

Mapping State Proficiency Standards Onto the NAEP Scales

Results From the 2019 NAEP Reading
and Mathematics Assessments

Technical Notes

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Mapping states' standards onto the NAEP scales

Under the 2001 and 2015 reauthorizations of the Elementary and Secondary Education Act of 1965, states are required to define and report their standards of reading and mathematics for grades 4 and 8. Because each state sets its own standards, students who meet the standards set by one state may not be able to meet the standards set by another state. Comparing the stringency of the standards set by the states is possible because Congress mandated states to participate in the National Assessment of Educational Progress (NAEP). NAEP provides a common scale on which the stringency of the various state criteria for proficiency can be compared.

The NAEP equivalent score—that is, the NAEP score that corresponds to a state's standard—is determined by a direct application of equipercentile mapping. For a given grade and subject, the percentage of students in each NAEP school who met the state assessment standard is matched to the point on the NAEP scale corresponding to that percentage. For example, if 70 percent of the students in grade 4 in a particular school are meeting the state reading achievement standard and 70 percent of the students in the NAEP achievement distribution in that school are at or above 241 on the NAEP scale, then the best estimate using the results from that school is that the state's standard is equivalent to 241 on the NAEP scale. Results are then aggregated over all schools in the state that are participating in NAEP to provide an estimate of the NAEP score that is equivalent to the state's threshold for its standard. By extension, when estimating the NAEP scores equivalent to the standard of a common assessment shared by a group of states, all schools participating in NAEP in those states are included in the estimation.

The classification of NAEP equivalent scores into NAEP achievement levels accounts for the error associated with the estimates. A state's NAEP equivalent score is assigned the highest NAEP achievement level for which the upper bound of the score's margin of error equals or exceeds cut score of the achievement level. For example, in grade 4 reading, a state with a NAEP equivalent score of 236 and a standard error of 1.5 would have an upper bound of 239, calculated by $(236 + 2 \times 1.5)$. Since 239 exceeds the *NAEP Proficient* cut score of 238 but does not exceed the *NAEP Advanced* cut score of 268, the state's standard would be classified as *NAEP Proficient*. However, if the score's standard error were 0.5, its upper bound would be 237, calculated by $(236 + 2 \times 0.5)$. Since 237 exceeds the *NAEP Basic* cut score of 208 but does not exceed the *NAEP Proficient* cut score of 238, the state's standard would be classified as *NAEP Basic*. NAEP achievement level cut scores for 2019 can be found in **table 3** in the main report ([NCES 2021-036](#)).

In reporting the mapping results, in addition to the NAEP equivalent scores, two types of error—*standard error* and *relative error*—are presented to describe the sources of variation in the mapping of state proficiency standards. The sources of random variation (measurement error and sampling variation) are accounted for by the *standard error* of the mapping, and the amount of error that is added to the placement of the standard, given the fact that NAEP and the state assessment may not measure exactly the same knowledge and skills, is captured in the *relative error*. This measure is based on the accuracy with which school-level percentages of students meeting the state standard are reproduced by applying the cut score indicated by the linkage to the NAEP results in each school, after taking into account measurement variation in NAEP and NAEP student sampling within each participating school.

A relative error greater than 0.5 (i.e., when the mapping error accounts for more than half of the total variation) indicates that the error is too large to support useful inferences from the placement of the state standard onto the NAEP scale without additional evidence. In the figures and tables in this report, a black triangle indicates that the relative error is greater than 0.5.

Additional details on the mapping methodology can be found in the previously published report [NCES 2010-456](#).

Data Tables

This section provides two supporting data tables. **Tables A-1** and **A-2** display the NAEP equivalent scores for each state, and the last two rows show the NAEP equivalent scores for the testing programs when all participating states in each program are considered as one single jurisdiction. A black triangle indicates that the relative error is greater than 0.5, and the results should be interpreted with caution.

Data tables with the complete NAEP scale score equivalents can be found at https://nces.ed.gov/nationsreportcard/studies/statemapping/data_tables.aspx for 2009 and 2017.

