

# The Changing Profile of a Virginia Graduate: Course Taking and Achievement of Virginia Ninth Graders

Samantha Viano, PhD & Katherine M. Bowser  
October 2020

## Key Findings

During the 2015-16 through 2018-19 school years:

- Enrollment in Geometry increased for Black students (14% increase) and students who qualify for free or reduced price lunch (FRPL; 11% increase). FRPL enrollment in Algebra II increased 20%.
- City enrollment in Algebra I decreased (5.5 percentage points), with increases in Geometry (4.3 percentage points) and Algebra II enrollment (1.9 percentage points).
- Rural enrollment in Algebra II increased 15%, but rural students have the lowest enrollment rates in Geometry and Algebra II with 37% of students enrolled in ninth grade across years compared to about half of suburban and city students.
- The SOL pass rate for all ninth graders did not vary greatly over this time period with SOL pass rates slightly decreasing by less than 1% over this time period from 85.2% to 84.4%.
- Students in suburban schools had higher Standards of Learning (SOL) pass rates than students who attended schools located in towns, cities, or rural areas. The largest achievement gap was between city-suburban students (9 percentage points) and the lowest gap was between suburban-rural students (2 percentage points).

**EdPolicyForward**

The Center for Education Policy  
at George Mason University



## Background

In November 2017, the Commonwealth of Virginia’s Department of Education and Board of Education updated the Commonwealth’s Regulations Establishing Standards for Accrediting Public Schools in Virginia (Standards of Accreditation). This policy change represented the Commonwealth’s effort to increase equity and access to advanced coursework. Indeed, this policy change was designed to encourage students to earn a more rigorous high school diploma, one that signals their readiness to succeed in higher education, by reducing testing requirements to obtain this degree. While other smaller changes<sup>1</sup> were made to the requirements, this is the most significant change that could lead to noticeable changes in student course taking patterns, degree attainment, and postsecondary access/success.

Implementation of the new graduation requirements began with students who entered ninth grade for the first time in the 2018-19 academic year, with cohorts who entered ninth grade in prior years subject to the previous graduation requirements. Virginian public school students have the option to pursue and earn one of two types of high school diplomas: the standard diploma or the advanced diploma. To earn a standard diploma, students under this new policy are required to earn one less verified credit than before, and advanced diploma students are required to earn four fewer verified credits than before. Notably, advanced diploma students must still earn the same number of credits in core subjects. Prior to this policy change, advanced diploma students were required to earn nine verified credits compared to six verified credits for standard diploma students. Students beginning ninth grade in 2018-19 now earn the same number of verified credits regardless of diploma type.

These changes increase access to the advanced studies diploma for students who avoided taking advanced courses because of the requirements to earn verified credits or students who took advanced courses but did not earn a verified credit. In addition, the changes increase overall access to earning a high school diploma by decreasing testing requirements for the standard diploma.

## Purpose

How the change in graduation requirements is affecting student course taking and academic success is unknown. In this brief, we assess whether these changes are having their intended effects on access and equity for students by race, socioeconomic status, and urbanicity in the first year of implementation. While the overall effects of this change will be judged in the years to come as the initial cohort graduates high school, this report represents a first-cut look at differences between ninth graders subject to the new policy and those who came before them.

Since the policy change was equity-driven, we focus on course taking and achievement overall and by student subgroup. We describe the course enrollment and Standards of Learning (SOL) assessment pass rate patterns of ninth grade students, overall and by race, socioeconomic status, and urbanicity, among those students who entered ninth grade prior to the policy change in the 2018-19 school year (i.e., first-time ninth grade students in the 2015-16, 2016-17, or 2017-18 school years). Then, we compare course enrollment and SOL pass rates among ninth grade students in the post-policy period (2018-19 school year) to ninth grade cohorts in the pre-policy period (2015-16, 2016-17, 2017-18), allowing insight into whether course enrollment and SOL patterns differed, potentially in response to the change in high school graduation requirements.

“WE ASSESS *WHETHER THESE CHANGES ARE HAVING THEIR INTENDED EFFECTS ON ACCESS AND EQUITY* IN THE *FIRST YEAR* OF IMPLEMENTATION”

<sup>1</sup> One other change was to require students to take at least one honors, Advanced Placement, or International Baccalaureate course or earn a career and technical education (CTE) credential. We are unable to assess the effect of this change specifically because the data do not differentiate between honors and regular-level courses.

## Analysis

Individual student-level data, including course enrollments, test scores, and demographic information was obtained via the Virginia Longitudinal Data System (VLDS). Subgroups include student race (White, Black, Hispanic, or Asian) and eligibility for free or reduced price lunch (FRPL; used as a proxy for socioeconomic status). We match data on school-level urbanicity retrieved from the federal Common Core of Data (CCD) to the student-level administrative data.

The sample in this report includes students entering ninth grade for the first time by year for the school years 2015-16 through 2018-19. We refer to school years throughout this report by the spring of the school year such that 2019 refers to school year 2018-19. If a student enrolled in ninth grade for the first time in 2018 and again in 2019, only data from that student in 2018 was included in the analysis. We only include first-time ninth graders to more clearly categorize student course taking behavior and achievement on SOL exams in their first year of high school. See Appendix Table 1A for overall sample sizes and percent of the sample by race, FRPL, and urbanicity.

