463	783	515	823	567	834	619	844
256	670	308	678	360	693	412	724	464	784	516	823	568	834	620	844
257	670	309	678	361	693	413	725	465	785	517	824	569	834	621	845
258	670	310	678	362	694	414	726	466	786	518	824	570	834	622	845
259	670	311	678	363	694	415	727	467	788	519	824	571	835	623	845
260	670	312	678	364	695	416	728	468	789	520	824	572	835	624	845
261	670	313	678	365	695	417	729	469	790	521	824	573	835	625	845
262	670	314	679	366	696	418	729	470	791	522	825	574	835	626	846
263	670	315	679	367	696	419	730	471	792	523	825	575	835	627	846
264	671	316	679	368	697	420	731	472	794	524	825	576	836	628	846
265	671	317	679	369	697	421	732	473	795	525	825	577	836	629	846
266	671	318	679	370	698	422	733	474	796	526	825	578	836	630	846
267	671	319	680	371	698	423	734	475	797	527	826	579	836	631	847
268	671	320	680	372	699	424	735	476	798	528	826	580	836	632	847
269	671	321	680	373	699	425	736	477	799	529	826	581	837	633	847
270	671	322	680	374	700	426	737	478	800	530	826	582	837	634	847
271	672	323	680	375	700	427	738	479	801	531	826	583	837	635	847
272	672	324	681	376	701	428	739	480	802	532	827	584	837	636	848
273	672	325	681	377	701	429	740	481	803	533	827	585	837	637	848
274	672	326	681	378	702	430	742	482	804	534	827	586	838	638	848
275	672	327	681	379	702	431	743	483	805	535	827	587	838	639	848
276	672	328	682	380	703	432	744	484	806	536	827	588	838	640	848
277	672	329	682	381	703	433	745	485	807	537	828	589	838	641	849
278	673	330	682	382	704	434	746	486	808	538	828	590	838	642	849
279	673	331	682	383	704	435	747	487	809	539	828	591	839	643	849
280	673	332	683	384	705	436	748	488	810	540	828	592	839	644	849
281	673	333	683	385	705	437	750	489	811	541	828	593	839	645	849
282	673	334	683	386	706	438	751	490	812	542	829	594	839	646	850
283	673	335	683	387	707	439	752	491	812	543	829	595	839	647	850
284	673	336	684	388	707	440	753	492	813	544	829	596	840	648	850
285	674	337	684	389	708	441	754	493	814	545	829	597	840	649	850
286	674	338	684	390	708	442	756	494	815	546	829	598	840	650	850
287	674	339	685	391	709	443	757	495	816	547	830	599	840		
288	674	340	685	392	709	444	758	496	817	548	830	600	840		
289	674	341	685	393	710	445	760	497	817	549	830	601	841		
290	674	342	686	394	711	446	761	498	818	550	830	602	841		
291	675	343	686	395	711	447	762	499	819	551	830	603	841		

Impact

To evaluate the impact of the cut scores obtained using different methods to link HSA and PARCC tests, the percentage of passing for each cut score is summarized in Tables 2.25 and 2.26 for ELA10 and Algebra respectively. The red color indicates the cut scores obtained using PSAT as an external linking test while the green color indicates the cut scores obtained using the propensity score matching method. For Algebra I, the blue color indicates the cut scores using the combined matched samples from Design II and III using propensity score matching. The black color indicates the passing rates for other PARCC scores adjacent to the cut scores obtained in this study.

Table 2.25

Passing Rates for the PARCC ELA10 Test

Cut score	700	701	702	703	704	705	706	707	708	709	710	711	712
Passing rate	78.65%	77.98%	77.29%	76.72%	76.07%	75.30%	74.67%	73.96%	73.23%	72.60%	71.88%	71.23%	70.32%
Count	43,750	43,378	42,997	42,676	42,314	41,889	41,540	41,144	40,737	40,386	39,984	39,625	39,118
Cut score	713	714	715	716	717	718	719	720	721	722	723	724	725
Passing rate	69.91%	69.02%	68.40%	67.76%	67.89%	66.22%	65.43%	64.62%	63.86%	63.02%	62.32%	61.35%	60.60%
Count	38,889	38,395	38,049	37,695	37,768	36,839	36,398	35,945	35,526	35,058	34,670	34,127	33,713