Table A-1. NAEP equivalent scores for state grade 4 reading and mathematics standards for proficient performance, by state and testing program: 2019

State	Testing program	Reading		Mathematics	
		NAEP equivalent score	Standard error	NAEP equivalent score	Standard error
Alabama		220	1.1	235	1.2
Alaska		222	1.3	238	0.9
Arizona		219	1.4	242	1.0
Arkansas		225	0.9	234	1.0
California	SBAC	223	1.2	241	0.8
Colorado		231	1.4	257	1.0
Connecticut ¹	SBAC	224	1.3	242	1.0
Delaware	SBAC	218	1.1	239	1.6
District of Columbia	PARCC	228	1.8	244	0.7
Florida		220	1.0	236	1.2
Georgia		229	1.4	239	0.8
Hawaii	SBAC	221	1.9	242	0.7
Idaho	SBAC	225	0.9	243	0.8
Illinois		236	1.3	253	1.3
Indiana		231	0.7	244	0.9
Iowa		207	0.8	224	0.8
Kansas		227	1.3	253	0.8
Kentucky		222	1.3	244	0.9
Louisiana	PARCC	217	0.9	240	1.0
Maine		219	1.6	250	1.1
Maryland	PARCC	231	0.9	251	1.5
Massachusetts		233	1.4	250	0.9
Michigan		226	0.9	243	0.7
Minnesota		223	2.2	240	1.3
Mississippi		222	1.0	242	1.0
Missouri		225	1.2	244	1.2
Montana	SBAC	229	1.0	247	0.6

See notes at end of table.

Table A-1. NAEP equivalent scores for state grade 4 reading and mathematics standards for proficient performance, by state and testing program: 2019—Continued

State	Testing program	Reading		Mathematics	
		NAEP equivalent score	Standard error	NAEP equivalent score	Standard error
Nebraska		219	0.9	245	0.7
Nevada	SBAC	222	1.2	242	1.0
New Hampshire ²		—	†	—	†
New Jersey		225	1.7	247	1.2
New Mexico		231	1.7	250	1.5
New York		227 ▲	1.9	239	1.0
North Carolina		232	1.4	251	1.1
North Dakota		230	1.4	250	0.7
Ohio		215	1.0	223	0.9
Oklahoma		237	1.0	245	1.1
Oregon	SBAC	224	0.9	245	1.0
Pennsylvania		213	1.1	250	1.5
Puerto Rico ³		—	†	180 ▲	1.1
Rhode Island		236	1.2	255	0.8
South Carolina		218	1.0	238	0.8
South Dakota	SBAC	226	1.3	245	1.1
Tennessee		238	1.1	244	1.3
Texas		226	0.9	247	0.9
Utah		231	1.4	246	1.2
Vermont	SBAC	226	0.9	243	0.9
Virginia		200	2.3	219	1.2
Washington	SBAC	220	1.3	240	0.9
West Virginia		—	†	238	1.1
Wisconsin		232	1.0	249	1.1
Wyoming		232	1.0	246	1.0
PARCC		225	0.9	245	0.5
SBAC ¹		223	0.9	241	0.8

— Not available.

† Not applicable.

▲ Interpret data with caution. Relative error greater than 0.5.

¹ Connecticut was not included in estimating the SBAC reading standard because the state did not use all SBAC reading assessment components.

² New Hampshire was not included in the study because the state did not use the same assessment for all students in grade 4 for reading and mathematics.

³ The NAEP equivalent score of Puerto Rico's reading standard is not available because the NAEP reading assessment was not administered in the jurisdiction.

NOTE: West Virginia was not included in grade 4 reading because reading data were not available. Summary tables displaying the relative error are available at <https://nces.ed.gov/nationsreportcard/studies/statemapping/>. PARCC refers to Partnership for Assessment of Readiness for College and Careers, and SBAC refers to Smarter Balanced Assessment Consortium.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2019 Reading and Mathematics Assessments; and U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, ED^{Facts} School Year 2018–19.