We examine general trends over time, but we are particularly interested in changes between the pre- and post-policy time periods, or, in other words, changes that occurred between 2018 and 2019. In the figures, we visually highlight this change using different colors to show pre- versus post-policy time periods.

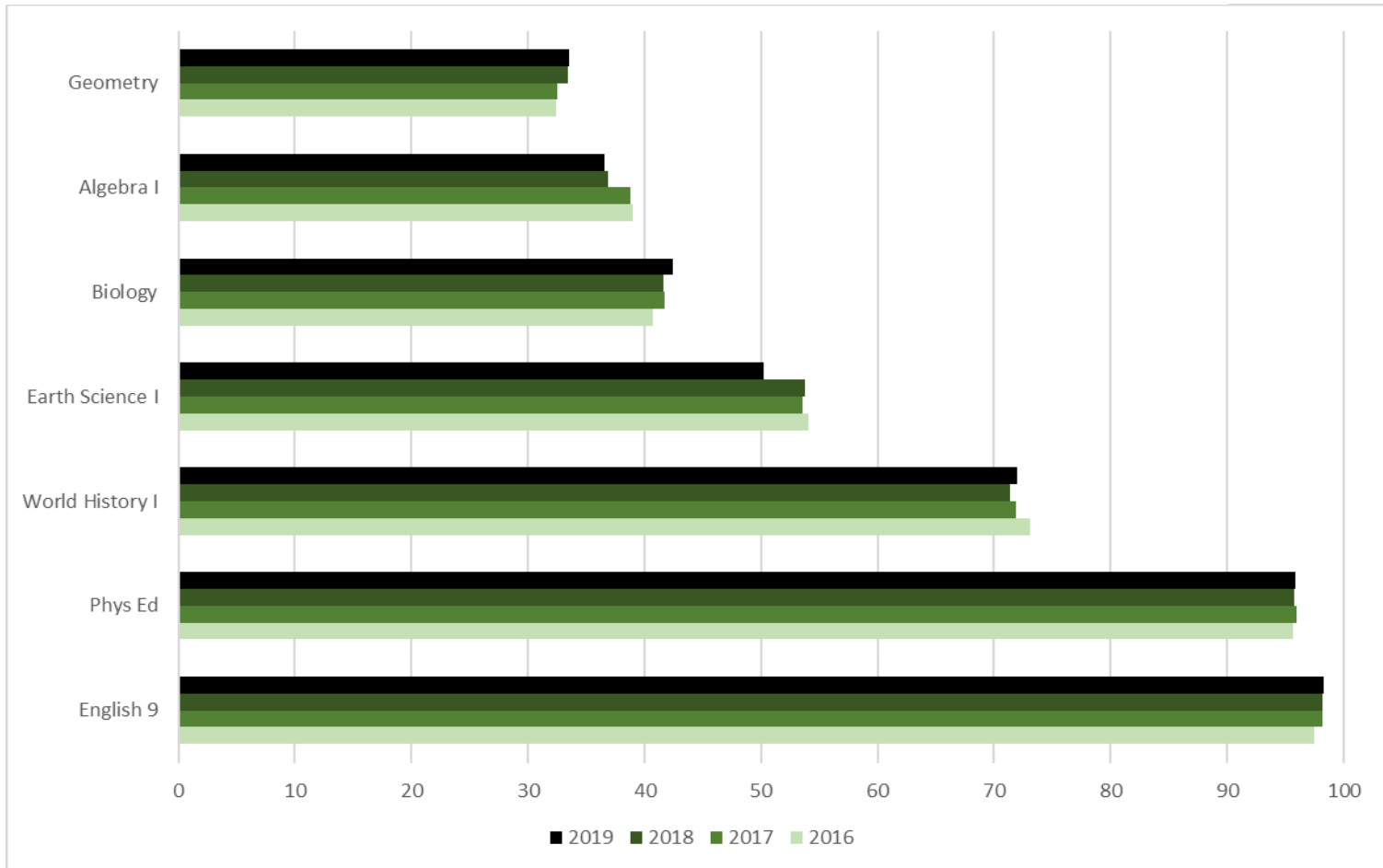
We include two separate analyses: student course taking and student achievement. We examined overall course taking patterns for all of the most popular courses across time. For course taking by student subgroup, we examined changes over time for math courses specifically. We focus on math courses because of the clear hierarchy of math courses where Geometry/Algebra II are advanced courses for ninth graders, Algebra I can be considered on grade level, with other courses being remedial. For student achievement, we describe patterns in SOL pass rates by subject, over time, and by student subgroup. We focus on overall pass rates by student subgroup with the exception of Algebra I which yielded particularly interesting results (graphs by subject for all subjects are in the Appendix). We performed chi-squared tests on all differences we describe in this report to assess statistical significance. Likely due to the very large sample size, all changes we observe, even ones that are in the single digits, are statistically significant at the 5% level.

