

Math Benchmarks: Aiming for 18+

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Key Findings:

Students who answered more questions correctly on the Math Benchmark exams in 2016-17 scored higher on the PSSA exam.

This pattern exists for grades 3-8 and for each of the three Benchmark tests during the school year.

For **grades 3 and 4**, answering **18 questions correctly** on the first Math Benchmark test in 2016-17 meant a 75% likelihood of scoring at least proficient on the Math PSSA. In **grades 5 and 6**, students needed to answer **20 questions correctly** for the 75% likelihood. In **grade 7**, students needed to answer **21 questions correctly**. In **grade 8** students needed to answer **24 questions correctly**.

On average, students answered 10-13 questions correctly in 2016-17 (depending on grade level), which corresponds to less than 25% likelihood of scoring proficient/advanced on the PSSA.

Benchmark Assessments in Philadelphia

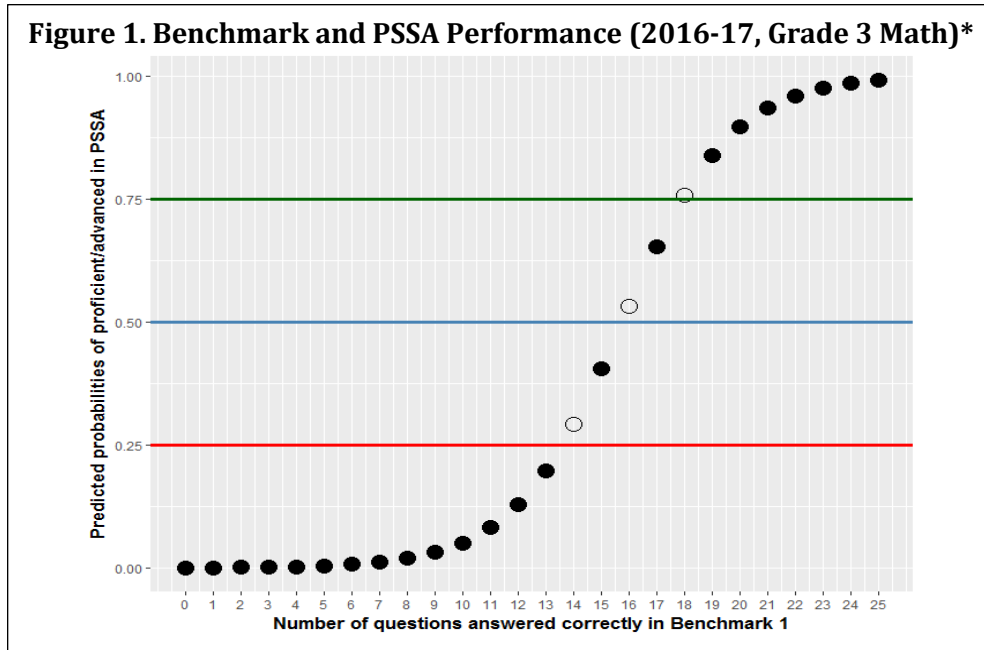
Benchmark – or interim – assessments have been administered in Philadelphia since 2004. Benchmark assessments are currently administered three times per year in grades 3-8 in English/Language Arts (ELA) and Math. HS Algebra, Biology, and English Benchmarks are also administered. Benchmark tests are aligned to the scope and sequence of the curriculum, and are designed to provide teachers with immediate feedback about student mastery of key concepts. Teachers use the results of the Benchmark exams and adjust their instructional approaches according to student needs.

Math Benchmark Performance is Related to Math PSSA Performance

We looked at student performance on the 2016-17 Math Benchmark 1 and end-of-year PSSA performance to determine how many questions students need to answer correctly to have a good chance of scoring proficient or advanced on the PSSA exam. Figure 1 shows that the likelihood of earning a PSSA score of at least 1000 (the minimum score for the proficient category) increases as the number of questions answered correctly on the Grade 3 Math Benchmark 1 increases. The pattern holds for grades 3-8 and Benchmarks 1-3.

The red horizontal line in Figure 1 lines up with a 0.25 probability of scoring proficient/advanced (at least 1000) on the PSSA. Slightly above this is an unfilled dot that indicates 14 Benchmark questions answered correctly. This means that approximately 25% of students who answered 14 questions correctly on grade 3 Math Benchmark 1 later scored proficient/advanced on the PSSA exam. The middle line (blue) on Figure 1 lines up with a 0.50 probability of scoring proficient or advanced. Just above the blue line is an unfilled dot that indicates 16 questions answered correctly. About half (50%) of the students who answered 16 questions correctly on the Benchmark scored proficient or advanced on the PSSA in 2016-17. Finally, the green line in Figure

1 lines up with a 0.75 probability of scoring proficient/ advanced. About 75% of third graders who answered 18 Benchmark questions correctly scored proficient/advanced in 2016-17.



Average Math Benchmark Performance in 2016-17

The average number of correct answers on the Math Benchmark 1 in 2016-17 was between 10-13, depending on grade level (Table 1, column A). The percent of students scoring proficient/advanced on the PSSA exam was 16-23% (column B). Columns C, D, and E show the number of correct answers needed to have at least a 25% (column C), 50% (column D), and 75% (column E) likelihood of scoring proficient/advanced. **In grades 3-4, at least 18 correct answers were needed for a 75% likelihood of scoring proficient/advanced on the PSSA.**

Table 1. Math Benchmark 1 and PSSA performance (2016-17, grades 3-8)

	District wide performance in 2016-17		# of Benchmark1 questions answered correctly for each predicted probabilities of scoring proficient or advanced in Math PSSA		
	Benchmark1 (Avg # of questions correct) (A)	PSSA (% proficient or advanced) (B)	≥ 25% (C)	≥ 50% (D)	≥75% (E)
Grade 3	11.1	23%	14	16	18
Grade 4	10.8	18%	15	17	18
Grade 5	12.5	18%	16	18	20
Grade 6	11.8	18%	16	18	20
Grade 7	13.0	20%	18	19	21
Grade 8	11.9	16%	19	22	24

*The predicted probabilities of scoring proficient/advanced on the Grade 3 ELA PSSA exam were estimated with logistic regression using each student’s Benchmark 1 performance as the predictor. The predicted probability of scoring proficient/advanced improved drastically between improvements made within the range of 14-18 correctly answered questions in Benchmark 1. Only students who participated in Benchmark 1 and PSSA in 2016-17 were included in the analysis (n=9,730). Student-level Benchmark 1 and PSSA data were obtained from SDP Business Data Warehouse.