Table A-2. NAEP equivalent scores for state grade 8 reading and mathematics standards for proficient performance, by state and testing program: 2019

State	Testing program	Reading		Mathematics	
		NAEP equivalent score	Standard error	NAEP equivalent score	Standard error
Alabama		263	1.1	273	0.9
Alaska		270	1.0	301	1.5
Arizona		272	1.4	—	†
Arkansas		261	1.0	278	0.9
California	SBAC	262	0.9	288	1.3
Colorado		272	0.8	297	1.3
Connecticut ¹	SBAC	267	1.2	293	1.3
Delaware	SBAC	—	†	—	†
District of Columbia	PARCC	262	1.5	—	†
Florida		260	0.8	—	†
Georgia		—	†	—	†
Hawaii	SBAC	259	1.0	287	1.2
Idaho	SBAC	267	0.7	294	0.9
Illinois		278	1.4	300	2.0
Indiana		269	1.2	298	1.1
Iowa		248	1.2	263	1.8
Kansas		288	1.0	307	1.8
Kentucky		254	1.1	282	1.1
Louisiana	PARCC	262	1.4	—	†
Maine		261	1.0	296	1.1
Maryland	PARCC	271	1.1	—	†
Massachusetts		273	1.0	298	1.0
Michigan		254	1.3	287	0.9
Minnesota		261	1.5	289	1.0
Mississippi		272	0.9	280	1.3
Missouri		269	1.0	—	†
Montana	SBAC	270	0.8	298	0.8
Nebraska		266	1.6	289	1.2
Nevada	SBAC	264	1.6	294	1.1
New Hampshire ²		—	†	—	†
New Jersey		261	1.8	—	†
New Mexico		273	1.3	—	†
New York		268 ▲	1.6	—	†
North Carolina		271	1.0	—	†
North Dakota		267	1.4	291	1.5

See notes at end of table.

Table A-2. NAEP equivalent scores for state grade 8 reading and mathematics standards for proficient performance, by state and testing program: 2019—Continued

State	Testing program	Reading		Mathematics	
		NAEP equivalent score	Standard error	NAEP equivalent score	Standard error
Ohio		261	1.1	—	†
Oklahoma		276	1.2	302	1.4
Oregon	SBAC	263	1.3	291	1.8
Pennsylvania		260	1.1	306	1.2
Puerto Rico ³		—	†	259▲	1.3
Rhode Island		280	0.9	305	1.5
South Carolina		266	1.9	289	1.2
South Dakota	SBAC	265	1.0	296	1.2
Tennessee		285	1.0	—	†
Texas		—	†	—	†
Utah		277	1.6	297	2.0
Vermont	SBAC	270	1.4	297	1.0
Virginia		236	1.8	—	†
Washington	SBAC	260	1.2	291	1.0
West Virginia		—	†	285	1.0
Wisconsin		282	1.4	303	1.2
Wyoming		257	1.1	283	1.0
PARCC ⁴		267	0.8	—	†
SBAC ¹		262	0.8	290	1.2

— Not available.

† Not applicable.

▲ Interpret data with caution. Relative error greater than 0.5.

¹ Connecticut was not included in estimating the SBAC reading standard because the state did not use all SBAC reading assessment components.

² New Hampshire was not included in the study because the state did not use the same assessment for all students in grade 8 for reading and mathematics.

³ The NAEP equivalent score of Puerto Rico's reading standard is not available because the NAEP reading assessment was not administered in the jurisdiction.

⁴ The NAEP equivalent score of the PARCC standards for grade 8 mathematics was not estimated because all states using PARCC did not require all students to take a general mathematics assessment.

NOTE: States that did not require all eligible students to take a general grade 8 reading or mathematics assessment were not included in the analysis. West Virginia was not included in grade 8 reading because reading data were not available. Summary tables displaying the relative error are available at <https://nces.ed.gov/nationsreportcard/studies/statemapping/>. PARCC refers to Partnership for Assessment of Readiness for College and Careers, and SBAC refers to Smarter Balanced Assessment Consortium.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2019 Reading and Mathematics Assessments; and U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, ED Facts Sch Year 2018–19.

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