# Course Enrollment

## Overall Course Enrollment

Figure 1 shows the percent of ninth graders who enrolled in the top seven most popular courses between 2016 and 2019. The distribution of course enrollments by year for courses with at least 10,000 enrollments can be found in Appendix Table 2A.

Figure 1. Percent Course Enrollment, 2016 through 2019



Almost all students enrolled in English 9 and Physical Education (Phys Ed). Each year, 71-73% of students took World History I as their social studies course. For science, students were split between taking Biology and Earth Science I with more students taking the latter. While more students enrolled in Earth Science I, the enrollment in Biology increased by 4% over this time period, with a corresponding decrease of 7% in Earth Science I enrollment. This decrease in Earth Science I enrollment is particularly pronounced in between 2018 and 2019 with 53.7% of students enrolled in Earth Science I in 2018 and 50.2% of students in 2019.<sup>2</sup>

<sup>2</sup> Officials at VDOE hypothesize that the increased enrollment in Biology was a direct result of the Biology assessment being selected as the science test for federal accountability requirements beginning in the 2018-19 school year. See [http://www.doe.virginia.gov/administrators/superintendents\\_memos/2018/299-18.docx](http://www.doe.virginia.gov/administrators/superintendents_memos/2018/299-18.docx)

## Course Enrollment by Race, SES, and Urbanicity

Figures 2, 3, and 4 show the percent of ninth graders enrolled in math courses (Algebra I Part 1, Algebra I Part 2, Geometry, and Algebra II). We show enrollment by race in Figure 2. Each year, White ninth graders enrolled in Geometry and Algebra II at higher rates than Black ninth graders. Conversely, Black ninth graders enrolled in Algebra I Pt 1, Algebra 1 Pt 2, and Algebra I at higher rates than White students. However, over this time period, Black enrollment in Algebra I decreased by nearly 3 percentage points (7%) with a corresponding increase in Geometry (3 percentage points or 14%).

“BLACK ENROLLMENT IN ALGEBRA I DECREASED BY NEARLY 3 PERCENTAGE POINTS (7%) WITH A CORRESPONDING INCREASE IN GEOMETRY (3 PERCENTAGE POINTS OR 14%).”

Figure 2. Math course enrollment rates comparing White and Black students.

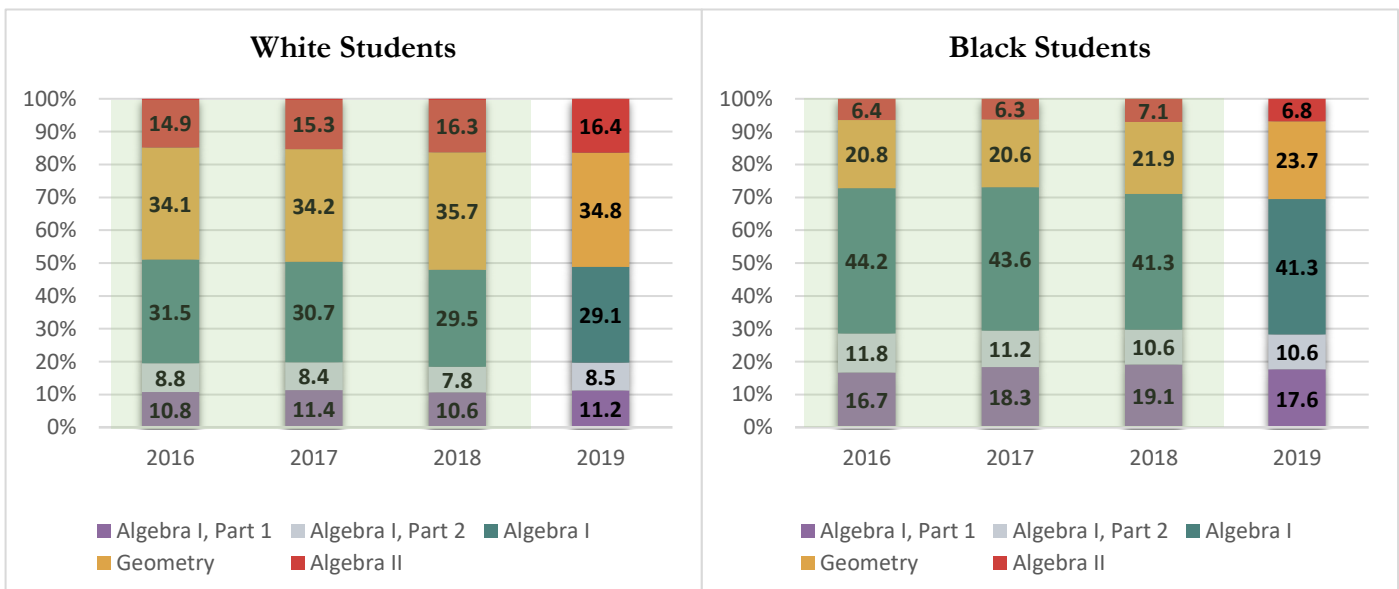


Figure 3. Math course enrollment rates comparing non-FRPL and FRPL students.

