

The Effects of SAT® Scale Recentering on Percentiles

In *Balancing the SAT® Scales*¹ there is a statement about unchanging percentiles that seems straightforward:

Will Percentiles change?

Percentiles will remain virtually unchanged. For example: a student who scored a 420 or 430 on the verbal section in 1993 (about the average verbal score for that year) would be at the 50th percentile. After recentering, that student's score would change to about 500 but the percentile would still be at 50 percent. *So even though the score changes, the percent of test-takers who score higher and lower remains the same.*

This statement attempts to explain that a student's relative standing in a particular group, as measured by a percentile score, is the same regardless of whether that student's score is on the SAT scale established in 1941 or on the recentered SAT scale, established with a 1990 reference group, and introduced in 1995. While an individual's scores on the 1941 and 1990 SAT scales were likely to have different numerical values, their performance relative to any group would not have changed. In other words, although a 430 on the 1941 scale looks different than a 500 on the 1990 scale, the two scores represent the same degree of performance. They both represent average performance for the 1990 reference group on the 1941 and 1990 scales.

Since the 1941 verbal and math scales had been in a state of imbalance for several years prior to recentering, comparisons of the verbal and math SAT scale scores could not be made directly, but could be made through the use of percentiles. For example, on the 1941 scales, a verbal score of 420 was equivalent in percentile terms to a math score of 470. Even though 420 on verbal and 470 on

math looked like different levels of proficiency, they were the same in percentile score units.

Percentiles were instrumental in determining the linkages between the 1941 and 1990 scales. A score of 420 on the 1941 SAT verbal scale converted to a score of 500 on the recentered *SAT I* verbal scale because a 420 on the 1941 scale and a 500 on the 1990 scale were at the fiftieth percentile on their respective scales in the 1990 reference group². Throughout the entire range of the verbal and math scales, equipercenile (equal percentile) relationships in the 1990 reference group were used to link the old and new scales and produce the recentered SAT scales.

Recentering removed the need to use percentiles to compensate for misaligned verbal and math scales, which made the lives of students, parents, and admission and guidance staff easier. The recentering of the SAT scales realigned the verbal and math scales, and altered the implicit meaning of numbers on the College Board 200-to-800 scale, creating two internally consistent paths for tracking trends over time, the 1941 path and the 1990 path. The concordance tables between the old and new scales provide the linkages between the two paths. The use of these concordance tables, found at the end of this document, makes it possible for institutional researchers to study trends over time.

The *Balancing the Scales* statement about percentiles was intended to assure students, admission and guidance staff, and other users of SAT scores that recentering did not alter a student's relative standing on the test even though the scales had been changed; i.e., the meanings attached to numerical score levels had not changed. Institutional researchers, among others, are interested in distributions of scores. They often track trends for specific score levels, e.g., 600 or 700,

¹The College Board (1994). *Balancing the SAT Scales: Recentering and the PSAT/NMSQT, SAT I, and SAT II Tests*. New York: The College Board.

²In fact, for technical reasons associated with the computation of percentiles, the exact 50 percent point occurs for an impossible-to-receive score that falls between 420 and 430. The word virtually is used in *Balancing the SAT Scales* to alert the user that percentiles might change slightly due to the fact that scores are reported on a rounded scale.

Research Summary

over time for their institutions. For these researchers, the term percentile implies percentage of students above or below a given score level.

These percentages of students will change with a shift in scale from the 1941 scale to the recentered SAT scale, as illustrated in the table that follows:

SAT-V (1941)	SAT-V (1990)	Score Level	SAT-M (1990)	SAT-M (1941)
1%	5%	700	6%	7%
4%	11%	650	12%	12%
8%	21%	600	23%	23%

This table has four rows and five columns. The first two columns contain percentages of students scoring above the three score levels of 600, 650, and 700 on the SAT verbal scales of 1941 and 1990 at a hypothetical university. The last two columns contain similar percentages of math scores above the levels of 600, 650, and 700, again on both SAT scales.

Note that the first column of percentages is very different than the other three columns of percentages, which are very close to each other. This is because the 1941 verbal scale was adjusted the most through recentering, bringing it in line with the math scale. In addition, recentering left the math scale virtually unchanged in the 600 to 700 score range. In math, a 600 converted to a 600, a 650 to a 650, and a 700 to a 690, making a 700 on the 1990 scale harder to achieve than a 700 on the 1941 scale for SAT math. For verbal, the recentering conversions changed a 600 to a 670, a 650 to a 710, and a 700 to a 760. Although the percentages above 600, 650, and 700 will be very close if not identical on the recentered and 1941 scales for SAT math, they will differ substantially for SAT verbal, as seen in the table above. *A student's rank will*

remain unaltered, but the percentage of students above a certain numerical value will change.