Table 2.26

Passing Rates for the PARCC Algebra I Test

Cut score	700	701	702	703	704	705	706	707	708	709	710	711	712	713
Passing rate	86.99%	85.54%	84.36%	83.47%	83.07%	82.51%	81.44%	79.18%	78.58%	78.04%	77.20%	75.53%	73.83%	73.26%
Count	53,722	52,832	52,100	51,550	51,305	50,958	50,298	48,904	48,533	48,199	47,679	46,649	45,597	45,246
Cut score	714	715	716	717	718	719	720	721	722	723	724	725	726	727
Passing rate	72.36%	70.68%	69.15%	68.29%	63.58%	65.83%	65.06%	63.58%	62.08%	61.00%	60.34%	58.37%	57.170%	56.346%
Count	44,690	43,649	42,709	42,177	39,264	40,659	40,182	39,264	38,342	37,675	37,267	36,047	35,308	34,799

These passing rates are also compared with the HSA historical passing rates as shown in Tables 2.27 and 2.28 for English and Algebra respectively. Figures 1 and 2 present the trend of the passing rate for HSA tests across years. In general, students taking HSA in different months differed in their test scores for both English and Algebra. Within each year, a majority of the students took the May HSA tests. Students who took the 2015 PARCC would be expected to resemble the May test takers of HSA better than other months' test-takers. The passing rates for the May HSA English tests ranged from 68.78 % to 76.74% while those for Algebra ranged from 67.70% to 75.23%. The yearly passing rates from 2008 to 2014 go from 64.32 % to 75.62% for English and from 65.51% to 73.77% for Algebra.

Overall, the PARCC ELA10 equivalent cut scores based on both methods produced the passing rates falling within the range of the HSA historical May and yearly passing rates except the cut score of 704 yielding a higher passing rate. Compared with the propensity score matching method, the PSAT linking produced a slightly higher PARCC equivalent cut score which leads to slightly lower passing rate for ELA10.

Table 2.27

Passing Rates for the HSA English Test

Month	Year	Min	Max	Mean	SD	N	%pass	year %pass
Jan	2008	240	650	391.88	36.99	11125	44.41%	64.32%
Jan	2009	240	650	402.72	34.97	7492	60.76%	71.27%
Jan	2010	240	650	408.03	33.40	6883	68.63%	73.62%
Jan	2011	240	650	405.02	34.49	7497	67.77%	73.68%
Jan	2012	240	650	407.42	33.23	6765	68.38%	75.62%
Jan	2013	240	522	403.82	36.00	5568	68.12%	73.05%
Jan	2014	240	650	402.70	36.73	4911	67.28%	74.04%
April	2009	240	455	382.67	38.00	307	41.37%	71.27%
April	2010	240	650	387.94	43.51	129	41.09%	73.62%
April	2011	240	450	382.96	34.24	144	37.50%	73.68%
April	2012	240	448	378.82	37.04	101	34.65%	75.62%
April	2013	240	475	385.79	34.69	140	35.00%	73.05%
April	2014	240	447	376.51	46.04	122	37.70%	74.04%
May	2008	240	650	409.82	34.70	58173	68.78%	64.32%
May	2009	240	650	411.41	33.43	55007	73.35%	71.27%
May	2010	240	650	411.39	32.37	54679	74.58%	73.62%
May	2011	240	650	411.34	33.03	53671	74.75%	73.68%
May	2012	240	650	413.29	30.09	52767	76.74%	75.62%
May	2013	240	650	409.94	34.19	52480	73.68%	73.05%
May	2014	240	650	410.76	32.07	52961	74.96%	74.04%
July	2008	240	462	385.70	38.60	310	47.42%	64.32%
July	2009	240	469	391.81	40.94	160	55.00%	71.27%
July	2010	240	484	393.81	39.99	126	57.14%	73.62%
July	2011	240	463	388.22	44.73	103	58.25%	73.68%
July	2012	240	447	394.38	31.11	125	56.80%	75.62%
July	2013	240	449	389.37	40.40	104	49.04%	73.05%
July	2014	240	471	381.80	46.44	154	46.75%	74.04%
Oct	2008	240	538	392.54	30.94	1154	54.59%	64.32%
Oct	2009	240	468	392.63	34.52	700	58.14%	71.27%
Oct	2010	240	500	398.16	30.95	715	65.87%	73.62%
Oct	2011	240	482	399.78	33.35	567	68.08%	73.68%
Oct	2012	240	507	402.92	35.30	587	75.98%	75.62%
Oct	2013	240	510	395.25	36.60	717	62.20%	73.05%
Oct	2014	240	479	392.30	38.55	847	56.67%	74.04%