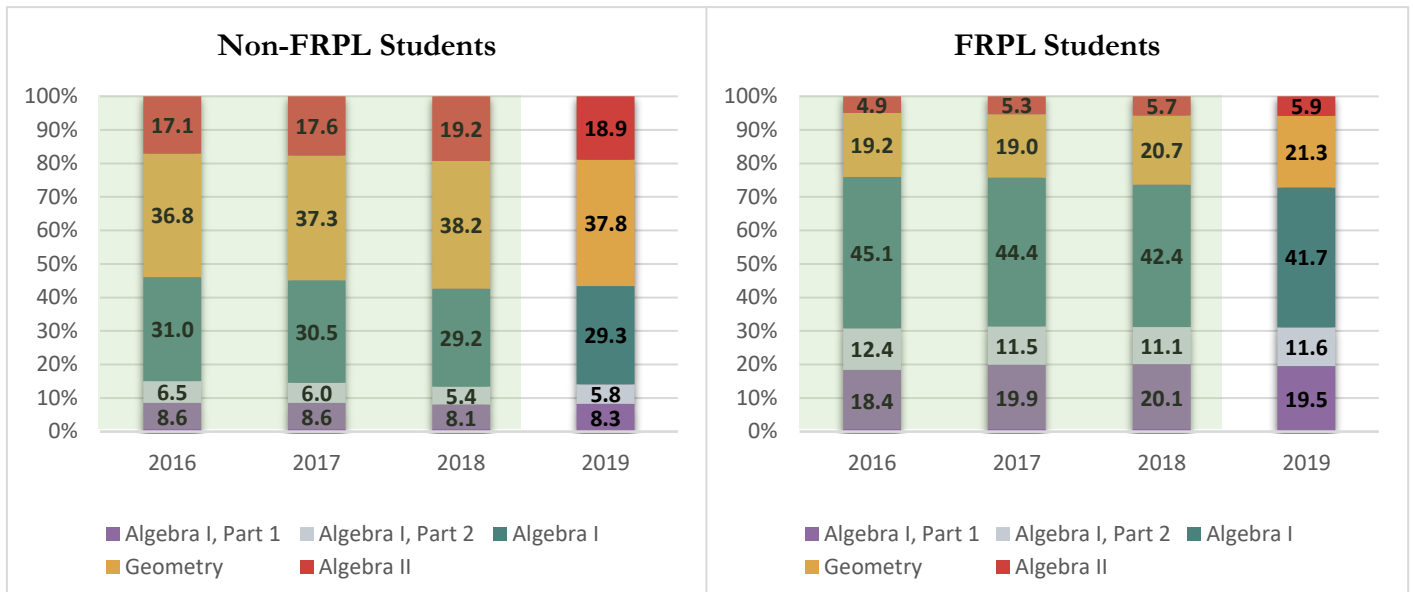


Figure 3 shows enrollment by FRPL. Ninth graders who qualify for FRPL enrolled in Algebra I Pt 1, Algebra 1 Pt 2, and Algebra I at higher rates and in Geometry and Algebra II at lower rates than non-FRPL students. Similar to Black students, students who qualify for FRPL demonstrated decreased Algebra I enrollment by 8% with an 11% increase in Geometry enrollment during this time period.