Advice for Tracking Trends

Three options are open to researchers interested in tracking percentiles over time. They can continue to track the same levels of performance on the verbal and math scales separately as they have before. In this case, a 600 on the 1941 verbal scale can be converted to a 670 on the 1990 verbal scale, and used in conjunction with a 600 on the 1990 math scale, which is equivalent to a 600 on the 1941 scale. Alternatively, a 600 on the 1990 scale could be used for both verbal and math, and old data can be converted to a new scale by using percentages on the 1941 scale for 520 for verbal and 600 for math. Or they can do both.

Use of the conversion from the new scale to the old scale for verbal and math produces converted scores (e.g., 600 to 600 for math, and 600 to 520 for verbal on the 1941 scale) that can be used to adjust trends for the new tracking points over time. If complete records exist for the institution, the percentages associated with a 520 on the 1941 scale can be determined, and merged with those obtained for a 600 on the 1990 scale to produce a continuous trend over several years of data.

If detailed historical data do not exist, trends can still be tracked on each scale by converting old 1941 scores to their 1990 scale equivalents and starting new trend tables. To use our example of 600 again, this means using 600 for both verbal and math on the 1990 scale (new trends with respect to new 600 scores), and 600 for math and 670 for verbal on the 1990 scale (old trends carried onto new scale). Tracking scores on the recentered scales, in time, will prove to be the most sensible course of action because with each passing year the original 1941 verbal and math scales become less and less relevant.

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TABLE 1. SAT I:VERBAL SCORES				TABLE 2. SAT I: MATH SCORES			
(Individual) Original to Recentered				(Individual) Original to Recentered			
Original	Recentered	Original	Recentered	Original	Recentered	Original	Recentered
800	800	490	570	800	800	490	520
790	800	480	560	790	800	480	510
780	800	470	550	780	800	470	500
770	800	460	540	770	790	460	490
760	800	450	530	760	770	450	480
750	800	440	520	750	760	440	480
740	800	430	510	740	740	430	470
730	800	420	500	730	730	420	460
720	790	410	490	720	720	410	450
710	780	400	480	710	700	400	440
700	760	390	470	700	690	390	430
690	750	380	460	690	680	380	430
680	740	370	450	680	670	370	420
670	730	360	440	670	660	360	410
660	720	350	430	660	650	350	400
650	710	340	420	650	650	340	390
640	700	330	410	640	640	330	380
630	690	320	400	630	630	320	370
620	680	310	390	620	620	310	350
610	670	300	380	610	610	300	340
600	670	290	370	600	600	290	330
590	660	280	360	590	600	280	310
580	650	270	350	580	590	270	300
570	640	260	340	570	580	260	280
560	630	250	330	560	570	250	260
550	620	240	310	550	560	240	240
540	610	230	300	540	560	230	220
530	600	220	290	530	550	220	200
520	600	210	270	520	540	210	200
510	590	200	230	510	530	200	200
500	580			500	520		

How to Use the Table

- Find the individual verbal or math score you wish to convert on the original scale. The equivalent score on the recentered scale appears in the right column.

Points to Note

- Because all scaled scores are reported as rounded scores, all conversions should be

considered approximate. When actual scores are calculated, precise formulae are used to generate the scale score.

- Students will retain the same rank order compared to other students, even if their numerical scores change. The scores are equivalent in terms of the level of reasoning ability they represent.

TABLE 3. SAT I: VERBAL SCORES				TABLE 4. SAT I: MATH SCORES			
(Individual) Recentered to Original				(Individual) Recentered to Original			
Recentered	Original	Recentered	Original	Recentered	Original	Recentered	Original
800	740	490	410	800	780	490	460
790	720	480	400	790	770	480	440
780	710	470	390	780	760	470	430
770	710	460	380	770	760	460	420
760	700	450	370	760	750	450	410
750	690	440	360	750	750	440	400
740	680	430	350	740	740	430	380
730	670	420	340	730	730	420	370
720	660	410	330	720	720	410	360
710	650	400	320	710	720	400	350
700	640	390	310	700	710	390	340
690	630	380	300	690	700	380	330
680	620	370	290	680	690	370	320
670	610	360	280	670	680	360	310
660	590	350	270	660	670	350	310
650	580	340	260	650	650	340	300
640	570	330	250	640	640	330	290
630	560	320	250	630	630	320	280
620	550	310	240	620	620	310	280
610	540	300	230	610	610	300	270
600	520	290	220	600	600	290	270
590	510	280	210	590	580	280	260
580	500	270	210	580	570	270	250
570	490	260	200	570	560	260	250
560	480	250	200	560	540	250	240
550	470	240	200	550	530	240	240
540	460	230	200	540	520	230	230
530	450	220	200	530	510	220	230
520	440	210	200	520	490	210	220
510	430	200	200	510	480	200	210
500	420			500	470		

How to Use the Table

- Find the individual verbal or math score you wish to convert on the recentered scale. The equivalent score on the original scale appears in the right column.

Points to Note

- Because all scaled scores are reported as rounded scores, all conversions should be

considered approximate. When actual scores are calculated, precise formulae are used to generate the scale score.

- Students will retain the same rank order compared to other students, even if their numerical scores change. The scores are equivalent in terms of the level of reasoning ability they represent.