The PARCC Algebra I equivalent cut score based on PSAT linking produced the lowest cut score which leads to a passing rate slightly lower than the lower bound of the yearly passing rate but below the range of the May passing rates. On the other hand, the PARCC cut scores obtained based on propensity score matching produced even higher cut scores yielding even lower passing rates when compared with both the May and yearly HSA passing rates for Algebra. Compared with the propensity score matching

method, the PSAT linking produced a lower PARCC equivalent cut score which leads to a higher passing rate for Algebra.

Table 2.28
Passing Rates for the HSA Algebra Test

Month	Year	Min	Max	Mean	SD	N	%pass	year %pass
Jan.	2008	240	650	391.65	37.65	11210	26.39%	65.51%
Jan.	2009	240	538	400.24	40.63	6272	41.65%	67.03%
Jan	2010	240	540	401.42	41.02	5057	44.24%	66.98%
Jan	2011	240	650	408.50	46.16	3245	56.12%	72.88%
Jan	2012	240	522	401.74	47.18	3318	49.46%	73.77%
Jan	2013	240	650	410.06	42.49	2852	57.43%	71.59%
Jan	2014	240	502	402.30	48.21	2789	52.35%	66.88%
April	2009	240	460	376.12	45.84	195	17.95%	67.03%
April	2010	240	478	386.84	43.06	164	26.22%	66.98%
April	2011	240	488	394.48	44.13	88	34.09%	72.88%
April	2012	256	499	408.42	48.58	59	55.93%	73.77%
April	2013	240	509	415.43	40.58	79	53.16%	71.59%
April	2014	295	471	394.77	39.59	48	31.25%	66.88%
May	2008	240	650	428.63	37.25	69227	72.59%	65.51%
May	2009	240	650	427.26	41.93	73165	69.88%	67.03%
May	2010	240	650	426.13	40.48	64195	69.11%	66.98%
May	2011	240	650	431.90	39.55	57107	74.08%	72.88%
May	2012	240	650	428.90	39.98	58817	75.23%	73.77%
May	2013	240	650	428.38	38.93	62026	72.33%	71.59%
May	2014	240	650	421.99	43.32	55817	67.70%	66.88%
July	2008	240	500	401.25	50.38	321	48.91%	65.51%
July	2009	240	486	412.33	43.05	161	55.28%	67.03%
July	2010	240	501	407.16	50.64	114	56.14%	66.98%
July	2011	240	500	417.00	48.15	85	64.71%	72.88%
July	2012	240	489	415.85	50.72	96	63.54%	73.77%
July	2013	240	489	417.21	46.94	70	65.71%	71.59%
July	2014	240	469	391.84	51.64	80	42.50%	66.88%
Oct.	2008	240	516	396.61	41.56	1355	41.92%	65.51%
Oct	2009	240	650	401.75	47.04	698	47.99%	67.03%
Oct	2010	240	498	405.89	42.46	513	55.36%	66.98%
Oct	2011	240	506	413.09	47.31	388	65.21%	72.88%
Oct	2012	240	540	409.65	50.07	325	61.85%	73.77%
Oct	2013	240	524	398.66	57.04	359	55.99%	71.59%
Oct	2014	240	519	394.84	52.11	773	45.15%	66.88%