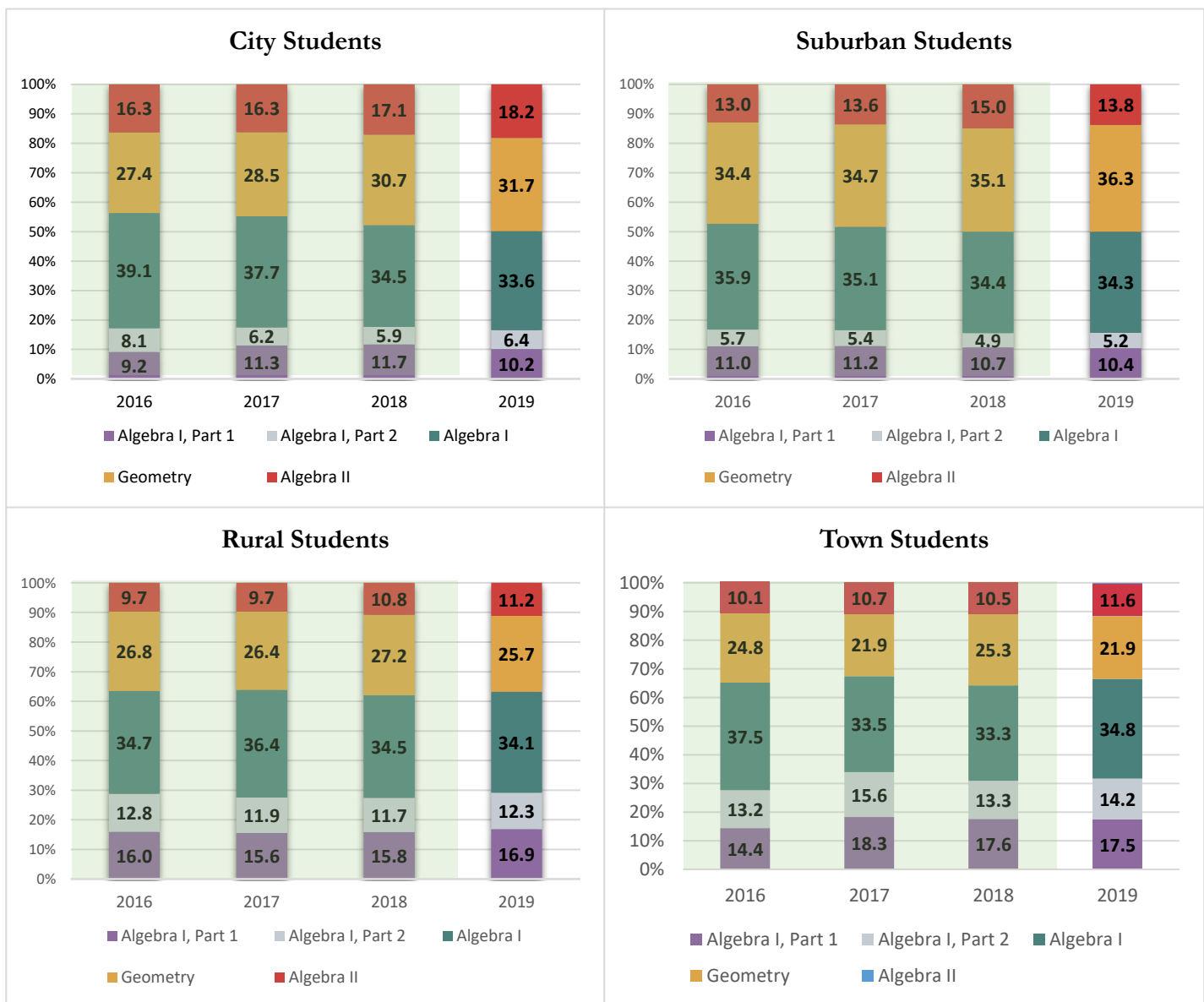
“STUDENTS WHO QUALIFY FOR FRPL DEMONSTRATED DECREASED ALGEBRA I ENROLLMENT BY 8% WITH AN 11% INCREASE IN GEOMETRY ENROLLMENT”

In Figure 4, we show math enrollment by urbanicity. Differences in Algebra I enrollment across groups of students are moderately less pronounced than by race and socioeconomic status. Town and rural students have the lowest enrollment rates in Geometry and Algebra II with 34% and 37% of students enrolled in advanced math courses in ninth grade in 2019, respectively, compared to about half of suburban and city students. City enrollment in Algebra I dropped over the four years by 14%, while city enrollment in Geometry and Algebra II rose by 16% and 11%, respectively. Rural students had a similar increase in enrollment in Algebra II.

**“TOWN AND RURAL STUDENTS HAVE THE LOWEST ENROLLMENT RATES IN GEOMETRY AND ALGEBRA II WITH 34% AND 37% OF STUDENTS ENROLLED IN ADVANCED MATH COURSES IN NINTH GRADE IN 2019, RESPECTIVELY, COMPARED TO ABOUT HALF OF SUBURBAN AND CITY STUDENTS.”**

Differences in Algebra I enrollment across groups of students are moderately less pronounced than by race and socioeconomic status. Town and rural students have the lowest enrollment rates in Geometry and Algebra II with 34% and 37% of students enrolled in advanced math courses in ninth grade in 2019, respectively, compared to about half of suburban and city students. City enrollment in Algebra I dropped over the four years by 14%, while city enrollment in Geometry and Algebra II rose by 16% and 11%, respectively. Rural students had a similar increase in enrollment in Algebra II.

Figure 4. Math course enrollment rates comparing students who attend suburban, rural, and city districts.

