



Understanding Concordance Tables: How do the scores from 2018–2019 compare to 2017–2018?

Project Lead The Way (PLTW) teachers, school administrators, and college admissions officers are familiar with PLTW’s previously-established end-of-course assessment (EoC) scores that ranged from 1–9. We typically think of a 1–9 scale as representing a *stanine score*, similar to a normal distribution. Stanine scores can be pictured as a bell curve that has been sliced up into 9 pieces. These pieces are numbered 1 through 9, starting at the left hand section. However, where a standard normal distribution has a mean of 0 and a standard deviation of 1, stanines have a mean of 5 and a standard deviation of 2. Typically, scores of 1–3 are considered below average, 4–6 are average, and 7–9 are above average.

PLTW’s scale of 1–9 is a little different, however. After determining which raw scores were associated with each scale score 1–9, staff worked with content experts in the various fields assess to set cut scores corresponding to the Achievement Level Descriptors: Basic, Proficient and Advanced. Then, over the years, care was taken to ensure that each of the nine scores had the same criterion interpretation every year. By not re-centering the scale every year at 5, each student has the opportunity to earn the highest score.

Definitions

Raw Score—the actual number of points a student earns by answering questions correctly, partially correct, or incorrectly.

Scale Score—the reported score that adjusts for the difficulty of the items so that the same interpretation can be made from year to year.

The following table shows how the former PLTW EoC assessment 1-9 scores align with the EoC achievement level indicators. Specifically, the national average score on any PLTW EoC assessment started at 5.

Key Information

The 2018–2019 PLTW EoC assessments are different from previous assessments as it has new item types and assesses the content more deeply while including transportable skills valued by industry experts.

In order to ease score interpretation during the transition, a linking table has been created to link the initial raw scores to the 1–9 scale, and after the new scale and new cut scores are developed, a linking table will be created to link the new scale scores to the former 1-9 scale in order to ease interpretation of the new scale scores as well.

Scores from the new tests were mapped onto the previous scale by assuming that student scores would have been distributed the same way if students took both tests.

If 15% of students scored a 3 on the old test, the scores were calculated so that 15% of students would score a 3 on the new test.

This is a temporary measure to support students, teachers, state departments of education, colleges, and business/industry through the transition to the new assessments and as PLTW will develop a new scale with new cut scores.

For now, we can reasonably assume equivalence in the new scores based on similar students taking the tests both years, even though the content has evolved.



Figure 1. PLTW Achievement Level Descriptions with Scores, 2017-18 and Before

Achievement Indicator	Basic			Proficient			Advanced		
Achievement Level Description The student demonstrates:	... minimal or limited understanding of course concepts. Major gaps may be present in the student's knowledge and skills.			... competent understanding of the course concepts. The student can apply knowledge and skills to familiar situations. There may be minor gaps in the student's understandings.			... comprehensive and complex understanding of the course concepts. The student has the capability to transfer knowledge and skills to novel situations. Gaps in knowledge and skills are minimal.		
EoC Score	1	2	3	4	5	6	7	8	9

Changes for 2018–2019

Beginning in the 2018–2019 school year, the PLTW EoC assessments were redesigned. PLTW recognized the need to provide more in-depth information on students' knowledge and skills to higher education and industry recruiters. Thus, new summative assessments were built that measure both subject-matter knowledge and mastery of in-demand, transportable skills. A coalition of secondary educators, higher education representatives, and industry experts worked with PLTW staff to determine what should be assessed and to design and review items. The assessments also moved to an online platform. Using innovative, inquiry-based items, the new EoC assessments measure a broader range of knowledge, skills, and cognitive abilities, and deliver a dynamic experience that resembles the hands-on learning context of the PLTW classroom.

So, how can the scores from the new assessment provide the same information?