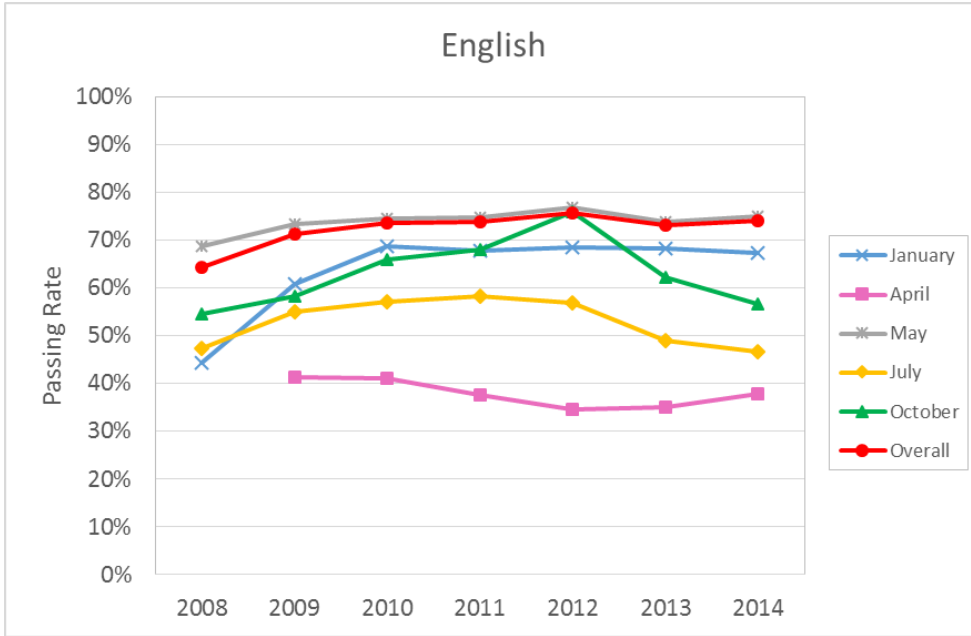


Figure 1. *Passing Rates for the HSA English Test*

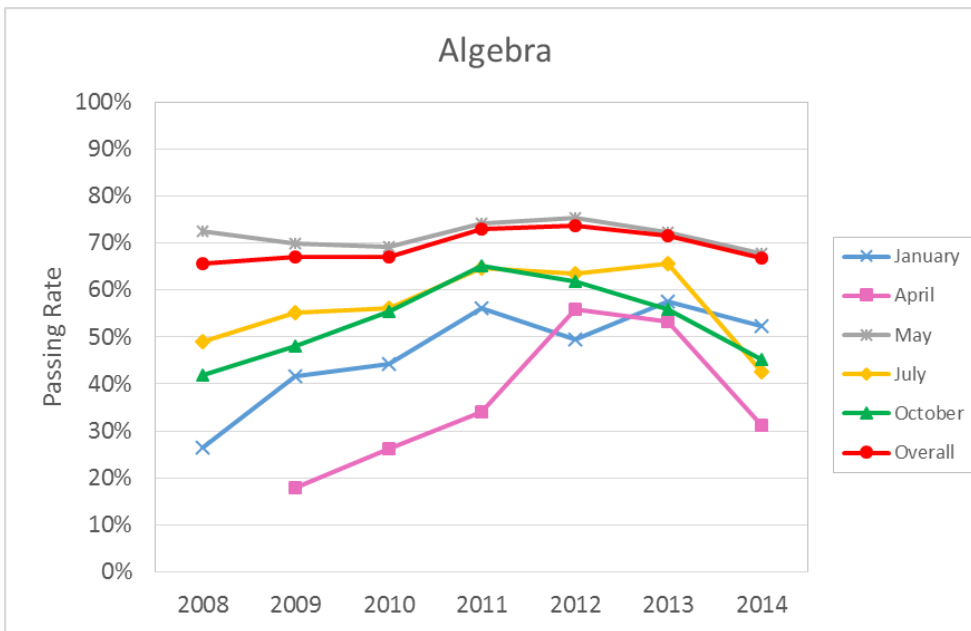


Figure 2. *Passing Rates for the HSA Algebra Test*

To further investigate the relationship between the mapped PARCC equivalents of HSA cut scores and the PARCC cut scores, especially the cut score that divides performance level 2 from 3 (a PARCC score of 725 for both ELA10 and Algebra I), the conditional standard error of measurement (CSEM) for the mapped PARCC cut score is utilized to construct a 95% confidence interval and 1 standard deviation above and below