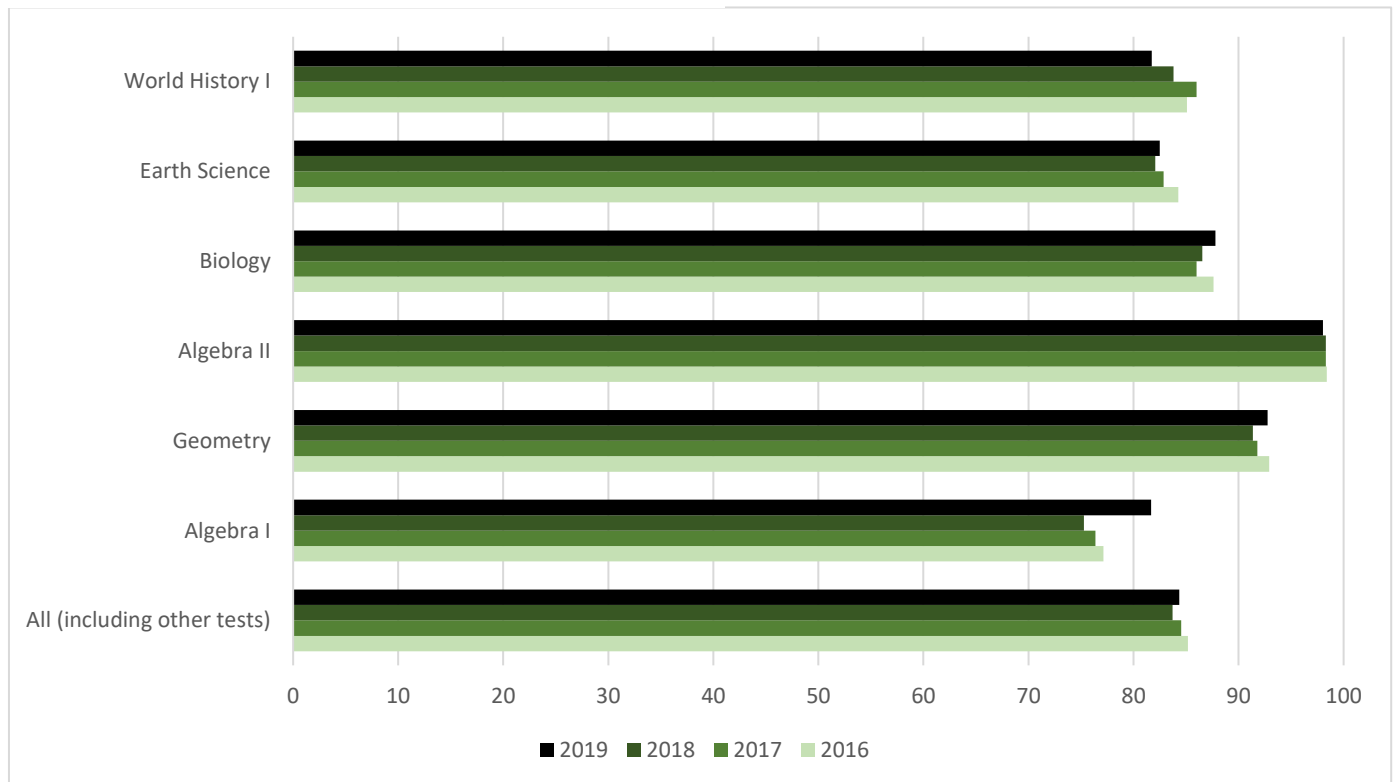


# Student Achievement

## *SOL Pass Rates*

The SOL pass rate for all ninth graders did not vary greatly over the time period studied (Figure 5). World History I pass rates decreased by 4% over the four years; after a slight increase in passing in 2017, the pass rate decreased steadily across 2018 and 2019. Algebra I showed the most drastic change in pass rate across time; between 2018 and 2019 the Algebra I SOL pass rate increased by 8.5%<sup>3</sup>.

**Figure 5. SOL pass rates by subject**



<sup>3</sup> In the 2018-19 school year, Virginia implemented new SOL assessments for Algebra I, Geometry, and Algebra II. Since the content changed, the Virginia Board of Education needed to establish the cut score that determined passing (i.e., the number of items students needed to answer correctly). Officials at VDOE believe that all gains in Algebra I pass rates are attributable to the change in the cut score, and the results showing decreasing achievement gaps are attributable to ceiling effects alone.



## SOL Pass Rates by Race, SES, and Urbanicity

Asian students exhibited the highest achievement, with an SOL pass rate about 5 percentage points higher than White students each year. Hispanic students passed at lower rates than White students and Black students had the lowest pass rates on average. The White-Black achievement gap exceeded 20 percentage points in both 2017 and 2018. The achievement gap between students who qualified for FRPL and those that did not was similar in magnitude to that of the gap between Black and White students, as shown in Figure 7.

Figure 6. SOL pass rate differences of Asian, Hispanic, and Black students compared to White students.

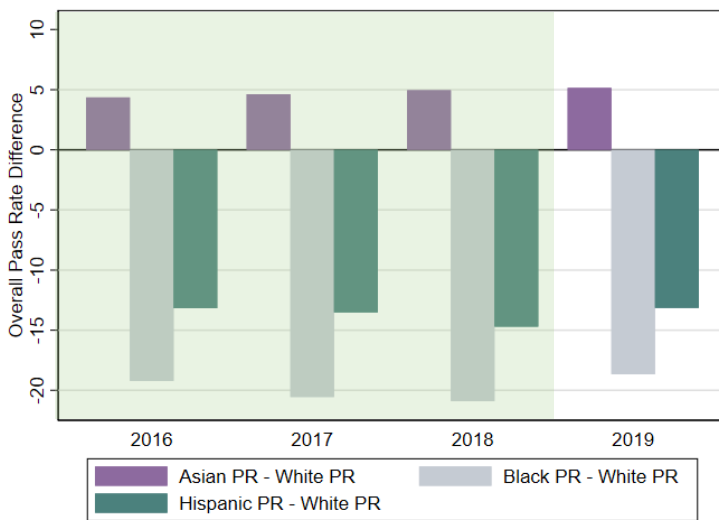
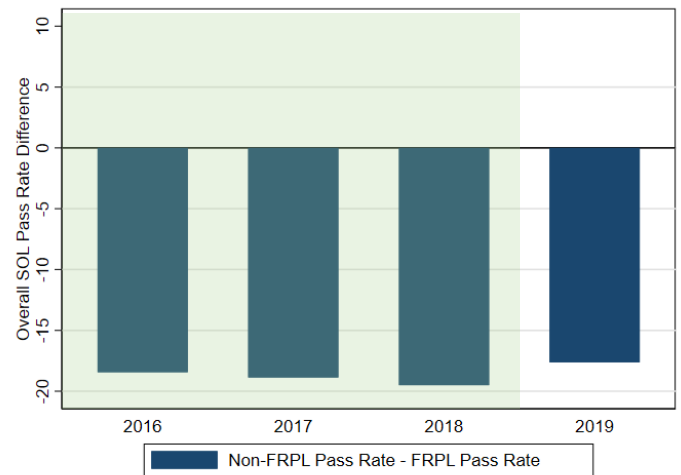