The short answer is that PLTW will develop a new scale and new achievement levels to provide more comprehensive and accurate information based on the new assessments. But, in doing so, PLTW is also building a bridge from the old assessment to the new assessment. The initial score reports issued in 2019 will be raw scores, meaning points earned over total possible points without any scaling. Then, in Summer 2019, scale scores will be established. However, in order to facilitate ease of interpretation and eliminate any gaps in student opportunities with entities who have established benchmarks based on the former 1 to 9 scale, PLTW has created score conversion tables to illustrate how raw scores “link” to each value of on the former 1 to 9 scale.

PLTW has several years of data showing how students performed on the old assessments. Each EoC assessment has a typical pattern of performance. That is, we know what percentage of students typically score at each of the possible scale score values. We can then find the new raw score that would allow the percentage of students scoring at each scale score to remain the same.

Figure 2 shows an example of calculations done behind the scene. In this example, using the percentage of students scoring at each of the old scale scores to the percentage at each of the new raw scores, the new scores can be mapped to the old scale. For example, approximately 7.25% of students earned a zero or 1 on the old assessment. The first cumulative raw score achieved by at least 7.25% of students is 11; therefore, any student scoring fewer than 11 points will receive a zero. Following that same logic, students scoring between 11 and 14 points on this assessment will receive a scale score of 1. The table continues through the maximum number of raw score points, but only part of it is shown for clarity.



Figure 2. Sample Conversion Table

Scale score on old form	Cumulative percentage of students scoring at each scale score on old form	Cumulative percentage of students scoring at each raw score on new form	Raw score	Interpolated score on new form	Final Scale Score for each raw score
0	0.00%	0.00%	0	0.00	0
1	7.25%	0.00%	1	0.00	0
2	21.58%	0.00%	2	0.00	0
3	33.33%	0.19%	3	0.03	0
4	43.64%	0.38%	4	0.05	0
5	55.56%	0.77%	5	0.11	0
6	69.73%	0.96%	6	0.13	0
7	76.81%	1.54%	7	0.21	0
8	89.37%	2.69%	8	0.37	0
9	100.00%	4.81%	9	0.66	0
		5.77%	10	0.80	0
		8.85%	11	1.11	1
		12.50%	12	1.37	1
		15.58%	13	1.58	1
		19.62%	14	1.86	1
		22.88%	15	2.11	2
		26.54%	16	2.42	2
		30.38%	17	2.75	2
		34.42%	18	3.11	3

Each EoC assessment has its own conversion table. For those who use specific scores for course grades or to make passing or admission determinations, they can continue to use that same score in 2019.



What's next?

While the tables have been created for 2018–2019, PLTW continues to work to create a new scale that will be more descriptive. Because students can earn 40–50 points on most assessments, compressing their score onto a 1–9 scale loses a lot of information that could be helpful in distinguishing student knowledge and skills. The new scale will have more points to provide more information from the raw scores. It will be finalized in Summer 2019 after a full year of test data are available for analysis.

Why can't we just use raw scores?

Test forms are built to be the same year after year, but with different items. As much as test developers try to make the items similar and the test forms parallel, sometimes an item turns out to be easier or more difficult than expected. Students may do better on one form of a test simply because it contained slightly easier items than another form. Reporting scores on a scale allows testing professionals to adjust the easier form so that it is statistically equivalent to all other forms. In doing so, we ensure that the same score has the same meaning year after year. This is common practice on other tests used in the field, such as the ACT with the 1–36 scale or the SAT with the 400–1600 scale.

How will we be able to make fair determinations if the scale changes?

When PLTW sets new cut scores, each of those scores will be explained with an achievement level descriptor. You can select the point that best meets your goal. In addition, PLTW will show approximately where the new scale scores map to the former 1–9 scores, so you can find the point most similar to one used in the past. It is important to remember, however, that because the content has changed, we should not hold too tightly to the old scores. Understanding the meaning of the new scores through the descriptors and released items will best serve the needs to make decisions about students based on their scores on EoC assessments.