the mapped cut scores using different methods. As multiple forms were constructed for the PARCC tests, the CSEM for the same PARCC score could be different for different forms. Thus, the mean, minimum, and maximum CSEM are used to construct the intervals respectively. The two intervals around the PARCC equivalent cut scores obtained using PSAT for linking are summarized in Tables 2.29. For ELA10, the 95% confidence interval around the mapped PARCC equivalent score of the HSA cut score using the mean and the maximum CSEM contained the PARCC cut score of 725 dividing level 2 and 3 while the interval one standard deviation above and below the CSEM did not contain the mapped PARCC cut score. Neither does the 95% confidence interval using the minimum CSEM. For Algebra I, all intervals contained the PARCC cut score of 725 as seen in Table 2.29. Similar patterns were found for the cut scores obtained using the propensity score matching method as shown in Tables 2.30 and 2.31.

Table 2.29
95% Confidence Intervals and One Standard Deviation above and below the Mapped PARCC Equivalent Cut Scores for Option I Using PSAT for Linking

Subject	Cut Score	Mean CSEM	Minimum CSEM	Maximum CSEM	95% CI	1 SD	95% CI	1 SD	95% CI	1 SD
					Mean CSEM	Mean CSEM	Minimum CSEM	Minimum CSEM	Maximum CSEM	Maximum CSEM
ELA10	707	9.80	8	10.7	(688, 726)	(697, 717)	(691, 723)	(699, 715)	(686, 728)	(696, 718)
Algebra I	720	10.73	9	11.8	(699, 741)	(709, 731)	(702, 738)	(711, 729)	(697, 743)	(708, 732)

Table 2.30
95% Confidence Intervals and One Standard Deviation above and below the Mapped PARCC Equivalent Cut Scores for Option II Using Propensity Score Matching

Subject	Cut Score	Mean CSEM	Minimum CSEM	Maximum CSEM	95% CI	1 SD	95% CI	1 SD	95% CI	1 SD
					Mean CSEM	Mean CSEM	Minimum CSEM	Minimum CSEM	Maximum CSEM	Maximum CSEM
ELA10	704	10.11	8.1	10.9	(684, 724)	(694, 714)	(688, 720)	(696, 712)	(683, 725)	(693, 715)
	705	9.99	9.2	10.8	(685, 725)	(695, 715)	(687, 723)	(696, 714)	(684, 726)	(694, 716)
	706	9.96	8.0	10.6	(686, 726)	(696, 716)	(690, 722)	(698, 714)	(685, 727)	(695, 717)
Algebra I	721	10.37	8.9	13.4	(701, 741)	(711, 731)	(704, 738)	(712, 730)	(695, 747)	(708, 734)
	725	9.81	8.5	10.9	(706, 744)	(715, 735)	(708, 742)	(717, 734)	(704, 746)	(714, 736)

Table 2.31
95% Confidence Intervals and One Standard Deviation above and below the Mapped PARCC Equivalent Cut Scores for Option II (Combining Design II and III) Using Propensity Score Matching

Subject	Cut Score	Mean CSEM	Minimum CSEM	Maximum CSEM	95% CI	1 SD	95% CI	1 SD	95% CI	1 SD
					Mean CSEM	Mean CSEM	Minimum CSEM	Minimum CSEM	Maximum CSEM	Maximum CSEM
Algebra I	722	10.15	8.8	12.5	(702, 742)	(712, 732)	(705, 739)	(713, 731)	(698, 747)	(710, 735)
	724	10.14	8.7	11.3	(704, 744)	(714, 734)	(707, 741)	(715, 733)	(702, 746)	(713, 735)
	727	9.70	8.4	10.7	(708, 746)	(717, 737)	(711, 743)	(719, 735)	(706, 748)	(716, 738)