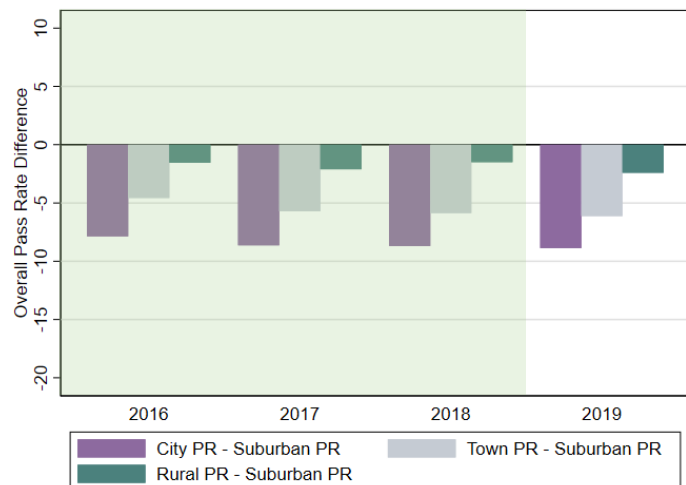
Figure 7. SOL pass rate differences of FRPL students compared to non-FRPL students.



“THE *LARGEST* [URBANICITY] *ACHIEVEMENT GAP* WAS BETWEEN *CITY AND SUBURBAN STUDENTS*, WITH SUBURBAN STUDENTS OUTPERFORMING URBAN STUDENTS BY 9 PERCENTAGE POINTS.”

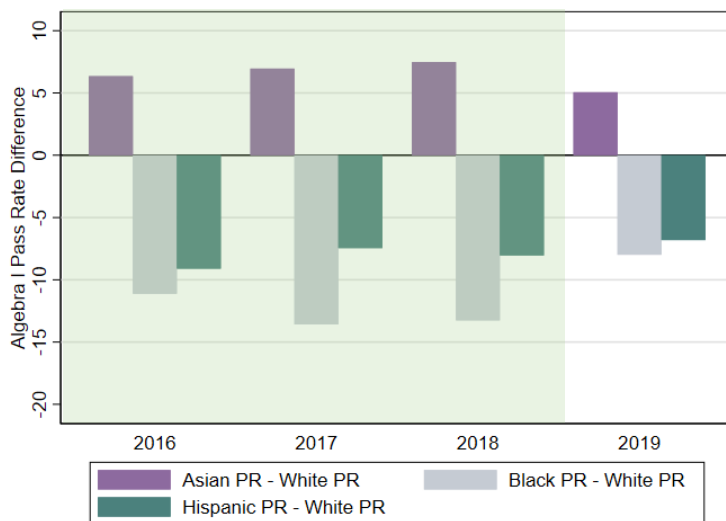
Students who attended schools in suburban areas had higher SOL pass rates than students who attended schools located in towns, cities, or rural areas (Figure 8). The largest achievement gap was that between city and suburban students, with suburban students outperforming city students by 9 percentage points. The achievement gap between suburban and town students was 5-6 percentage points, suburban and rural students was about 2 percentage points.

Figure 8. SOL pass rate differences of students who attended city, town, and rural districts compared to students who attended suburban districts.



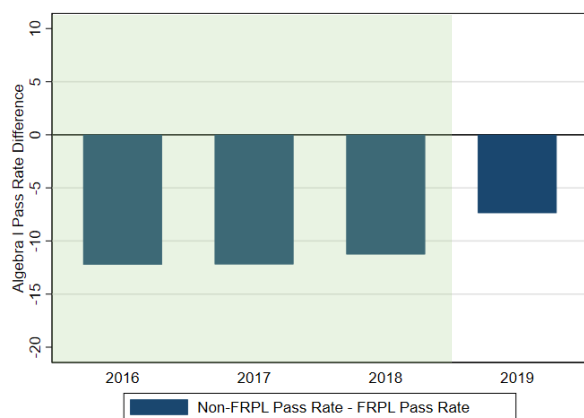
## Algebra I SOL Pass Rates

**Figure 9. Algebra I SOL pass rate differences of Asian, Hispanic, and Black students compared to White students.**



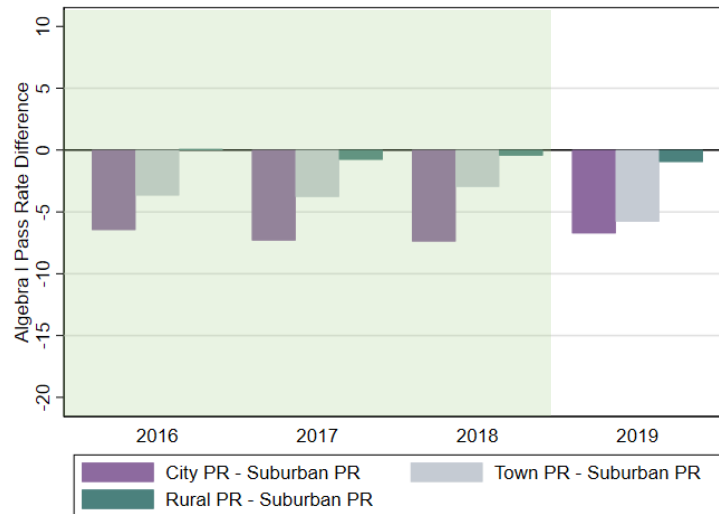
In Figure 9, we show the difference in Algebra I SOL pass rates of Asian, Hispanic, and Black students as compared to White students. Asian students outperformed all other racial groups, with a passing rate on the Algebra I SOL about 5 percentage points higher than White students. On average, the Algebra I achievement gap between Hispanic and White students (8 percentage points) and between Black and White students (11 percentage points) is of less magnitude than the achievement gap for Hispanic and Black students on all SOL exams (14 and 20 percentage points, respectively, see Figure 6). However, Hispanic and Black students consistently exhibit lower passing rates than White students. There is a notable closing of the achievement gap between Black and White students in Algebra I in the 2019 ninth grade cohort. Black students' Algebra I SOL pass rates went from 13% lower than White students' pass rates to 8% lower post-policy, a 40% decrease in the achievement gap. Hispanic students' Algebra I SOL pass rates were 8% lower than White students pre-policy and 7% lower post-policy, a 15% decrease in this achievement gap.

**Figure 10. Differences between non-FRPL and FRPL Algebra I SOL pass rates.**



Similarly, the Algebra I achievement gap between non-FRPL and FRPL students, is less than the achievement gap for all SOL exams (see Figure 7), but is nevertheless persistent as seen in Figure 10. Across the first three years, the gap remains within 1 percentage point of the year prior. As with the racial gap there is a decrease in the gap between FRPL and non-FRPL in the post-policy year from a 11% difference pre-policy to a 7% difference post-policy, a decrease in the FRPL-non-FRPL gap by 35%.

Figure 11. Algebra I SOL pass rate differences of students who attended city, town, and rural districts compared to students who attended suburban districts.



Algebra I pass rates across urbanicity exhibit similar patterns as those of pass rates on all SOLs (Figure 11 compared to Figure 8). Again, students who attended suburban schools had higher Algebra I SOL pass rates than students who attended schools located in towns, cities, or rural areas. Suburban students outperformed city students by about 7 percentage points with no noticeable changes over time. The gap between suburban and rural pass rates grew from almost 0 in 2016 to a 1 percentage point difference in 2019. The difference in pass rates between suburban and town students almost doubled between 2018 and 2019 from about a 3 percentage point difference to a 6 percentage point difference. Algebra I SOL pass rates increased in all urbanicities, and the highest increase were in city schools where pass rates increased 10% with a 9% increase in suburban schools, 8% increase in rural schools, and a 5% increase in town schools. Algebra I pass rates increased for students across urbanicities, but this increase was steeper in city, rural and suburban areas than town areas (see Appendix Table 4A).

## Conclusion

This report describes small changes in science and math course enrollment over time as well as decreasing achievement gaps in Algebra I SOL pass rates for the 2018-19 cohort of first-time ninth graders. Algebra I SOL pass rates increased across the board (see Appendix Figures 4A, 12A, and 20A), but these increases were much steeper for students in the lowest performing groups – Black students, Hispanic students, FRPL students, and students in city schools. When we examined Algebra I enrollment data, we showed that students are increasingly enrolling in higher level courses (Geometry and Algebra II).

Overall, we find few changes in student course taking and achievement in the first cohort of ninth graders subject to the new graduation requirements. However, these kinds of changes in requirements likely would only lead to changes later in high school when students get closer to graduation and start to make more decisions about which courses they take. In the future, we will follow the 2019 cohort of ninth grade students to assess the effect of the changing graduation requirements with full information about the courses they enrolled in. We will evaluate if the changing graduation requirements increased access to the advanced diploma, encouraged students to enroll in more advanced courses, and led to increased access and achievement equity statewide.