In addition, the HSA equivalents of the PARCC cut score of 725 dividing performance level 2 from 3 are summarized in Table 2.32 when using PSAT for linking and in Table 2.33 for propensity score matching. When propensity score matching was used, Design I condition 4 for ELA10 did not have a PARCC score of 725 corresponding to a HSA test score. A reversed mapping was implemented to find a HSA equivalent of a PARCC score of 725. For the condition with Design II and III combined for Algebra I, two HSA scores were equivalent to a PARCC score of 725. Thus a reversed mapping was also implemented to find a single HSA equivalent score of a 725 PARCC cut score. In general, the HSA equivalents of the PARCC cut score, 725 for both ELA10 and Algebra I were higher than the original HSA cut scores.

Table 2.32

HSA Equivalent Scores of the PARCC Cut Score of 725 for Dividing Performance Level 2 from 3 (Option I Using PSAT for Linking)

Subject	HSA
English	408
Algebra	419

Table 2.33

HSA Equivalent Scores of the PARCC Cut Score of 725 for Dividing Performance Level 2 from 3 (Option II Based on Propensity Score Matching)

Condition	1	2	3	4
Design I (English)	407	407	407	407
Design II (Math)	416	417	417	417
Design III (Math)	412	412	412	412
Design II & III Combined	415	410	415	413

Summary

This study explored two methods of obtaining the PARCC equivalent scores of the HSA cut scores for PARCC ELA10 and Algebra I, and vice versa. One method used PSAT as an external linking test to link HSA and PARCC based on a two-step single group linking design. Specifically, the HSA English and Algebra tests were linked to the PSAT Verbal and Math tests respectively and then the PSAT tests were linked to the corresponding PARCC tests. Based on the first-time test-takers' scores, the corresponding PARCC Algebra I score to the HSA Algebra passing score of 412 is **720** and the corresponding PARCC ELA10 score to the HSA English passing score of 396 is **707**.

The other method uses propensity score matching to come up with equivalent groups between students taking HSA and PARCC. Four matching conditions were explored based on the use of different caliper values and the use of replacement of cases for each design. The absolute standardized mean difference values for each covariate indicate the matched samples were relatively equivalent. Among the 16 designs, the

corresponding PARCC ELA10 equivalent scores of the HSA English passing score are 704, 705, and 706 while the corresponding PARCC Algebra I scores equivalent to the HSA Algebra passing scores are 721 and 725 for Design II and III respectively, and 722, 724, and 727 for the combined Design II and III samples (refers to Table 2.5).

Two intervals, 95% confidence intervals and one standard deviation above and below the PARCC equivalents of the HSA cut scores were also constructed. For ELA10, the 95% confidence interval around the mapped PARCC equivalent score of the HSA cut score using the mean and the maximum CSEM captured the PARCC cut score of 725 between performance level 2 vs. 3 while the interval one standard deviation above and below the CSEM did not capture the mapped PARCC cut score. Neither does the 95% confidence interval using the minimum CSEM. For Algebra I, all intervals captured the PARCC cut score of 725. The patterns were consistent across linking methods.

The HSA equivalents of the PARCC cut score of 725 dividing performance level 2 from 3 are summarized. In general, the HSA equivalents of the PARCC cut score, 725 for both ELA10 and Algebra were higher than the original HSA cut scores.

This study provides empirical evidence about the PARCC equivalents of the HSA cut scores and the HSA equivalents of the PARCC cut score of 725 between performance level 2 vs. 3 for ELA10 and Algebra I. The final adoption of cut scores obtained in this study depends on considerations from psychometric, policy, and practical perspectives.

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Appendix A

Equating Program - LEGS 2.0.1

File Window

Frequency Distributions as Input | Raw Scores as Input

Y Form :
Alphanumeric Identifier : File : ...

X Form :
Alphanumeric Identifier : File : ...

Subgroups :
Number of Subgroups :
List of subgroups :

Correlations
combined group :
Correlation for the subgroups :

Equipercntile Smoothing
slim :
Number of Smoothing Values :
List of Smoothing Values :

Truncation
Lowest Valid Score(Y) :
Highest Valid Score(Y) :
Truncation :

Options
remsd_wts :
eeinput :